Attachment 2

CITY OF

IMPERIAL BEACH *California*

LOCAL ROADWAY SAFETY PLAN

FEBRUARY 2021

FINAL

Kimley»Horn

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TO BE SIGNED BY MYCHAL LOOMIS_____

Signature line

By signing and stamping this Local Roadway Safety Plan, the engineer is attesting to this report's technical information and engineering data upon which local agency's recommendations, conclusions, and decisions are made.

INTRODUCTION

The City of Imperial Beach is one of the nineteen jurisdictions that comprise the San Diego Region. The City is the most southwesterly community in San Diego County (see **Figure 1**) and covers approximately 4.5 square miles. The City is bordered by the San Ysidro community to the south, the San Diego Bay and City of Coronado to the north, the Pacific Ocean to the west, and the City of San Diego to the East. There is a population of about 27,500[1] in the City. Imperial Beach serves as a key beach destination in south San Diego County, with estimates for beach attendance generally exceeding over 400,000 visitors per year and generating $2.5 million in revenue[2].

The Imperial Beach Local Roadway Safety Plan (LRSP) identifies, analyzes, and prioritizes safety needs on local roads within the City's jurisdiction. The process for developing the City's LRSP created a framework to systematically identify and analyze safety problems, establish emphasis areas, and recommend safety improvements that help the City be one step closer to the Vision Zero initiative. Vision Zero is a nationwide initiative and state goal to eliminate traffic fatalities and severe injuries by increasing safe, healthy, and equitable mobility.

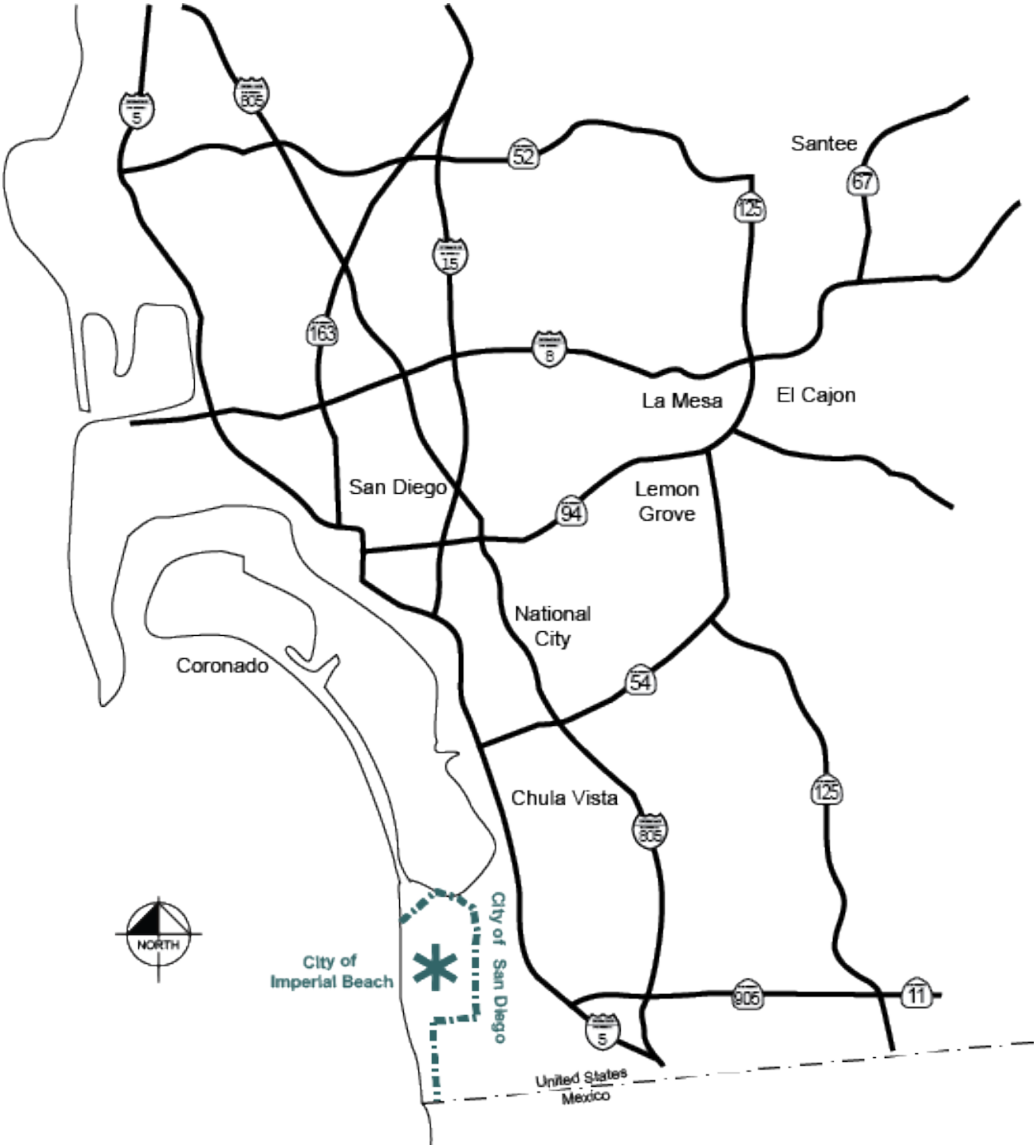
This plan documents the process and analysis performed to develop the City's LRSP including its vision and goals, findings from the crash history analysis, and emphasis areas that address key safety concerns from the data analysis and outreach with the City's safety partners. The crash history analysis and emphasis areas identify site specific infrastructure and non-infrastructure recommendations as well as broader systemic city-wide recommendations to help address key safety issues within the City. The LRSP analyzes 2015-2019 crash data from the Statewide Integrated Traffic Records System (SWITRS) to identify high-collision locations, high-risk locations, and city-wide trends and patterns. The analysis of crash history throughout the City's roadway network allows for opportunities to: 1) identify factors on local roads that inhibit safety for all roadway users, 2) improve safety at specific high-collision locations, and 3) develop safety measures using the five E's of safety in the 2020-2024 California State Highway Safety Plan (2020-2024 SHSP): Engineering, Enforcement, Education, Emergency Response, and Emerging Technologies to encourage safer driver behavior and better severity outcomes. Emphasis areas include certain types of crashes, specific locations, and notable relationships between current efforts and crash history. The information compiled in this plan will help guide the City to enhance safe mobility for all modes. In addition, the LRSP will allow the City to apply for Highway Safety Improvement Program (HSIP) funding in the future. Starting with HSIP Cycle 11, a LRSP or equivalent documents will be required to compete for HSIP grant funding.

The City of Imperial Beach is committed to improving transportation safety to reduce the risk of fatal and serious injuries that result from incidents on public roads. Through a data-driven approach with input from key safety partners, the LRSP tells the story of traffic safety needs and strategies for Imperial Beach. Implementation of the LRSP will help improve transportation safety for the residents and visitors of Imperial Beach.

[1] US Census Bureau, ACS 5 Year 2018 Estimate

[2] City of Imperial Beach General Plan/Local Coastal Program Land Use Plan (2019)

Figure 1. Location of City of Imperial Beach



SAFETY PARTNERS

The City continues to establish working partnerships within the community and with outside partners to better serve existing transportation safety needs. The LRSP is a continuation of the collaboration between the City and its safety partners that were involved in developing this report:

- City staff from Public Works Department
- City staff from Community Development Department
- City staff from GIS Department
- City staff from Strategic Communications Department
- County of San Diego Sherriff Department
- City Fire Rescue

In addition, the City continues to work collaboratively with agencies such as the San Diego Association of Governments (SANDAG) and the San Diego Metropolitan Transit System (MTS) on efforts to create safe and efficient mobility choices for the community.

VISION AND GOALS

LRSPs have been effective across the country as part of the effort to reduce injury and fatal collisions because they provide a locally developed and customized roadmap to directly address the most common safety challenges in the given jurisdiction. Based on discussions with City staff, the City's safety partners, and a review of the City's existing plans, policies, and safety efforts, the following vision and goals were established for the LRSP.

VISION *Provide safe, efficient, and complete streets to expand mobility choices, enhance the small beach town atmosphere, and to meet the City's Vision Zero goal.*

Goal #1: Identify areas with a high risk for collision

Objectives:

A. Identify intersections and segments in the transportation network that would most benefit from traffic safety countermeasures and mitigation.
B. Identify areas of interest with respect to traffic safety concerns covering the 5Es of traffic safety in the 2020-2024 SHSP: Engineering, Enforcement, Education, Emergency Response, and Emerging Technologies.
C. Evaluate the crash history to identify priority corridors.

Goal #2: Develop a comprehensive safety program and supporting systemic process

Objectives:

A. Demonstrate the systemic process' ability to identify locations with higher risk for collisions based on present characteristics closely associated with fatal and severe collisions.

B. Demonstrate the gaps and data collection activities that can be improved upon.
C. Develop prioritization processes that help achieve the City's vision.

Goal #3: Plan future safety improvements that improve mobility choices

Objectives:

A. Identify safety countermeasures that are effective for specific locations.
B. Identify effective safety countermeasures that can be applied City-wide to address a certain behavior or condition.

Goal #4: Define safety projects for future HSIP and other program funding consideration

Objectives:

A. Identify safety improvements that can be used in forth-coming Highway Safety Improvement Program (HSIP) cycles to apply for funding.
B. Demonstrate the correlation between the proposed safety countermeasures and projects with the Vision Zero Initiative and the 20202-2024 SHP.

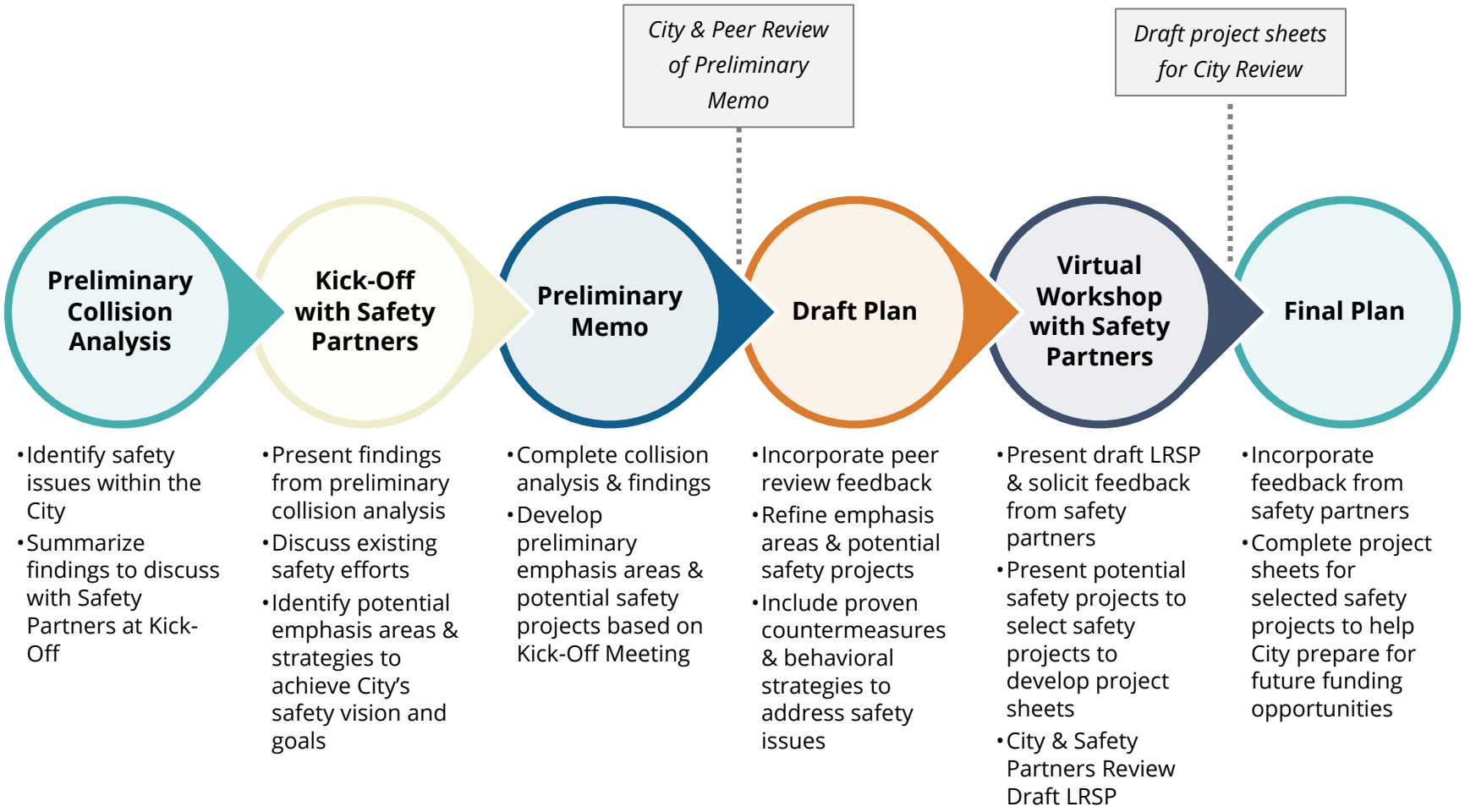
PROCESS

Providing safe, sustainable, and efficient mobility choices for their constituents and visitors is a primary goal for the City and their safety partners. Through the development of the LRSP, the City collaborated with their safety partners to identify and discuss safety issues and potential safety improvements.

Figure 2 outlines the process for developing the City's LRSP. The City held a kick-off meeting in the spring of 2020 to collectively discuss existing safety efforts and concerns and identify strategies to achieve the City's safety goals and vision with their safety partners (see **Appendix A**). To help inform this discussion, initial safety concerns and 2015-2019 SWITRS data were collected and organized to identify critical safety issues and preliminary emphasis areas. In preparation of developing the final LRSP, the City held a virtual workshop with their safety partners to discuss the draft LRSP (see **Appendix B**). The virtual workshop allowed the City to present and solicit feedback for the draft LRSP and select safety projects to develop project sheets that will help the City when funding opportunities such as safety grants arise.

This LRSP documents the vision and goals for the LRSP, existing safety efforts, findings and trends from the collision analysis, and emphasis areas with recommended safety projects and strategies to address key safety concerns. The development of the LRSP recommendations considers existing guidance for roadway design and safety are available at the national and state level. The following provides a brief summary for three of the more predominate guiding manuals in the industry.

Figure 2. Imperial Beach LRSP Process



Guiding Manuals

Local Roadway Safety Manual

The Local Roadway Safety Manual: A Manual for California's Local Road Owners (LRSM), published in April 2020, encourages local agencies to pursue a proactive safety analysis and approach when identifying and analyzing safety issues and preparing to compete for project funding opportunities. A proactive approach is defined as analyzing the safety of the entire roadway network through either a one-time, network wide analysis, or by routine analyses of the roadway network to identify the highest safety needs.[3]

According to the Local Roadway Safety Manual (LRSM), "The California Department of Transportation (Caltrans) – Division of Local Assistance is responsible for administering California's federal safety funding intended for local safety improvements."

To provide the most benefit and to be competitive for funding, the analysis leading to countermeasure selection should focus on both intersections and roadway segments and be considerate of roadway characteristics and traffic volumes. The result should be a list of locations that are most likely to benefit from cost-effective countermeasures, preferably prioritized by benefit/cost ratio. The manual suggests using a mixture of quantitative and qualitative measures to identify and rank locations that considers both crash frequency and crash rates. These findings should then be screened for patterns such as crash types and severity to aid in the determination of issues causing higher numbers of crashes and the potential countermeasures that could be most effective. Qualitative analysis should include field visits and a review of existing roadway characteristics and devices. The specific roadway context can then be used to assess what conditions may increase safety risk at the site and systematic level.

Countermeasure selection should be supported using Crash Modification Factors (CMFs). These factors are the peer reviewed product of before and after research that quantifies the expected rate of collision reduction that can be expected from a given countermeasure. If more than one countermeasure is under consideration, the LRSM provides guidance on how to apply CMFs appropriately.

Highway Safety Manual

The AASHTO Highway Safety Manual (HSM), published in 2010, presents a variety of methods for quantitively estimating crash frequency or severity at a variety of locations.4 This four-part manual is divided into Parts: A) Introduction, Human Factors, and Fundamentals, B) Roadway Safety Management Process, C) Predictive Method, D) Crash Modification Factors.

[3] Local Roadway Safety Manual (Version 1.5) 2020. Page 5.

[4] AASHTO, Highway Safety Manual, 2010, Washington D.C., http://www.highwaysafetymanual.org/Pages/About.aspx

Chapter 4 of Part B of the HSM discusses the Network Screening process. The Network Screening Process is a tool for an agency to analyze their entire network and identify/rank locations that (based on the implementation of a countermeasure) are most likely to least likely to realize a reduction in the frequency of collisions.

The HSM identifies five steps in this process:[5]

1. **Establish Focus:** Identify the purpose or intended outcome of the network screening analysis. This decision will influence data needs, the selection of performance measures and the screening method that can be applied.
2. **Identify Network and Establish Reference Populations:** Specify the types of sites or facilities being screened (i.e., segments, intersections, geometrics) and identify groupings of similar sites or facilities.
3. **Select Performance Measures:** There are a variety of performance measures available to evaluate the potential to reduce crash frequency at a site. In this step, the performance measure is selected as a function of the screening focus and the data and analytical tools available.
4. **Select Screening Method:** There are three principle screening methods described in this chapter (i.e., ranking, sliding window, peak searching). Each method has advantages and disadvantages; the most appropriate method for a given situation should be selected.
5. **Screen and Evaluate Results:** The final step in the process is to conduct the screening and analysis and evaluate the results.

The HSM provides several statistical methods for screening roadway networks to identify high risk locations based on overall collision histories. In addition to flat crash quantities, the method used in this study is referred to as Critical Crash Rate.

California's Strategic Highway Safety Plan (SHSP)

The 2020-2024 California Strategic Highway Safety Plan (2020-2024 SHSP) is a comprehensive statewide data-driven traffic safety plan that provides a decision-making framework for reducing traffic fatalities and serious injuries on all public roads in California. Developed through a collaborative, data-driven process, the 2020-2024 SHSP identifies key safety needs and effective strategies to help guide investment decisions and the development of local safety plans. Through an extensive analysis of crash data systems in California, the 2020-2024 SHSP identified current trends around traffic safety including trends seen in fatalities and serious injuries, primary causes for collisions, economic costs of collisions, the rate of fatalities and serious injuries, and the location of collisions. Using these existing trends, stakeholder outreach, and the 5Es of traffic safety (Engineering, Enforcement, Education, Emergency Services, and Emerging Technologies), the 2020-2024 SHSP outlines 16 challenge areas to optimize progress toward zero fatalities and serious injuries. The 2020-2024 SHSP identified challenge areas can be found on the next page.

[5] AASHTO. *Highway Safety Manual.* 2010. Washington, DC. Page 4-2.

- Aggressive Driving
- Aging Drivers (≥65)
- Bicyclists
- Commercial Vehicles
- Distracted Driving
- Driver Licensing
- Emergency Response
- Emerging Technologies
- Impaired Driving
- Intersections
- Lane Departures
- Motorcyclists
- Occupant Protection
- Pedestrians
- Work Zones
- Young Drivers (15-20)

While the SHSP is used as a statewide approach for improving traffic safety, the LRSP is a means for providing local and rural road owners an opportunity to address safety needs and issues in their jurisdictions while contributing to the success of the SHSP. The LRSP offers a proactive approach to addressing safety needs and demonstrates responsiveness to safety challenges seen locally.

Highway Safety Improvement Program (HSIP)

The Highway Safety Improvement Program (HSIP) is a federal-aid program to States for the purpose of reducing fatal and severe collisions on all public roads. Caltrans Local Assistance manages California's local agency share of HSIP funds. HSIP funds are eligible for work on any public road or publicly owned bicycle/pedestrian pathway or trail that improves safety for its users. To obtain HSIP funds, local agency must submit an application during the HSIP cycle's call-for-projects period. For a project to be eligible, a specific safety problem must be identified and proposed countermeasure(s) must address the condition. In addition, the project must be consistent with the most recent version of the SHSP. Details and restrictions for project applications are included in the HSIP Guidelines and HSIP cycle's call-for-projects materials.

HSIP Cycle 10 call-for-projects in April 2020 recommended but not required applicants to have a LRSP or equivalent document. However, agencies with a LRSP or equivalent document would be given priority should there be more applications than funding. Starting with HSIP Cycle 11, a LRSP or equivalent document will be required to compete for HSIP grant funding. The HSIP Cycle 11 call-for-projects is anticipated to be released in April 2021. The completion of the Imperial Beach LRSP will allow the City to be eligible to apply for HSIP funding

EXISTING EFFORTS

The City is committed to improving transportation safety and to reduce the risk of death and serious injuries that result from incidents on the transportation system. The City actively engages with multiple decision and policy-making bodies as well as performed various studies and safety initiatives to improve safety for all its roadway users. The City is involved with the following efforts to promote transportation safety:

- **Palm Avenue Master Plan** – Ongoing project for infrastructure changes along Palm Avenue that includes pedestrian and bicyclist safety improvements. The project includes alignment studies, public outreach, and traffic studies associated with potential changes now that Palm Avenue is a City roadway instead of a Caltrans facility.
- **13th Street Lane Reallocation** – A recently completed project (2016) that reallocated existing lanes with a goal to reduce the number of crashes.

- **Imperial Beach Boulevard Enhancement Project** – Recently completed improvements along Imperial Beach Boulevard including bulb outs, wider sidewalks, enhanced crosswalks, and the reallocation of driving lanes.
- **Office of Traffic Safety (OTS) Grants** – California Highway Patrol has been successful in obtaining OTS grant funding to set up impaired driving checkpoints that have been effective each year.
- **Neighborhood Traffic Management Program** – Imperial Beach residents can request speed bumps and other traffic calming measures for City review and implementation.
- **Bayshore to Border Bikeway Project** – In collaboration with SANDAG, this project includes street calming and intersection improvements along the Bayshore Bikeway alignment in Imperial Beach.
- **Vision Zero Initiative** – City is taking necessary steps to have zero deaths or serious injuries from traffic crashes. These steps include implementing projects such as the Palm Avenue Master Plan and the Imperial Beach Boulevard Enhancement Project.

COLLISION DATA ANALYSIS SUMMARY

The following section describes the analysis process undertaken to evaluate safety within Imperial Beach at a systemic level. Using a network screening process, locations within the City that will most likely benefit from safety enhancements are identified. Using historic collision data, collision risk factors for the entire network are derived. The resulting data trends inform the identification and prioritization of engineering and non-infrastructure safety measures that address roadway characteristics and related behaviors that contribute to motor vehicle collisions with active transportation users.

Analysis Techniques

Collision Analysis

A component of the LRSP is to identify locations with elevated risk of collisions either through their collision histories, or their similarities to other locations that do have more active collision patterns. The initial step in analyzing this information is to spatially reference injury-related and property damage only (PDO) collisions that occurred within the study area from January 1st. 2015 through December 31st, 2019. The charts and figures below display all collision activity for this period using SWITRS data processed through Crossroads Collision Software. In addition, Crossroads has access to the latest police reports, allowing validation of the City's data with Transportation Injury Mapping System (TIMS), which provides access to California injury and fatal crash data from the SWITRS data. This helps to confirm that all relevant data is included.

Network Screening Analysis

To help complete the initial crash history analysis, the network screening analysis was performed on the 2015-2019 crash data including both injury-related and PDO collisions. The network screening analysis is a Geographic Information System (GIS) tool that helps identify the following: 1) collision hot spots (intersection and segment locations with a high-number of collisions), 2) locations for fatal collisions, and 3) pedestrian-involved and bicycle-involved collision locations.

OTS Crash Rankings

The Office of Traffic Safety (OTS) Crash Rankings were also utilized to identify emerging and on-going safety issues within Imperial Beach. The OTS rankings help see what areas the City may have problems in and what areas the City is doing well or improving in by comparing safety statistics of Imperial Beach to cities with similar-sized populations. Based on the Empirical Bayesian Ranking Method, OTS rankings utilize crash counts that reflect the aggregated impacts of all influential factors by adding weights to different statistical categories such as observed crash counts, population, and vehicle miles traveled.

Imperial Beach is grouped with about 90 other cities with a population of 25,001 - 50,000. For each OTS ranking category, Imperial Beach receives a ranking where ranking 1 is being the highest or "worst" city in the group for a given category. Imperial Beach's OTS rankings for all the available categories between 2013 to 2017 can be seen in **Appendix C**. At the time the LRSP was developed, the most recent year available for OTS rankings was 2017. A 5-year period from 2017 was used to see how Imperial Beach historically did for its grouping. OTS rankings for safety issues in the City such as impaired driving, pedestrians, and bicyclists are also included in the "Key Findings" of this section. Imperial Beach's OTS rankings for the categories of motorcycles and pedestrians 65 and over are not included in the "Key Findings" as these are not prominent safety issues for Imperial Beach based on the collision analysis.

Key Findings

In this section, the collision findings are broken into the following: crash type, collision factor, collision impacts, fatal and severe injury collisions, pedestrian-involved collisions, and bicycle-involved collisions. In addition, 9th Street and 13th Street were identified as priority corridors. Both these corridors received a corridor-level collision analysis to understand the collision trends along them. The corridor-level collision analysis can be found in the next section under "Emphasis Area 1: Safety On Priority Corridors".

Vehicle Volumes

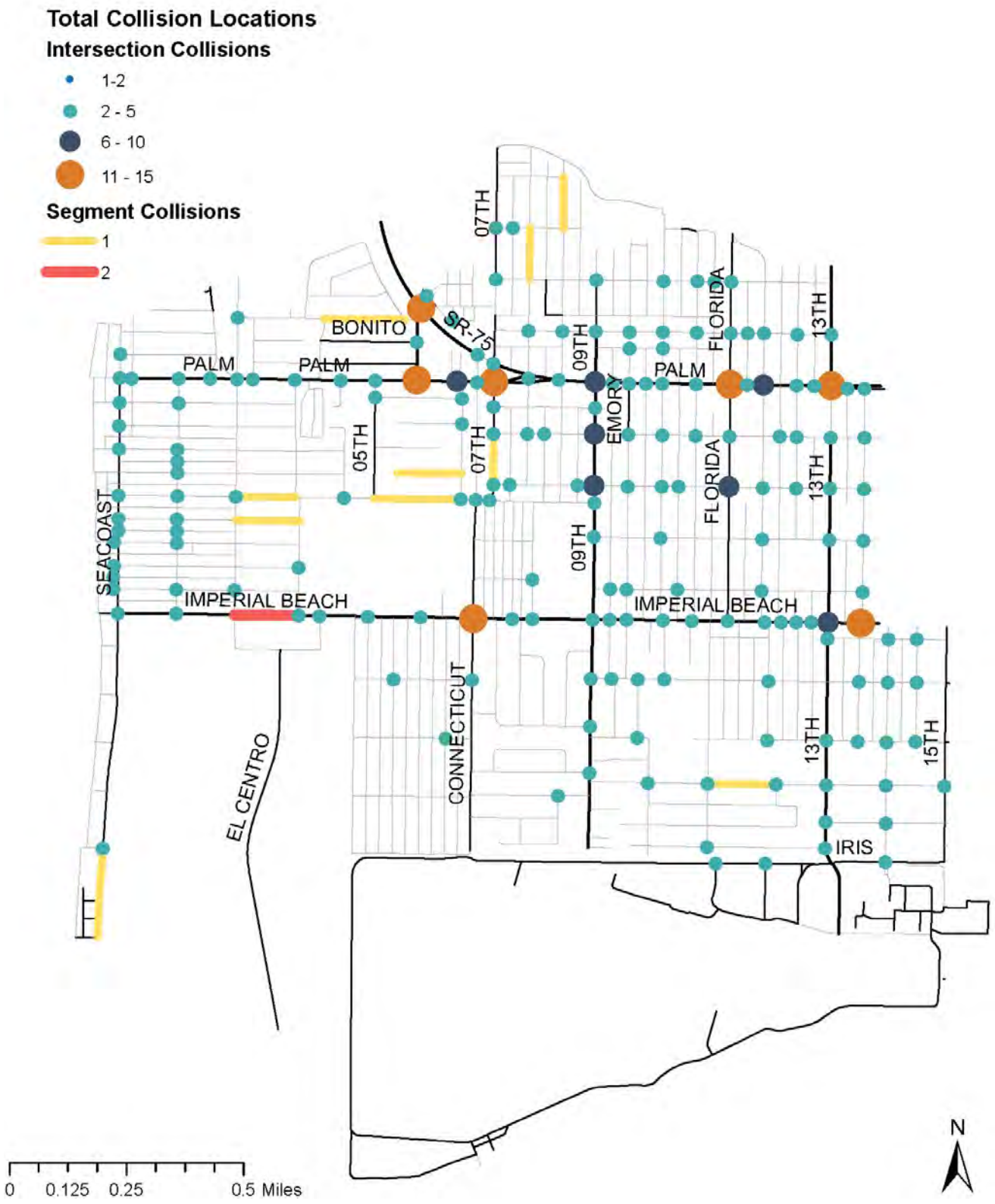
Recent vehicle counts along major arterials in Imperial Beach from 2015 and 2016 are shown in **Figure 3**. Higher vehicle counts are seen on the following roads: Imperial Beach Boulevard, Palm Avenue, 9th Street, and 13th Street.

Total Collisions

A total of 502 collisions occurred within the City of Imperial Beach between January 2015 and December 2019 (the crash history period). The locations of these collisions are shown in **Figure 4**. The collisions are spread throughout the City's roadway network with a majority occurring on Palm Avenue, Imperial Beach Boulevard/Coronado Avenue, 9th Street, and 13th Street.

Figure 3. Most Recent Vehicle Counts by Year in the City of Imperial Beach

Figure 4. Collisions in the City of Imperial Beach



Crash Types

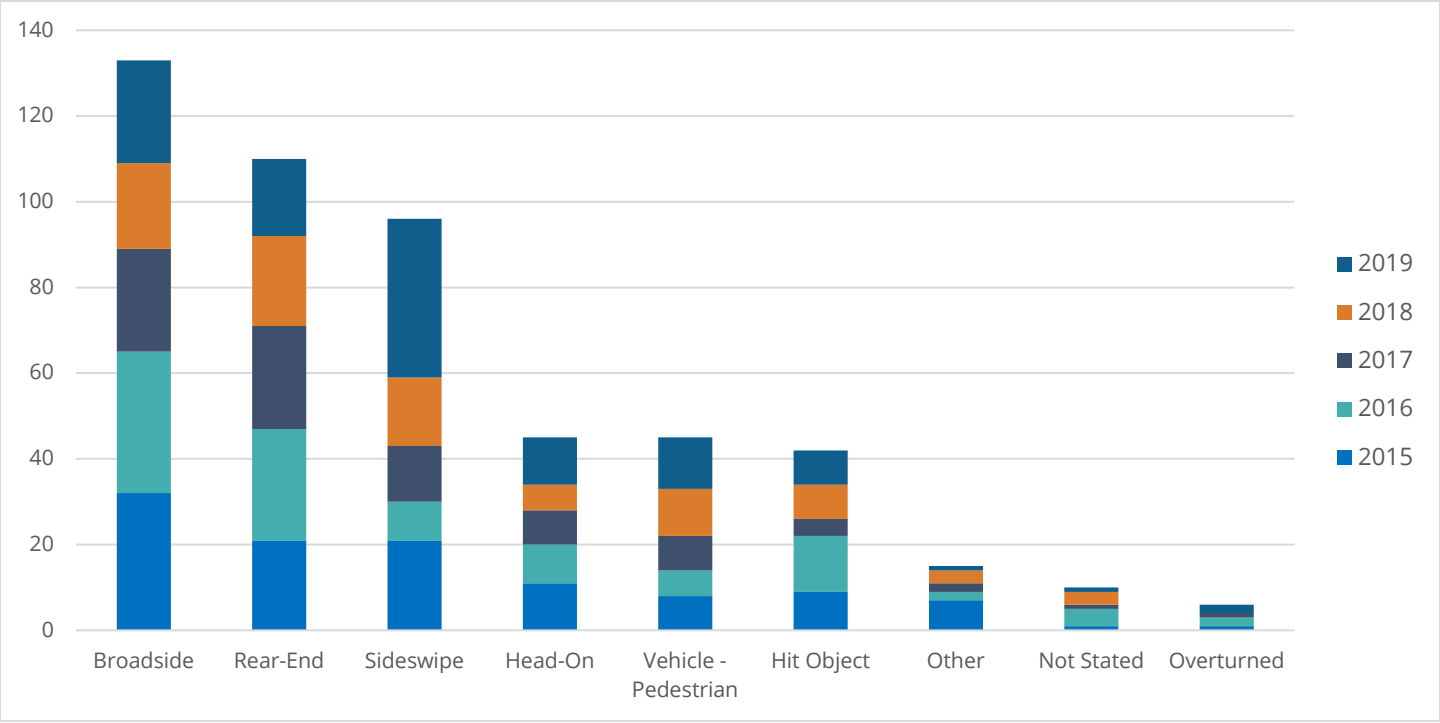
The crash types that occurred between 2015-2019 are shown in **Table 1.** The crash types broken down by year and percentage can be seen in **Figure 5.** These visuals indicate that broadside collisions (26%) are consistently the most common crash type within the City. Rear-end (22%) and sideswipe (19%) collisions are the next leading crash types. Head-on, hit object, and pedestrian collisions are significant, equally constituting almost 30% of collisions within the City. Only a handful of collisions involved overturned vehicles (1%).

Table 1. Percentage of Total Collisions by Crash Types in the City of Imperial Beach

Crash Type	Percent of Total Collisions
Broadside	26%
Rear-End	22%
Sideswipe	19%
Head-On	9%
Vehicle – Pedestrian	9%
Hit Object	8%
Other	3%
Not Stated	2%
Overturned	1%
Number of Total Collisions	**502**

Source: Statewide Integrated Traffic Records System (SWITRS) 2015-2019

Figure 5. Number of Collisions by Crash Types for Each Crash History Year in the City of Imperial Beach



Source: Statewide Integrated Traffic Records System (SWITRS) 2015-2019

Collision Factors

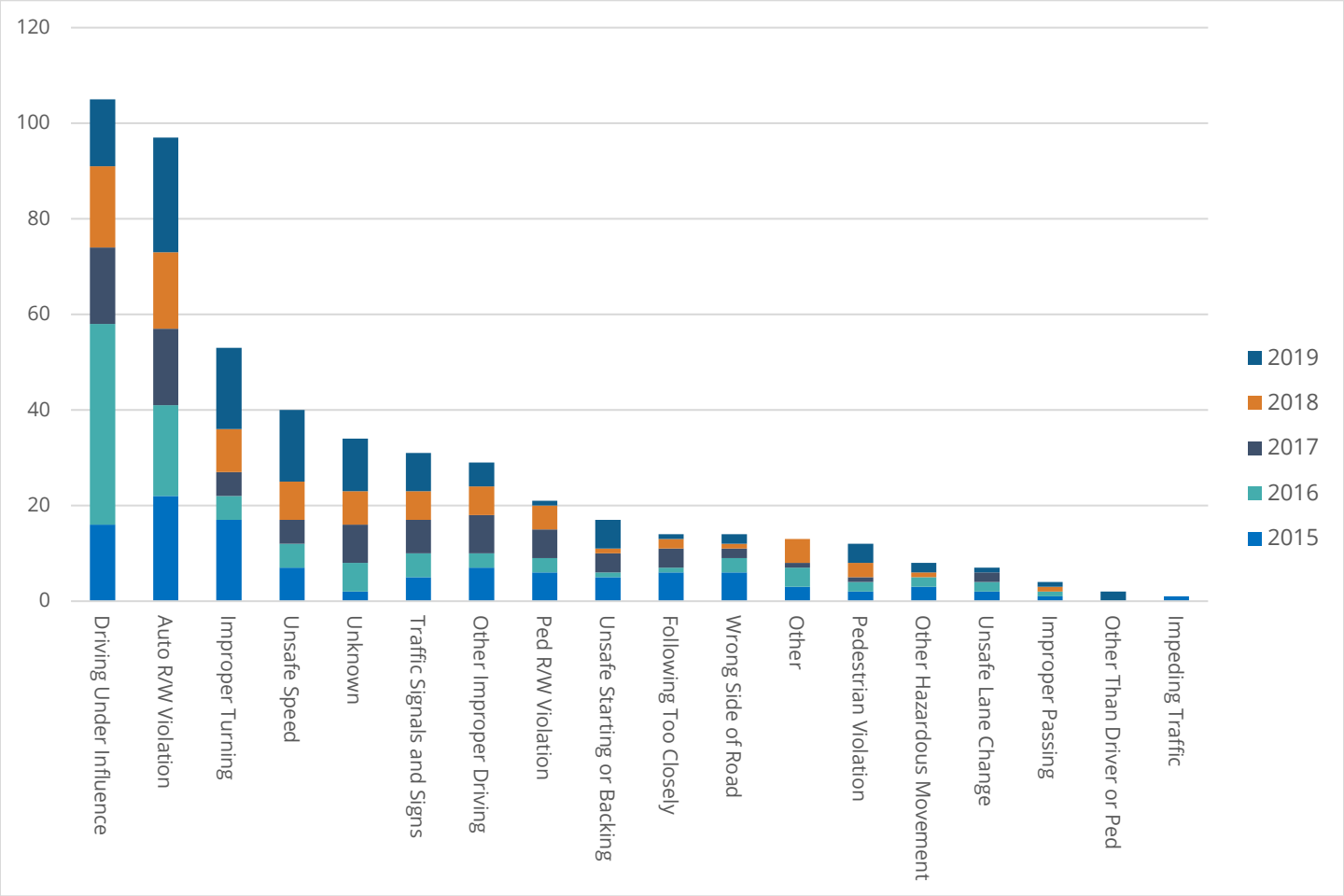
Knowing the recorded causes of collisions can help identify safety factors systemwide that may contribute to collisions. **Table 2** and **Figure 6** show the percent of total collisions by collision factor between 2015 and 2019. The top leading collision factors are driving under influence (21%), automobile right of way violation (19%), and improper turning (11%). The remaining collision factors for the crash history analyzed fall under 10% of all collisions.

Table 2. Percent of Total Collisions by Collision Factor in the City of Imperial Beach

Collision Factor	Percent of Total Collisions
Driving Under Influence	21%
Auto R/W Violation	19%
Improper Turning	11%
Unsafe Speed	8%
Unknown	7%
Other Improper Driving	6%
Traffic Signals and Signs	6%
Ped R/W Violation	4%
Following Too Closely	3%
Other	3%
Unsafe Starting or Backing	3%
Wrong Side of Road	3%
Other Hazardous Movement	2%
Pedestrian Violation	2%
Improper Passing	1%
Unsafe Lane Change	1%
Impeding Traffic	0%
Other Than Driver or Ped	0%
Number of Total Collisions	**502**

Source: Statewide Integrated Traffic Records System (SWITRS) 2015-2019

Figure 6. Percent of Total Collisions by Collision Factor in the City of Imperial Beach

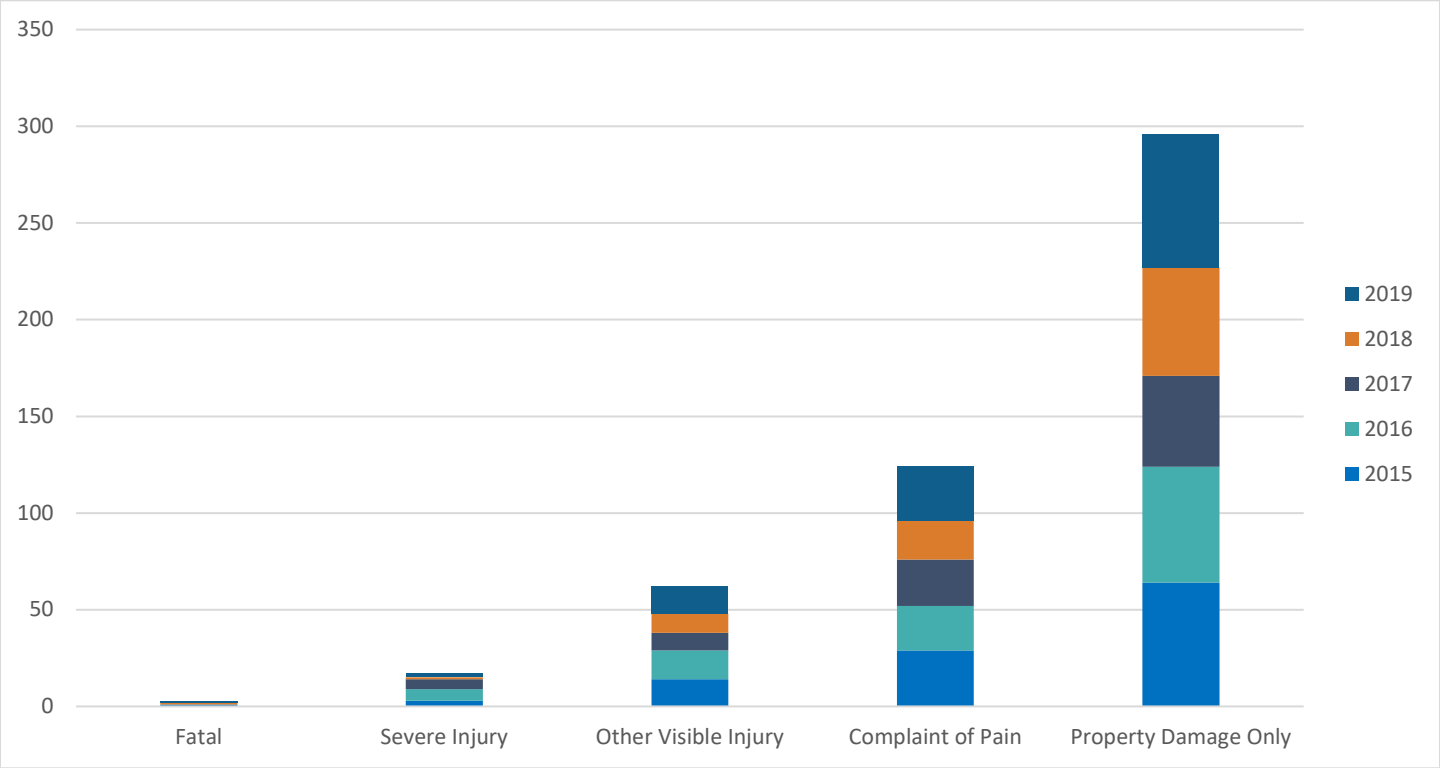


Source: Statewide Integrated Traffic Records System (SWITRS) 2015-2019

Collision Impacts

Knowing the collision impacts (the injuries or type of damage which occurred) is a key part of assessing the environment and safety factors around the site of a collision. **Figure 7** displays the count of each collision impact by crash history year. While the vast majority of collisions are property damage only (PDO) over the crash history period observed, there was a total of 3 fatal collisions and 17 severe injury collisions within the five-year timeframe.

Figure 7. Number of Collisions in the City of Imperial Beach by Collision Impact Type for Each Crash History Year



Data Source: Statewide Integrated Traffic Records System (SWITRS) 2015-2019

Figure 8 shows the OTS ranking of Imperial Beach for the total number of fatal and injury collisions between 2013-2017. While the OTS rankings do not provide ranking exclusively for the fatal and severe collisions, the fatal and injury ranking helps identify emerging or on-going safety issues as well as see how Imperial Beach is doing in this area in comparison to cities with similar-sized populations. Compared to other cities in its population group, Imperial Beach saw an increase in fatal and injury-related collisions since 2015. With an OTS ranking of 58th in 2015 and 34th in 2017, Imperial Beach has been rising more rapidly in fatal and injury-related collisions compared to its peer cities.

Fatal and Severe Collision Impacts

Dissecting the crash type and collision factors for fatal and severe collisions is a key step in detecting patterns in the City that result in fatal and severe injury collisions. **Table 3** shows the crash types and collision factors for both fatal and severe injury collisions within the City and a comparison to San Diego County.

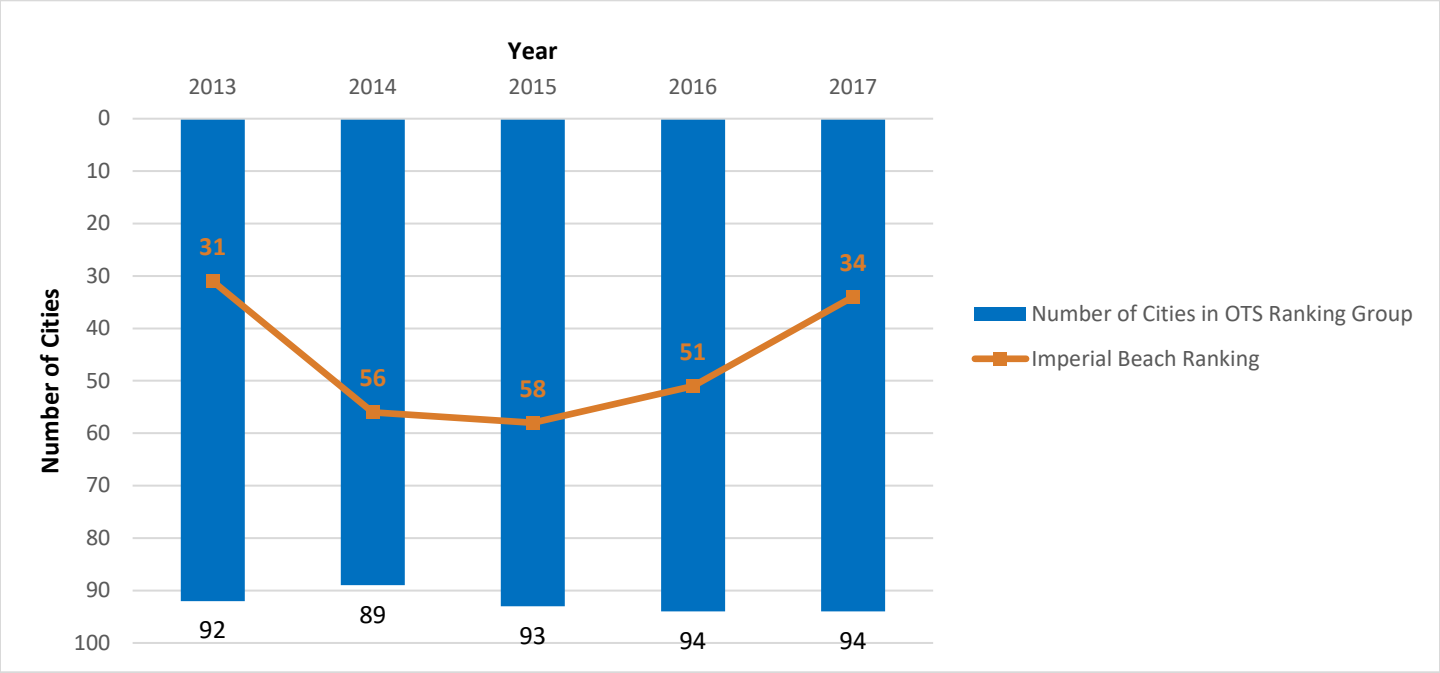
The top leading crash types for fatal and severe collisions in Imperial Beach is vehicle/pedestrian (40%), broadside (35%), and head on (10%). The top collision factors for fatal and severe collisions in Imperial Beach is automobile right of way (40%), driving or bicycling under the influence (25%), and pedestrian right of way (15%). The top leading crash type and primary collision factors of the fatal and severe collisions are a higher percentage when compared to San Diego County.

Table 3. Fatal & Severe Injuries by Crash Type and Collision Factor in the City of Imperial Beach and San Diego County

	City of Imperial Beach		San Diego County	
Number of Fatal & Severe Injuries	**20**		**5,332**	
CRASH TYPE	Number of Collisions	Percent of Fatal & Severe Collisions	Number of Collisions	Percent of Fatal & Severe Collisions
Vehicle/Pedestrian	8	40%	866	16%
Broadside	7	35%	990	19%
Head On	2	10%	436	8%
Rear-End	1	5%	790	15%
Hit Object	1	5%	1,109	21%
Other	1	5%	138	3%
Not Stated	0	0%	19	0%
Sideswipe	0	0%	419	8%
Overturned	0	0%	565	11%
PRIMARY COLLISION FACTOR	Number of Collisions	Percent of Fatal & Severe Collisions	Number of Collisions	Percent of Fatal & Severe Collisions
Automobile Right of Way	8	40%	498	9%
Driving or Bicycling Under the Influence	5	25%	911	17%
Pedestrian Right of Way	3	15%	172	3%
Pedestrian Violation	2	10%	602	11%
Wrong Side of Road	1	5%	187	4%
Improper Turning	1	5%	992	19%
Unknown	0	0%	111	2%
Impeding Traffic	0	0%	8	0%
Unsafe Speed	0	0%	1,131	21%
Following Too Closely	0	0%	19	0%
Improper Passing	0	0%	48	1%
Unsafe Lane Change	0	0%	176	3%
Traffic Signals and Signs	0	0%	238	4%
Hazardous Parking	0	0%	7	0%
Brakes	0	0%	1	0%
Other Equipment	0	0%	4	0%
Other Hazardous Violation	0	0%	52	1%
Other Than Driver (or Pedestrian)	0	0%	108	2%
Unsafe Starting or Backing	0	0%	30	1%
Other Improper Driving	0	0%	26	0%
Not Stated	0	0%	11	0%

Data Source: Statewide Integrated Traffic Records System (SWITRS) 2015-2019

Figure 8. City of Imperial Beach OTS Ranking for Fatal and Injury Crash Types



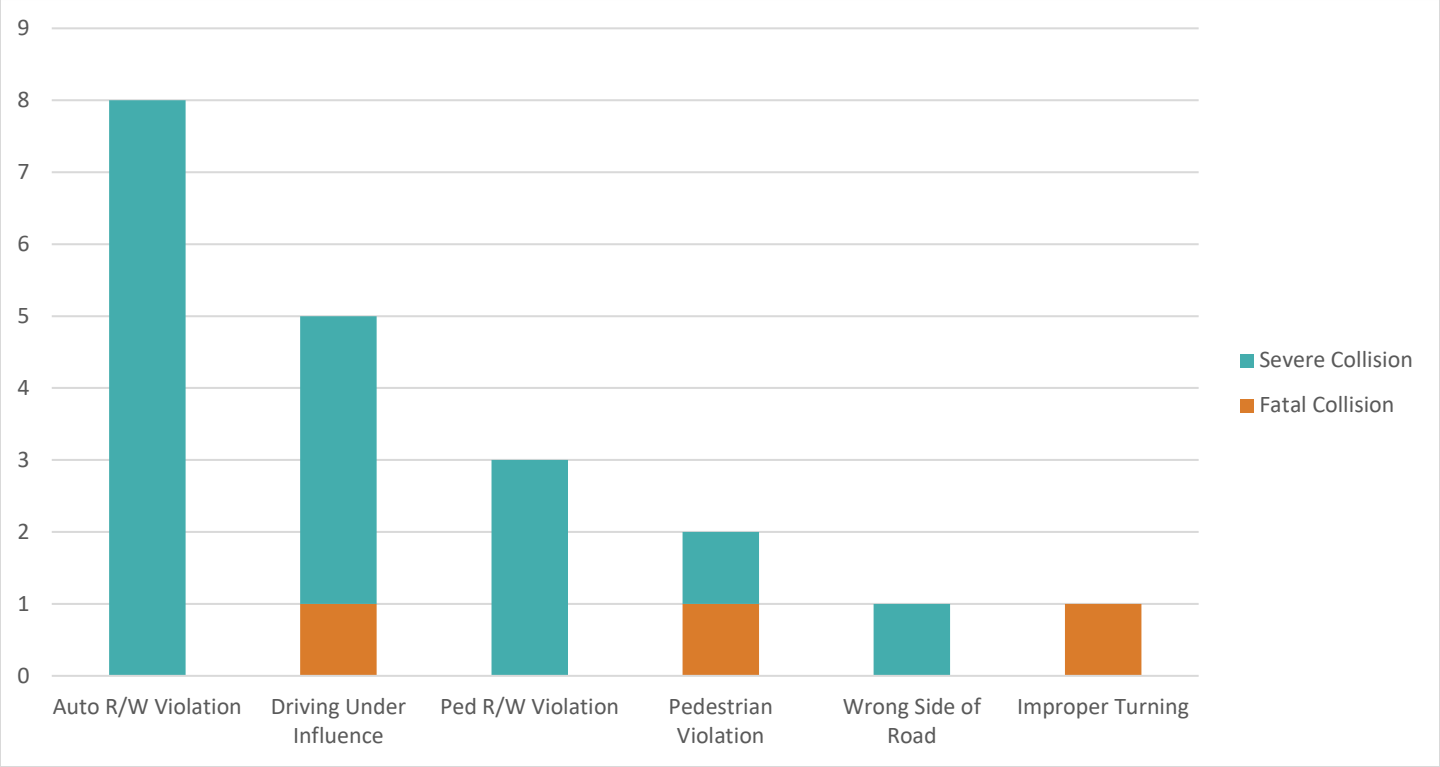
Data Source: OTS Crash Rankings 2013-2017

Figure 9 shows the locations of the three fatal collisions and 17 severe collisions during the 5-year crash history. Locating the fatal and severe collisions allow the opportunity to look at the site conditions to help determine the potential safety factors and roadway geometry/design that may have led to the fatal and severe collision impact.

Figure 9. Locations of Fatal & Severe Collisions in the City of Imperial Beach

Figure 10 displays more details on the annual number of fatal and severe collisions by their primary collision factor. As shown in the figure, the leading collision factor for the collisions is auto right-of-way violation but had no associated fatalities. The collision factors for the three fatal collisions in the City were driving under the influence, improper turning, and pedestrian violation.

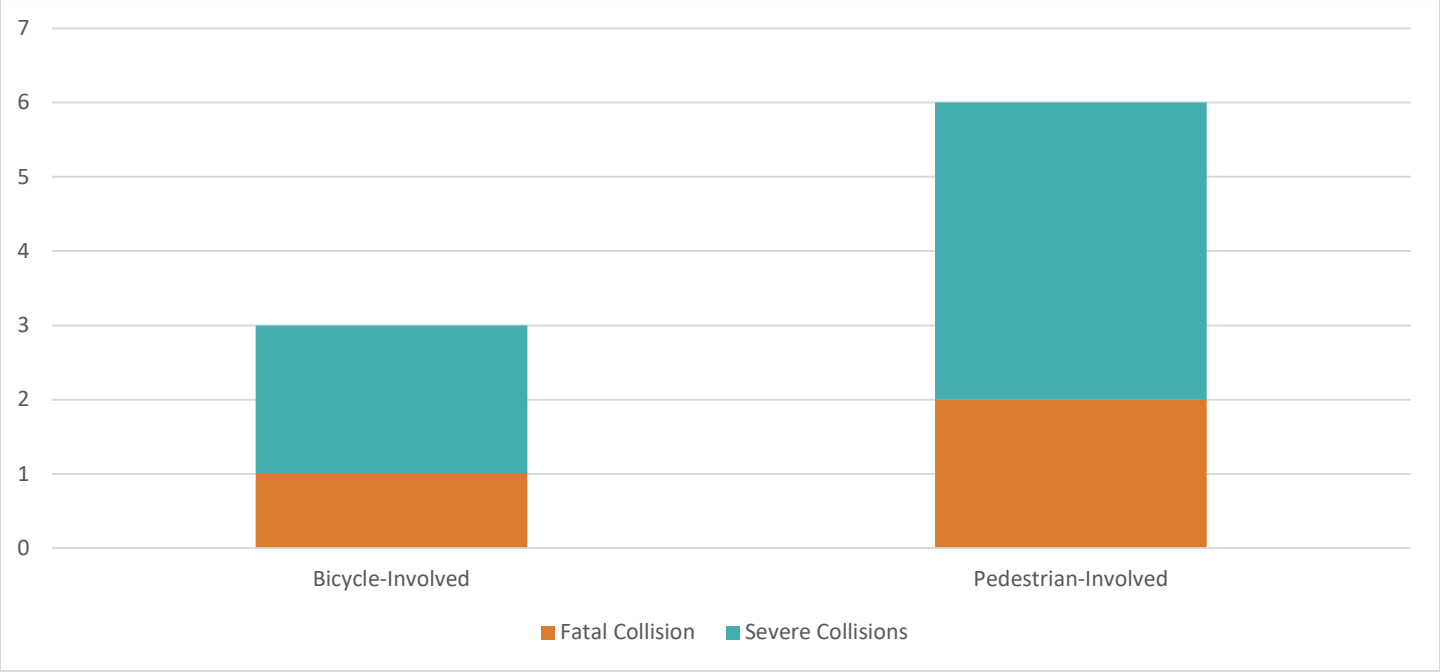
Figure 10. Number of Fatal & Severe Collisions in the City of Imperial Beach by Primary Collision Factor



Data Source: Statewide Integrated Traffic Records System (SWITRS) 2015-2019

There was a total of nine fatal and severe collisions between 2015-2019 involving a bicyclist or pedestrian. This represents about 45% of the total fatal and severe collisions that occurred in the City, showing that pedestrians and bicyclists are some of the more vulnerable roadway users in the City. **Figure 11** shows the number of fatal and severe collisions that involved a pedestrian or bicyclist.

Figure 11. Bicycle- and Pedestrian-Involved Fatal & Severe Collisions in the City of Imperial Beach



Data Source: Statewide Integrated Traffic Records System (SWITRS) 2015-2019

Table 4 displays the location of intersection collisions between 2015-2019 for both signalized and unsignalized intersections. Table 4 also includes the number of collisions at each intersection by fatal and severe, crash type, and involved with a pedestrian or bicyclist. The three fatal collisions occurred at unsignalized intersections. The 17 severe injury collisions occurred at both signalized and unsignalized intersections.

Table 4. Intersection Collisions by Fatal & Severe Collisions, Crash Type and Involved with Pedestrian or Bicyclist in the City of Imperial Beach

Intersection	Total Collisions	Fatal Collisions	Severe Injury Collisions	PDO Collisions	Broadside	Sideswipe	Rear End	Head On	Other	Pedestrian	Bicycle
Signalized Intersections											
09TH ST & PALM AV	**10**	0	2	5	2	3	1	0	2	1	0
09TH ST & IMPERIAL BEACH BL	**5**	0	1	1	1	0	0	4	0	0	0
Unsignalized Intersections											
RAINBOW DR & PALM AV	**12**	0	1	6	3	0	4	3	1	0	0
09TH ST & ELM AV	**7**	0	2	0	4	0	1	0	0	0	0
12TH ST & PALM AV	**6**	0	1	4	2	1	1	0	0	1	0
10TH ST & PALM (SB) AV	**5**	1	0	2	2	1	0	0	0	1	0
DELAWARE ST & PALM AV	**4**	0	1	3	0	0	1	3	0	0	0
04TH ST & PALM AV	**4**	1	0	1	0	0	1	0	0	1	0
12TH ST & IMPERIAL BEACH BL	**3**	1	0	1	0	1	0	1	0	1	0
13TH ST & ELM AV	**3**	0	1	1	2	0	0	1	0	0	0
09TH ST & HOLLY AV	**2**	0	1	1	0	0	1	1	0	0	0
ALLEY & PALM AV	**2**	0	2	0	0	0	0	0	1	1	0
11TH ST & PALM (SB) AV	**2**	0	1	0	2	0	0	0	0	0	0
09TH ST & ELDER AV	**1**	0	1	0	1	0	0	0	0	0	0
FLORENCE ST & CALLA AV	**1**	0	1	0	0	0	0	0	0	1	0
08TH ST & CALLA AV	**1**	0	1	0	1	0	0	0	0	0	0
03RD ST & CALLA AV	**1**	0	1	0	1	0	0	0	0	0	0

Collision by Involvement With

Collisions occur for a variety of reasons ranging from combinations of driver behavior, inclement weather, traffic control features, and a myriad of other causes. The following sections discuss the collisions from 2015-2019 within Imperial Beach based on the types of vessels involved. This includes:

- Cars and trucks
  - Single Vehicle Crashes/Off-Road Collisions
  - Vehicular Night-Time Collisions (with and without streetlights)
  - Driver Negligence
- Bicycles
- Pedestrians

Pedestrian and Bicycle Collisions

Table 5 shows the number of collisions by severity level within the City that involved a pedestrian or bicyclist. Between 2015-2019, there were a total of 72 collisions that involved a pedestrian or bicyclist, which is about 14% of the total collisions within the City. Of the 72 collisions, about 12% of the collisions involved a fatality, injury, or complaint of pain.

Table 5. Number of Collisions Involving a Pedestrian or Bicyclist in the City of Imperial Beach by Collision Severity

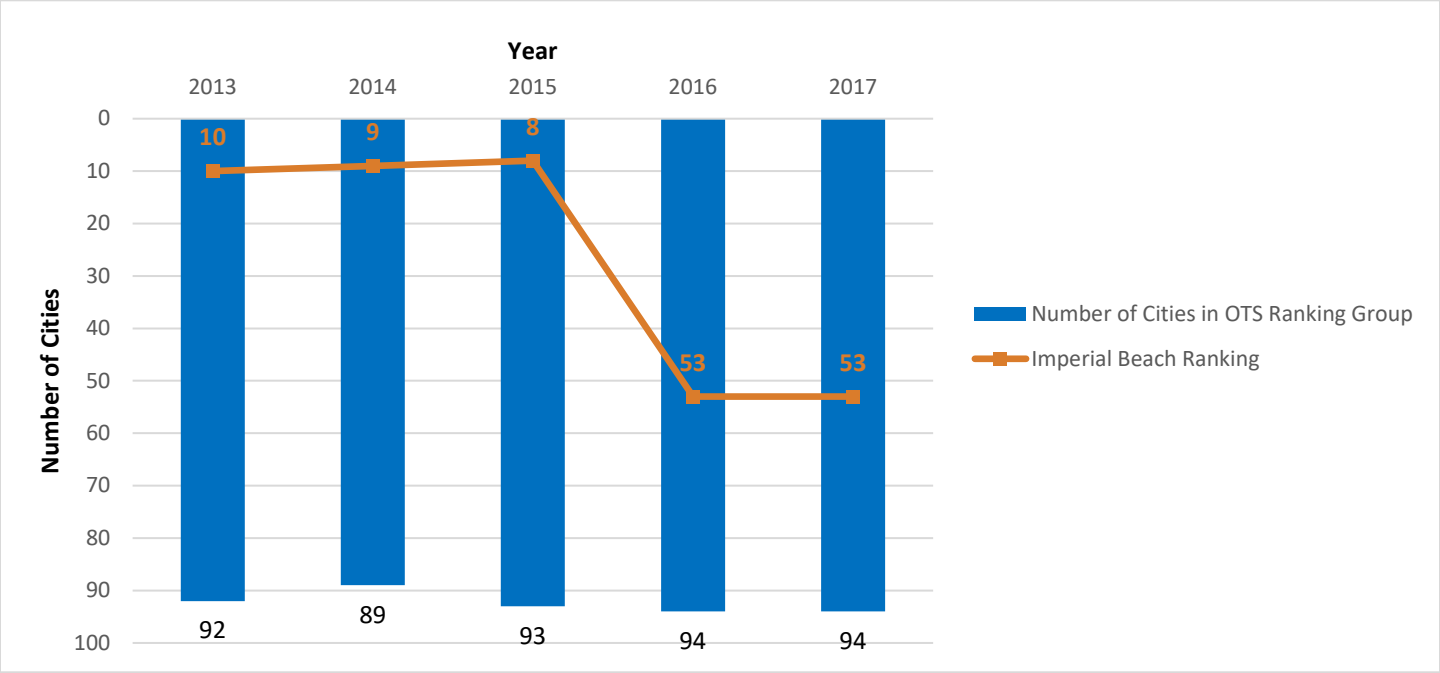
Collision Severity	Number of Pedestrian-Involved Collisions	Number of Bicycle-Involved Collisions	Total Collisions
Fatal	2	1	3
Severe	4	2	6
Other Visible Injury	19	9	28
Complaint of Pain	16	12	28
Property Damage Only	3	4	7
Total Collisions	**44**	**28**	**72**

Data Source: Statewide Integrated Traffic Records System (SWITRS) 2015-2019

From 2015 to 2017, Imperial Beach has gone from 8th to 53rd in the OTS rankings of collisions involving a bicyclist (see **Figure 12**). From 2013 to 2016, Imperial Beach saw an improvement in collisions involving bicyclist under the age of 15; however, the City's ranking slightly climbed back up in 2017 (see **Figure 13**). This shows that Imperial Beach has improved the safety of its bicycle users. Imperial Beach is ranked 12th as of 2017 in the OTS rankings group for number of collisions involving a pedestrian and ranked 4th in 2017 for collisions involving a pedestrian under the age of 15 (see **Figure 14** and **Figure 15**). Compared to other cities in the state with a similar population size, Imperial Beach should prioritize improving its safety for pedestrians.

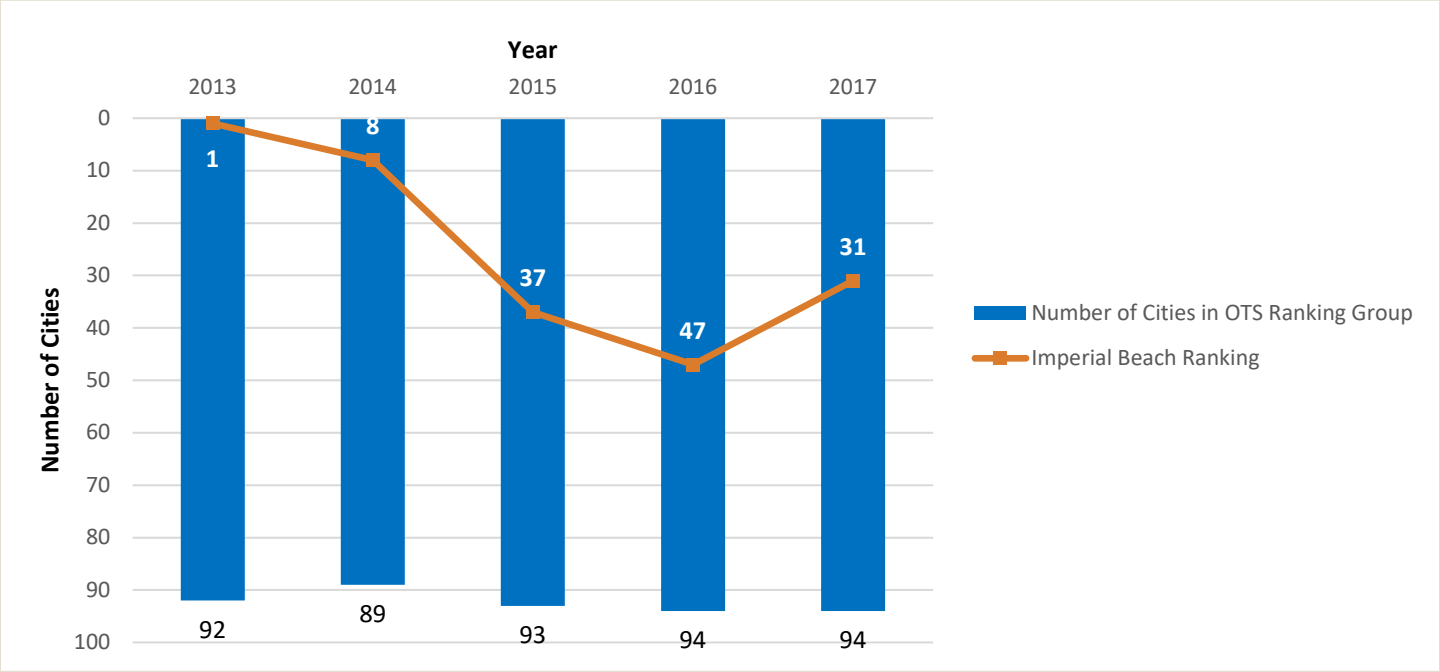
Figure 16 displays the locations of pedestrian-involved collisions while **Figure 17** displays the locations of bicycle-involved collisions overlaid on existing bike routes. All pedestrian- and bicycle-involved collisions occurred either at an intersection or within 250 feet of an intersection. A majority of the pedestrian- and bicycle-involved collisions occur on Palm Avenue and Coronado Avenue/Imperial Beach Boulevard where there are gaps in the bicycle network and limited low-stress bicycle facilities given the vehicle volumes on these corridors.

Figure 12. City of Imperial Beach OTS Ranking for Bicycle-Involved Collisions



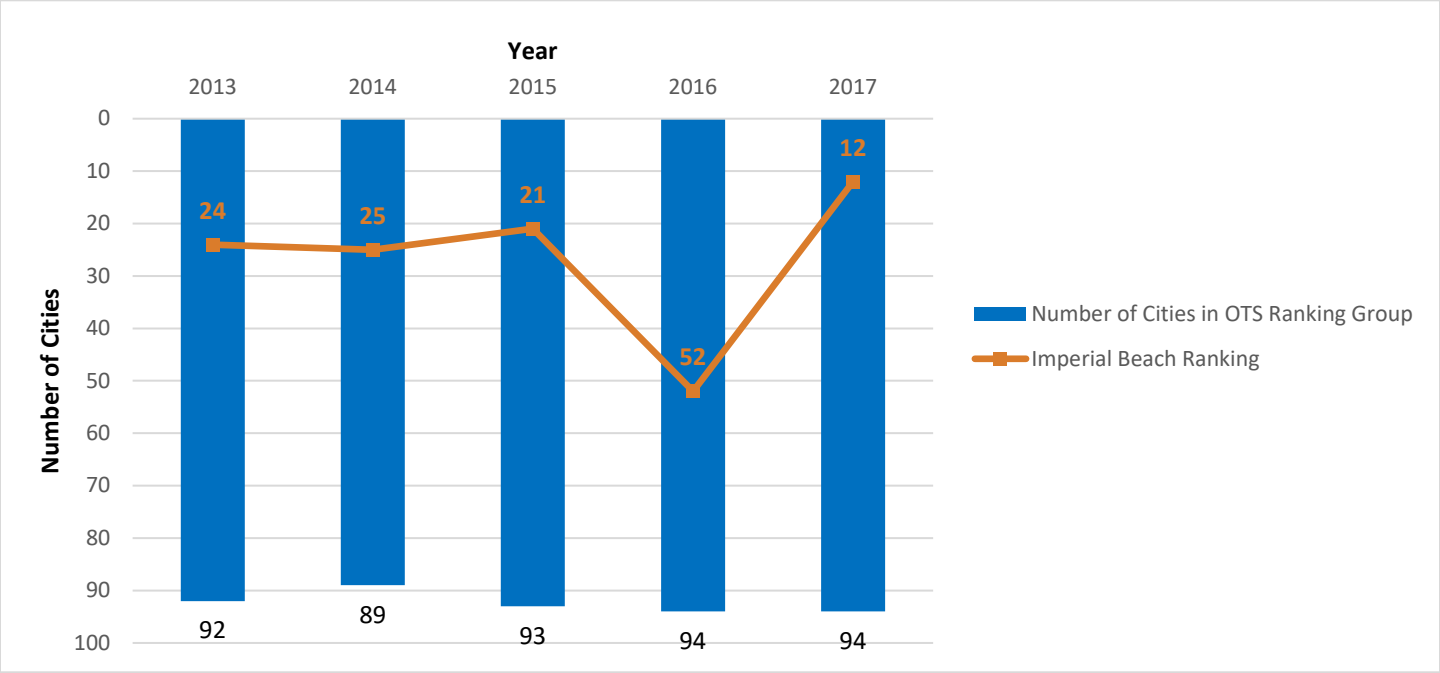
Data Source: OTS Crash Rankings 2013-2017

Figure 13. City of Imperial Beach OTS Ranking for Bicyclists-Involved (Under 15) Collisions



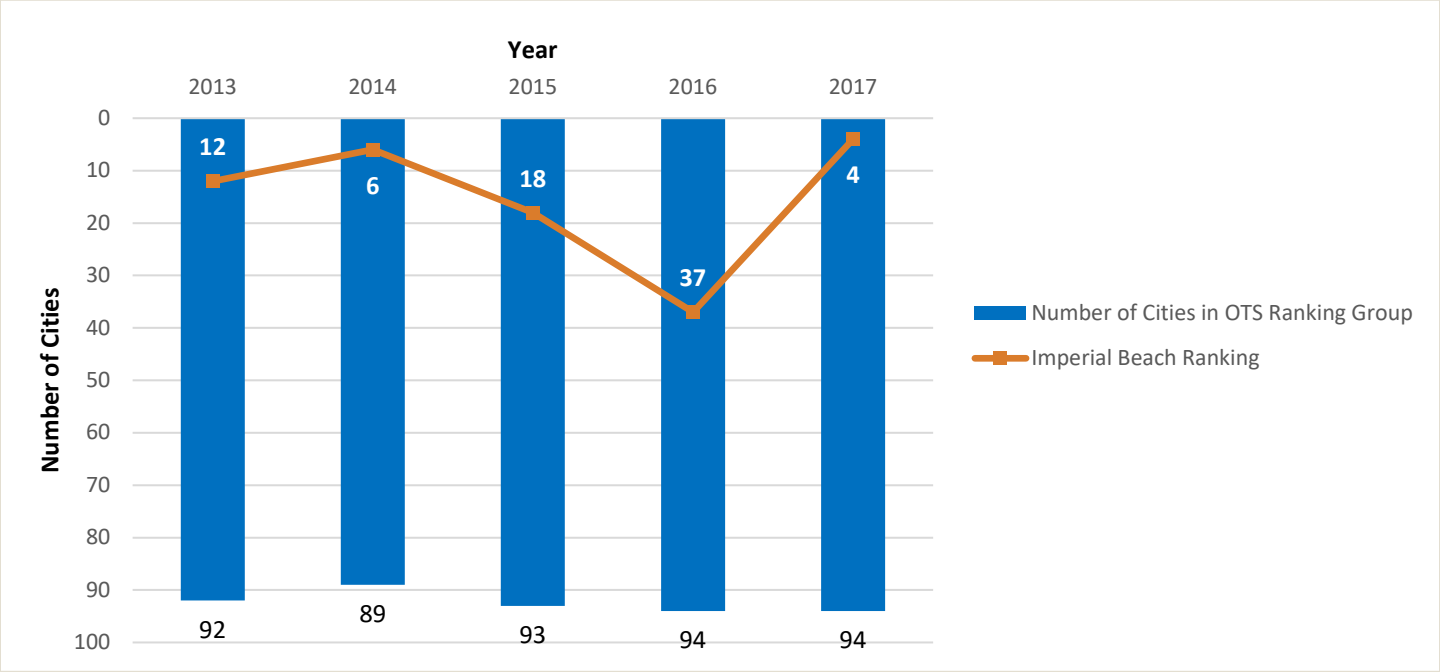
Data Source: OTS Crash Rankings 2013-2017

Figure 14. City of Imperial Beach OTS Ranking for Pedestrian-Involved Collisions



Data Source: OTS Crash Rankings 2013-2017

Figure 15. City of Imperial Beach OTS Ranking for Pedestrian-Involved (Under 15) Collisions



Data Source: OTS Crash Rankings 2013-2017

Figure 16. Pedestrian-Involved Collision Locations in the City of Imperial Beach

Figure 17. Bicycle-Involved Collision Locations in the City of Imperial Beach

Cars and Trucks

Vehicular collisions are reported by their involvement with other modes. Understanding the types and locations of these collisions is an important part of analyzing the safety conditions of the transportation network.

A reported vehicular collision with fixed objects typically indicates that the vehicle collided with an immobile object outside of the travel lanes. These are often collisions with light poles, signage, personal property, etc. The type of collision with a fixed object may include head-on, sideswipe, broadside, and overturned vehicles. **Figure 18** represents the locations of collisions involving an object from 2015-2019.

Collisions occurring during periods of darkness are often associated with locations without streetlights present. **Figure 19** shows the lighting situation (i.e., streetlight, no streetlight, streetlight not functioning) at the locations where collisions at dark occurred between 2015-2019. Many of the collisions that occurred at dark where there were no streetlights present occurred on the City's local roads. However, 7th, 9th, and Florida Streets are three north-south corridors in the City that experienced 2-3 collisions at dark Compared to similar cities, Imperial Beach has been in the top third of the OTS rankings since 2013. In the most recent documented OTS ranking for collisions occurring at Nighttime (between 9:00 PM and 2:59 AM), Imperial Beach was 32nd out of 94 cities total (see **Figure 20**).

Driver Negligence

Identifying collision locations is important in understanding if there are areas of the roadway network where collisions related to impaired driving occur. Collisions where a driver is impaired are represented in **Figure 21.** Often when drivers are impaired, they are known to have been drinking alcohol. As mentioned previously, the top leading collision factor for collisions is driving under influence, which makes up about 21% of the collisions. Driving under the influence has been a steadily increasing problem for Imperial Beach.

In OTS rankings, Imperial Beach is shown to vary over the years for the following impaired driver categories: alcohol involved, driver had been drinking, underage driver had been drinking, and DUI arrests (see **Figure 22** to **Figure 25**). For its group, Imperial Beach ranked 1 in 2016 and 4 in 2017 for alcohol involved collisions, meaning Imperial Beach has a higher number of collisions involving alcohol than other cities with similar population size. For driver had been drinking collisions, Imperial Beach's ranking dropped from 2 in 2016 to 49 in 2017. However, underage driver who had been drinking ranking spiked from 60 in 2016 to 11 in 2017. The City's OTS ranking for DUI arrests have been increasing throughout the years, landing the City a ranking of 49 in 2017.

Distracted driving is a growing challenge and reflects situations where the driver responsible for the collision was engaging in another activity that took their attention away from driving, thus increasing the chance of a crash. In recent years, distracted driving has most attributed to cell phone usage while driving. These collisions are shown in **Figure 26.** Data related to distracted driving is limited, as it is often hard to identify the behavior of the driver prior to the crash.

Aggressive driving identifies collisions where the responsible driver engaged in unsafe speeding, following too closely, or improper passing. **Figure 27** is a visual representation of where these collisions occurred. The speed of a vehicle has a direct correlation with the severity of crashes.

Figure 18. Locations of Collisions Involving a Hit Object in the City of Imperial Beach

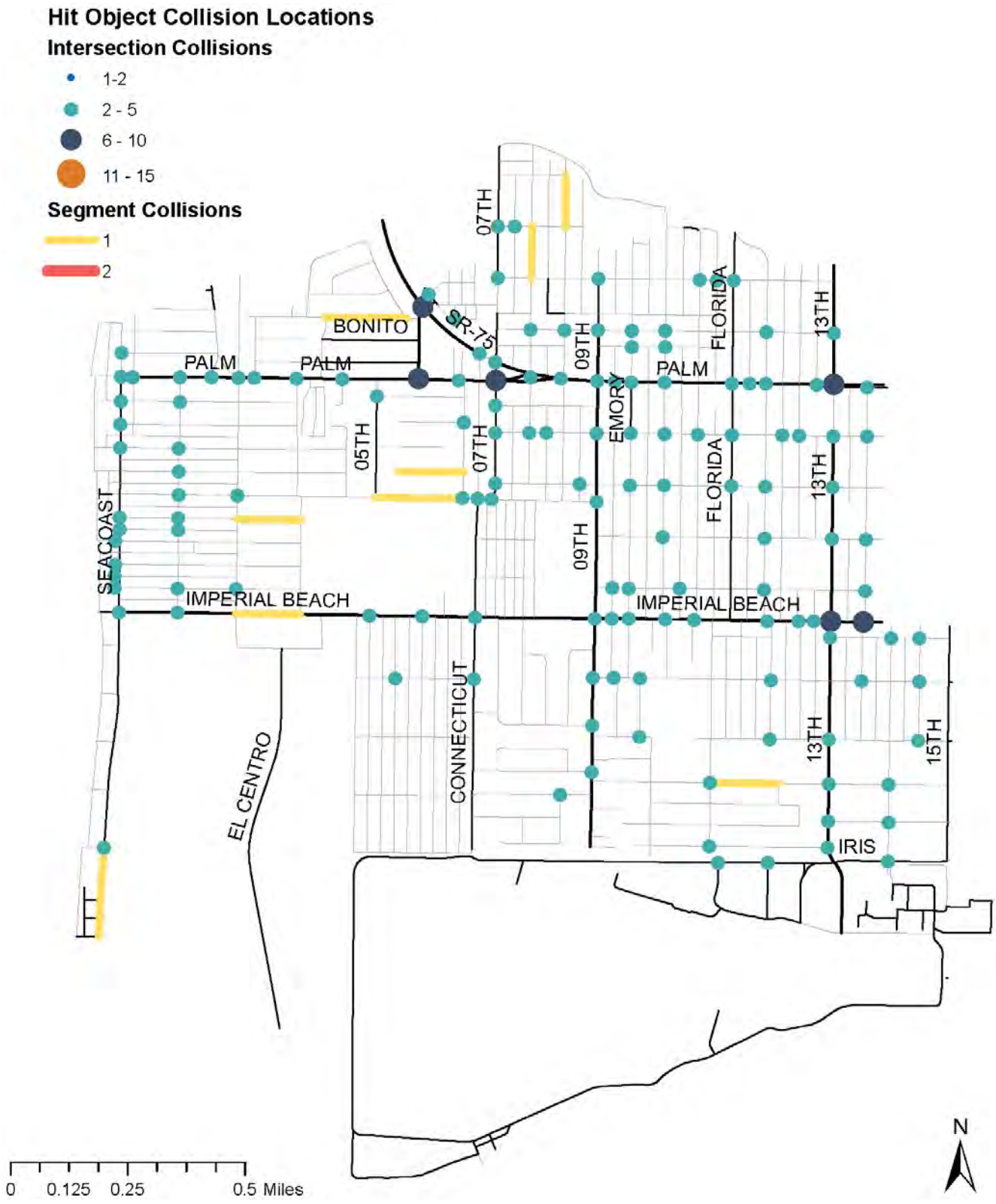


Figure 19. Collisions at Dark with Lighting Status in the City of Imperial Beach

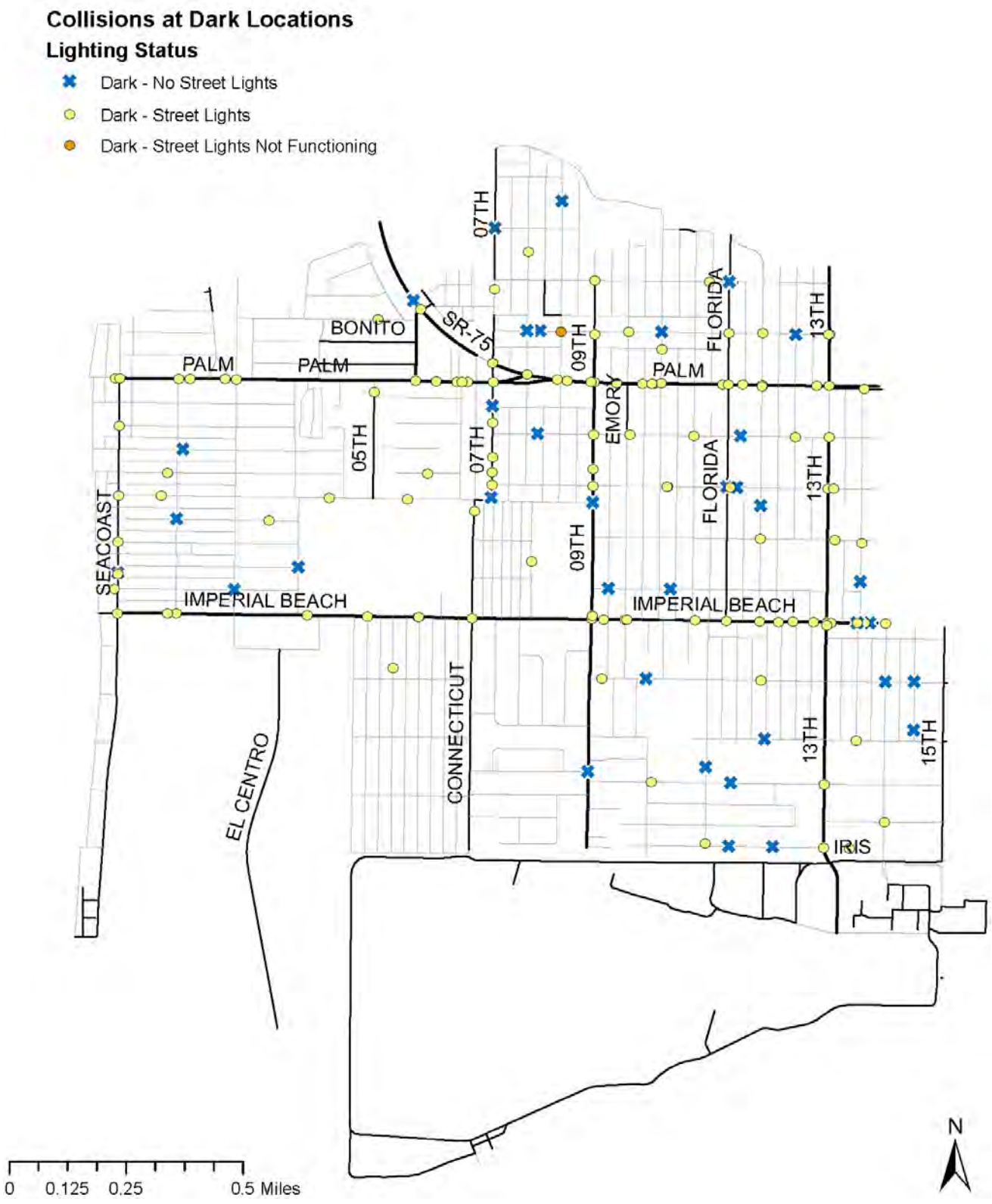
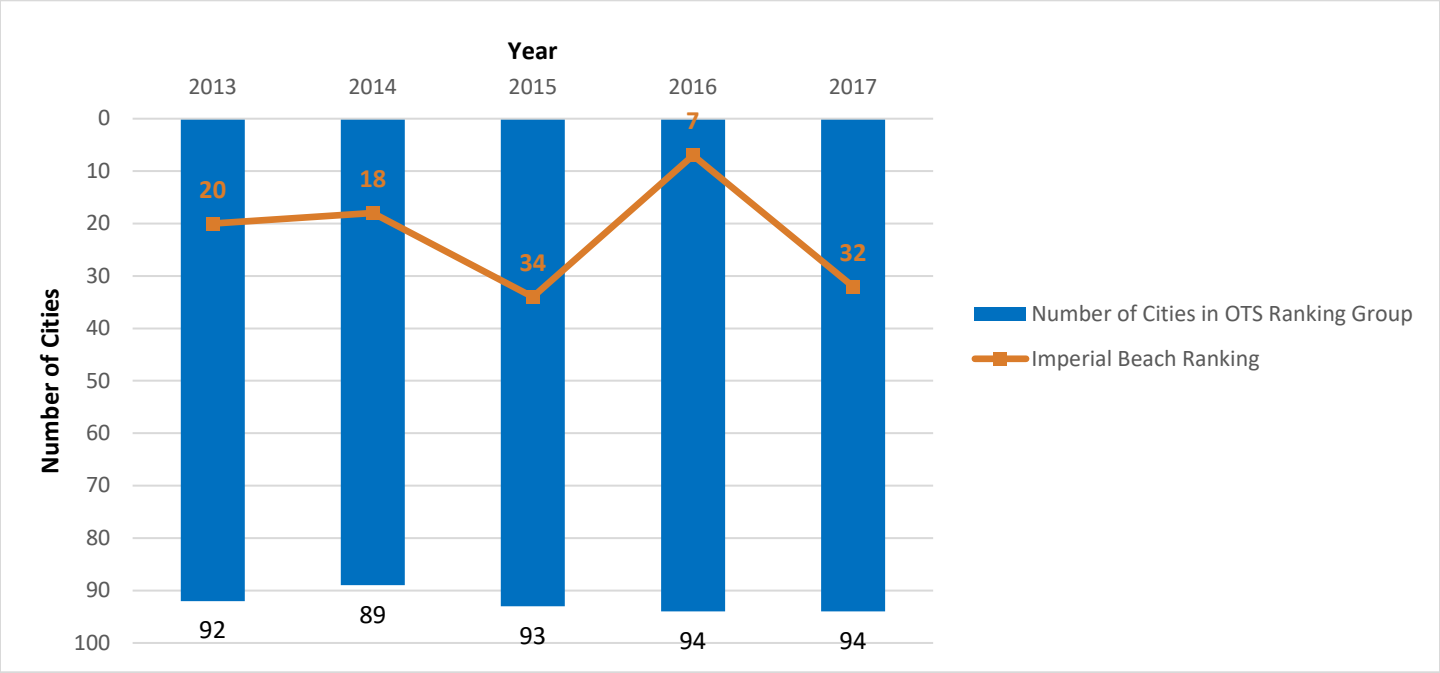


Figure 20. City of Imperial Beach OTS Ranking for Crash Types Occurring at Nighttime (Between 9:00 pm and 2:59 am)



Data Source: OTS Crash Rankings 2013-2017

Figure 21. Locations of Collisions Involving an Impaired Driver in the City of Imperial Beach

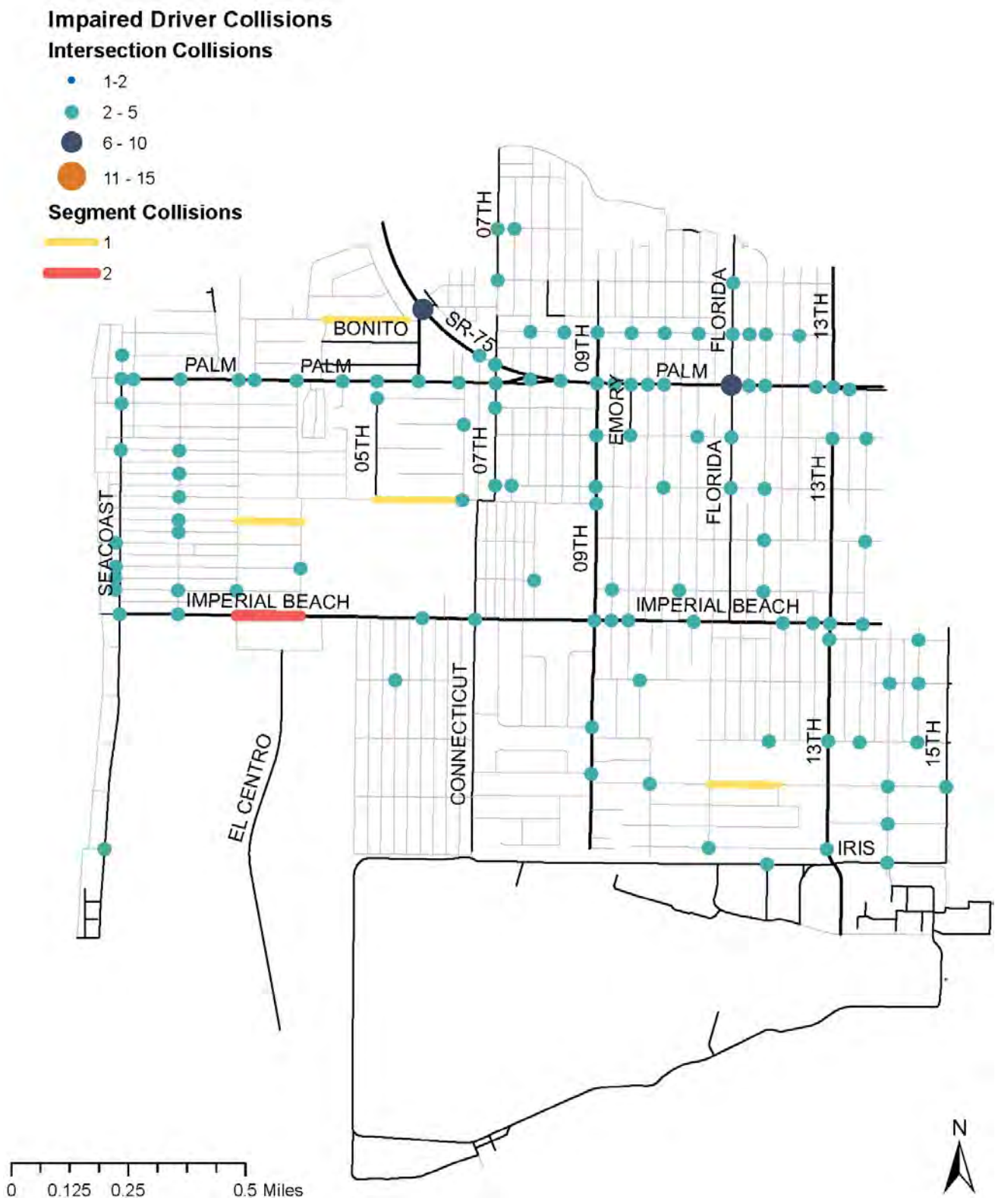
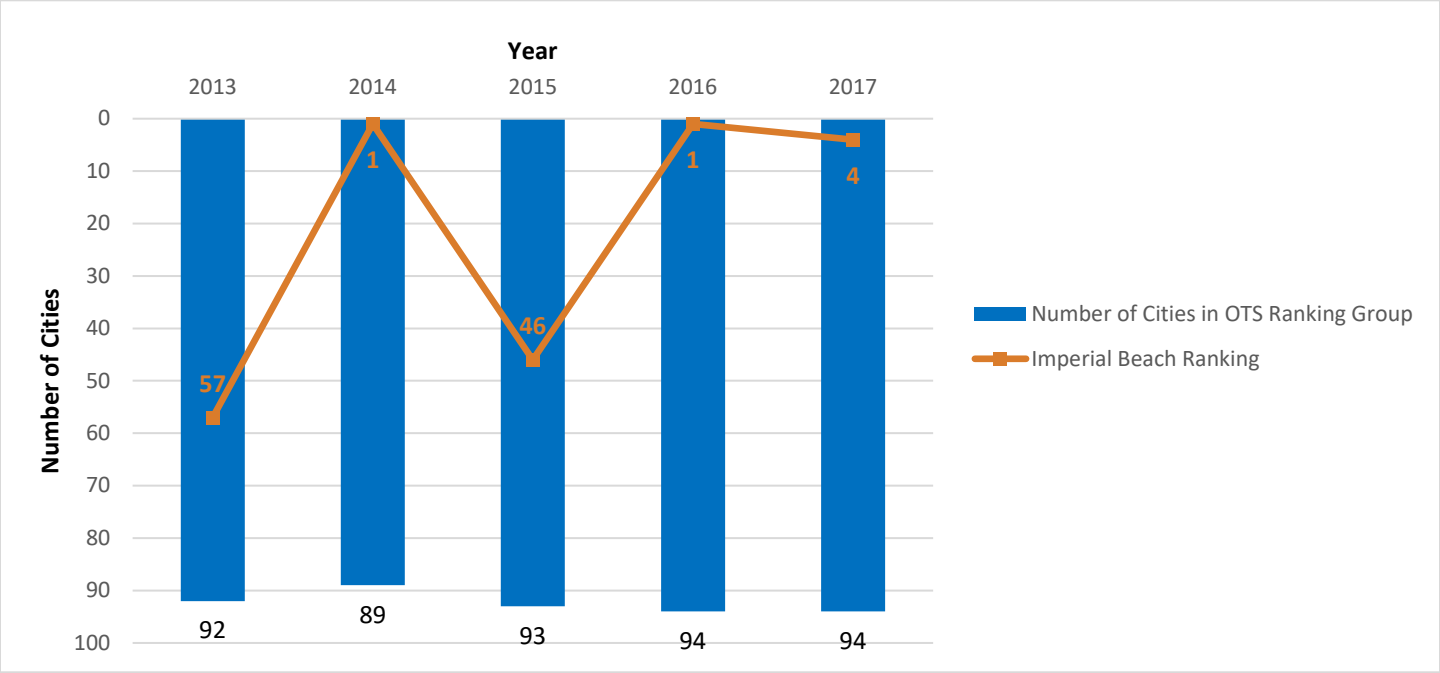
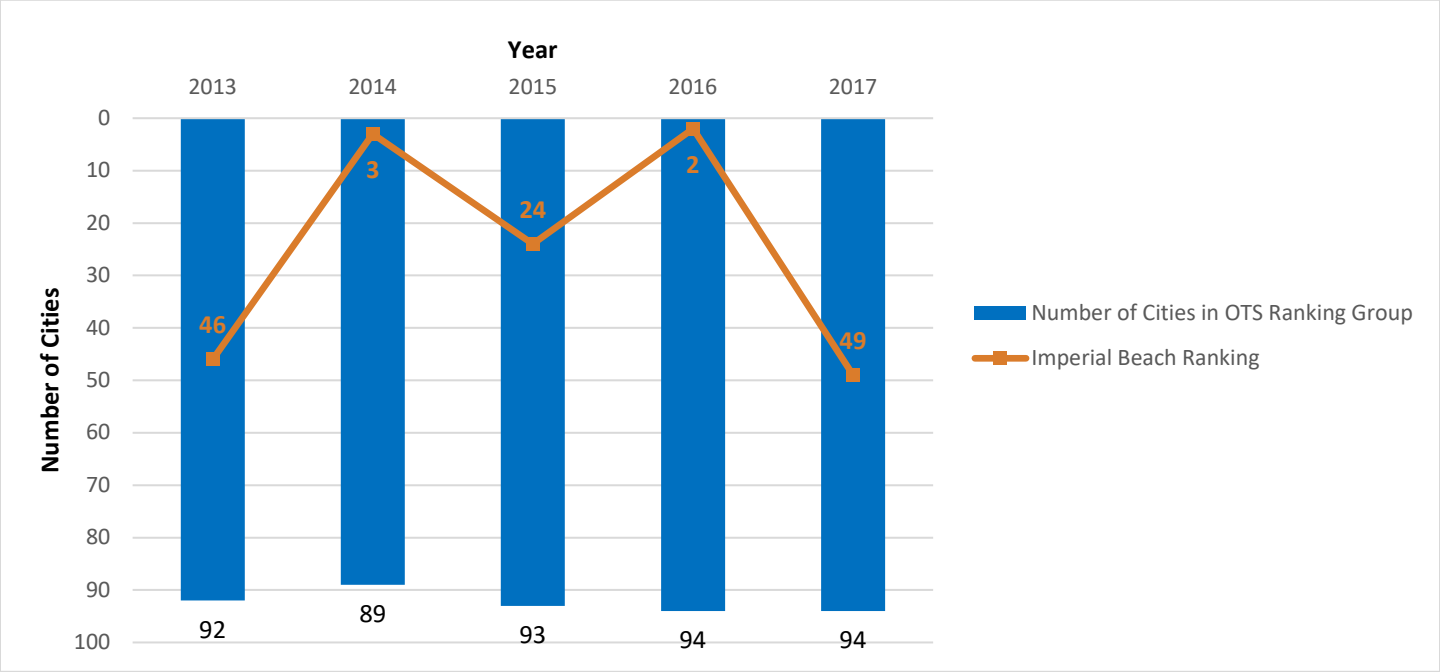


Figure 22. City of Imperial Beach OTS Ranking for Alcohol Involved Crash Types



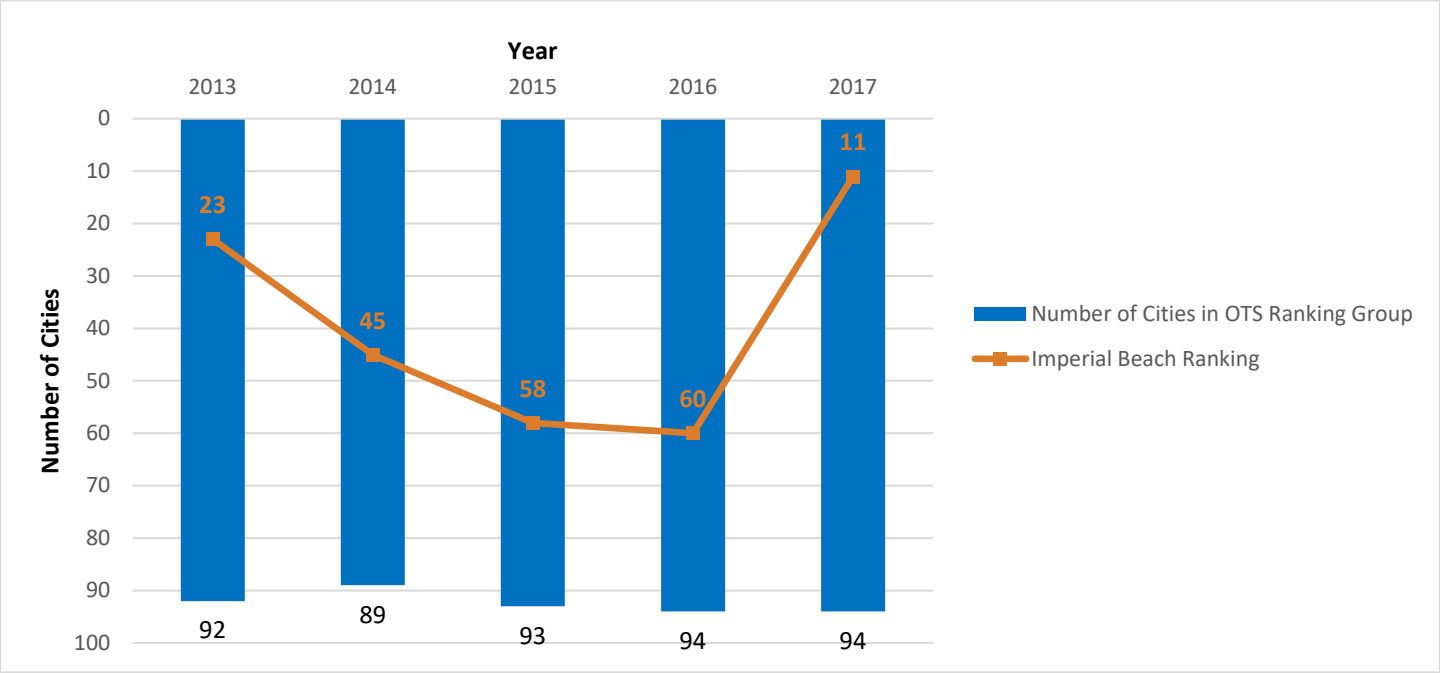
Data Source: OTS Crash Rankings 2013-2017

Figure 23. City of Imperial Beach OTS Ranking for Driver Had Been Drinking Collisions



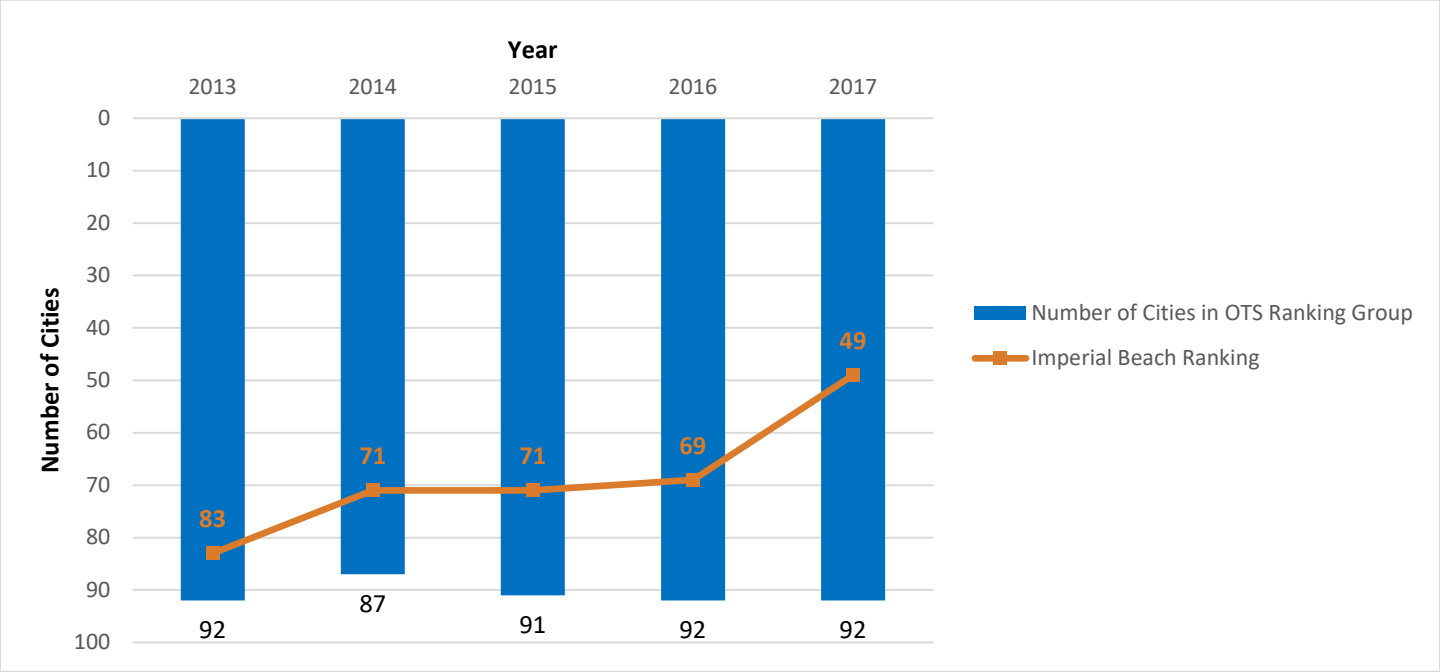
Data Source: OTS Crash Rankings 2013-2017

Figure 24. City of Imperial Beach OTS Ranking for Underage Driver Had Been Drinking Collisions



Data Source: OTS Crash Rankings 2013-2017

Figure 25. City of Imperial Beach OTS Ranking for DUI Arrests



Data Source: OTS Crash Rankings 2013-2017

Figure 26. Locations of Collisions Involving a Distracted Driver in the City of Imperial Beach

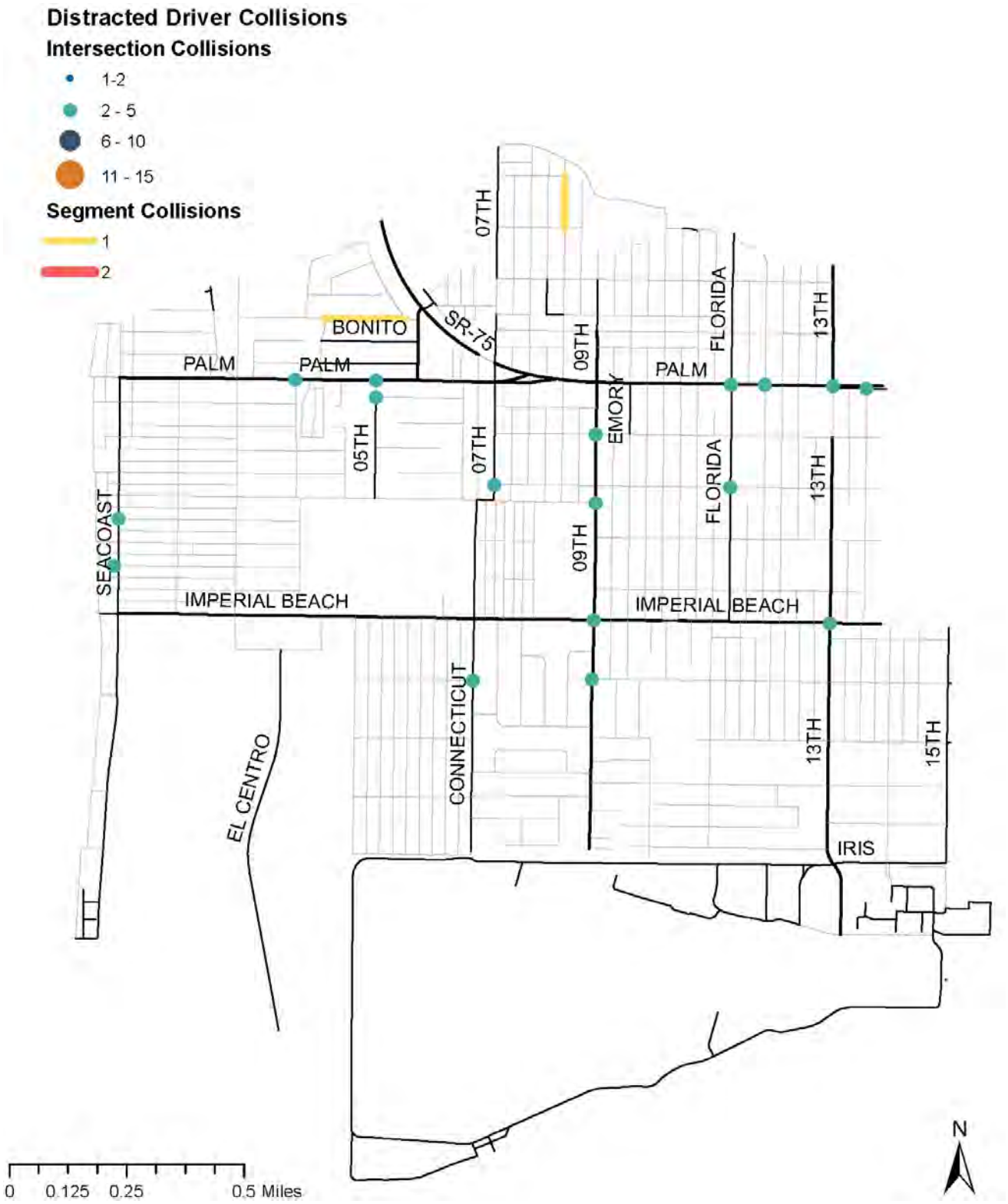


Figure 27. Locations of Collisions Involving an Aggressive Driver in the City of Imperial Beach

Top Collision Locations

Table 6 and **Table 7** show the top intersections and segments where collisions occurred. These top intersections and segments are visually shown in the City's roadway network in **Figure 28**. A majority of the collisions during the crash history occurred at intersections along Palm Avenue and Imperial Beach Boulevard/Coronado Avenue.

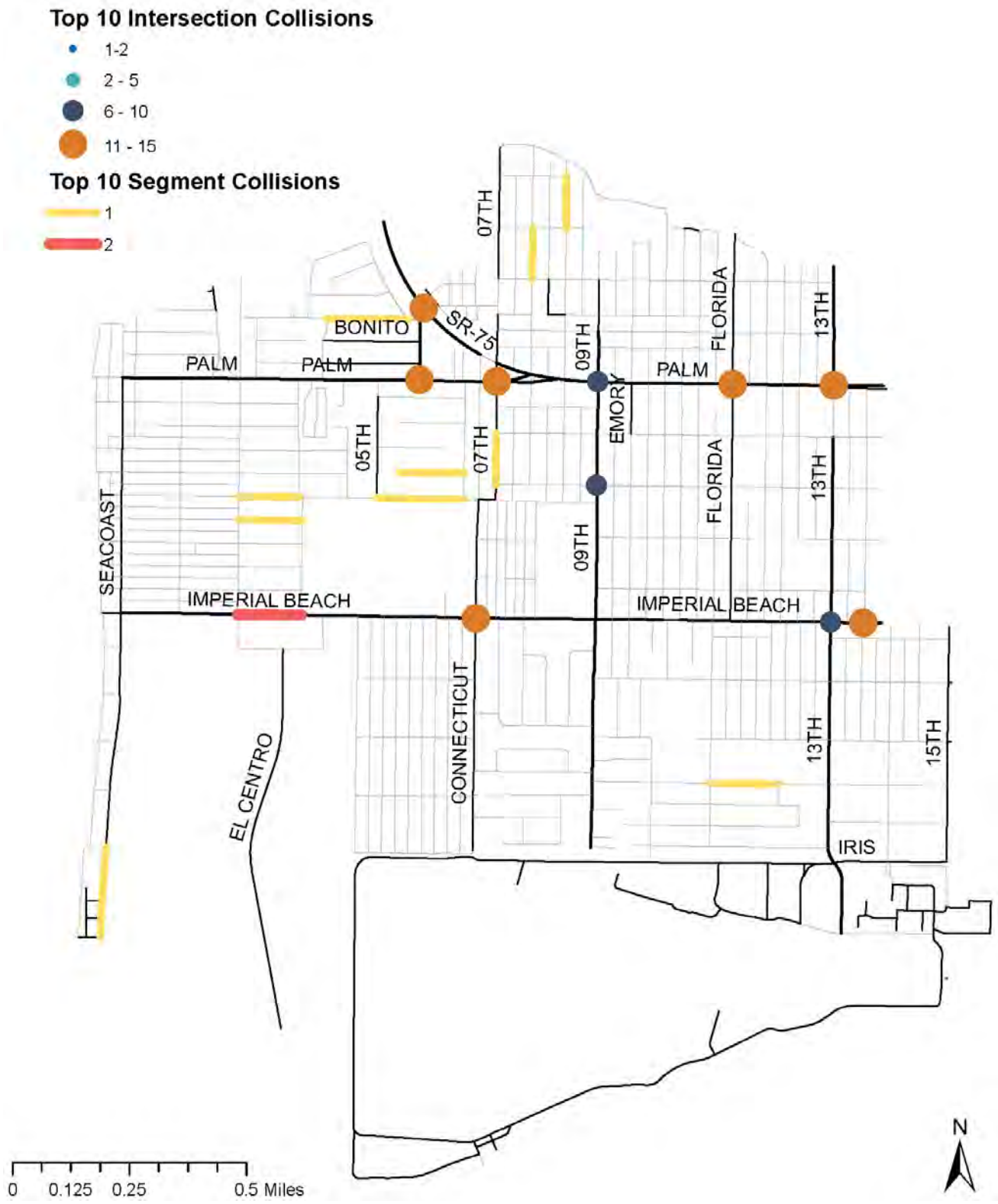
Table 6. Top 10 Intersections for Collisions in the City of Imperial Beach

Signalized Intersections						
	Intersection	**Total # of Collisions**	**Fatal & Severe Collisions**	**Leading Collision Type**	**Bicycle-Involved Collisions**	**Pedestrian-Involved Collisions**
1	13TH ST & PALM AV	15	0	Rear End	0	1
2	07TH ST & PALM AV	14	0	Broadside	0	2
3	FLORIDA ST & PALM AV	14	0	Broadside/Rear End	0	2
4	RAINBOW DR & SR-75	13	0	Rear End	0	0
5	09TH ST & PALM AV	10	2	Sideswipe	0	1
Unsignalized Intersections						
	Intersection	**Total # of Collisions**	**Fatal & Severe Collisions**	**Leading Collision Type**	**Bicycle-Involved Collisions**	**Pedestrian-Involved Collisions**
1	RAINBOW DR & PALM AV	12	1	Rear End	0	0
2	CONNECTICUT ST & IMPERIAL BEACH BL	11	0	Broadside	0	3
3	GEORGIA ST & IMPERIAL BEACH BL	11	0	Broadside	0	0
4	09TH ST & ELM AV	7	2	Broadside	0	0
5	FLORIDA ST & ELM AV	6	0	Sideswipe	0	0

Table 7. Top Segments for Collisions in the City of Imperial Beach

Arterial Segments						
	Corridor	**End Segment Streets**	**Total # of Collisions**	**Fatal & Severe Collisions**	**Bicycle-Involved Collisions**	**Pedestrian-Involved Collisions**
1	Belshire Ave	FROM 03RD ST TO 04TH ST	2	0	0	0
Collector Segments						
	Corridor	**End Segment Streets**	**Total # of Collisions**	**Fatal & Severe Collisions**	**Bicycle-Involved Collisions**	**Pedestrian-Involved Collisions**
1	No collisions on Collector Streets					
Local Segments						
	Corridor	**End Segment Streets**	**Total # of Collisions**	**Fatal & Severe Collisions**	**Bicycle-Involved Collisions**	**Pedestrian-Involved Collisions**
1	Norwalk Blvd	FROM 03RD ST TO END OF STREET	1	0	0	0
2	Norwalk Blvd	FROM ENCANTO AV TO END OF STREET	1	0	0	0
3	188th St	FROM 05TH ST TO CAROLINA ST	1	0	0	0
4	Gridley Rd	FROM CORVINA ST TO 05TH ST	1	0	0	0
5	Baber Ave	FROM CHERRY AV TO CYPRESS AV	1	0	0	0
6	8th St	FROM BASSWOOD AV TO CHERRY AV	1	0	0	0
7	7th St	FROM DONAX AV TO ELM AV	1	0	0	0
8	Thorn St	FROM END OF STREET TO CAROLINA ST	1	0	0	0
9	Evergreen Ave	FROM 03RD ST TO 04TH ST	1	0	0	0
10	Holly Ave	FROM 11TH ST TO 12TH ST	1	0	0	0

Figure 28. Top 10 Collision Locations in the City of Imperial Beach



Probability of Specific Crash Types Exceeding Threshold Proportion

The Highway Safety Manual (HSM) describes the methodology for determining the probability that crash type is greater than an identified threshold proportion. This helps to identify locations where a crash type is likely to occur.

Data Needs

The probability of a specific crash type can be determined using collisions records with location data, and classifications of the locations (intersections or segments) studied.

Strengths

- Can be used as a diagnostic tool
- Considers variance in data
- Not affected by selection bias

The HSM methodology first determines the frequency of a specific collision type at an individual location, then determines the observed proportion of that collision type relative to all collision types at that location. A threshold proportion is then determined for the specific collision type; HSM suggests utilizing the proportion of the collision type observed in the entire reference population (e.g. throughout the entire City of Sunnyvale). These proportions are then utilized to determine the probability that the proportion of a specific crash type is greater than the long-term expected proportion of that crash type. The calculation is shown below in **Figure 29**.

Figure 29. *Probability of Specific Crash Types Exceeding Threshold Proportion*

$$P\left(p_i > \overline{p^*_i} \,/\, N_{observed\,i}, N_{observed\,i(TOTAL)}\right) = 1 - betadist\left(\overline{p^*_i}, a + N_{observed\,i}, \beta + N_{observed\,i(TOTAL)} - N_{observed\,i}\right)$$

Where:

$\overline{p^*_i}$ = Threshold proportion

p_i = Observed proportion

$N_{observed,i}$ = Observed target crashes for a site i

$N_{observed,i(TOTAL)}$ = Total number of crashes for a site i

Source: Highway Safety Manual

Table 8 and **Table 9** outline intersection and segment locations where more than two collisions occurred between 2015-2019 in Imperial Beach. They are organized by number of crashes at each location and highlights locations in which the probability of those crash types exceeding the threshold proportion is greater than 33%. The rankings include a breakdown of crash type as well as severity of crash and causes of driver negligence.

Table 10 is a list of 20 priority locations comprised of high collision locations and all locations where a fatality occurred. In addition, locations along 9th Street and 13th with more than 5 collisions or severe injury.

Table 8. Analysis Rankings – Intersections in the City of Imperial Beach

Legend: Probability of Crash Type Exceeding Threshold Proportion: 90-100% 80-90% 70-80%

Intersection	Crashes	Fatal Collisions	Serious Injury Collisions	Other Visible Injury Collisions	Complaint of Pain Collisions	PDO Collisions	Broadside	Sideswipe	Rear End	Head On	Other	Pedestrian	Bicycle	Aggressive	Distracted	Impaired	Dark	Wet
Signalized Intersections																		
13TH ST & PALM AV	**15**	0	0	3	2	10	2	1	9	0	0	1	0	8	1	5	4	0
07TH ST & PALM AV	**14**	0	0	2	6	6	8	1	1	1	1	2	0	3	0	3	4	0
FLORIDA ST & PALM AV	**14**	0	0	4	6	4	3	2	3	1	1	2	0	7	1	6	3	0
RAINBOW DR & SR-75	**13**	0	0	1	2	10	1	2	5	0	4	0	0	6	0	6	5	2
09TH ST & PALM AV	**10**	0	2	2	1	5	2	3	1	0	2	1	0	3	0	4	3	0
13TH ST & IMPERIAL BEACH BL	**9**	0	0	0	3	6	2	1	3	0	1	2	0	4	1	3	5	0
09TH ST & IMPERIAL BEACH BL	**5**	0	1	0	3	1	1	0	0	4	0	0	0	0	1	2	2	0
07TH ST & SR-75	**5**	0	0	1	1	3	1	0	2	1	1	0	0	1	0	3	2	0
Unsignalized Intersections																		
RAINBOW DR & PALM AV	**12**	0	1	1	4	6	3	0	4	3	1	0	0	0	0	5	2	1
CONNECTICUT ST & IMPERIAL BEACH BL	**11**	0	0	2	5	4	2	1	1	1	0	3	0	1	0	2	1	0
GEORGIA ST & IMPERIAL BEACH BL	**11**	0	0	1	2	8	5	1	2	1	1	0	0	3	0	4	6	0
09TH ST & ELM AV	**7**	0	2	1	4	0	4	0	1	0	0	0	0	1	0	3	2	0
FLORIDA ST & ELM AV	**6**	0	0	2	1	3	2	2	1	1	0	0	0	0	1	4	4	0
09TH ST & DONAX AV	**6**	0	0	2	1	3	2	0	2	0	0	2	0	2	1	2	1	0
12TH ST & PALM AV	**6**	0	1	0	1	4	2	1	1	0	0	1	0	1	1	1	3	1
PRIVATE RD & PALM AV	**6**	0	0	2	3	1	2	1	0	0	1	2	0	0	0	4	4	0
13TH ST & HOLLY AV	**5**	0	0	0	2	3	2	1	2	0	0	0	0	1	0	0	1	0
PRIVATE RD & IMPERIAL BEACH BL	**5**	0	0	2	1	2	1	0	3	0	0	1	0	2	0	3	1	0
LOUDEN LN & IMPERIAL BEACH BL	**5**	0	0	2	2	1	0	0	0	0	1	3	0	0	0	2	2	0
10TH ST & PALM (SB) AV	**5**	1	0	0	2	2	2	1	0	0	0	1	0	0	0	2	2	0
14TH ST & IRIS AV	**4**	0	0	0	0	4	2	2	0	0	0	0	0	0	0	2	0	1
12TH ST & ELM AV	**4**	0	0	1	2	1	2	1	0	0	1	0	0	1	0	2	1	0
13TH ST & DONAX AV	**4**	0	0	1	2	1	3	0	0	0	0	0	0	0	0	1	1	0
DELAWARE ST & PALM AV	**4**	0	1	0	0	3	0	0	1	3	0	0	0	2	0	1	3	0
02ND ST & PALM AV	**4**	0	0	1	0	3	0	2	1	0	0	0	0	0	0	3	2	0
SEACOAST DR & PALM AV	**4**	0	0	1	0	3	0	0	2	1	0	1	0	0	0	2	3	0
04TH ST & PALM AV	**4**	1	0	1	1	1	0	0	1	0	0	1	0	1	1	2	0	0
13TH (SB) ST & IRIS AV	**3**	0	0	0	0	3	2	1	0	0	0	0	0	0	0	1	1	0

IMPERIAL BEACH LOCAL ROADWAY SAFETY PLAN

Legend: Probability of Crash Type Exceeding Threshold Proportion: 90-100% 80-90% 70-80%

Intersection	Crashes	Fatal Collisions	Serious Injury Collisions	Other Visible Injury Collisions	Complaint of Pain Collisions	PDO Collisions	Broadside	Sideswipe	Rear End	Head On	Other	Pedestrian	Bicycle	Aggressive	Distracted	Impaired	Dark	Wet
14TH ST & GROVE AV	**3**	0	0	1	2	0	3	0	0	0	0	0	0	1	0	0	0	0
12TH ST & IMPERIAL BEACH BL	**3**	1	0	0	1	1	0	1	0	1	0	1	0	0	0	0	1	0
SEACOAST DR & IMPERIAL BEACH BL	**3**	0	0	0	1	2	1	1	0	0	0	0	0	1	0	1	1	0
EMORY ST & IMPERIAL BEACH BL	**3**	0	0	0	1	2	1	0	0	0	1	1	0	1	0	2	2	0
05TH ST & IMPERIAL BEACH BL	**3**	0	0	1	1	1	0	1	0	0	1	1	0	0	0	0	1	0
OCEAN LN & ELDER AV	**3**	0	0	0	0	3	0	1	0	0	1	1	0	1	0	2	1	0
02ND ST & EVERGREEN AV	**3**	0	0	0	1	2	1	2	0	0	0	0	0	0	0	2	1	0
07TH ST & ELM AV	**3**	0	0	1	0	2	0	2	0	0	1	0	0	0	1	2	2	1
CONNECTICUT ST & ELM AV	**3**	0	0	1	0	2	0	2	0	0	0	0	0	0	0	0	1	0
13TH ST & ELM AV	**3**	0	1	0	1	1	2	0	0	1	0	0	0	0	0	0	2	0
02ND ST & DATE AV	**3**	0	0	0	1	2	2	1	0	0	0	0	0	1	0	1	1	0
SEACOAST DR & DAHLIA AV	**3**	0	0	0	1	2	0	2	0	0	1	0	0	0	0	1	0	0
SEACOAST DR & DONAX AV	**3**	0	0	0	2	1	1	0	0	0	1	1	0	0	0	0	1	0
07TH ST & DONAX AV	**3**	0	0	1	0	2	1	1	0	0	0	1	0	0	0	0	1	0
EMORY ST & DONAX AV	**3**	0	0	0	1	2	1	0	2	0	0	0	0	0	0	2	1	0
ALABAMA ST & PALM AV	**3**	0	0	0	1	2	0	1	2	0	0	0	0	3	0	1	0	0
03RD ST & PALM AV	**3**	0	0	0	1	2	2	1	0	0	0	0	0	0	0	2	2	0
SILVER STRAND BL & PALM AV	**3**	0	0	0	1	2	1	2	0	0	0	0	0	0	0	0	0	0
EMORY ST & PALM AV	**3**	0	0	1	0	2	0	1	1	0	0	0	0	1	0	1	0	0
09TH ST & CALLA AV	**3**	0	0	0	1	2	2	1	0	0	0	0	0	1	0	1	1	0
DELAWARE ST & CALLA AV	**3**	0	0	1	1	1	0	0	1	1	0	1	0	0	0	2	3	1

Table 9. *Analysis Rankings - Segments in the City of Imperial Beach*

Facility	Cross Street 1	Cross Street 2	Crashes	*Fatal Collisions*	*Serious Injury Collisions*	*Other Visible Injury Collisions*	*Complaint of Pain Collisions*	*PDO Collisions*	Broadside	Sideswipe	Rear End	Head On	Other	Pedestrian	Bicycle	Aggressive	Distracted	Impaired	Dark	Wet
Arterial																				
Belshire Ave	03RD ST	04TH ST	**2**	0	0	0	1	1	0	1	1	0	0	0	0	0	0	2	0	0
Collector																				
No collisions on Collector Streets																				
Local																				
Norwalk Blvd	03RD ST	End of Street	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
Norwalk Blvd	ENCANTO AV	End of Street	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0
188th St	05TH ST	CAROLINA ST	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	1	0
Gridley Rd	CORVINA ST	05TH ST	1	0	0	0	0	1	0	0	1	0	0	0	0	0	1	1	1	0
Baber Ave	CHERRY AV	CYPRESS AV	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0
8th St	BASSWOOD AV	CHERRY AV	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	0
7th St	DONAX AV	ELM AV	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Thorn St	End of Street	CAROLINA ST	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0
Evergreen Ave	03RD ST	04TH ST	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	1	0
Holly Ave	11TH ST	12TH ST	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	1	0

**Changes to Segment occurred during analysis process; may be omitted. Recent construction has changed roadway geometry; omitted from countermeasure analysis

Table 10. Top 20 Locations of Interest in the City of Imperial Beach

Rank	Signalized / Unsignalized	Intersection	Crashes	Fatal Collisions	Serious Injury Collisions	Other Visible Injury Collisions	Complaint of Pain Collisions	PDO Collisions	Broadside	Sideswipe	Rear End	Head On	Other	Pedestrian	Bicycle	Aggressive	Distracted	Impaired	Dark	Wet
1	S	13TH ST & PALM AV	**15**	0	0	3	2	10	2	1	9	0	0	1	0	8	1	5	4	0
2	S	07TH ST & PALM AV	**14**	0	0	2	6	6	8	1	1	1	1	2	0	3	0	3	4	0
3	S	FLORIDA ST & PALM AV	**14**	0	0	4	6	4	3	2	3	1	1	2	0	7	1	6	3	0
4	S	RAINBOW DR & SR-75	**13**	0	0	1	2	10	1	2	5	0	4	0	0	6	0	6	5	2
5	U	RAINBOW DR & PALM AV	**12**	0	1	1	4	6	3	0	4	3	1	0	0	0	0	5	2	1
6	U	GEORGIA ST & IMPERIAL BEACH BL	**11**	0	0	1	2	8	5	1	2	1	1	0	0	3	0	4	6	0
7	U	CONNECTICUT ST & IMPERIAL BEACH BL	**11**	0	0	2	5	4	2	1	1	1	0	3	0	1	0	2	1	0
8	S	09TH ST & PALM AV	**10**	0	2	2	1	5	2	3	1	0	2	1	0	3	0	4	3	0
9	S	13TH ST & IMPERIAL BEACH BL	**9**	0	0	0	3	6	2	1	3	0	1	2	0	4	1	3	5	0
10	U	09TH ST & ELM AV	**7**	0	2	1	4	0	4	0	1	0	0	0	0	1	0	3	2	0
11	U	12TH ST & PALM AV	**6**	0	1	0	1	4	2	1	1	0	0	1	0	1	1	1	3	1
12	U	PRIVATE RD & PALM AV	**6**	0	0	2	3	1	2	1	0	0	1	2	0	0	0	4	4	0
13	U	FLORIDA ST & ELM AV	**6**	0	0	2	1	3	2	2	1	1	0	0	0	0	1	4	4	0
14	U	09TH ST & DONAX AV	**6**	0	0	2	1	3	2	0	2	0	0	2	0	2	1	2	1	0
15	U	10TH ST & PALM (SB) AV	**5**	1	0	0	2	2	2	1	0	0	0	1	0	0	0	2	2	0
16	S	09TH ST & IMPERIAL BEACH BL	**5**	0	1	0	3	1	1	0	0	4	0	0	0	0	1	2	2	0
17	U	13TH ST & HOLLY AV	**5**	0	0	0	2	3	2	1	2	0	0	0	0	1	0	0	1	0
18	U	04TH ST & PALM AV	**4**	1	0	1	1	1	0	0	1	0	0	1	0	1	1	2	0	0
19	U	12TH ST & IMPERIAL BEACH BL	**3**	1	0	0	1	1	0	1	0	1	0	1	0	0	0	0	1	0
20	U	13TH ST & ELM AV	**3**	0	1	0	1	1	2	0	0	1	0	0	0	0	0	0	2	0

Key Findings Summary

The majority of collisions within the City occur within 500 feet of an intersection. This aligns with the street network of Imperial Beach which has tightly spaced intersections throughout the community that dictate traffic operations and safety.

The highest occurring crash type in the City is broadside collisions (26%), followed by rear-end (22%) and sideswipe (19%) collisions. Collisions are primarily caused by driving under the influence (21%), automobile right of way violations (19%), and improper turning (11%).

Several intersections along Palm Avenue and Imperial Beach Boulevard are in the top 10 highest collision intersections but a reduction of future collisions is expected after planned improvements occur.

Priority Corridors

As detailed in **Figure 30** on the following page, the City identified 9th Street and 13th Street as a priority corridor for the LRSP. These roadways provide access to the City's commercial core, coastal areas, senior living centers, and several schools. 9th Street is identified as a Multimodal Boulevard and thus, it is to be designed to serve different modes and provide multiple mobility options for its users.

Emphasis Areas

From the key findings in the crash history analysis, discussions with City staff, and review of the 2020-2024 SHSP, the following five key emphasis areas have been identified:

1. Safety on Priority Corridors
2. Distracted Driving
3. Impaired Driving
4. Vulnerable Roadway Users
5. Small-Scale Infrastructure

The five developed emphasis areas are described in the next section. Each emphasis area includes preliminary supporting data findings, goals, strategies and improvement locations.

Figure 30. City of Imperial Beach Roadway Network and Identified Priority Corridors

EMPHASIS AREAS

The five emphasis areas in the LRSP are areas of opportunity to improve safety in the City through the incorporation of a comprehensive 5 Es of traffic safety approach (Engineering, Enforcement, Education, Emergency Response, and Emerging Technologies), where appropriate. The five emphasis areas included are based off the trends and findings identified during the LRSP process, which includes the data analysis and interactions with the City's safety partners. Each emphasis area includes the following three parts:

- a description of the safety issue and where there is opportunity to improve,
- a goal to strive for to help reduce the safety concern;
- and strategies that include activities, potential safety projects, and countermeasures to address the safety issue identified.

Below are the five emphasis areas identified for the LRSP including the challenge area from the 2020-2024 SHSP it aligns with:

Emphasis Area	2020-2024 SHSP Challenge Area
Safety On Priority Corridors	Aging Drivers, Bicyclists, Motorcyclists, Pedestrians, & Young Drivers
Distracted Driving	Distracted Driving
Impaired Driving	Impaired Driving
Vulnerable Roadway Users	Bicyclists & Pedestrians
Small-Scale Infrastructure	Intersections & Lane Departures

Emphasis Area 1: Safety On Priority Corridors

Description:

The City identified 9th Street and 13th Street as priority corridors for the LRSP. These roadways are utilized by local residents and visitors alike and are both prioritized for the safe mobility of all transportation modes. Description and the collision history for these corridors are described below. Collision analyses of these priority corridors help in the identification of other systemic improvements.

Priority Corridor: 9th Street

9th Street is a north-south roadway, and it is classified as a 4-Lane undivided collector in the City of Imperial Beach General Plan Circulation Element. This roadway provides access to the City's commercial core, coastal areas, senior living centers, and schools. Currently, this roadway is described as a "Multimodal Boulevard[6]." 9th Street poses safety concerns due to the number of schools in the area, frequent bus stops, senior living, and pedestrian activity. The senior living facilities along 9th Street pose great safety concerns not only for the pedestrian environment, but also for emergency response. Enhancements to both the pedestrian environment and emergency response would greatly benefit the elderly community along this roadway.

As shown in **Figure 31**, there are no dedicated bike facilities along 9th Street. There are only two signalized intersections along this corridor and high visibility crosswalks are provided on four (4) intersections. The speed limit along this roadway ranges between 30 to 35 miles per hour.

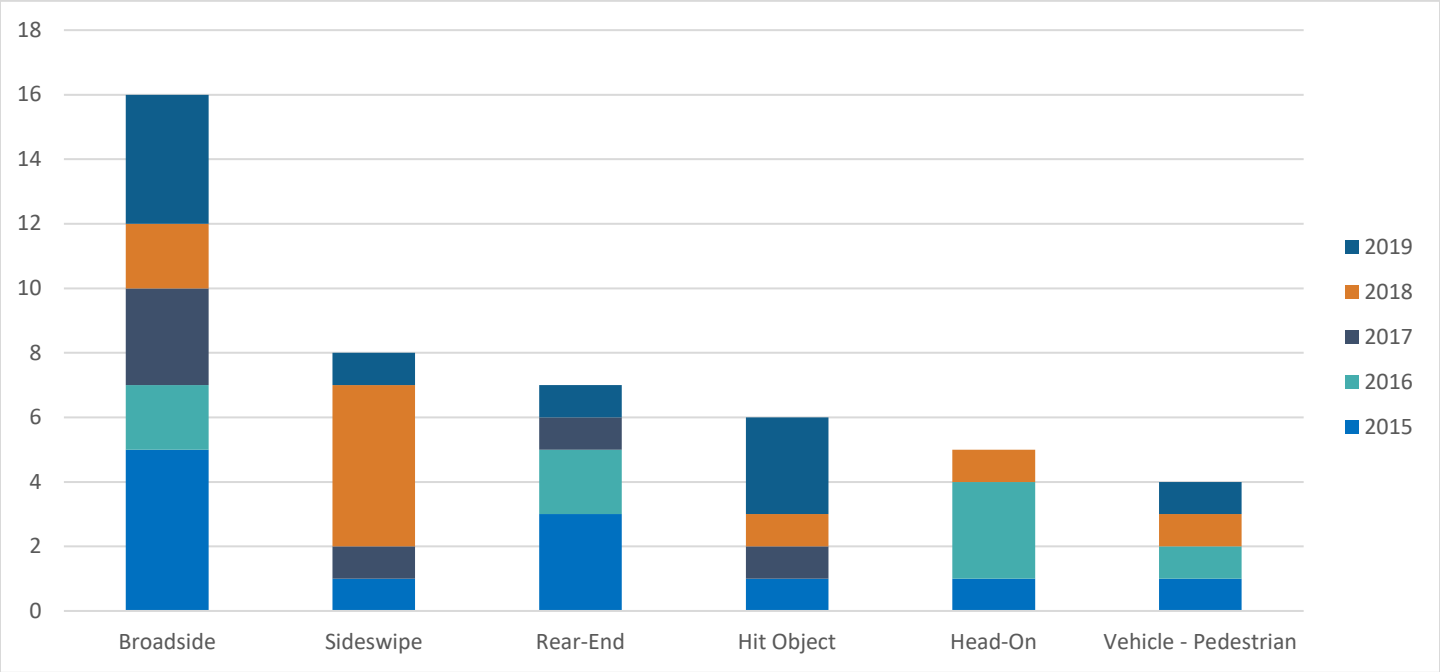
Figure 31. Existing 9th Street Conditions

Source: Google Maps (2019)

[6] City of Imperial Beach General Plan (2018).

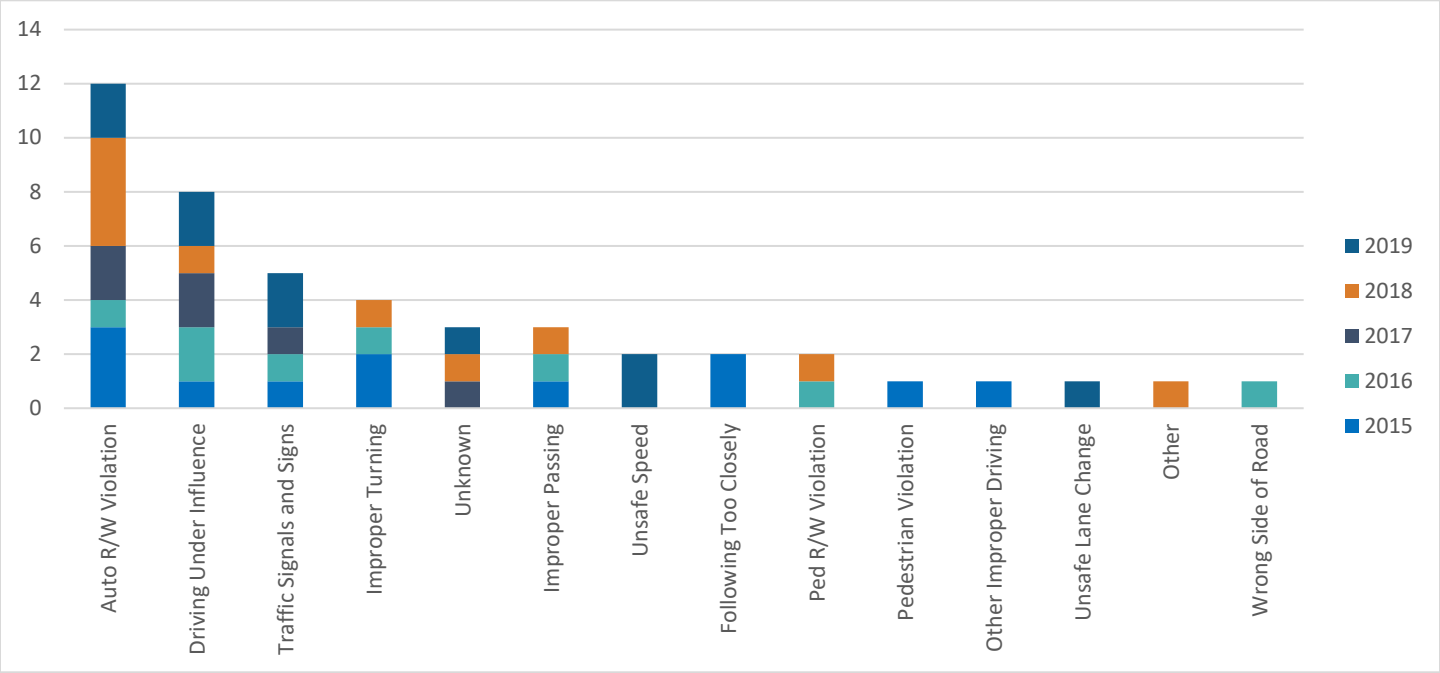
For the crash history analysis between 2015-2019, a total of 46 collisions occurred either along 9th Street or within 250 feet of the intersection. **Figure 32** shows the number of collisions for 9th Street by crash type for each year in the crash history period analyzed. The leading crash type for collisions along 9th Street is broadside collisions with 16 collisions followed by sideswipe at eight collisions and rear-end crash type at seven collisions. Broadside collisions have occurred consistently along 9th Street between 2015-2019. **Figure 33** shows the number of collisions along 9th Street by collision factor. The collision factor with the highest number of collisions is automobile right of way violation (12 collisions). The next leading collision factors are driving under the influence (8 collisions) and traffic signals and signs (5 collisions). **Figure 34** provides a breakdown of the collision impact along 9th Street. Of the 46 collisions, there were six collisions resulting in severe injuries.

Figure 32. Number of Collisions along 9th Street by Crash Type for Each Crash History Year



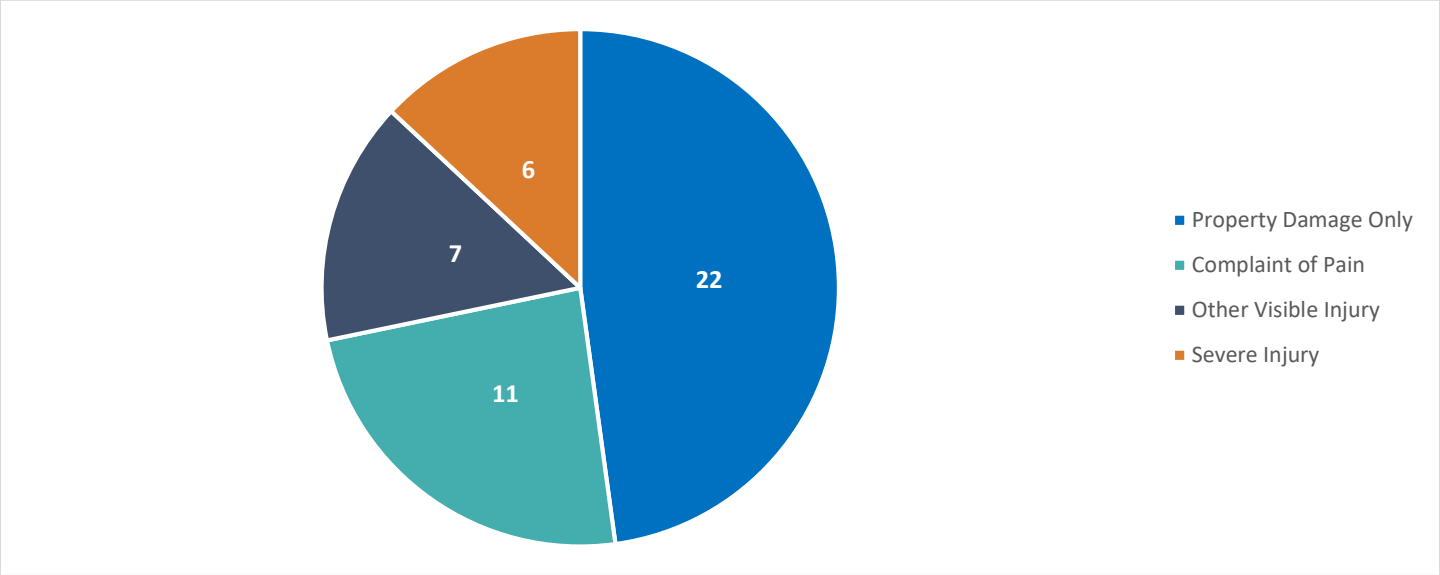
Data Source: Statewide Integrated Traffic Records System (SWITRS) 2015-2019

Figure 33. Number of Collisions along 9th Street by Collision Factor for Each Crash History Year



Data Source: Statewide Integrated Traffic Records System (SWITRS) 2015-2019

Figure 34. Number of Collisions along 9th Street by Collision Impact



Data Source: Statewide Integrated Traffic Records System (SWITRS) 2015-2019

DATA FINDING	A total of 46 collisions occurred along 9th Street corridor between 2015-2019. This represents about 6% of the total collisions that occurred in the City. Six collisions involved a pedestrian or bicyclists, which is about 8% of all pedestrian- and bicycle-involved collisions in the City. Of the six pedestrian/bicyclist-involved collisions, three resulted in a severe injury and three resulted in another visible injury.

A more detailed collision analysis breakdown by intersection along 9th Street and potential safety projects is included in **Appendix D**.

Priority Corridor: 13th Street

13th Street is also a north-south roadway in the City. This corridor functions as a 4-Lane Class I collector south of SR-75/Palm Avenue and as a 3-lane Class II collector north of SR-75/Palm Avenue. This corridor poses safety concerns due to its proximity to schools in the area, the Naval Outlying Landing Field entrance points, commercial centers, and bike/pedestrian activity. Enhancements to the active transportation environment would greatly benefit the community along this roadway.

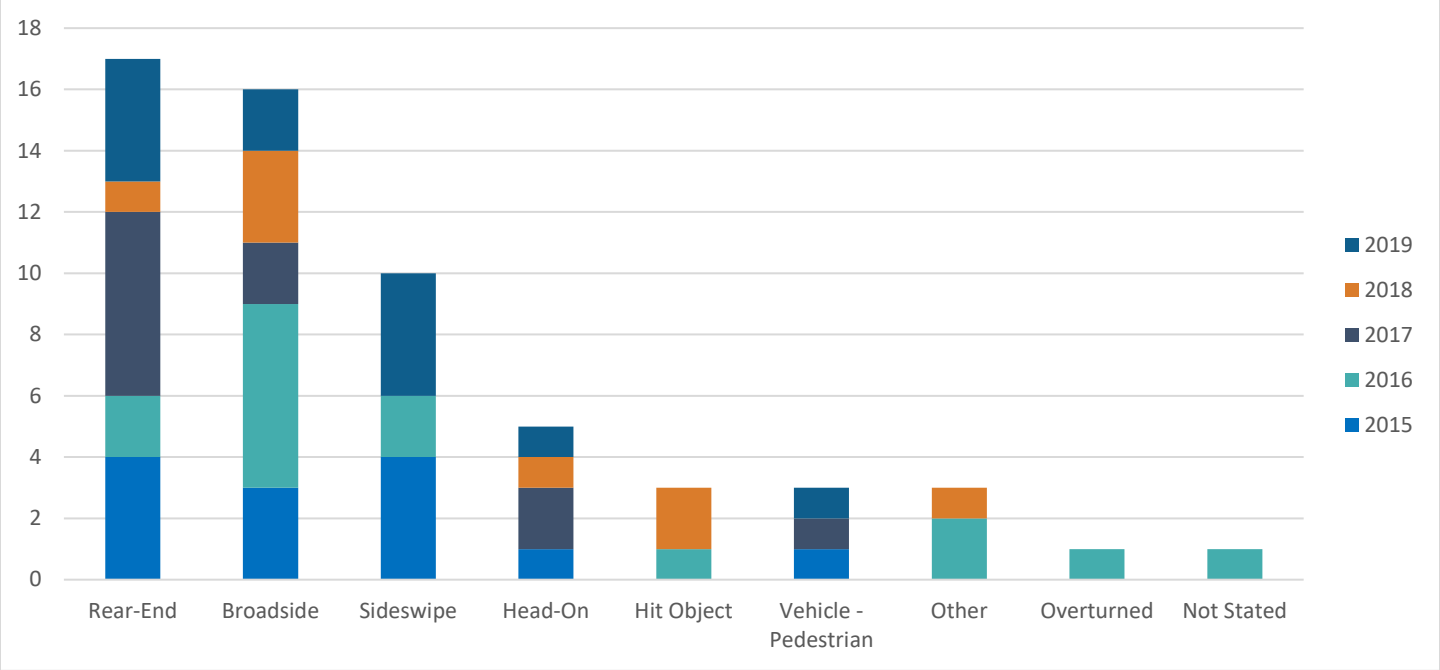
Figure 35 shows the existing conditions for a majority of 13th Street after the completion of the Street Lane Reallocation in 2016. A majority of 13th Street have buffered bike lines with a few intersection approaches switching to bike lane facilities. In addition, this corridor provides local bike facilities that connect to the regional bike network via Bayshore Bikeway at the northern end of 13th Street. There are three signalized intersections along this corridor and high visibility crosswalks are provided on a few legs for nine (9) intersections. There are also multiple school crossings along the corridor south of Palm Avenue. The speed limit along this roadway ranges between 30 to 35 miles per hour with a drop in the speed limit with the school zone between Elm Avenue and Imperial Beach Boulevard.

Figure 35. Existing 13th Street Conditions

Source: Google Maps (2019)

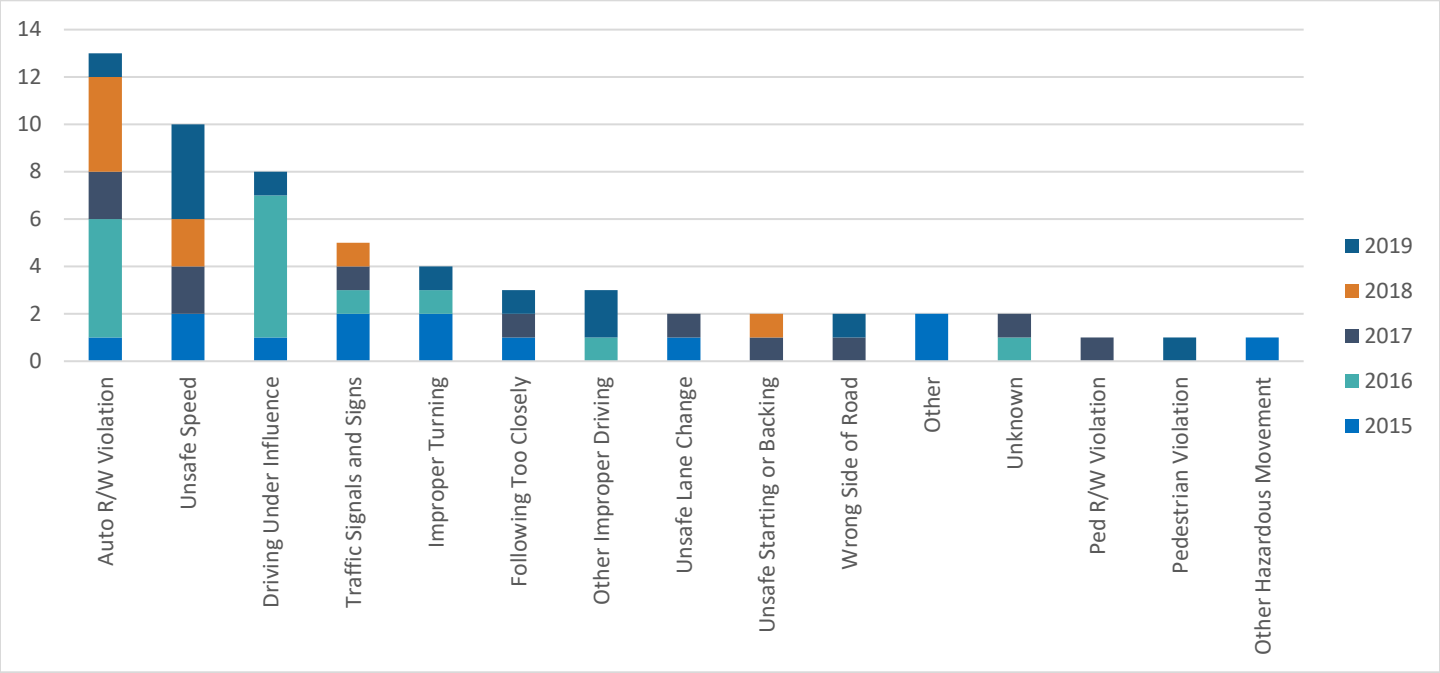
For the crash history analysis between 2015-2019, a total of 59 collisions occurred along 13th Street. The 13th Street Lane Reallocation was completed in 2016. The crash history data presented includes collisions after the completion of the project. **Figure 36** shows the number of collisions along 13th Street by crash type for each year in the crash history period analyzed. The leading crash type for collisions along 13th Street is rear-end collisions with 17 collisions followed by broadside crash type at 16 collisions. **Figure 37** shows the number of collisions along 13th Street by collision factor. The collision factor with the highest number of collisions is automobile right of way violation with 13 collisions. The next leading collision factors are unsafe speed (10 collisions) and driving under the influence (8 collisions). **Figure 38** provides a breakdown of the collision impact along 13th Street. Of the 59 collisions, there was one collision resulting in severe injuries.

Figure 36. Number of Collisions along 13th Street by Crash Type for Each Crash History Year



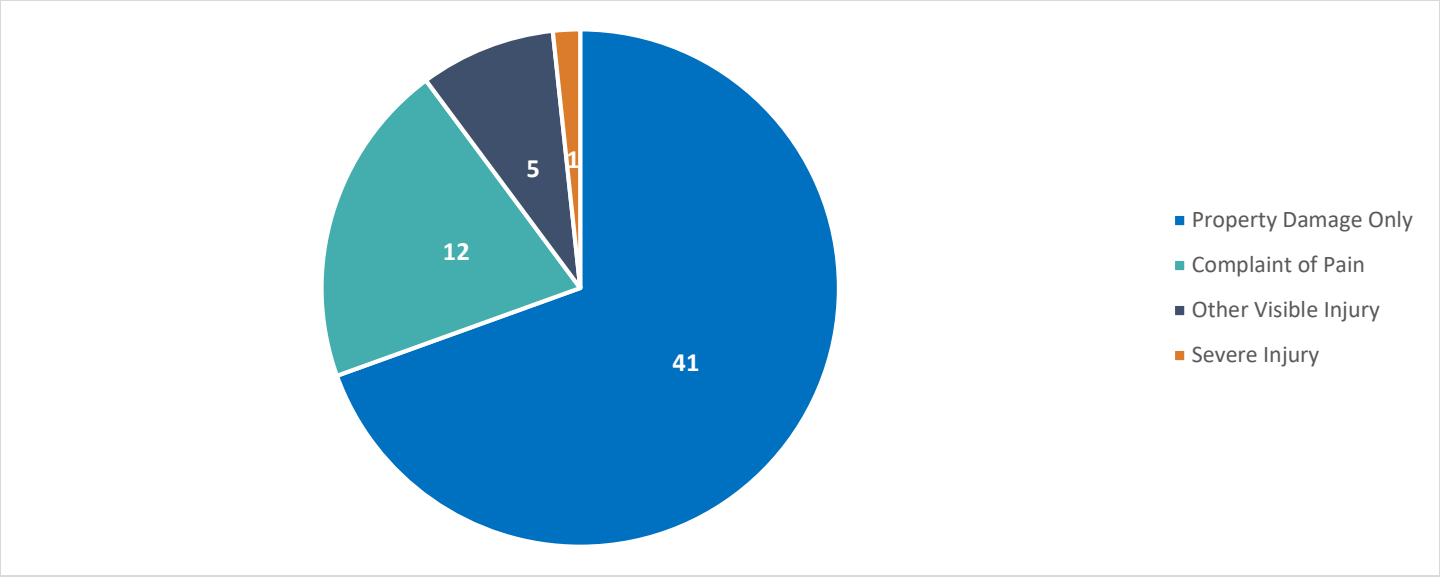
Data Source: Statewide Integrated Traffic Records System (SWITRS) 2015-2019
Note: The 13th Street Lane Reallocation project was completed in 2016.

Figure 37. Number of Collisions along 13th Street by Collision Factor for Each Crash History Year



Data Source: Statewide Integrated Traffic Records System (SWITRS) 2015-2019
Note: The 13th Street Lane Reallocation project was completed in 2016.

Figure 38. Number of Collisions along 13th Street by Collision Impact



Data Source: Statewide Integrated Traffic Records System (SWITRS) 2015-2019
Note: The 13th Street Lane Reallocation project was completed in 2016.

DATA FINDING	A total of 59 collisions occurred along 13th Street corridor between 2015-2019. This represents about 12% of the total collisions that occurred in the City. Eight collisions involved a pedestrian or bicyclists, which is about 11% of all pedestrian- and bicycle-involved collisions in the City. Of the eight pedestrian/bicyclist-involved collisions, two resulted in other visible injury and three resulted in a complaint of pain.

Goals:

- Reduce the frequency and severity of crashes at signalized and unsignalized intersections
- Incorporate Complete Streets principles where applicable
- Enhance emergency response times prior to implementing in-road features
- Facilitate enhanced pedestrian crossings

Strategies:

The following engineering-related countermeasures are recommended for achieve the goals above.

Countermeasure	HSIP CM #[2]	Crash Types	CRF	Systemic Opportunity	CMF Clearinghouse Crash Types	CMF Clearinghouse CRF
High-visibility crosswalk[1]	--	--	--	--	P&B	40%
Install advance stop bar before crosswalk (bike box)	S20PB	P&B	15%	Very High	P&B	35%
Install pedestrian countdown signal heads	S17PB	P&B	25%	Very High	P&B	25%
Modify signal phasing to implement an LPI	S21PB	P&B	60%	Very High	P&B	59%
Install raised medians / refuge islands	NS19PB	P&B	45%	Medium	P&B	30-56%
Curb extensions (Roadway)	R35PB	P&B	35%	Medium	P&B	8-56%
Curb extensions (Non-Signalized Intersection)	NS21PB	P&B	35%	Medium	P&B	37%

Source: Local Roadway Safety Manual, 2020.

[1] FHWA Crash Modification Factor Clearinghouse

[2] S = Signalized Intersection, NS = Non-Signalized Intersection

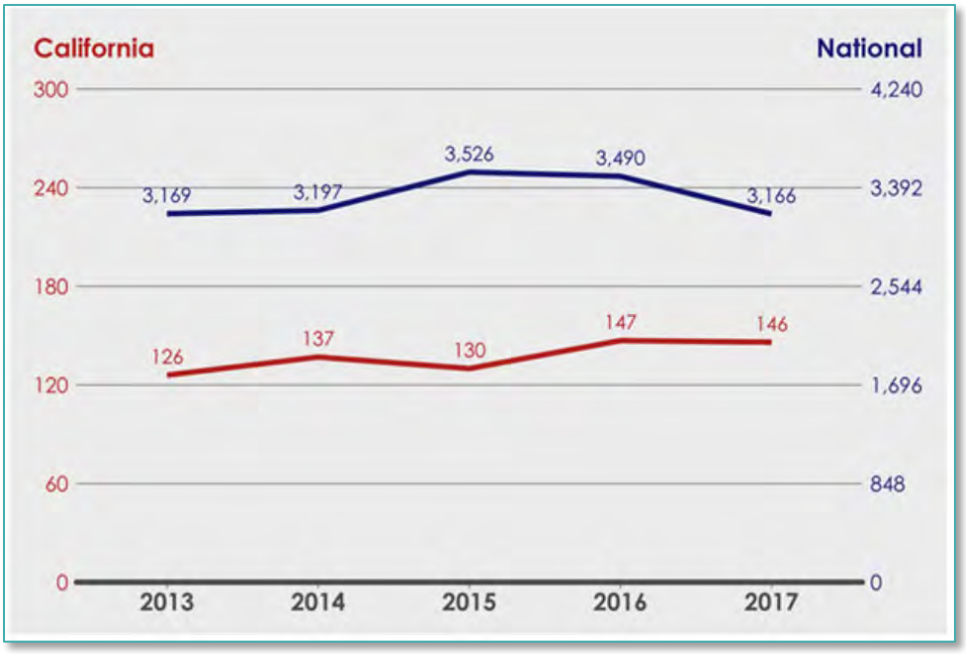
POTENTIAL IMPROVEMENT LOCATION	The entirety of 9th Street should be addressed as a corridor to counter several identified issues related to traffic safety. The intersections of 9th Street/Palm avenue and 9th Street/Elm Avenue were in the top 10 intersections with collisions in the City.

Emphasis Area 2: Distracted Driving

Description:

The California Office of Traffic Safety (OTS) describes distracted driving as anything that takes your eyes or mind off the road or hands off the steering wheel – especially when texting or using a phone. California has put in place distracted driving laws in an effort to eliminate distracted driving. The California's Cell Phone Law requires drivers to use hands-free devices or cellphone mounts attached on the dashboards or center console, as long as it is not hindering the drivers view. The risks associated with distracted driving are relatively high. **Figure 39** illustrates California and national fatality numbers. Data related to distracted driving is known to be less available as it is difficult to identify the behavior of the driver prior to a crash. According to input from the City of Imperial Beach stakeholders, distracted driving is a high priority.

Figure 39. Distracted Driving Fatality Trends



Source: Fatality Analysis Reporting System (FARS) 2013 - 2017

DATA FINDING	The City and its safety partners identified distract driving as a safety concern. Even though there were 20 distracted driving collisions, it is generally believed that these types of collisions are significantly underreported in the SWITRS data due to the difficulty of an officer being able to determine if a driver was distracted when the officer arrives on the scene after a collision.

Goals:

- Reduce annual distracted driving crashes

Strategies:

Countermeasure / Strategy	Why it Works
Public outreach campaign coordinated with other jurisdictions and major employers	Public information campaigns by themselves are unlikely to change behavior. No studies have documented the effects of public information campaigns on driver behavior. However, communication campaigns remain a means to alert the population about the problem.[1]
High-visibility enforcement campaigns	High-visibility law enforcement programs increase a driver's perception of risk of being ticketed. This strategy increases effectiveness with extensive publicity. [1]

[1] National Highway Traffic Safety Administration (NHTSA) *Understanding the Effects of Distracted Driving and Developing Strategies to Reduce Resulting Deaths and Injuries,* 2013

Emphasis Area 3: Impaired Driving

Description:

The second leading collision factor for fatal and severe injuries between 2015 and 2019 is driving or biking under the influence of alcohol and/or drugs, which is ten percent higher than the next highest collision factor (pedestrian right-of-way). The percentage of fatal and severe injuries with the collision factor of driving or biking under the influence of alcohol and/or drugs (25%) is slightly higher than that of San Diego County (17%). By law, drivers are alcohol-impaired when they have a blood alcohol concentration (BAC) of 0.08% or higher. Driving under the influence of drugs include prescribed medication, illicit drugs, over-the-counter medications or marijuana - medical or recreational is also considered impaired driving.

Between 2015 and 2019, the City had about 147 collisions that involved impaired driving. Of the 147 collisions, about 143 of them were fatal and injury-related collisions. Of the 143 fatal and injury-related collisions, 22% involved a driver who was reported as being under the influence. Of the 143 fatal and injury-related collisions, six were fatal and severe collisions.

DATA FINDING	About 29% of the total collisions in the City is due impaired driving, and one of the three fatal collisions was due to impaired driving.

Goals:

- Reduce the number of fatal and severe injury collisions attributed to driving under the influence

Strategies:

Countermeasure / Strategy	Why it Works
Authorize, publicize, and conduct sobriety checkpoints programs	The purpose of checkpoints is to deter driving after drinking by increasing the perceived risk of arrest. To do this, checkpoints should be highly visible, publicized extensively, and conducted regularly, as part of an ongoing sobriety checkpoint program. The CDC's systematic review of 15 high-quality studies found that checkpoints reduce alcohol-related fatal crashes by 9%. [1]
Implement an impaired driving education campaign targeting specific audiences based on age group	In 2018, the highest percentage of drunk drivers were 21- to 24-year-olds (27%), followed by 25- to34-year-olds (26%). [2]
High-Visibility Saturation Patrols	Large number of law enforcement officers patrolling specific areas at times and locations where impaired-driving crashes commonly occur. The primary reason for effectiveness is the perceived risk of arrest. Similar to publicized sobriety checkpoints, this strategy increases effectiveness with extensive publicity. [1]

Countermeasure / Strategy	Why it Works
Create effective media campaigns in both visual and print media	Media campaigns that are research-based, and carefully planned in coordination with law enforcement are believed to be effective in impacting decisions out of fear of arrest and fear of injury to self or others. [3] [4]

[1] *Countermeasures That Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices*, Ninth Edition, 2017, National Highway Traffic Safety Administration (NHTSA)
[2] NHTSA Drunk Driving Risk Factors
[3] Absolute Advocacy *Drunk Driving Prevention Media Campaigns*, 2013
[4] Community Preventive Services Task Force *Motor Vehicle Injury - Alcohol-Impaired Driving: Mass Media Campaigns*, 2013

POTENTIAL IMPROVEMENT LOCATION	The top locations for collisions with the primary collision factor of driving under the influence of drugs were Palm Avenue and Imperial Beach Boulevard. The City can consider doing an impaired driving education campaign (e.g., community awareness events) along these streets. In addition, the City can consider having additional enforcement presence at these top location streets.

Emphasis Area 4: Vulnerable Roadway Users

Description:

There are many pedestrians, especially elderly and young adults, throughout the City that need appropriate infrastructure to commute to key destinations such as schools, beaches, and core commercial areas. The City of Imperial Beach has outlined policies for complete streets and multi-modal street designs and access in the City's General Plan Mobility Element. These policies will ensure that all street and highway designs further the goal of providing safe and efficient mobility for all users. Currently, many of the roads lack active transportation infrastructures such as sidewalks, crosswalks, bike paths, intersection control, and speed controls that help provide a safe and comfortable environment for people walking and biking. Of the 72 collisions in which at least one pedestrian or bicyclist was involved, 6 resulted in severe injuries and 3 resulted in a fatality.

DATA FINDING	A total of 72 collisions that involved a pedestrian or bicyclist, which is about 14% of the total collisions within the City. There was a total of nine fatal and severe collisions between 2015-2019 involving a bicyclist or pedestrian. This represents about 45% of the total fatal and severe collisions that occurred in the City, showing that pedestrians and bicyclists are some of the more vulnerable roadway users in the City.

Goals:

- Improve active transportation infrastructure by adding pedestrian facilities, bike lanes, and other amenities to make it safer for employees and community members to get to key destinations such as school, commercial centers, transit centers, and recreation areas
- Encourage healthier lifestyles through active transportation infrastructure

Strategies:

The following engineering-related countermeasures are recommended for achieve the goals above:

Countermeasure	HSIP CM #	Crash Types	CRF	Systemic Opportunity	CMF Clearinghouse Crash Types	CMF Clearinghouse CRF
Install pedestrian crossing	S18PB	P&B	25%	High	P&B	25%
High-visibility crosswalk					P&B	40%
Add segment lighting	R01	Night	35%	Medium	Night, All	18-69%
Widen shoulder	R15	al	30%	Medium	Fixed object, Run-off road, sideswipe	15-75%
Install flashing beacons as advance warning	S10	All	30%	Medium	All	38%-64%
Install bike lanes	R32PB	P&B	35%	High	P&B	0-53%

Countermeasure	HSIP CM #	Crash Types	CRF	Systemic Opportunity	CMF Clearinghouse Crash Types	CMF Clearinghouse CRF
Install separated bike lanes	R33PB	P&B	45%	High	P&B	3.7-100%

Source: Local Roadway Safety Manual, 2020.

In addition to the above engineering countermeasures, it is recommended that the City consider the provision of bicycle storage facilities as a condition of approval on new development applications for proposed commercial, hotel or major residential projects and/or provided at public transit and bus system facilities, or designated public transit stops.

POTENTIAL IMPROVEMENT LOCATION	A majority of the pedestrian- and bicycle-involved collisions occurred on Palm Avenue and Coronado Avenue/Imperial Beach Boulevard. In addition, Multimodal Boulevards such as 9th Street should be prioritized for active transportation enhancements such as traffic calming, road diets, and wider sidewalks.

Emphasis Area 5: Small-Scale Infrastructure

Description:

According to the FHWA, roadway factors that may impact the safety of a particular roadway include facility pavement condition, access control, speed, roadway cross-section and traffic volumes. This emphasis area notes the importance of these factors, categorized as roadway geometry, in the City of Imperial Beach to maintain safe facilities. From 2015-2019, 18 collisions occurred with roadway surface condition of wet or slippery while 482 collisions occurred on dry roadways. Similarly, 477 collisions occurred on roadways where no unusual roadway condition was present signifying that pavement conditions are not a significant contributing factor for roadway collisions. It was determined that 248 collisions occur at intersections and 125 of those intersection collisions occur where no right-of-way controls are present. At intersections with no right-of-way control, the number of potential conflict points between roadway users increases. The data shows that broadside collisions are the most common collision type at intersections with no right-of-way control , which includes 38 total collisions, 24 of which are auto right-of-way violations and 10 of which involved a bicyclist.

At a high level, broadside collisions typically include two motor vehicles where at least one party is making a turn and the other is proceeding straight. At intersections with no right-of-way control, roadway users rely more heavily on their own judgement and the limitations of the roadway geometry to execute a move safely. In general, sight distance, roadway geometry, unsignalized intersections and outdated striping should be evaluated throughout the City of Imperial Beach to improve the geometric safety of the roads for their users.

DATA FINDING	Broadside collisions (26%) are consistently the most common crash type within the City.

Goals:

- Increase roadway safety by improving roadway geometry

Strategies:

The following engineering-related countermeasures are recommended for achieve the goals above:

Countermeasure	HSIP CM #	Crash Types	CRF	Systemic Opportunity	CMF Clearinghouse Crash Types	CMF Clearinghouse CRF
Install raised median	R08	All	25%	Medium	Head-on	20-75%
Install median (flush)	R09	All	15%	Medium	All	15-78%
Improve signal hardware: lenses, back-plates, mounting, size, number	S02	All	15%	Medium	Rear-end, Angle	0-46%
Install Flashing Yellow Arrow for left-turns	N/A	N/A	N/A	N/A	Left-turn	14.3%

Countermeasure	HSIP CM #	Crash Types	CRF	Systemic Opportunity	CMF Clearinghouse Crash Types	CMF Clearinghouse CRF
Upgrade intersection pavement markings	NS07	All	25%	Very High	All	13-60%
Convert to AWSC from TWSC or Yield	NS02	All	50%	High	Left-turn, angle	6-80%
Improve sight distance to intersection	NS11	All	20%	High	All	11-56%

Source: Local Roadway Safety Manual, 2020.
AWSC = All-Way Stop Control; TWSC = Two-Way Stop Control

In addition to the above engineering strategies, the following behavioral strategies are also recommended:

Countermeasure / Strategy	Why it Works
Organize targeted education campaign on safety problems at "high risk" intersections	Provides public awareness of vulnerable roadway users

POTENTIAL IMPROVEMENT LOCATION	Evaluate intersections with high number of collisions such as 13th Street at Palm Avenue, 7th Street at Palm Avenue, and Florida Street at Palm Avenue. Evaluate segments with high number of collisions such as Imperial Beach Boulevard between 3rd Street and 4th Street, Seacoast Drive between Encanto Ave and End of Road, and Holly Avenue between 11th Street and 12th Street.

EVALUATION & IMPLEMENTATION

For the LRSP to be successful, it must be implemented and monitored. The success of the LRSP will be evaluated using the preliminary process outlined below. This process will be useful to ensure proper implementation of objectives and to determine when updates are needed.

- Quarterly progress meetings will be conducted to track the implementation of the plan. In addition, the success of the plan will be evaluated on an annual basis.
- An update to the plan should be considered after no more than five years.
- Continued monitoring and recording of traffic incidents on local roadways by law enforcement.
- Maintain a list of focus areas where there are transportation safety concerns.
- Perform before & after collision analysis for safety projects to determine effectiveness.
- Continue collecting an inventory of assets in the City such as existing conditions (E.g., sidewalk conditions), safe route to school activities, pedestrian crossing types, and other project improvements to understand the infrastructure provided for roadway users.

Applying improvements that can have the most substantial impact on reducing collisions is the most effective way to show commitment to traffic safety. Using statistics to analyze the network for the most challenging locations in the City from a safety perspective, locations that may not yet see these challenges but are composed of similar characteristics to those locations should be identified and included for investments as part of the ongoing safety program.

The strategies discussed in the emphasis area section of this report include some of the systemic countermeasures that can be applied. The emphasis areas highlighted some of the most frequent influences contributing to collisions and/or issues expressed by the community. The recommended countermeasures for both systemic and project-specific improvements can be used as a basis for developing projects at locations where addressing these focus areas would be of the most benefit. Projects that address these emphasis areas can be developed with a high benefit to cost ratio allowing competitive projects to be developed even at sites with little to no direct collision history, but with conditions that might contribute to future collisions.

Through the LRSP process, the following two potential projects were identified and developed into project sheets:

- Seacoast Drive & 2nd Street Corridor Improvements
- Western Palm Avenue Corridor Improvements

The project sheets further evaluated the potential projects for collisions findings and recommended improvements and countermeasures to help the City with project implementation and funding opportunities. The project sheets can be found in **Appendix E**.

Countermeasure Selection Process

Part D of the HSM provides information on Crash Modification Factors (CMF) for roadway segments, intersections, interchanges, special facilities, and road networks.

CMF's are used to estimate the safety effects of highway improvements and apply CMFs to compare and select highway safety improvements. A CMF less than 1.0 indicates that a treatment has the potential to reduce collisions. A CMF greater than 1.0 indicates that a treatment has the potential to increase collisions. The application of an appropriate CMF can influence the decision to implement a particular project, and the misapplication of CMFs can lead to misinformed decisions. Key factors to consider when applying CMFs include:

1. Selection of an appropriate CMF,
2. Estimation of collisions without treatment,
3. Application of CMFs by type and severity, and
4. Estimation of the combined effect for multiple treatments

Examples of Safety Countermeasure can be found through several sources. This report utilizes the countermeasures found in the California LRSM and the CMF Clearinghouse website.

Countermeasures for the developed project sheets are based on collision data analysis and the workshop held with the City's safety partners. Additional countermeasures were identified for the high-level issues on a city-wide level for the 5 Emphasis Areas.

Benefit to Cost Ratio Process

Benefit to Cost Ratio (B/C Ratio) is a way to compare the overall benefits against the overall cost of a project over a specified period of time. The process of calculating the B/C Ratio begins with the identification of a horizon year (typically a 20-year project life span). The Benefit (B) of a project is the monetized value of collisions that would be prevented by the improvement over the project life-span. No build collisions are computed assuming a consistent crash rate as traffic grows in the future. The crash modification factor is then used to reduce future year collisions over the 20-year period. The Cost (C) is the initial construction cost of the project and the cost per year to maintain the project over the same 20-year span.

The B/C Ratio calculations will illustrate the expected benefits of the Crash Modification Factors (CMFs) using four steps from the Local Roadway Safety Manual:

1. Estimation of the number of expected collisions without treatment
2. Application of CMFs by type and severity
3. Application of multiple CMFs at same location/facility
4. Application of benefit of value by crash severity

For step 4, the benefit discussed is evaluated in dollars. Caltrans maintains an evaluation for the cost of collisions (injury, incapacitating, and fatal). This number is applied to the amount of collisions "avoided" and is considered the benefit value. The final step of the evaluation is to determine if the benefit equals or exceeds the costs.

B/C ratio are the most typical prioritization metric used by grant programs to determine funding awards. The overall list of projects should then be listed by their cost/benefit ratio and bundled into funding groups. This will assist the County in prioritizing the implementation of projects that will have the highest benefit first, while still planning for other recommended projects. Cost/benefit calculations will ensure that the highest ranked projects are most

competitive for external funding and will lead to the greatest amount of safety improvement for the lowest possible investment.

Funding Opportunities

Funding is a major component to implementing safety projects. Typically, local funding is supplemented by grants and other funding sources from the region, state, and federal level. By being aware and preparing for funding opportunities that support safety initiatives, the City can leverage other funding sources to help address safety issues and concerns. Potential funding opportunities include the following:

Program Name	Agency	Description
Smart Growth Incentive Program and Active Transportation Grant Program	SANDAG	The Smart Growth and Active Transportation Grant Programs fund local capital and planning projects that increase opportunities for biking, walking, and transit usage throughout the region. Eligible projects may include, but are not limited to: • Pedestrian street crossings • Traffic calming features • Pedestrian & bicycle facilities • Comprehensive planning efforts (e.g., Community Plans) • Smaller-scale neighborhood planning activities (e.g., Traffic calming or mobility plans)
Active Transportation Program (ATP)	Caltrans	The ATP funds capital and planning projects that encourage increased use of active modes of transportation through increasing proportion of trips accomplished by biking and walking, increasing safety and mobility for non-motorized users, and advancing active transportation efforts to achieve Greenhouse Gas (GHG) reduction goals. Eligible projects may include, but are not limited to: • Infrastructure Projects: Capital improvements that will further the goals of ATP. • Non-Infrastructure (NI) Projects: Education, encouragement, and enforcement activities that further the goals of the ATP. • Combination Projects: A project that combines Infrastructure and Non-Infrastructure components. • Plans: The development of a community wide bicycle, pedestrian, safe routes to school, or active transportation plan that is located in a disadvantaged community.
Highway Safety Improvement Program (HSIP)	FHWA/Caltrans	The HSIP is a core federal-aid program with the purpose of achieving a significant reduction in fatalities and serious injuries on all public roads. Eligible projects may include, but are not limited to: • Intersection improvements • Construction of shoulders • Traffic calming • Improvements for bicyclists, pedestrians, and individuals with disabilities • Minimum standards of retro-reflectivity of traffic signs and pavement markings

Program Name	Agency	Description
Surface Transportation Block Grant Program (STBGP)	FHWA	The STBGP 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. Eligible projects may include, but are not limited to: • Construction, reconstruction, rehabilitation, resurfacing, restoration, preservation, or operational improvements for highways, bridges, and tunnels on any public roadway • Construction of new bridges and tunnels on a federal-aid highway • Inspection and evaluation of bridges, tunnels, and other highway assets as well as training for bridge and tunnel inspectors • Transit capital projects • Bicycle, pedestrian, and recreational trails • Environmental mitigation efforts
Caltrans Sustainable Transportation Planning Grant Program	Caltrans	The Sustainable Transportation Planning Grant Program include the Sustainable Communities Grants and Strategic Partnership Grants. Eligible projects may include, but are not limited to: • Active transportation plans • Studies that advance a community's effort to reduce transportation related greenhouse gases • Complete Streets Plans • First Mile / Last Mile project development planning • Community to school studies or safe routes to school plans • Traffic calming and safety enhancement plans • Data collection/data sharing initiatives

CONCLUSION

The City of Imperial Beach has completed this LRSP to guide the process of future transportation safety improvements for years to come. The data-driven analysis process identified collision types, related primary collision factors, and locations of many collisions. Based on this process, five emphasis areas were developed. These emphasis areas will guide corridor improvements, education programs, and capital improvements for the City and help the City reduce collisions, especially fatal and severe collisions. The City will actively seek funding opportunities, collaborate with established safety partners, and iteratively evaluate existing and proposed transportation safety programs and capital improvements to design a safer transportation network in Imperial Beach and help the City achieve their Vision Zero initiative.