City of Fontana
LOCAL ROADWAY SAFETY PLAN

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1.0 EXECUTIVE SUMMARY

The California Department of Transportation (Caltrans) established a program for cities to prepare a Local Roadway Safety Plan (LRSP) to identify safety needs and recommend projects to address these needs. This document serves as the LRSP for the City of Fontana.

1.1 OVERVIEW

An LRSP analyzes collision data, assesses infrastructure deficiencies through an inventory of roadway system elements, and identifies roadway safety solutions on a citywide basis. The LRSP was created by the State to help local agencies develop safety projects that can be submitted for funding by the Highway Safety Improvement Program (HSIP). HSIP Cycle 11, expected around April 2022, and subsequent cycles will require an LRSP or equivalent plans such as a Vision Zero Plan or System Safety Analysis Report.

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

- Crash data source and analysis techniques
- Crash data analysis results and highest occurring crash types
- High-risk corridor and intersection analysis and safety countermeasures
- Cost estimates of recommended improvements
- Prioritization of projects based on cost-benefit ratio and effectiveness of safety improvement
- Strategies for safety project implementation
- Traffic safety analysis based on Office of Traffic Safety (OTS) data

The LRSP fulfills the following purposes:

- Identify the highest occurring collision types and the roadway characteristics contributing to the collisions.
- Identify high-risk corridors and intersections.
- Propose safety countermeasures to address the safety issues.
- Prioritize safety improvement projects based on benefit/cost ratio and other considerations.

1.2 PROMINENT COLLISION PATTERN

Five years of collision records were utilized from January 2016 to December 2020, adhering to the maximum period permitted by the HSIP for a safety infrastructure project application for federal funding. The collisions were categorized by severity, collision type, Primary Collision Factor (PCF), involved parties, lighting conditions, and facility type (signalized intersections, non-signalized intersections, and mid-block locations). A total of 14,586 crashes were recorded from 2016 to 2020. The following summarizes the collision patterns within the City:

- Most common collision types were rear-end, broadside, and sideswipe.

- Bicycle- and pedestrian-related crashes accounted for approximately 3% of total collisions, but about 36% of fatal and severe injury collisions.
- Sideswipes due to improper turning is one of the prominent collision patterns.

1.3 SAFETY MEASURES

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

- Young and Old Road Users
- Rear-end and Broadside Collisions
- Pedestrians and Bicyclists
- Unsafe Speeding
- Driving or Bicycling Under the Influence

The LRSP recommends engineering and non-engineering countermeasures which help to address the identified emphasis areas derived from the collision analysis. Concerns and recommended improvements were discussed with City staff including law enforcement, Omnitrans, and the Fontana Unified School District.

Some of the engineering countermeasures recommended for multiple locations in the City include:

- Installation of nearside signals at signalized intersections
- Installing a new traffic signal at non-signalized intersections with a collision history.
- Adding bike lanes to major roadway segments

Additionally, engineering analysis recommended other safety countermeasures to address high collision locations on a location by location basis. Funding for engineering countermeasures listed in the LRSP are available from the Highway Safety Improvement Program (HSIP).

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

- Advanced Transportation and Congestion Management Technologies Deployment Program
- Active Transportation Program
- Sustainable Communities Grant Program
- Office of Traffic Safety Grants

2.0 INTRODUCTION

KOA Corporation (KOA) has been retained by the City of Fontana to develop a Local Roadway Safety Plan (LRSP). Traditionally, agencies have selected safety projects based on historical crash records, focusing on sites with a concentration of recent severe collisions. By contrast, the LRSP shares a similar framework with the California Statewide Strategic Highway Safety Plan (SHSP), which focuses on engineering and non-engineering solutions to roadway safety issues. The LRSP identifies the most common collision categories across a roadway network to target projects that address the factors associated with those categories. By focusing on causal factors rather than collisions, the LRSP allows agencies to assess risks before a collision occurs. Systemic improvements target a broader geography than the traditional spot location improvements. The systemic project selection favors the broad implementation of cost-effective countermeasures.

2.1 FOUR E'S OF SAFETY

The LRSP not only focuses on engineering improvements to mitigate crashes. The LRSP also addresses the other safety improvements in other areas such as enforcement, education, and emergency services. According to the SHSP 2020-2024, two-thirds of all crashes are the result of aggressive driving. Male drivers are more likely to be at fault in aggressive driving-related crashes regardless of age. Making roadways safer requires the Four E's to be involved (Engineering, Enforcement, Education, and Emergency Services). Working together with the Four E's at the city level will help make city roads safer. Recently, Federal and State agencies have also considered Emerging Technologies and Equity as additional E's to improve traffic safety. For instance, considering the use of emerging technologies such as "smart" traffic signal equipment can serve to connect vehicles and traffic control systems to enhance traffic safety.

2.2 PURPOSE OF THE LRSP

The LRSP systematically identifies and analyzes safety problems and recommends safety improvements. Preparing the LRSP facilitates collaboration through the development of partnerships between Fontana and stakeholders, which inlcudes the city's Police Department and the Fontana Unified School District. The results of the LRSP are summarized with a prioritized list of improvements and actions. The LRSP offers a proactive approach to addressing roadway safety needs in Fontana.

2.3 CITY OF FONTANA

Fontana is a city in San Bernardino County. According to the 2010 census, Fontana had a population of 196,069; the US Census estimated the 2019 population at 214,547.

Based on the Statewide Integrated Traffic Records System (SWITRS) database, between January 2016 and December 2020 there were 14,586 collisions in Fontana, of which 229 collisions resulted in fatal and severe injuries. **Figure 2.1** illustrates a map of the collisions citywide, and **Figure 2.2** shows a heat map of these collisions.

Figure 2.1: Fontana Citywide Collision Map (2016-2020)

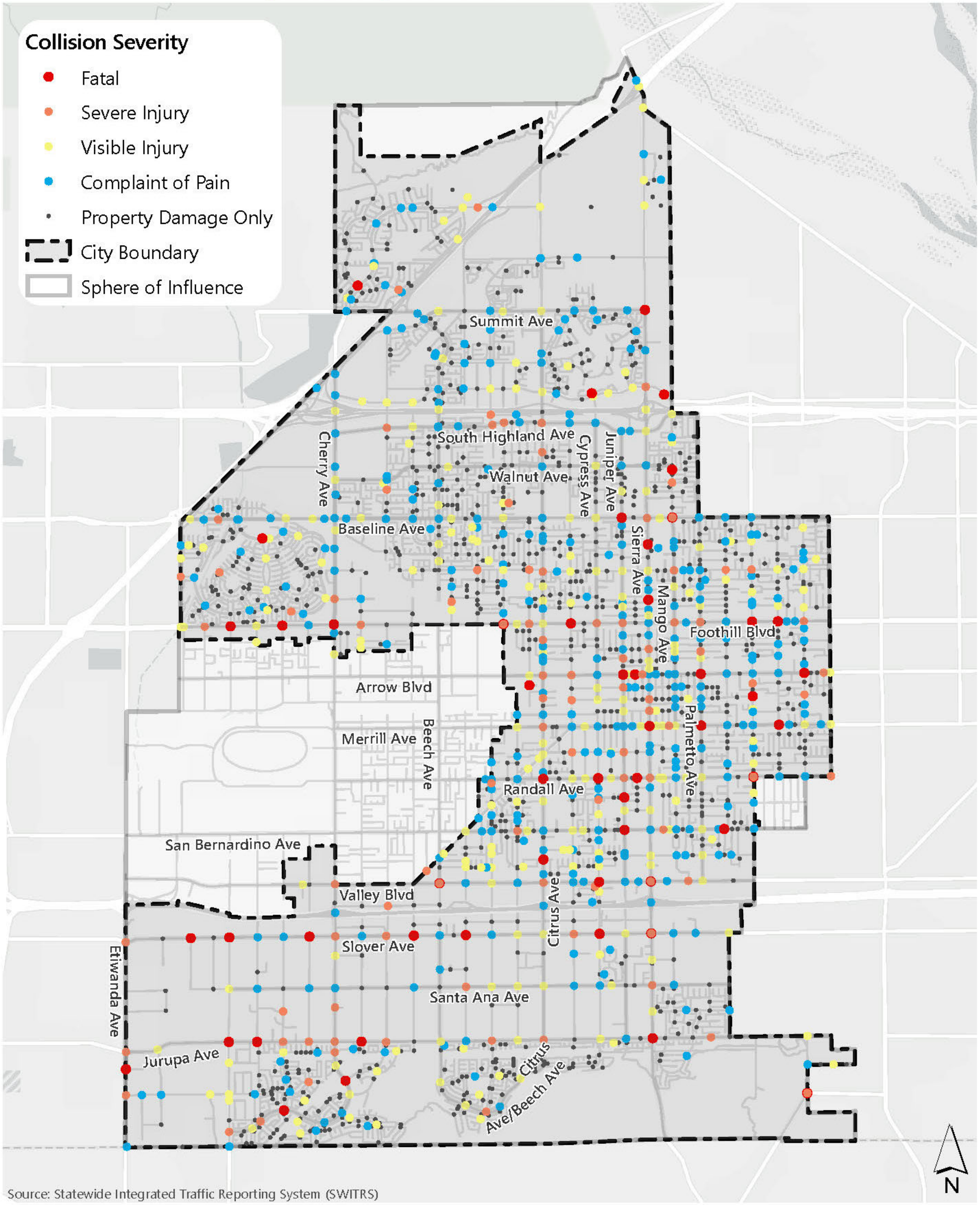
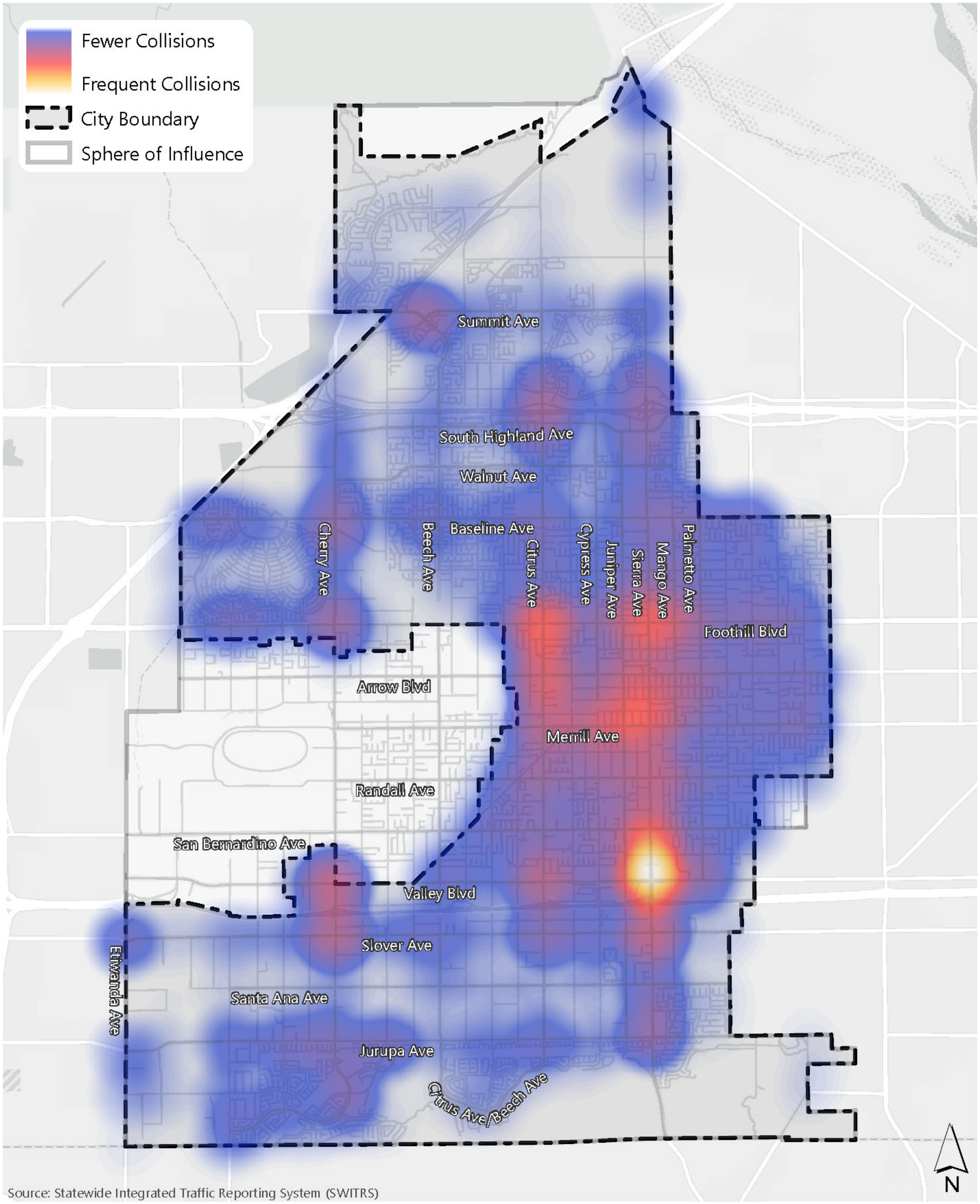


Figure 2.2: Fontana Citywide Collision Heat Map (2016-2020)



2.4 LRSP OVERVIEW

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

2.4.1 Data Collection

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

- Five-years (1/1/2016 to 12/31/2020) of collision data collected via the SWITRS collision database
- Traffic count information
- Base map with street centerlines

2.4.2 Safety Data Analysis

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

2.4.3 Identify Safety Measures

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

2.4.4 Develop Safety Projects and Cost Estimates

Roadways and intersections were ranked based on the collision frequency. The top locations of interest were investigated to determine appropriate safety improvements. The improvements include new traffic signals, additional signal heads at existing signalized intersections, and new bicycle facilities. Planning-level cost estimation are provided for each safety project. The list of safety projects are prioritized based on the following considerations:

- Benefit/Cost Ratio (for engineering solutions only)
- Funding availability for engineering and non-engineering programs
- Other factors recommended by city staff

The safety projects and cost estimates are discussed in Section 8 of this document.

3.0 METHODOLOGY

3.1 COLLISION DATA SOURCES

KOA derived data on citywide collision trends between January 1st, 2016 and December 31st, 2020 from the California Highway Patrol's SWITRS database. The California Office of Traffic Safety Rankings (OTS) contributed collision data for the year 2018 for Fontana and 58 cities in California with a similar population.

3.1.1 SWITRS

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

3.1.2 OTS

The OTS Rankings compare traffic safety statistics among cities in the state of California with similar populations. The statistics focus on the victims killed and injured in collisions. Cities can use these comparisons to see the areas in which they underperform. In the OTS Collision Ranking system, Fontana belongs to Group B, which contains 58 cities with a population between 100,001 and 250,000. At the time of completing the collision analysis, the OTS website only had data available up to the year 2018.

3.2 STAKEHOLDER OUTREACH

In addition to using analytical methods to identify locations for treatments and make recommendations, the LRSP also focuses on partnerships with the community to give input into this process and provide feedback on areas that the LRSP should focus on. Stakeholders were contacted after completing the collision analysis but before selecting emphasis areas or specific infrastructure improvements or programs. Stakeholders were asked to provide feedback about traffic safety issues they have observed through their work and possible approaches to resolving these issues. For the Fontana LRSP, feedback was provided by the Fontana Police Department, Omnitrans, and the Fontana Unified School District.

3.2.1 Fontana Police Department

A meeting with the Fontana Police Department was held on February 15, 2021. Items discussed include the following:

- Roadway segments with a history of speeding
- Intersections of concern and reasons for concern
- Street racing activity on local roadways
- Experience with newer traffic control devices such as Flashing Yellow Arrow (FYA) and Rectangular Rapid Flashing Beacons (RRFB)

- Enforcement strategies such as pedestrian crosswalk sting operations, speed trailers, and Driving Under the Influence (DUI) checkpoints
- Collision report policy
- Ideas for improving traffic safety
- Traffic safety awareness and educational campaigns

The police department noted that pedestrian issues were most prominent on Foothill Boulevard. The police department also noted the following specific enforcement activities and campaigns currently being conducted by the City:

- Primary Collision Factor (PCF) related enforcement
- Click It or Ticket
- Bicycle Safety Awareness
- Motorcycle Safety Awareness
- DUI Saturation
- Distracted Driving
- Social media educational campaign

3.2.2 Omnitrans

A meeting with Omnitrans was held on February 16, 2021. During the meeting, issues discussed included safety concerns with bus accessibility at particular stations, recent transit route upgrades, and areas needing safety enhancements.

3.2.3 Fontana Unified School District

A meeting with the Fontana Unified School District was held on February 16, 2021. Items discussed included the following:

- How students travel to school
- Crossing guard information
- Driving patterns related to school drop-off or pickup
- Areas with safety concerns and the need for safety enhancements

Though the school district noted it did not have current programs to improve traffic safety, the expressed openness to adding an online program for parents or students.

3.3 IDENTIFYING LOCATIONS FOR ENGINEERING COUNTERMEASURES

Crash data analysis for this LRSP was conducted using collision data from the SWITRS collision database. The collision records include a variety of information about each collision, including the location, date, time of the day, crash type, crash severity, primary violation category, transportation mode of the involved parties, and movement of the involved parties prior to the collision. Per California state law, motor vehicle collisions must be reported when vehicle or property damage exceeds $1,000, or when any of the parties suffer an injury or fatality. Collisions with no injured parties or little property damage might not be reported and, therefore, are not included in the collision database.

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

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

The LRSM guidelines require analyzing at least three to five years of the most recent crash data. Five years-worth of collision data from January 2016 to December 2020 was reviewed for the Fontana LRSP. Five years of crash data usage adheres to the maximum threshold permitted by the Highway Safety Improvement Program (HSIP) for a safety infrastructure project application for federal funding.

3.3.1 Ranking Function

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

3.3.2 Average Crash Frequency

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

3.3.3 Crash Rate

The Crash Rate method goes a step beyond average crash frequency, normalizing facilities' crash frequency by the amount of vehicle traffic or travel. This method divides the number of collisions (or collisions in a particular category) by the quantity of Million Entering Vehicles (for intersections) or 100 Million Vehicle Miles Traveled (for roadway segments). While the Crash Rate method accounts for differences in facilities' length and traffic volume, it may instead unduly favor low-volume and low-collision roadways where countermeasures produce the lowest net benefit for travelers.

3.3.4 EPDO Scores

Equivalent Property Damage Only (EPDO) scores assign weighting factors to crashes by severity relative to property damage only (PDO) collisions. The weight generally reflects an order of magnitude difference between the cost of fatal/severe injury crashes and non-severe injury collisions. The weights by crash severity come from the 2020 Local Roadway Safety Manual.

- Fatal and Severe Injury at signalized intersections – $1,590,000
- Fatal and Severe Injury at non-signalized intersections – $2,530,000
- Fatal and Severe Injury at mid-roadway locations – $2,190,000
- Other Visible Injury – $142,300
- Compliant of Pain – $80,900
- PDO – $13,300

EPDO scores are useful for a benefit-to-cost analysis as collision costs can be translated into measurable benefits from installing improvements that reduce the collisions in question. However, EPDO scores may place undue weight on the injury outcomes of previous collisions rather than overall trends suggested by collision patterns regardless of injury outcome. Furthermore, a location's EPDO score could be inflated by a fatal or severe collision caused by DUI.

3.4 PROPOSING ENGINEERING COUNTERMEASURES

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

- Make citywide collision maps for dominant collision types such as rear-end collisions, broadside collisions, bicycle and pedestrian collisions, and collisions due to unsafe speed. Identify high-risk locations by collision type.
- Review crash details (party involved, movement before the crash, primary collision factor, violation code, time of the day, and others) at high-risk locations. Obtain detailed police reports from the City and reviewed for all the fatal and severe injury collisions.
- Manually create collision diagrams for high-risk locations. Review field conditions through physical site visits in the City. Assess the nature of prevalent crash types with respect to the intersection's control type, geometrical features, and signal phasing/timing.
- Review current conditions and recent historical conditions via Google Map Street View, whenever necessary, to check whether any geometry, signal, or signage changes have been made in the past few years.
- Evaluate and screen countermeasures from the LRSM or Crash Modification Factor (CMF) Clearinghouse (http://www.cmfclearinghouse.org/), a searchable database that can be easily queried to identify CMFs and Crash Reduction Factors (CRFs).
- Identify intersections/roadway segments that do not have a demonstrated crash history but resemble other locations with documented crash history and risk factors. Once identified, these locations can be analyzed through the steps mentioned above.

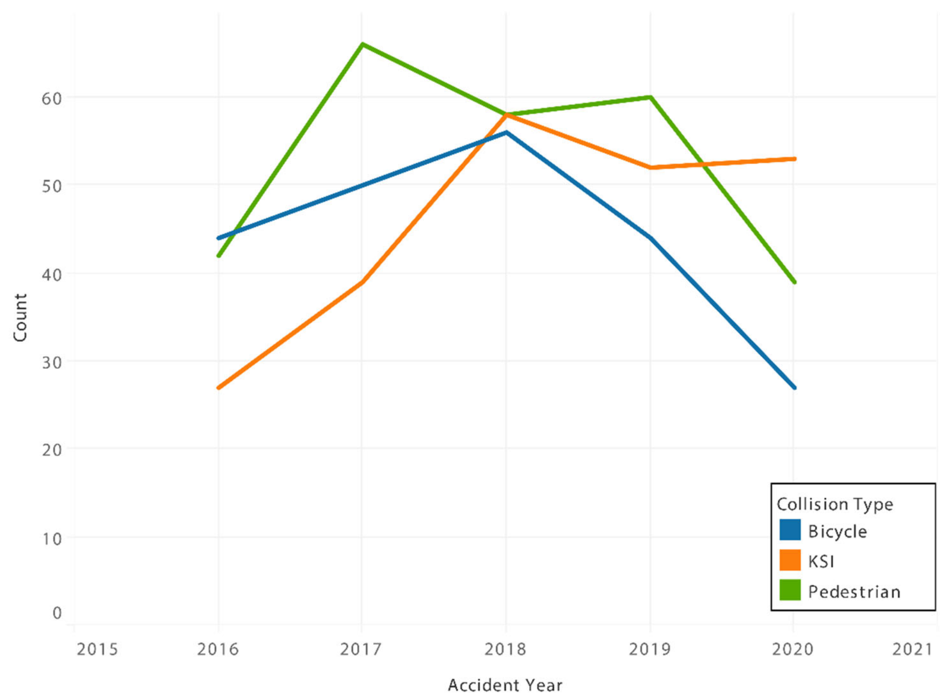
4.0 SYSTEMIC SAFETY ANALYSIS – COLLISION TREND AND PATTERNS

4.1 TOTAL COLLISIONS AND KSI COLLISIONS

The collision trend analysis draws from the five years of data obtained from the SWITRS database. From 2016 to 2020, a total of 14,586 collisions occurred on Fontana's roadways, excluding the Interstate 210 (I-210), Interstate 15 (I-15), and Interstate 10 (I-10) Freeways. Of these, 229 resulted in fatal or severe injuries. **Figure 4.1** highlights the annual number of collisions per year over the 5-year period for non-motorized modes and killed and severe injury (KSI) collisions. Overall, total collision (ALL collisions) trends remained relatively consistent year over year from 2016 to 2019, but experience a significant dip from 3,146 collisions in 2019 to 2,101 collisions in 2020. Although collision totals decreased, the number KSI collisions increased from 52 to 53 from 2019 to 2020. In fact, since 2018, KSI collision totals have exceeded 50 on an annual basis. In 2016 and 2017, Fontana experienced 27 and 39 KSI collisions, respectively.

Over the 5-year period, bicyclist-involved collisions peaked in 2018 and have since experienced a significant decline in yearly totals. Similarly, pedestrian-involved collisions peaked in 2017 and have since experienced a steady decline in yearly totals. Pedestrian-involved collisions exceeded bicyclist-involved collisions in all years except 2016.

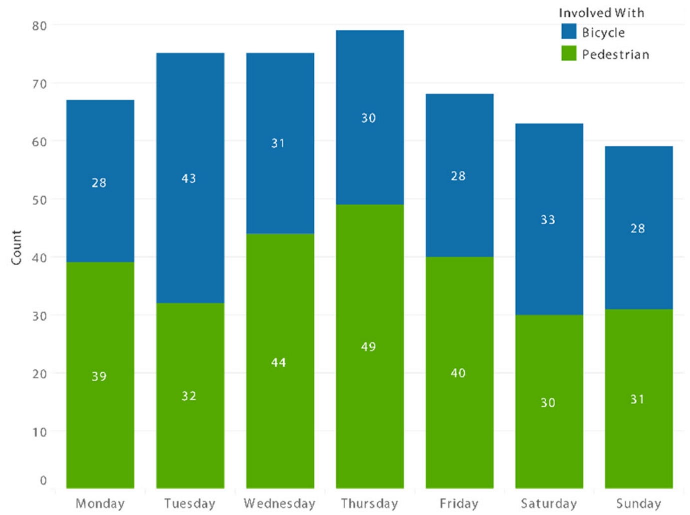
Figure 4.1: Collisions by Year



Source: SWITRS, 2016-2020

Figure 4.2 illustrates bicyclist- and pedestrian-involved collision frequency by day of the week. While the total number of collisions varies little across different days, pedestrian and bicycle collisions show noticeable day-to-day variation. Pedestrian-involved collisions were most prevalent during later weekdays (Wednesday-Friday). The number of daily bicyclist-involved collisions peak on Tuesday, but remained consistent on all other days.

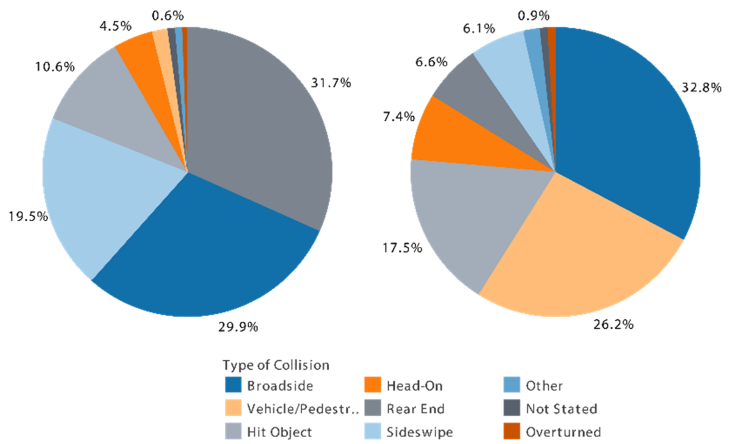
Figure 4.2: Bicyclist- and Pedestrian-Involved Collisions by Day of the Week



Source: SWITRS, 2016-2020

Figure 4.3 breaks down total collisions (left) and KSI collisions (right) by collision type. Rear-end and broadside collisions accounted for more than half of all collisions, holding the largest share of citywide collision types. Sideswipe collisions accounted for the third-largest share of total collisions. Broadside collisions accounted for one-third of all KSI collisions and Vehicle/Pedestrian collisions accounted for nearly a quarter of KSI collisions. Historically, Vehicle/Pedestrian collision types are the most likely to result in a severe injury or fatality. Hit object collisions accounted for the third-largest share of KSI collisions.

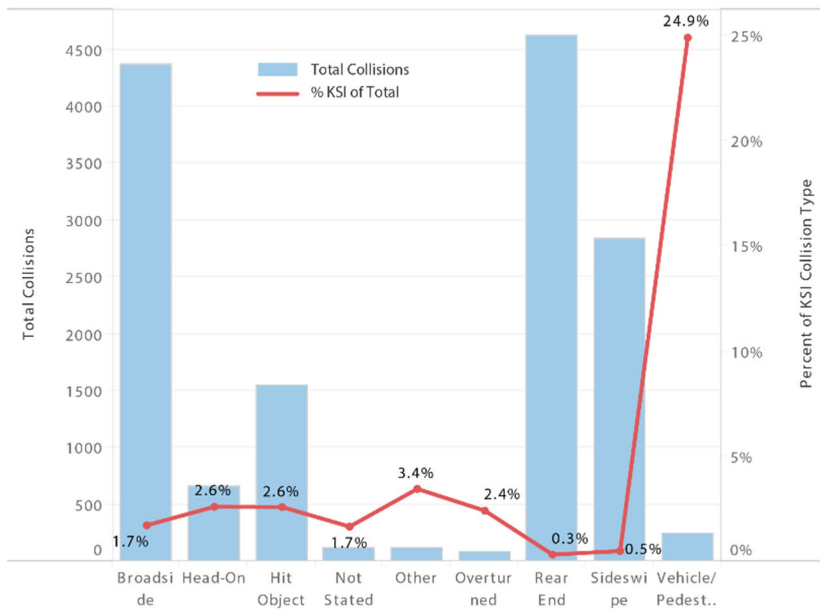
Figure 4.3: Collisions by Type, Total Collisions vs. KSI Collisions



Source: SWITRS, 2016-2020

Figure 4.4 more clearly illustrates the increased severity of vehicle-pedestrian collisions. Nearly a quarter of vehicle-pedestrian collisions were KSI collisions, despite the vehicle-pedestrian collision category comprising the sixth-smallest share of total collisions in Fontana. By contrast, 1.7% of broadside collisions, 0.3% of rear-end collisions, and 0.5% of sideswipe collisions resulted in a severe injury or fatality.

Figure 4.4: Type of Collisions with KSI Percentage

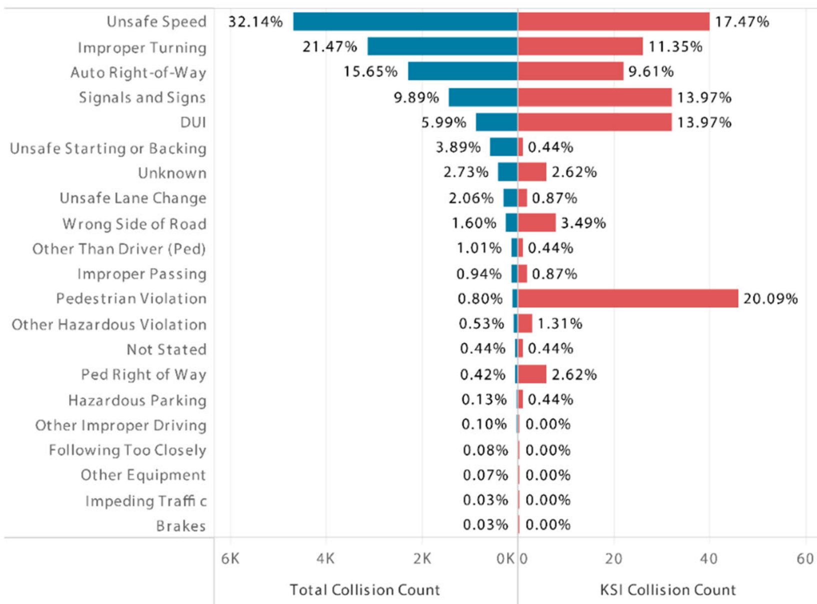


Source: SWITRS, 2016-2020

Figure 4.5 summarizes the Primary Collision Factor (PCF) for all collisions and KSI collisions over the past five years. PCF is the leading cause of the collision based on the opinion of the officer who conducted the investigation.

Among all collisions, unsafe speed (32%), improper turning (21.5%), automobile right-of-way (15.7%), and signals and signs (9.9%) were the top four primary collision factors. For KSI collisions, the top four PCF categories were pedestrian violation (20%), unsafe speed (17.5%), driving or bicycling under the influence/DUI (14%), and signals and signs (14%). The inclusion of the pedestrian violation category reflects the prevalence of vehicle-pedestrian collisions among fatal or severe injury collisions. The pedestrian violation is often defined as a pedestrian violating the opposing party's right-of-way.

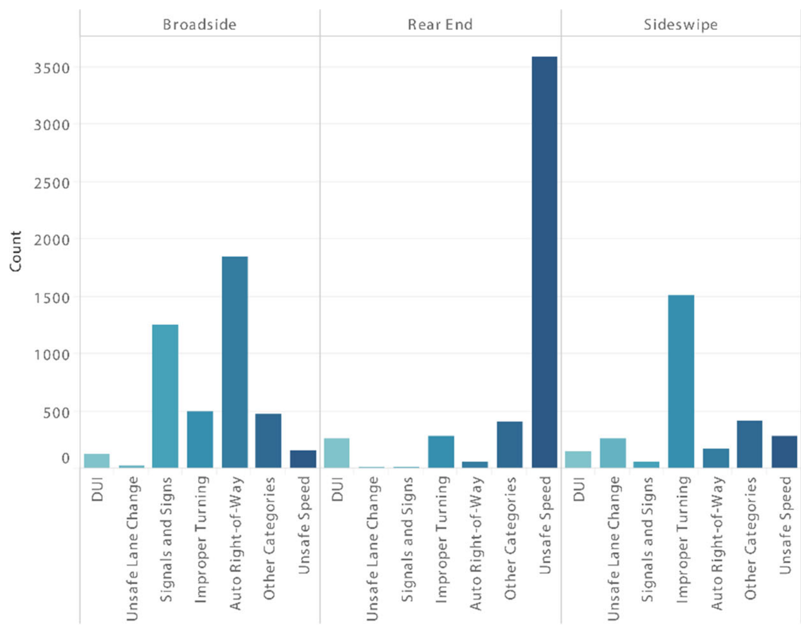
Figure 4.5: Collisions by Primary Collision Factor (PCF)



Source: SWITRS, 2016-2020

Figure 4.6 illustrates how the most-frequently-occurring PCFs correlate with the most significant collision types. Automobile right-of-way violations followed by signals and signs are the primary causes of most broadside collisions. Unsafe travel speeds account for the large majority of rear-end collisions, and improper turning is the most common PCF for sideswipe collisions.

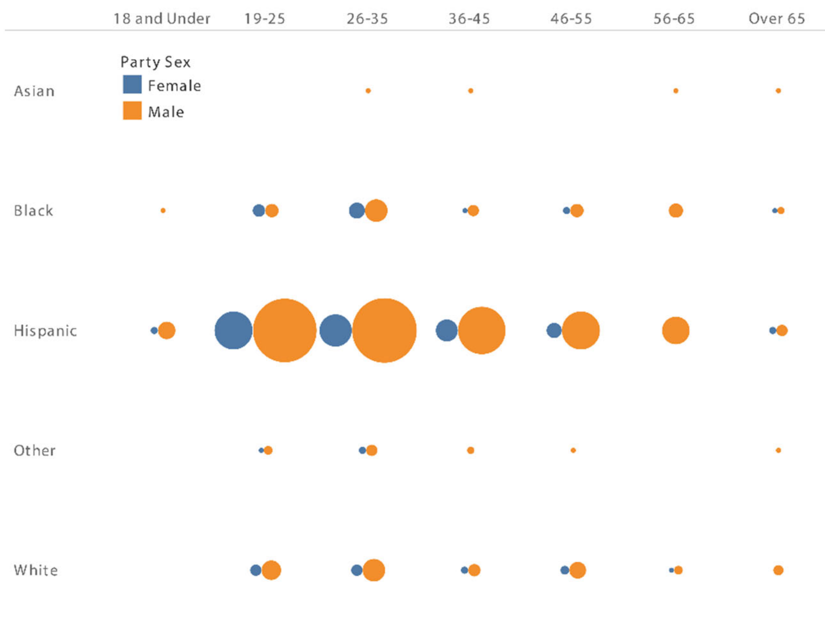
Figure 4.6: Primary Collision Factor vs. Top 4 Collision Types



Source: SWITRS, 2016-2020

Driving or bicycling under the influence of drugs or alcohol (DUI) is the fifth-most-frequent PCF violation category for collisions in Fontana. Since DUI collisions stem from driving behavior rather than roadway design factors, addressing these collisions requires an in-depth assessment of driver demographics. **Figure 4.7** breaks down DUI collisions by the age, race, and sex of the at-fault party. The chart shows that Hispanic males between the ages of 19 and 35 are most frequently found to be at fault.

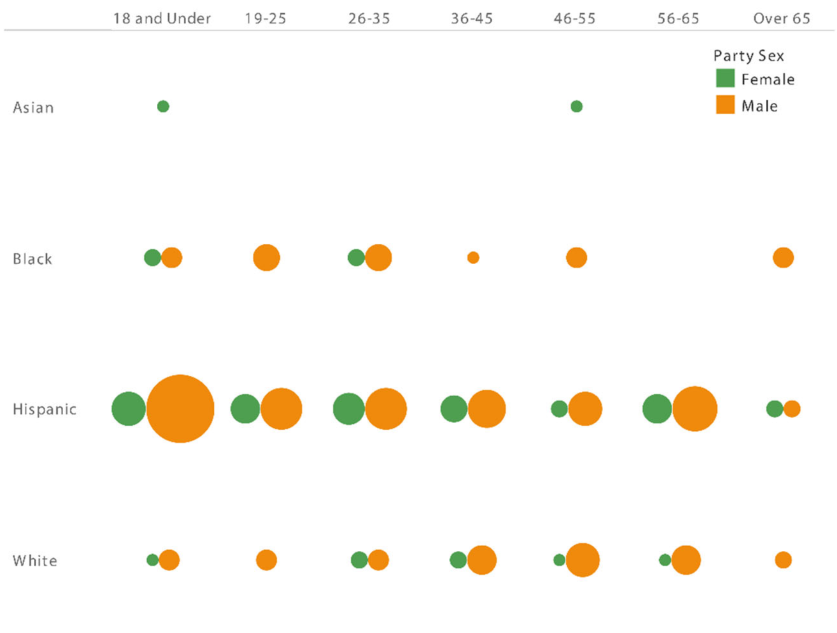
Figure 4.7: At-fault Parties in DUI Collisions by Race, Sex, and Age



Source: SWITRS, 2016-2020

Figure 4.8 classifies the pedestrian- and bicyclist-related collisions in Fontana by age group, party sex, and race. The chart shows that Hispanic males 18 years and under are most frequently found to be involved in pedestrian- or bicyclist-related collisions.

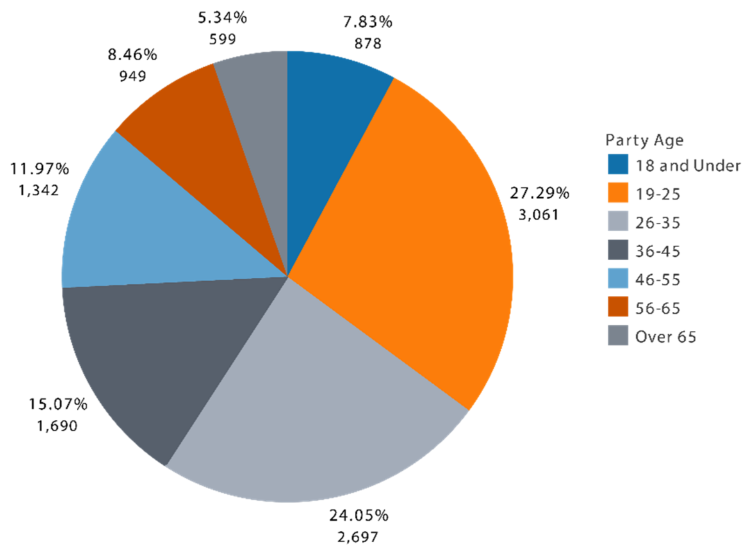
Figure 4.8: Pedestrian and Bicyclist Collision Victims



Source: SWITRS, 2016-2020

Finally, **Figure 4.9** classifies the at-fault collision parties in Fontana by age group. The chart shows a quite clear-cut pattern: the younger the age group (above age 18), the higher the share of at-fault drivers and vice-versa. Drivers over the age of forty-six were responsible for fewer collisions (26% of collisions) than drivers between the ages of 19 and 25 (27% of collisions).

Figure 4.9: At-Fault Collision Parties by Age Group



Source: SWITRS, 2016-2020

4.2 COLLISIONS BY FACILITY TYPE

Collision patterns by facility type (intersections vs. mid-block locations) were analyzed by using SWITRS data from 2016 to 2020. This analysis was used to determine the effect of access control and intersection geometry on collision frequency. The analysis classifies collisions by facility type as follows:

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

Table 4.1 shows the total number of collisions associated with each type of facility. 42% of all collisions occurred at signalized intersections, 33% occurred at non-signalized intersections, and 25% occurred at mid-block locations. Both pedestrian- and bicyclist-involved collisions followed a similar pattern. Of all pedestrian-involved collisions, 38% occurred at signalized intersections, 33% occurred at non-signalized intersections, and 29% occurred at mid-block locations. Of all bicyclist-involved collisions, 44% occurred at signalized intersections, 36% occurred at non-signalized intersections, and 19% occurred at mid-block locations.

Table 4.1: Collisions by Facility Type

Collision Grouping	Signalized Intersection		Non-Signalized Intersection		Midblock Locations		Grand Total	
	Collisions	%	Collisions	%	Collisions	%	Collisions	%
Total Number of Collisions	6,148	42%	4,780	33%	3,658	25%	14,586	100%
Bicycle Collisions	98	44%	80	36%	43	19%	221	100%
Pedestrian Collisions	102	38%	87	33%	76	29%	265	100%

Source: SWITRS, 2016-2020

Table 4.2 shows how the collision type varies by location. Rear-end collisions comprise the largest share of collisions at signalized intersections and mid-block locations (41% and 30%, respectively). At non-signalized intersections, broadside collisions (40%) are most prevalent, while rear-end and sideswipe collisions comprise the second- and third-largest categories (21% and 17%, respectively). Sideswipe collisions also amounted to the second-largest share of collisions at mid-block locations (25%), and third-largest share of collisions at signalized intersections (18%).

Table 4.2: Collision Types by Facility Type

Collision Type	Signalized Intersections		Non-Signalized Intersections		Midblock		Grand Total	
	Collisions	%	Collisions	%	Collisions	%	Collisions	%
Broadside	1,655	27%	1,931	40%	779	21%	4,365	30%
Head-On	227	4%	244	5%	183	5%	654	4%
Hit Object	422	7%	598	13%	527	14%	1,547	11%
Not Stated	62	1%	41	1%	18	0%	121	1%
Other	36	1%	42	1%	38	1%	116	1%
Overturned	26	0%	21	10%	36	1%	83	1%
Rear End	2,526	41%	1,009	21%	1,087	30%	4,622	32%
Sideswipe	1,099	18%	813	17%	925	25%	2,837	19%
Vehicle/Pedestrian	95	2%	81	2%	65	2%	241	2%
Total	1,108	100%	4,780	100%	3,658	100%	14,586	100%

Source: SWITRS, 2016-2020

Table 4.3 shows the relationship between street lighting conditions and facility type. At all location types, most collisions occurred in daylight (with the proportion ranging from 64.9% at non-signalized intersections to 69.8% percent at signalized intersections). Most collisions that occurred in the dark were in the presence of functioning street lights. Only 3% of all collisions occurred in the dark where no street lights exist, a figure ranging from 0.5% at signalized intersections to 2.8% at mid-block locations.

Table 4.3: Street Lighting by Facility Type

Collision Type	Signalized Intersections		Non-Signalized Intersections		Midblock		Grand Total	
	Collisions	%	Collisions	%	Collisions	%	Collisions	%
Daylight	4,293	69.8%	3,103	64.9%	2,384	65.2%	9,780	67.1%
Dark - Street Lights	1,636	26.6%	1,387	29.0%	1,043	28.5%	4,066	27.9%
Dark - No Street Lights	4	0.1%	4	0.1%	1	0.0%	9	0.1%
Not Stated	14	0.2%	17	0.4%	16	0.4%	47	0.3%
Dusk - Dawn	169	2.7%	175	3.7%	113	3.1%	457	3.1%
Dark - Street Lights Not Functioning	1	0.1%	0	0.0%	2	0.4%	3	0.1%
Total	6,148	100%	4,780	100%	3,658	100%	14,586	100%

Source: SWITRS, 2016-2020

Table 4.4 tabulates the PCFs by facility type. At signalized intersections, unsafe speed, improper turning, and signals and signs comprised the three largest PCF categories. At non-signalized intersections and mid-block locations, unsafe speed, automobile right-of-way, and improper turning comprised the three largest PCF categories.

Table 4.4: Primary Collision Factor by Facility Type

Collision Type	Signalized Intersections		Non-Signalized Intersections		Midblock		Grand Total	
	Collisions	%	Collisions	%	Collisions	%	Collisions	%
Unsafe Speed	2,449	39.8%	1,117	23.4%	1,122	30.7%	4,688	32.1%
Improper Turning	1,084	17.6%	997	20.9%	1,051	28.7%	3,132	21.5%
Driving or Bicycling Under the Influence of Alcohol or Drug	307	5.0%	294	6.2%	273	7.5%	874	6.0%
Other Than Driver (or Pedestrian)	59	1.0%	39	0.8%	49	1.3%	147	1.0%
Other Improper Driving	4	0.1%	8	0.2%	3	0.1%	15	0.1%
Automobile Right of Way	668	10.9%	1,129	23.6%	486	13.3%	2,283	15.7%
Unsafe Starting or Backing	168	2.7%	206	4.3%	193	5.3%	567	3.9%
Traffic Signals and Signs	860	14.0%	556	11.6%	26	0.7%	1,442	9.9%
Unknown	165	2.7%	138	2.9%	95	2.6%	398	2.7%
Other Hazardous Violation	36	0.6%	25	0.5%	16	0.4%	77	0.5%
Wrong Side of Road	60	1.0%	87	1.8%	87	2.4%	234	1.6%
Hazardous Parking	2	0.0%	9	0.2%	8	0.2%	19	0.1%
Pedestrian Violation	38	0.6%	30	0.6%	48	1.3%	116	0.8%
Other	17	0.3%	23	0.5%	24	0.7%	64	0.4%
Unsafe Lane Change	157	2.6%	48	1.0%	96	2.6%	301	2.1%
Pedestrian Right of Way	33	0.5%	24	0.5%	4	0.1%	61	0.4%
Improper Passing	32	0.5%	43	0.9%	62	1.7%	137	0.9%
Impeding Traffic	2	0.0%	1	0.0%	2	0.1%	5	0.0%
Other Equipment	1	0.0%	3	0.1%	6	0.2%	10	0.1%
Brakes	1	0.0%	1	0.0%	2	0.1%	4	0.0%
Following Too Closely	5	0.1%	2	0.0%	5	0.1%	12	0.1%
Total	6,148	100%	4,780	100%	3,658	100%	14,586	100%

Source: SWITRS, 2016-2020

As previously mentioned, rear-end collisions were the most-frequently-occurring collision type in Fontana. Unsafe speed violations were the pre-eminent Primary Collision Factor (PCF) in rear-end collisions. **Table 4.5** breaks down rear-end collisions with an unsafe speed PCF by facility type. Approximately 78% of rear-end collisions from 2016 to 2020 resulted from unsafe speed violations. The percentage of rear-end collisions caused by unsafe speed violations ranged from 69.9% at mid-block locations to 83.9% at signalized intersections.

Table 4.5: Rear-End Collisions by Facility Type

Facility Type	Rear-end Collisions	Rear-end Collisions due to Unsafe Speed	Percentage of Rear-end Collisions due to Unsafe Speed
Signalized Intersections	2,526	2,120	83.9%
Non-Signalized Intersections	1,009	710	70.4%
Mid-block Locations	1,087	760	69.9%
Total	4,622	3,590	77.7%

Source: SWITRS, 2016-2020

Broadside collisions were also a prevalent collision type. Automobile right-of-way violations were the pre-eminent Primary Collision Factor (PCF) in broadside collisions. **Table 4.6** tabulates broadside collisions with an automobile right-of-way PCF by facility type. Approximately 42% of broadside collisions from 2016 to 2020 resulted from automobile right-of-way violations. Broadside collisions resulting from automobile right-of-way violations ranged from 30% at signalized intersections to 50% at non-signalized intersections.

Table 4.6: Broadside Collisions by Facility Type

Facility Type	Broadside Collisions	Broadside Collisions due to Automobile ROW	Percentage of Broadside Collisions due to Automobile ROW
Signalized Intersections	1,655	500	30.2%
Non-Signalized Intersections	1,931	963	49.9%
Mid-block Locations	779	379	48.7%
Total	4,365	1,842	42.2%

Source: SWITRS, 2016-2020

4.3 FONTANA VS. SAN BERNARDINO COUNTY

SWITRS data was extracted for the entire County of San Bernardino using the same 5-year period from 2016 to 2020, to compare the characteristics of injury and fatality collisions for the City of Fontana with those for all of San Bernardino County. As shown in **Table 4.7**, from mid-2016 to 2020, Fontana experienced 14,586 collisions. As the City had an estimated 214,557 residents in 2019, this amounted to 13,596 collisions per one million residents per year. A total of 142,563 collisions occurred in San Bernardino County during the same period, making for a rate of 13,079 collisions per one million residents per year. Thus, Fontana had a slightly higher collision rate than the county average.

Fontana had a significantly lower percentage of KSI collisions (1.7% vs. 3.5%). Both bicyclist- and pedestrian-involved collision percentages were comparable to countywide percentages (1.8% and 1.5%, respectively).

Table 4.7: Total Collision Comparison, Fontana vs. San Bernardino County

	City of Fontana	San Bernardino County
Population (2019 estimates)	214,557	2,180,085
Total Collisions	14,586	142,563
Collision/1,000,000/Year	13,596	13,079
Fatal and Severe Collisions (KSI)	229	4,961
KSI %	1.7%	3.5%
Pedestrian Collisions	265	2,973
Pedestrian %	1.8%	2.1%
Bicycle Collisions	221	1,673
Bicycle %	1.5%	1.2%

Source: SWITRS, 2016-2020

Table 4.8 focuses on the KSI collisions in Fontana and San Bernardino County from 2016 to 2020. Fontana had a significantly lower rate of KSI collisions per million residents per year than San Bernardino County (213 vs. 455). Among KSI collisions, Fontana had a slightly higher percentage of fatalities (32% vs. 28%) and a slightly lower percentage of severe injuries (68% vs. 72% for the County) than the County as a whole. In comparison to the County, pedestrian collisions comprised a much higher proportion of KSI collisions in Fontana (28% vs. 17% for the County). Bicyclist-involved collisions also comprised nearly double the proportion (5.2% vs. 3% for the County).

Table 4.8: KSI Collision Comparison, Fontana vs. San Bernardino County

	City of Fontana	San Bernardino County
Population (2019 estimates)	214,557	2,180,085
Fatal and Severe Collisions (KSI)	229	4,961
KSI Collision/1,000,000/Year	213	455
Fatal	74	1,368
Fatal %	*32.3%*	*27.6%*
Severe Injury	155	3,593
Severe Injury %	*67.7%*	*72.4%*
Pedestrian	64	829
Pedestrian %	*27.9%*	*16.7%*
Bicyclist	12	147
Bicyclist %	*5.2%*	*3.0%*

Source: SWITRS, 2016-2020

Table 4.9 breaks down the SWITRS data by collision type for Fontana and San Bernardino County. In both Fontana and the County as a whole, rear-end collisions accounted for the largest proportion of collisions. Overall, collision type proportions for the City of Fontana are quite similar to that of the County. However, Fontana had a significantly higher proportion of broadside collisions (30% vs. 19% for the County).

Table 4.9: Collision Type Comparison, Fontana vs. San Bernardino County

Type of Collision	City of Fontana	San Bernardino County
Broadside	30%	19%
Head-On	4%	5%
Hit Object	11%	17%
Other	1%	1%
Overturned	1%	3%
Rear End	32%	34%
Sideswipe	19%	18%
Vehicle/Pedestrian	2%	2%
Not Stated	1%	1%
Total %	**100%**	**100%**

Source: SWITRS, 2016-2020

Table 4.10 compares PCFs for the City and the County. As with collision type, the ranking of PCF categories in Fontana aligns with that for San Bernardino County. In both geographies, unsafe speed, automobile right-of-way, and improper turning comprise the top three PCF categories.

Table 4.10: PCF Comparison, Fontana vs. San Bernardino County

Primary Collision Factor	City of Fontana	San Bernardino County
Unsafe Speed	32.3%	34.3%
Automobile ROW	15.7%	11.0%
Improper Turning	21.6%	19.5%
Following Too Closely	0.1%	0.8%
Traffic Signals & Signs	9.9%	6.2%
Driving or Bicycling Under the Inf.	6.0%	7.2%
Unsafe Lane Change	2.1%	7.5%
Wrong Side of Road	1.6%	2.0%
Unknown	2.7%	2.7%
Other Than Driver	1.0%	2.3%
Improper Passing	0.9%	1.0%
Pedestrian Violation	0.8%	1.0%
Unsafe Starting or Backing	3.9%	2.5%
Other Hazardous Violation	0.5%	0.7%
Other Improper Driving	0.1%	0.5%
Pedestrian ROW	0.4%	0.5%
Hazardous Parking	0.1%	0.1%
Other Equipment	0.1%	0.1%
Brakes	0.0%	0.0%
Lights	0.0%	0.0%
Not Stated	0.0%	0.0%
Pedestrian Under the Inf.	0.0%	0.0%
Impeding Traffic	0.1%	0.1%
Fell Asleep	0.0%	0.0%
Total %	100.0%	100.0%

Source: SWITRS, 2016-2020

4.4 FONTANA VS. CITIES OF SIMILAR SIZES

In the State of California's OTS Collision Ranking system, Fontana falls under Group B. This group consists of 59 cities in the state of California with a population between 100,001 and 250,000. **Table 4.11** shows the City's 2018 collisions ranking among the cities in Group B (1 being the highest or worst and 59 being the lowest or best). The City's traffic safety performance raises concern in several areas:

- The City ranked 6th for killed or injured bicyclists under the age of 15
- The City ranked 37th for injury and fatality collisions with alcohol involved
- The City ranked 40th for total collision fatalities and injuries
- The City ranked 28th for nighttime (the period between 9:00 pm and 2:59 am) injury and fatality collisions

- The City ranked 25th for injury and fatality collisions with a driver between the ages of 21 and 34 who had been drinking
- The City ranked 28th for composite collisions (which aggregated the had been drinking 21-34, had been drinking under 21, alcohol involved, hit and run, nighttime and speed collision categories)

Table 4.11: 2018 OTS Ranking, Fontana

Type of Crash	Victims Kill and Injured	OTS Ranking
Total Fatal and Injury	777	40/59
Alcohol Involved	82	37/59
Had Been Drinking Driver < 21	4	24/59
Had Been Drinking Driver 21 – 34	32	25/59
Motorcycles	37	38/59
Pedestrians	50	48/59
Pedestrians < 15	7	38/59
Pedestrians 65+	6	50/59
Bicyclists	34	45/59
Bicyclists < 15	9	6/59
Composite	438	28/59
Type of Crash	**Fatal and Injury Crashes**	**OTS Ranking**
Speed Related	149	30/59
Nighttime (9:00pm-2:59am)	92	28/59
Hit and Run	79	30/59
Type of Arrests	Victims Kill and Injured	OTS Ranking
DUI Arrests		NA

Source: OTS, 2018

5.0 TRANSPORTATION SAFETY EMPHASIS AREAS

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

Based on the collision data analysis conducted for the City of Fontana, the following transportation safety emphasis areas were identified:

- Young Road Users
- Rear-end and Broadside Collisions
- Pedestrians and Bicyclists
- Unsafe Speeding
- Driving or Bicycling Under the Influence

The following section explains how each area was selected based on the collision analysis.

5.1 YOUNG AND OLD ROAD USERS

Young drivers are more likely to be involved in a collision due to insufficient experience operating a motor vehicle when they are first licensed. Furthermore, young drivers tend to engage in risky driving behaviors, including speeding and distracted driving. The 5-year SWITRS data shows that drivers between the ages of 19 and 25 were responsible for more than a quarter of collisions in Fontana. Young Hispanic male drivers were the demographic most frequently deemed responsible for DUI collisions. The California OTS ranked Fontana 25th among 58 peer cities for accidents involving drivers between 21 and 34 years old who had been drinking.

Thus, the first Transportation Safety Emphasis Area targets young road users, encompassing programs that promote safe practices among young motorist, pedestrians, and bicyclists.

5.2 REAR-END AND BROADSIDE COLLISIONS

According to the SWITRS dataset, rear-ends are the most common type of collision in Fontana, accounting for nearly a third of total collisions during the 5-year period. Most rear-end collisions occur within intersections, with unsafe speed violations being the most PCFs. Thus, intersection improvements that reduce vehicle speeds may lessen the prevalence of rear-end collisions.

Broadside collisions also posed a heavy weight on collision types. They accounted for roughly 30% of all collisions and 33% of KSI collisions. Most broadside collisions occur within intersections, with automobile right-of-way and traffic signal and sign violations being the two most common PCFs. Thus, intersection improvements that reduce vehicle conflicts may lessen the prevalence of broadside collisions.

5.3 PEDESTRIANS AND BICYCLISTS

Pedestrians and bicyclists are among the most vulnerable roadway users. Pedestrian and bicyclist commuters in suburban communities are often too young or too old to drive or lack the means to purchase a car. Broad streets, narrow sidewalks, and limited crossing facilities make walking not only uncomfortable but unsafe. While pedestrian-involved collisions comprised only 1.8% of total collisions in Fontana, they accounted for 33% of KSI collisions. In the 2018 OTS Rankings, Fontana ranked 48th among peer cities for the number of killed or injured pedestrians.

Although bicyclist-involved collisions comprised only 5.7% of KSI collisions in Fontana, the proportion is much larger than that of the County. Additionally, the 2018 OTS Rankings ranked Fontana 6th among peer cities for the number of killed or injured bicyclists under the age of 15, suggesting that young bicyclists are highly vulnerable.

5.4 SPEEDING

Unsafe travel speeds was the leading PCF for collisions in Fontana. In aggregate, unsafe speed was the most-frequent PCF in Fontana over the 5-year period, accounting for 32.3% of total collisions and 18% of KSI collisions across the City. Although San Bernardino County experienced a slightly higher proportion of unsafe speed collisions, it weighed heavily in Fontana in comparison to other violations.

5.5 DRIVING UNDER THE INFLUENCE

Driving under the Influence (DUI) is the fifth-largest PCF in Fontana, responsible for nearly 6% of all collisions over the 5-year period. Additionally, DUI collisions accounted for the third-largest PCF for KSI collisions (14%). The 2018 OTS Rankings gave Fontana standard ranks for several DUI-related statistics, including injury/fatality collisions involving alcohol (37th out of 59 cities), injury/fatality collisions with a 21-34-year-old driver who had been drinking (25th out of 59 cities) and driver younger than 21 who had been drinking (24th out of 59 cities).

6.0 ENGINEERING COUNTERMEASURES

The recommended Engineering Countermeasures (improvements to enhance transportation safety) address the emphasis areas on bicyclists, speeding/rear-end collisions and emergency medical services. Five years of collision data from January 2016 to December 2020 were utilized to conduct a more in-depth review of the collision data. Safety countermeasures for the identified candidate locations were selected based on the following collision patterns:

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

Table 6.1 summarized the list of safety countermeasures included in the LRSM and applied to this project. The table summarizes each countermeasure's applicable crash types, crash reduction factor (CRF), project life of the recommended improvement, maximum federal reimbursement percentage, and the opportunity for a systemic approach.

Table 6.1: Safety Countermeasures Applied to Fontana LRSP

CM No.	Countermeasure Name	Crash Type	CRF	Expected Life (Years)	HSIP Funding Eligibility	Systemic Approach Opportunity?
S02	Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number	All	15%	10	100%	Very High
S03	Improve signal timing (coordination, phases, red, yellow, or operation)	All	15%	10	50%	Very High
S21PB	Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	P&B	60%	10	100%	Very High
NS01	Add intersection lighting	Night	40%	20	100%	Medium
NS03	Install signals	All	30%	20	100%	Low
NS18	Install left-turn lane (where no left-turn lane exists)	All	35%	20	90%	Low

CM No.	Countermeasure Name	Crash Type	CRF	Expected Life (Years)	HSIP Funding Eligibility	Systemic Approach Opportunity?
R1	Add segment lighting	Night	35%	20	100%	Medium
R8	Install raised median	All	25%	20	90%	Medium
R15	Widen shoulder	All	30%	20	90%	Medium
R18	Flatten crest vertical curve	All	25%	20	90%	Low
R32PB	Install bike lanes	P&B	35%	20	90%	High
R33PB	Install separated bike lanes	P&B	45%	20	90%	High
R34PB	Install sidewalk/pathway (to avoid walking along roadway)	P&B	80%	20	90%	Medium

Source: Local Roadway Safety Manual, Version 1.5 April 2020

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

6.1 IDENTIFIED PROJECT LOCATIONS

6.1.1 Identified Roadway Segments

According to the City's Community Mobility and Circulation Element of the General Plan, all roadways within the City are classified into the following categories of high traffic roadways: Major Highways, Primary Highways, Secondary Highways, and Collectors. A total of 33 roadway segments were defined that include all categories in the City. The definition of the roadway segments was based primarily on major changes in roadway configurations and major changes in intersecting facilities such as freeways and rail tracks, major cross streets, roadway configuration, and land use. The roadway segment map is provided in **Figure 6.1**.

As shown in **Figure 6.2**, three roadway segments were selected for focused analysis, and development of roadway improvement recommendations:

1. Foothill Boulevard from West City Limits to Citrus Avenue
2. Valley Boulevard from Etiwanda Avenue to East City Limits
3. Citrus Avenue form Arrow Boulevard to Jurupa Avenue

Figure 6.1: Roadway Segment Map

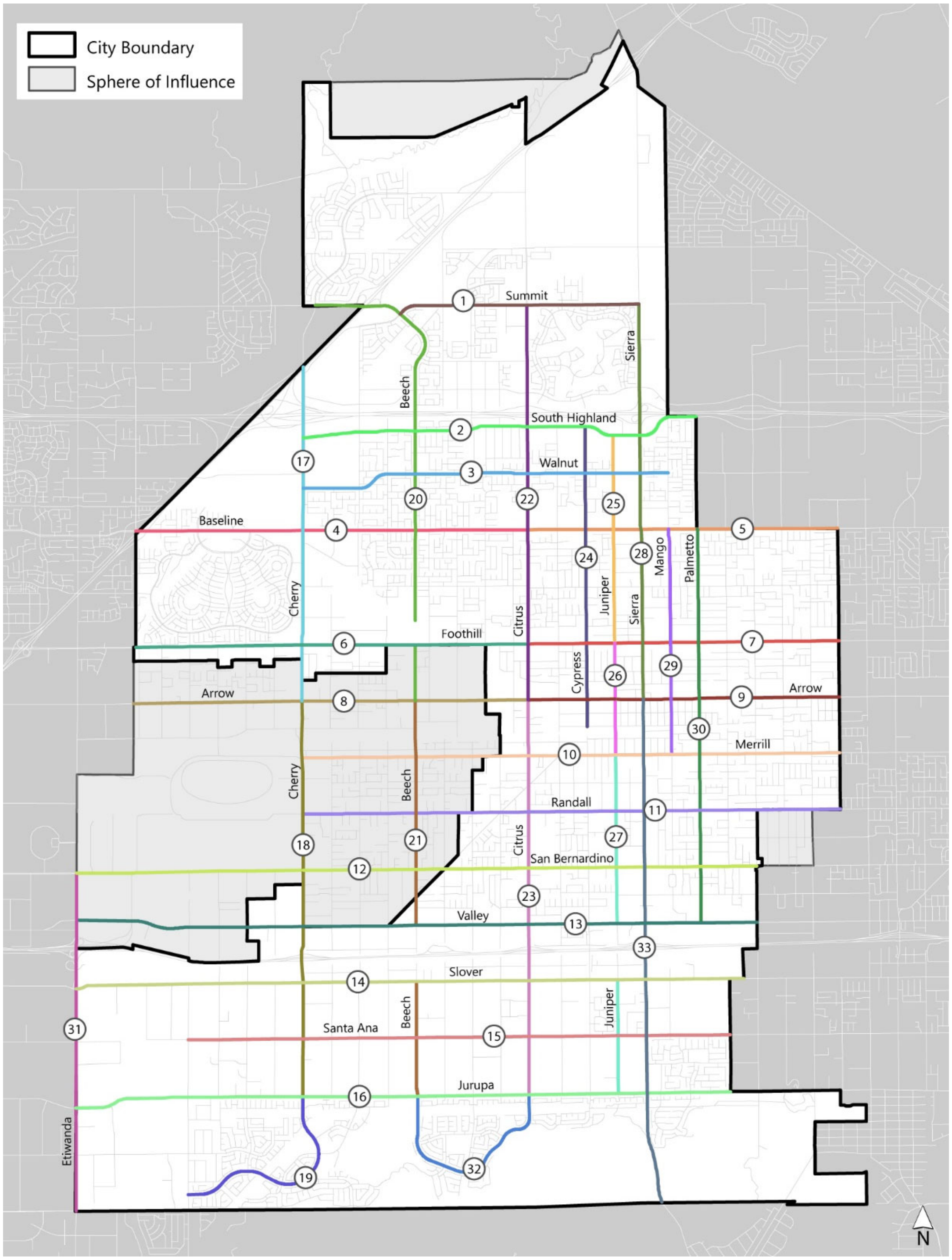
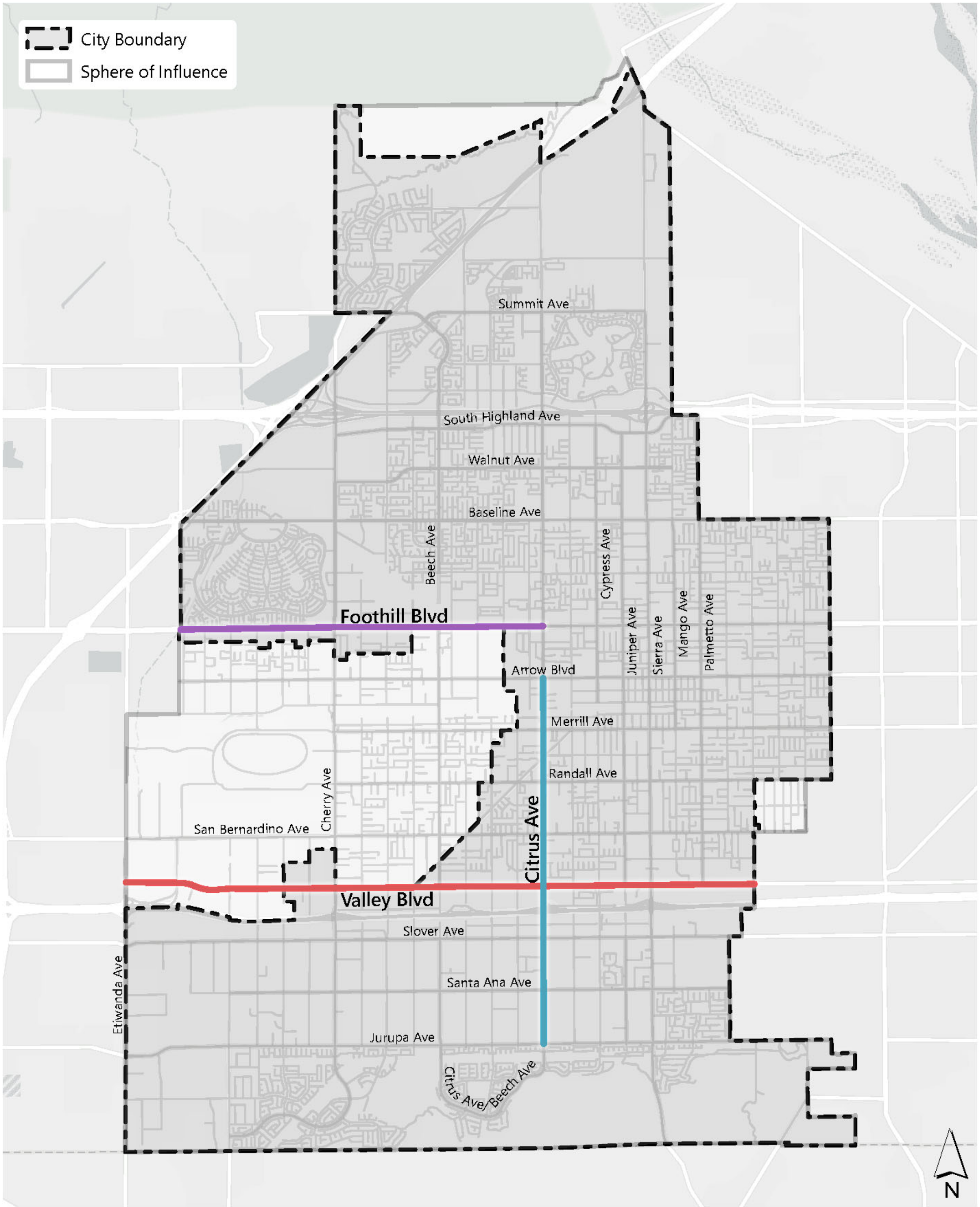


Figure 6.2: Proposed Roadway Segments Countermeasures

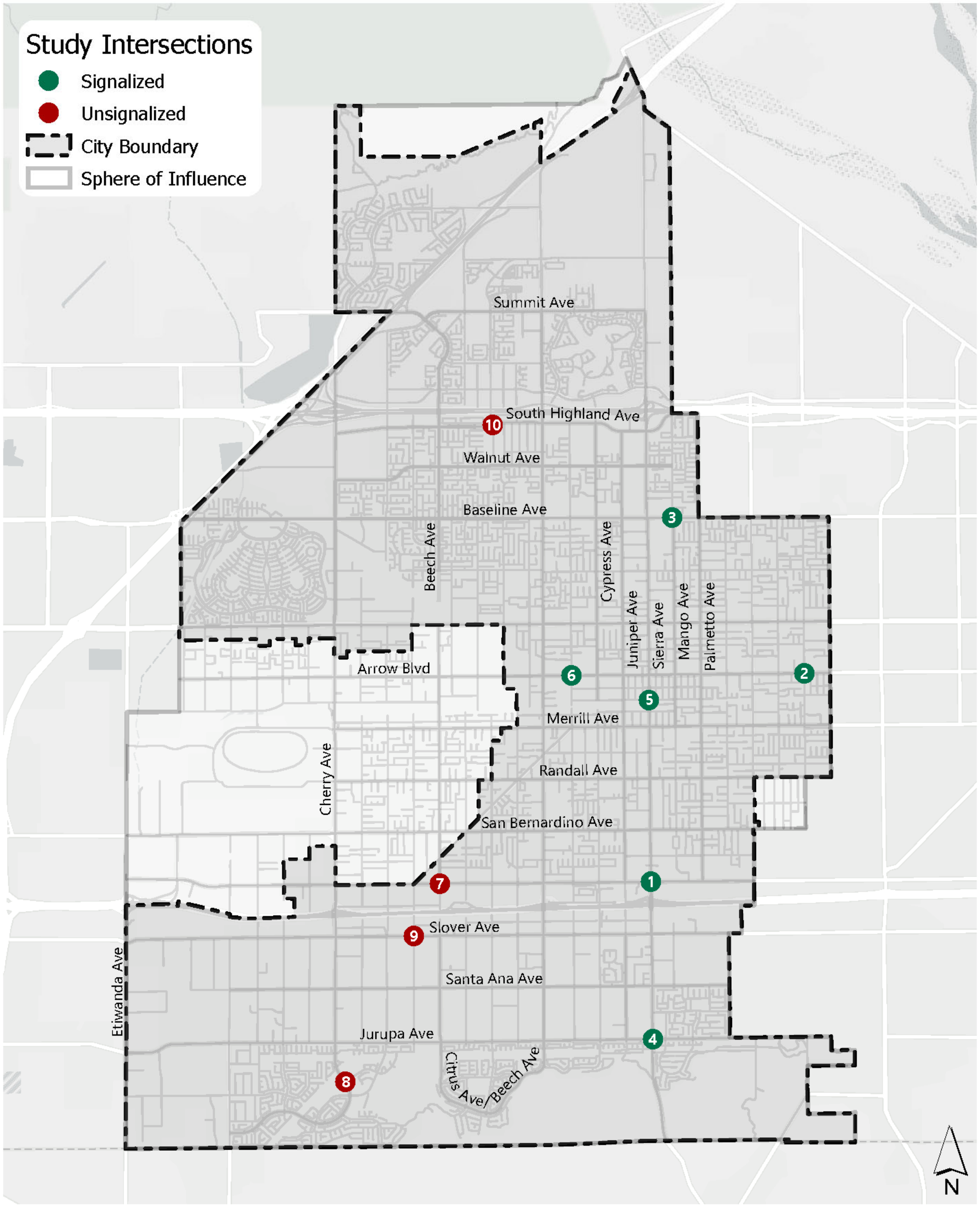


6.1.2 Identified Intersections

All intersections located on City streets in the public right-of-way were included in the safety analysis, and were reviewed using industry standard crash frequency and "EPDO" methods. A total of 10 intersections were selected for potential countermeasure implementation. **Figure 6.3** illustrates the locations of the proposed intersection countermeasures, as shown in the list below:

1. Sierra Avenue and Valley Boulevard (Signalized)
2. Arrow Boulevard and Locust Avenue (Signalized)
3. Baseline Avenue and Mango Avenue (Signalized)
4. Jurupa Avenue and Sierra Avenue (Signalized)
5. Sierra Avenue and Orange Way (Signalized)
6. Arrow Boulevard and Oleander Avenue (Signalized)
7. Beech Avenue and Valley Boulevard (Non-signalized – Two-way Stop)
8. Cherry Avenue and Village Drive (Non-signalized – All-way Stop)
9. Hemlock Avenue and Slover Avenue (Non-signalized – Two-way Stop)
10. Highland Avenue and Knox Avenue (Non-signalized – Two-way Stop)

Figure 6.3: Intersections with Proposed Safety Countermeasures



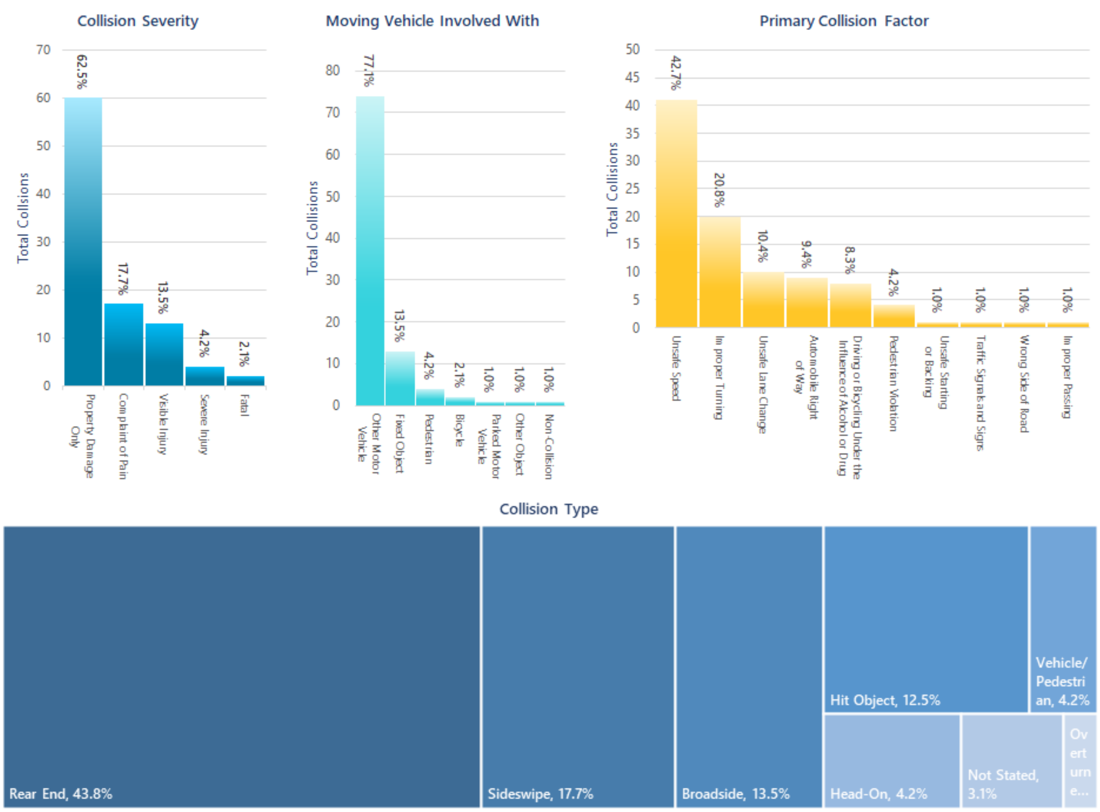
6.2 ROADWAY SEGMENT RECOMMENDATIONS

6.2.1 Foothill Boulevard

This segment on Foothill Boulevard from the west boundary (East Avenue) to Citrus Avenue is approximately 3.5 miles long. The average daily traffic volume ranges from approximately 23,000 (Cherry Avenue to Citrus Avenue) to 25,300 (west boundary to Cherry Avenue) in 2014. The speed limit is 50 mph west of Hemlock Avenue and 45 mph east of Hemlock Avenue. The width of the segment varies from 50 feet to 100 feet. The segment includes a total of 11 signalized intersections. It provides three lanes in each direction with a landscaped median and bike lanes from the west boundary to Hemlock Avenue. East of Hemlock Avenue, the corridor provides two travel lanes in each direction with a two-way left-turn lane and no bike lanes (the two-way left-turn lane drops after Sultana Avenue) until Almeria Avenue. East of Almeria Avenue until Citrus Avenue, the segment provides three lanes of travel in each direction and a landscaped median, but no bike lanes.

In total, 96 collisions occurred on this segment from January 2016 to December 2020, ranking 8th in total collisions and 2nd in EPDO score. Thirty-six collisions (38%) occurred at night. The top collision type was rear-end followed by sideswipe and then broadside collisions. Forty-one collisions (43%) were caused by unsafe speed and 20 collisions (21%) from improper turning. There were two fatalities and two severe injuries from pedestrians who were considered to be at fault for these collisions. Two other severe injury collisions resulted from improper turning. City staff noted that concerns about pedestrians were prominent on this segment. **Figure 6.4** shows collision statistics for this roadway segment.

Figure 6.4: Collision Statistics – Foothill Boulevard



During field review, project staff noted that while ample lighting is provided on the segment from the City's west border to Hemlock Avenue, existing lighting is much more sparse east of Hemlock Avenue, and is usually only provided at intersections. The following safety countermeasure could be considered in this corridor under existing conditions:

- R01 – Add segment lighting to utility poles or on temporary poles from Hemlock Ave to Almeria Avenue.

There are a variety of other improvements that could be completed on the portion of the segment from Hemlock Ave to Almeria Ave to improve safety on the corridor. However, in order to implement these changes, the available right of way would need to be increased. Currently, right of way is limited as the roadway passes under the Pacific Electric trail. Due to the tunneling of the underpass and restrictive walls, the roadway currently lacks a shoulder, median barrier, bike facilities, and pedestrian facilities. In order to add these facilities while retaining the benefits of the existing Pacific Electric trail, the bridge would need to be demolished and replaced with a longer elevated bridge that would pass over the roadway without the need for an underpass. The following improvements would improve safety once these other bridge project changes have been completed:

- R08 – Add raised median from Hemlock to Almeria Avenue
- R15 – Widen shoulder from Hemlock to Almeria Avenue
- R18 – Improve sight distance by raising street and eliminating need for vertical curve east of Sultana Avenue
- R33PB – Install separated bike lanes with two-foot buffer between Hemlock Avenue and Almeria Avenue
- R34PB – Construct sidewalk on both sides of the street from Hemlock Avenue to Almeria Avenue, except on south side of the street in the vicinity of Sultana Avenue where there is existing sidewalk

The plans for the collected set of safety projects alongside the bridge reconstruction is included in Appendix B.

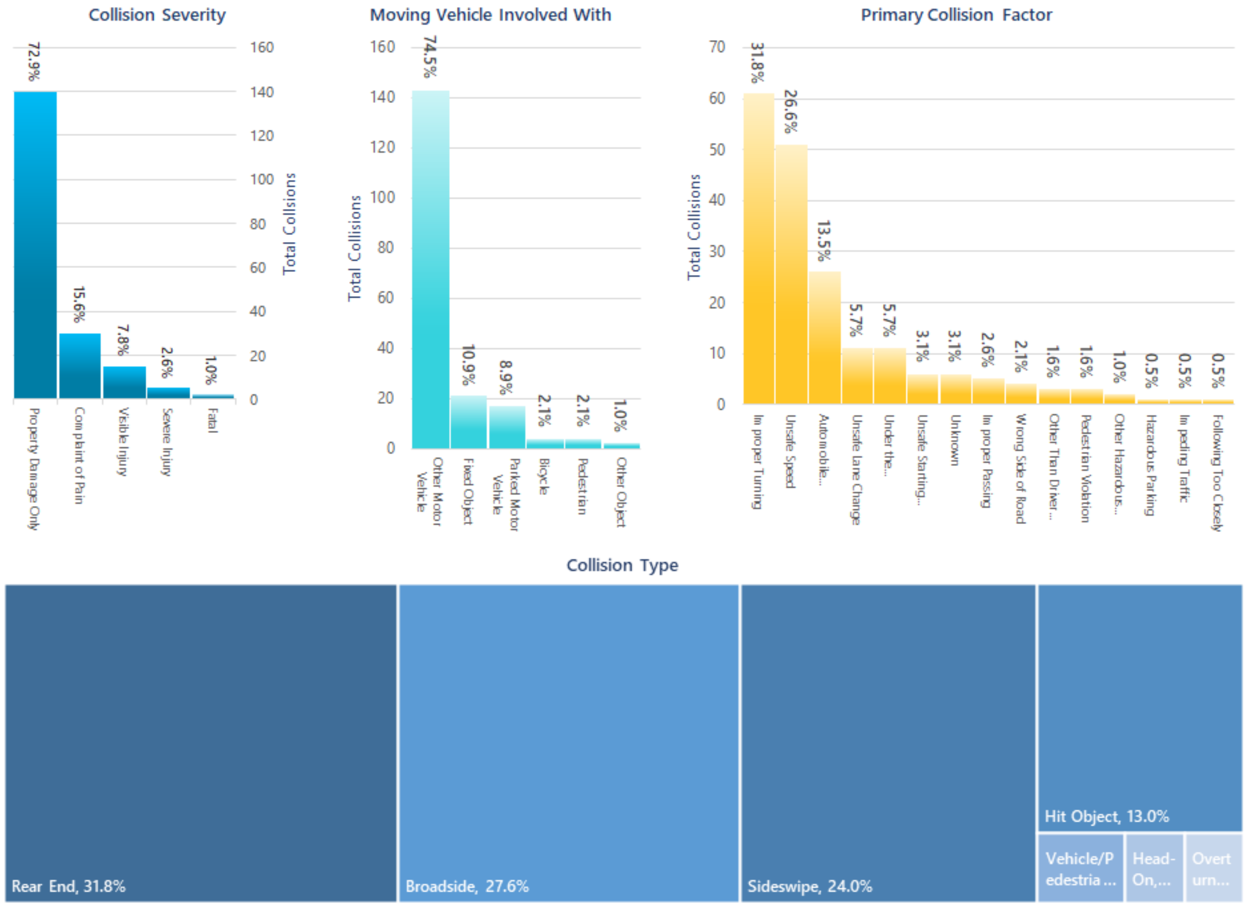
6.2.2 Valley Boulevard

This segment on Valley Boulevard from Etiwanda Avenue to the City's east boundary (Alder Avenue) is approximately 6 miles long. The daily traffic volume ranges from approximately 18,400 (near Etiwanda Avenue) to 30,000 (near Alder Avenue) in 2015. The speed limit is 50 mph from Etiwanda Avenue to Calabash Avenue. From Calabash Avenue to Palmetto Avenue, the speed limit is 45 mph. The speed limit drops to 40 mph for the final short segment from Palmetto Avenue to Alder Avenue. The width of the segment varies from 50 feet to 110 feet. The segment includes a total of 11 signalized intersections. East of Etiwanda Avenue to Commerce Drive, the roadway provides three travel lanes in each direction with a center landscaped median. From Commerce Drive to Calabash Avenue, the roadway provides the same configuration but drops from three to two travel lanes in the eastbound direction. From Calabash Avenue to Juniper Avenue, the roadway provides two travel lanes in each direction, usually with a center two-way left-turn lane. From Juniper Avenue to Sierra Avenue, there are three travel lanes in the eastbound direction and two in the westbound direction, with a center landscaped median. From Sierra Avenue to Health Care Parkway, there are three travel lanes in each direction with a center landscaped median. From Health Care Parkway to Palmetto Avenue, there are two lanes of travel in the eastbound direction and three in the westbound direction, with a center two-way left-turn lane. From Palmetto Avenue to Alder Avenue, the roadway provides two travel lanes in each direction with a two-way left-turn lane.

In total, 192 collisions occurred on this segment from January 2016 to December 2020, ranking 1st in both total collisions and EPDO scores. Forty collisions (21%) occurred at night. The most frequent collision type was rear end, followed by broadside and then sideswipe. Sixty-one (32%) collisions occurred due to improper turning, while 51 (27%) collisions occurred due to unsafe speed. Of the two fatality collisions, one fatality was from a rear-end collision of a motorist crashing into a parked vehicle caused by unsafe speed, while the other fatality involved an intoxicated driver crashing into an object. There were five severe injuries on this segment. These included two collisions with motorists caused by unsafe speed (one a broadside, one a rear end), a driver hitting an object when turning improperly, a head-on collision caused by travel on the wrong side of the road, and a severe injury of a pedestrian where the pedestrian was listed at fault. **Figure 6.5** shows collision statistics for this roadway segment.

Note: Portions of this corridor are within the County of San Bernardino's jurisdiction. Therefore, coordination between the City of Fontana and the County is encouraged to make the appropriate safety improvements along the entire corridor for regional consistency and operations.

Figure 6.5: Collision Statistics – Valley Boulevard



The following safety countermeasures could be considered in this corridor:

- **R32PB –** Add bike lanes from Banana Avenue to Alder Avenue.

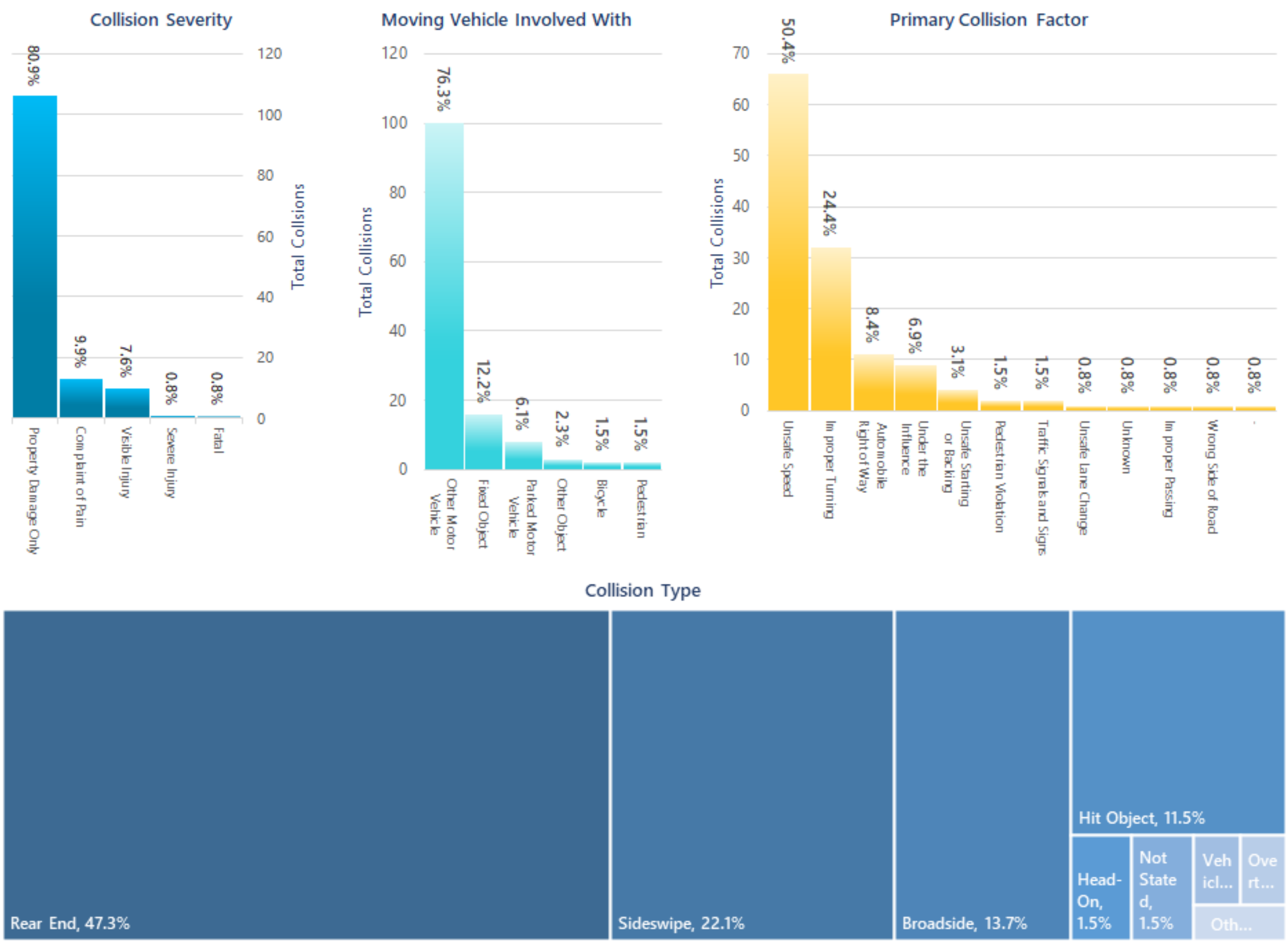
The concept plans for this project are located in Appendix B.

6.2.3 Citrus Avenue

This segment on Citrus Avenue from Arrow Boulevard to Jurupa Avenue is approximately 3.5 miles long. The daily traffic volume ranges from approximately 14,000 (near Jurupa Avenue) in 2014 to 28,100 (near Merrill Avenue) in2016. The speed limit is 35 mph from Arrow Boulevard to Randall Avenue. From Randall Avenue to Valley Boulevard, the speed limit is 40 mph. From Valley Boulevard to Slover Avenue, the speed limit is 45 mph. From Slover Avenue to Jurupa Avenue, the speed limit returns to 40 mph. The width of the segment is typically around 65 feet but widens to 110 feet when passing over the I-10 freeway. The segment includes a total of 11 signalized intersections. From Arrow Boulevard to Fontana Avenue, the segment provides two lanes of travel in each direction with either a landscaped median or two-way left-turn lane. South of Fontana Avenue to Valley Boulevard, there are two lanes of travel in each direction, but no center median or two-way left-turn lane. From Valley Boulevard to Slover Avenue, over the freeway, there are three northbound travel lanes, two southbound travel lanes, bike lanes, and a landscaped median. From Slover Avenue to Santa Ana Avenue, Citrus Avenue provides two northbound travel lanes, one southbound travel lane, and a two-way left-turn lane. South of Santa Ana Avenue to Jurupa Avenue, there are two northbound travel lanes and one southbound travel lane, but no two-way left-turn lane.

A total of 131 collisions occurred on this segment from January 2016 to December 2020, ranking 3rd in total collisions and 6th by EPDO score. Forty-three (33%) of the collisions occurred at night. Rear-end was the most common collision type followed by sideswipe and then broadside collision types. Sixty-six collisions (50%) occurred due to unsafe speed. There was one fatality, south of Citrus Avenue and Rosemary Avenue, of a pedestrian after a collision with a vehicle, though the pedestrian was listed as the fault of the collision. The one severe collision on this segment was a head-on between two motor vehicles caused by improper turning. It occurred north of Citrus Avenue and Valley Boulevard. **Figure 6.6** shows collision statistics for this roadway segment.

Figure 6.6: Collision Statistics – Citrus Avenue



The following safety countermeasure could be considered on this corridor: is shown in Appendix B.

- **R32PB –** Install bike lanes from Arrow Boulevard to Jurupa Avenue

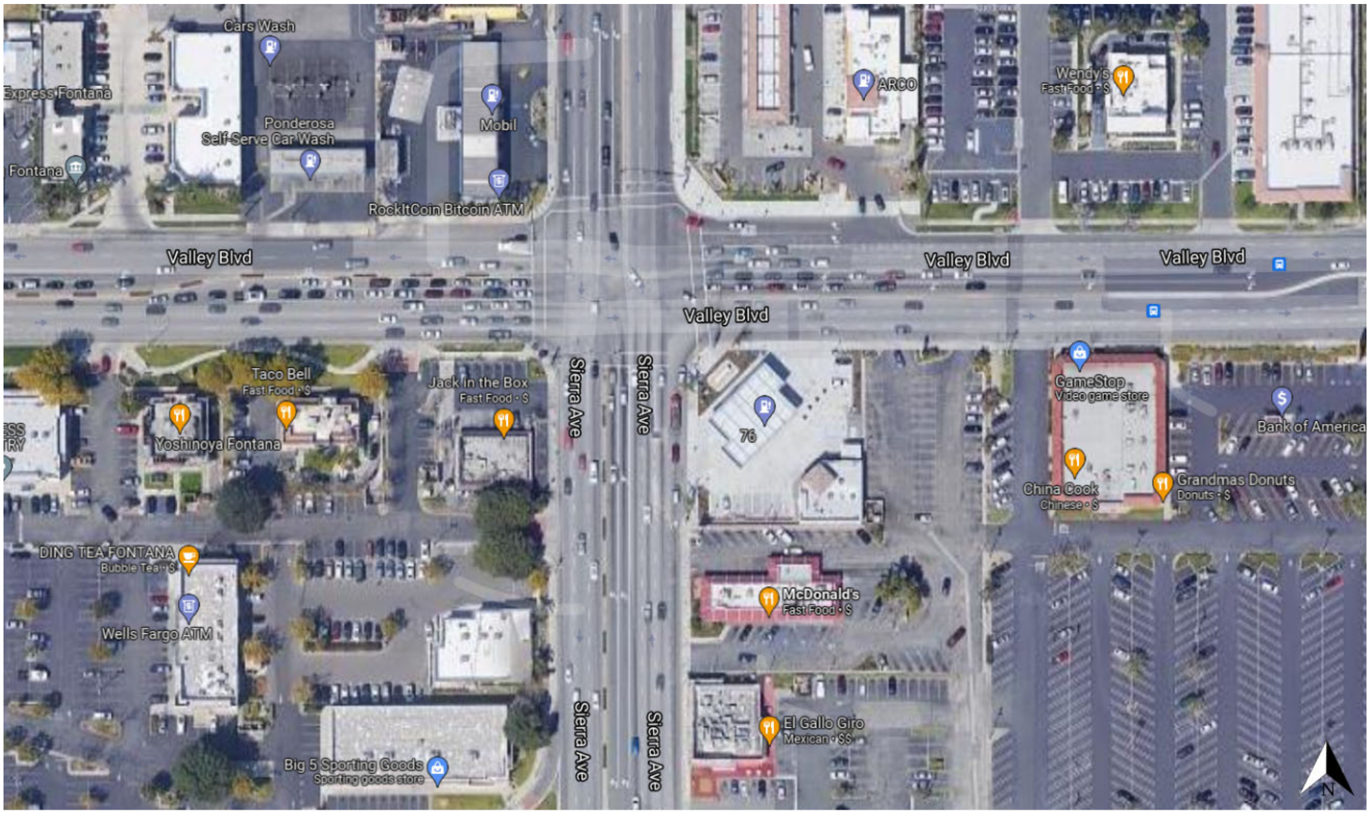
The concept plans for this project are located in Appendix B.

6.3 INTERSECTION RECOMMENDATIONS

6.4.1 Sierra Avenue and Valley Boulevard

As shown in **Figure 6.7**, all legs of Sierra Avenue and Valley Boulevard provide three lanes in each direction with a left-turn lane at the signalized intersection except for the westbound movement on Valley Boulevard, which provides two lanes with a left-turn lane. There are right-turn pockets on the northbound and westbound approaches. There are no bike lanes and on-street parking is not allowed on either direction. Sierra Avenue has a speed limit of 40 miles per hour (mph) and Valley Boulevard has a speed limit of 45 mph. ADA ramps and standard crosswalks exist on all legs of the intersection. Commercial zoning exists along the intersection with a gas station at the southeast, northwest and northeast corners and a drive-thru restaurant at the southwest corner.

Figure 6.7: An Aerial View of the intersection of Sierra Avenue and Valley Boulevard



Source: Google (2021)

A total of 257 collisions occurred at the intersection of Sierra Avenue and Valley Boulevard between January 2016 and December 2020. The intersection ranks 1st by total collision frequency and 1st by the

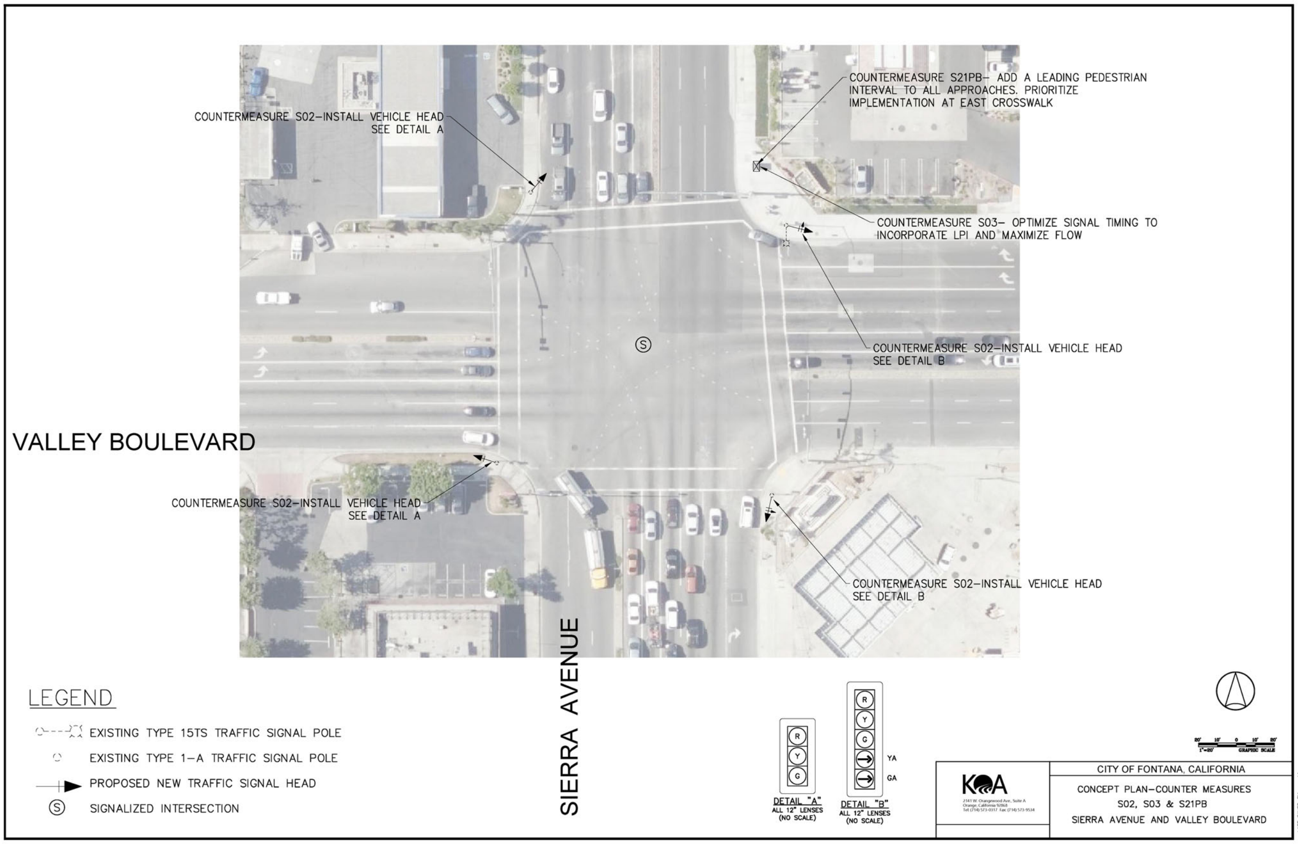
EPDO score method. Collision types consisted of hit-object (9), rear-end (114), broadside (49), and sideswipe (70). The most common primary collision factors are unsafe speed (106), improper turning (62) and unsafe lane change (20). A total of 188 collisions occurred during daylight conditions and 65 collisions occurred at this intersection under the dark – with street lights condition. In total nine collisions were involved with a pedestrian and seven collisions with a bicyclist. **Figure 6.8** shows collision statistics for this intersection.

Figure 6.8: Collision Statistics – Sierra Avenue & Valley Boulevard

The following safety countermeasures could be considered at this intersection and are shown in **Figure 6.9**.

- S21PB – Add a leading pedestrian interval to all approaches. Prioritize implementation at east crosswalk.
- S02 – Add nearside signal at all approaches.
- S03 – Optimize signal timing to incorporate LPIs and maximize flow.

Figure 6.9: Recommended Improvements – Sierra Avenue & Valley Boulevard



6.4.2 Arrow Boulevard and Locust Avenue

As shown in **Figure 6.10**, all legs of Arrow Boulevard and Locust Avenue provide one lane in each direction with a left-turn lane at the signalized intersection. There are right-turn pockets on the southbound and eastbound approaches. The eastbound and westbound approaches on Arrow Boulevard provide a bike lane in each direction, and on-street parking is not allowed except on northbound Locust Avenue north of the intersection. Arrow Boulevard has a speed limit of 35 mph and Locust Avenue has a speed limit of 40 mph. ADA ramps and standard crosswalks exist on all legs of the intersection. Commercial zoning exists both north and south of the intersection with residential existing on the southwest corner.

Figure 6.10: An Aerial View of the intersection of Arrow Boulevard and Locust Avenue

Source: Google (2021)

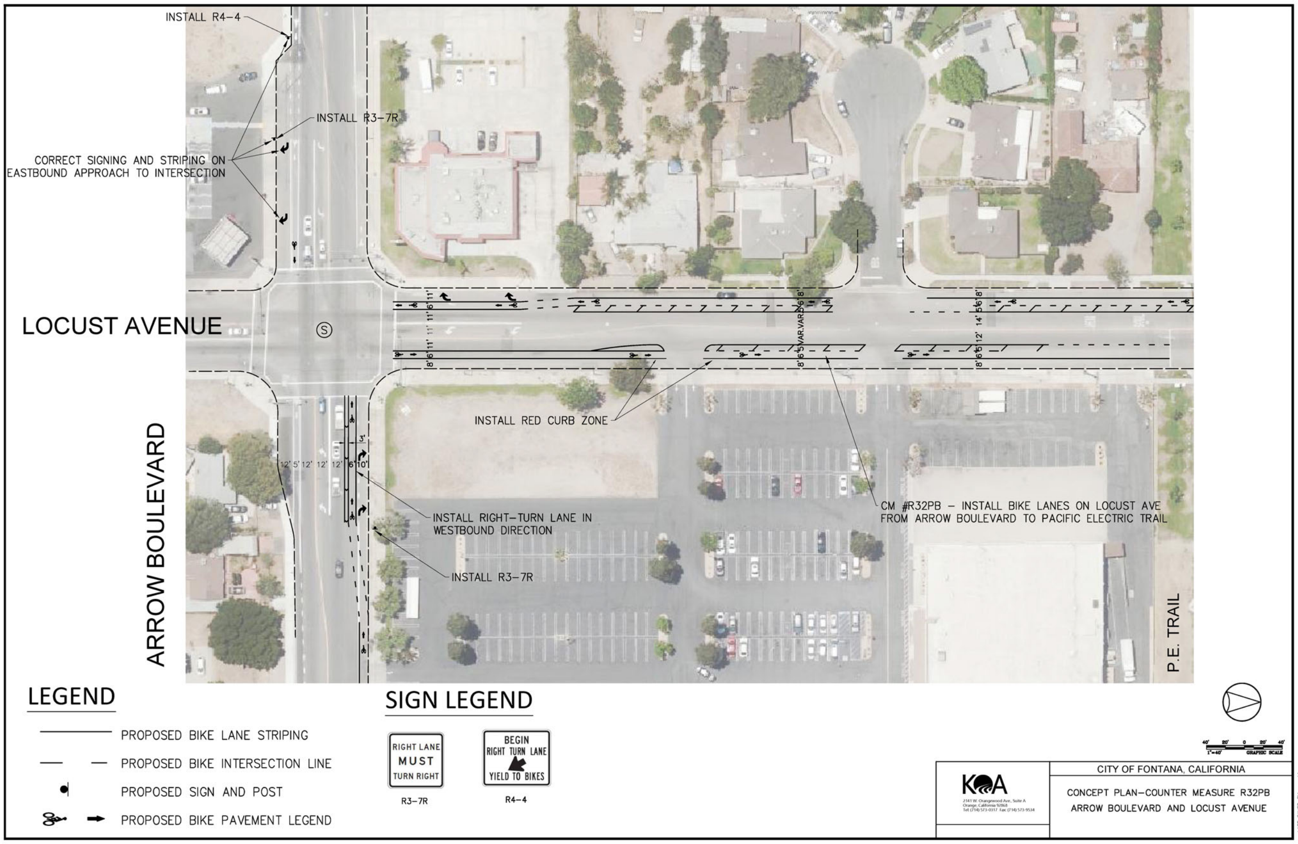
A total of 32 collisions occurred at the intersection of Arrow Boulevard and Locust Avenue from January 2016 and December 2020. The intersection ranks 69th by total collision frequency and 3rd by the EPDO method. The top collision types consisted of broadside (13), sideswipe (5), and rear end and vehicle/pedestrian (1). The most common primary collision factors are unsafe speed (14), automobile right of way (5), and improper turning (4). A total of 24 collisions occurred during daylight conditions and seven collisions occurred at this intersection under the dark – with street lights condition. In total one collision was involved with a pedestrian and one collision with a bicyclist. **Figure 6.11** shows collision statistics for this intersection.

Figure 6.11: Collision Statistics – Arrow Boulevard & Locust Avenue

The following safety countermeasures could be considered in this intersection and are shown in **Figure 6.12.**

- R32PB – Add bike lanes on Locust Avenue from Arrow Boulevard to Pacific Electric trail
- Correct signing and striping on eastbound approach to intersection (right-turn lane should be marked)
- Install right-turn lane in westbound direction.

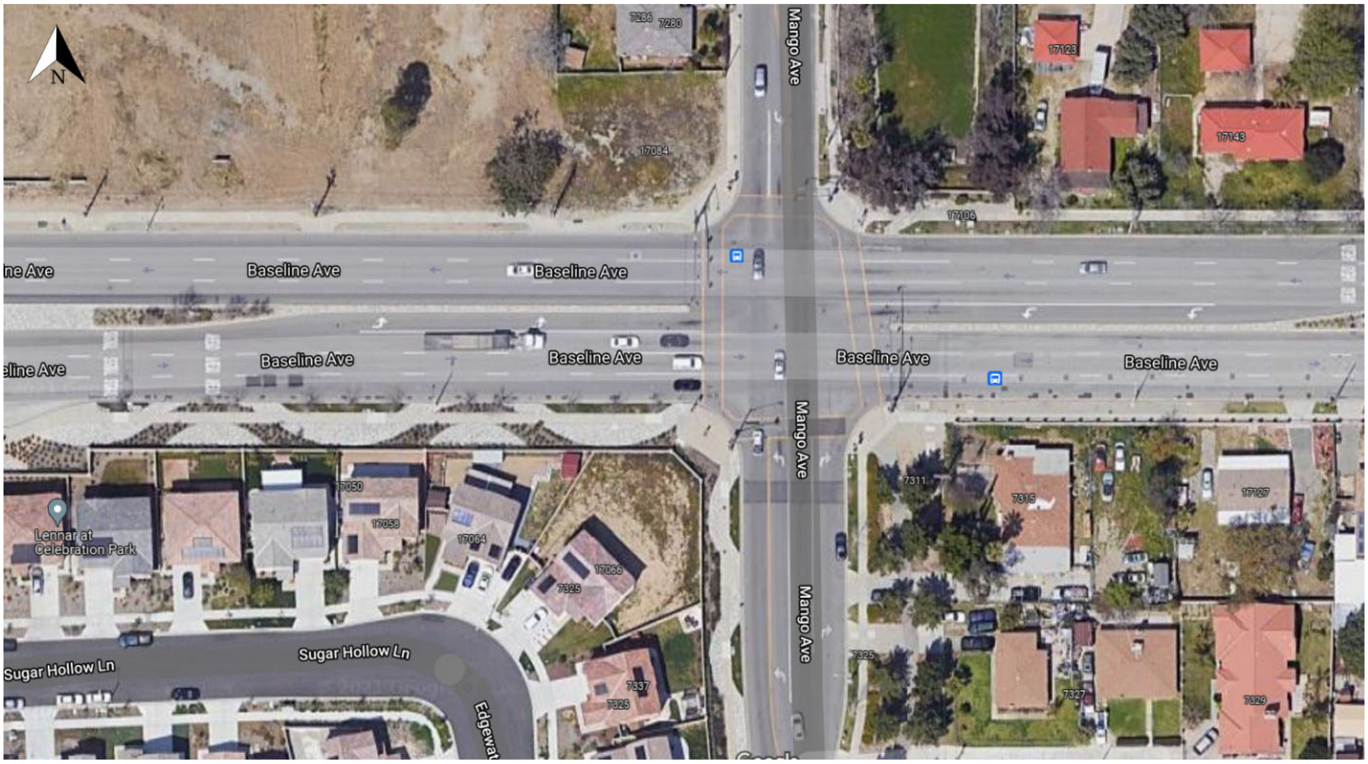
Figure 6.12: Recommended Improvements – Arrow Boulevard & Locust Avenue



6.4.3 Baseline Avenue and Mango Avenue

As shown in **Figure 6.13**, Baseline Avenue provides three lanes in each direction with a left-turn lane at the signalized intersection. Mango Avenue provides one lane in each direction with a left-turn lane at the intersection. There is a single right-turn pocket on the northbound approach of Mango Avenue. There are no bike lanes and on-street parking is only allowed on Mango Avenue. Baseline Avenue has a speed limit of 45 mph and Mango Avenue has a speed limit of 40 mph. ADA ramps and standard crosswalks exist on all legs of the intersection. Residential uses exists on all corners of the intersection. The northwest corner is currently a vacant lot.

Figure 6.13: An Aerial View of the intersection of Baseline Avenue & Mango Avenue



Source: Google (2021)

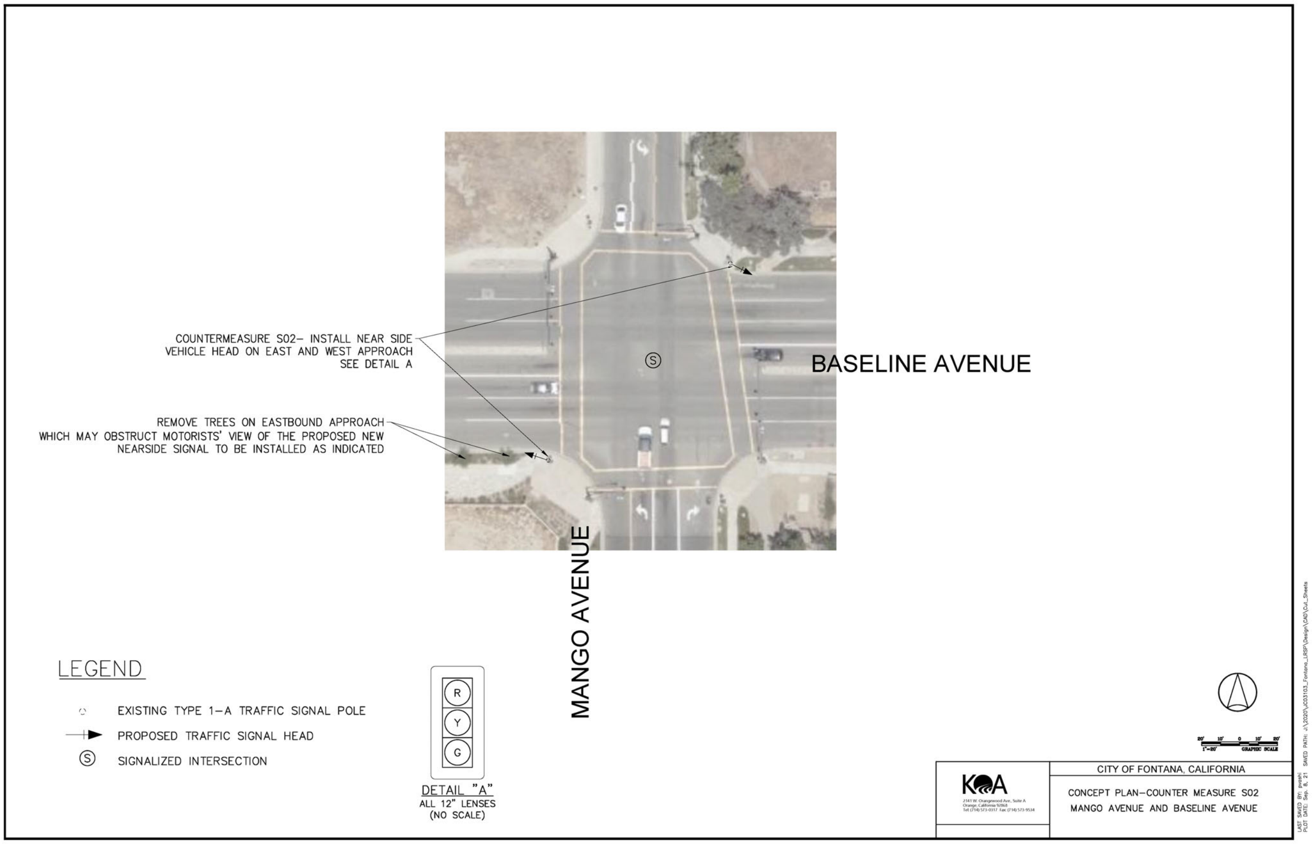
A total of 36 collisions occurred at the intersection of Baseline Avenue and Mango Avenue from January 2016 and December 2020. The intersection ranks 55th by total collision frequency and 7th by the EPDO score. The top collision types consisted of broadside (14), rear end (7), and sideswipe (6). The most common primary collision factors are unsafe speed (10), traffic signals and signs (10), and improper turning (7). A total of 22 collisions occurred during daylight conditions and 12 collisions occurred at this intersection under the dark – with street lights condition. In total one collision was involved with a pedestrian and one collision with a bicyclist. **Figure 6.14** shows collision statistics for this intersection.

Figure 6.14: Collision Statistics – Baseline Avenue & Mango Avenue

The following safety countermeasures could be considered in this intersection and is shown in **Figure 6.15**.

- S02 – Add nearside signal on east approach and west approach. Remove any trees on west approach which may block nearside signal.

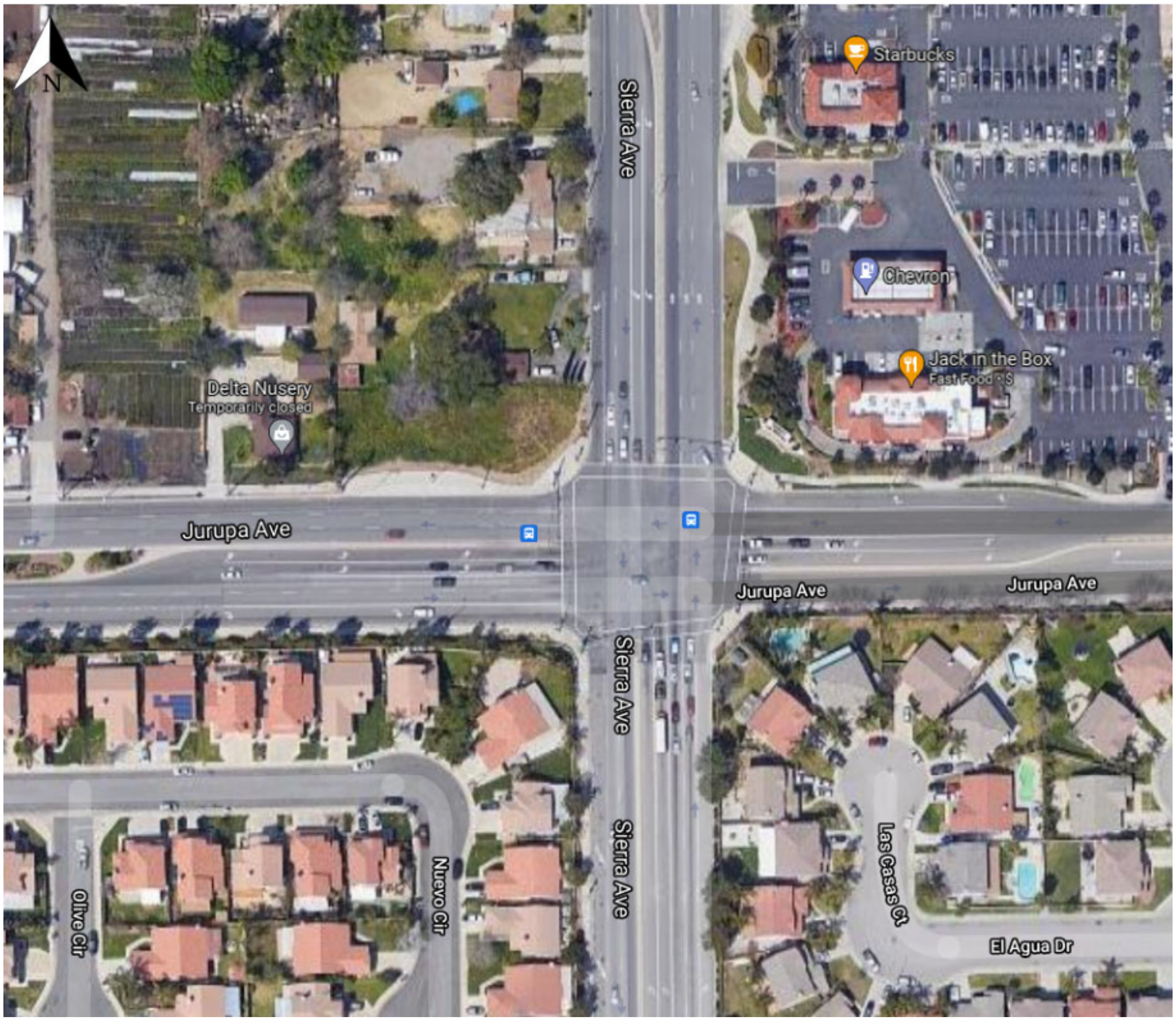
Figure 6.15: Recommended Improvements – Baseline Avenue & Mango Avenue



6.4.4 Jurupa Avenue and Sierra Avenue

As shown in **Figure 6.16**, Sierra Avenue has either two or three through lanes in each direction. All directions have dual left turn lanes and single right turn lanes. There are no bike lanes and on-street parking is not allowed. Sierra Avenue has a speed limit of 50 mph and Jurupa Avenue has a speed limit of 45 mph. ADA ramps and standard crosswalks exist on all legs of the intersection. Residential uses exists along the northwest, southeast, and southwest corners of the intersection. Commercial uses, where a shopping center currently exists, is on the northeast corner.

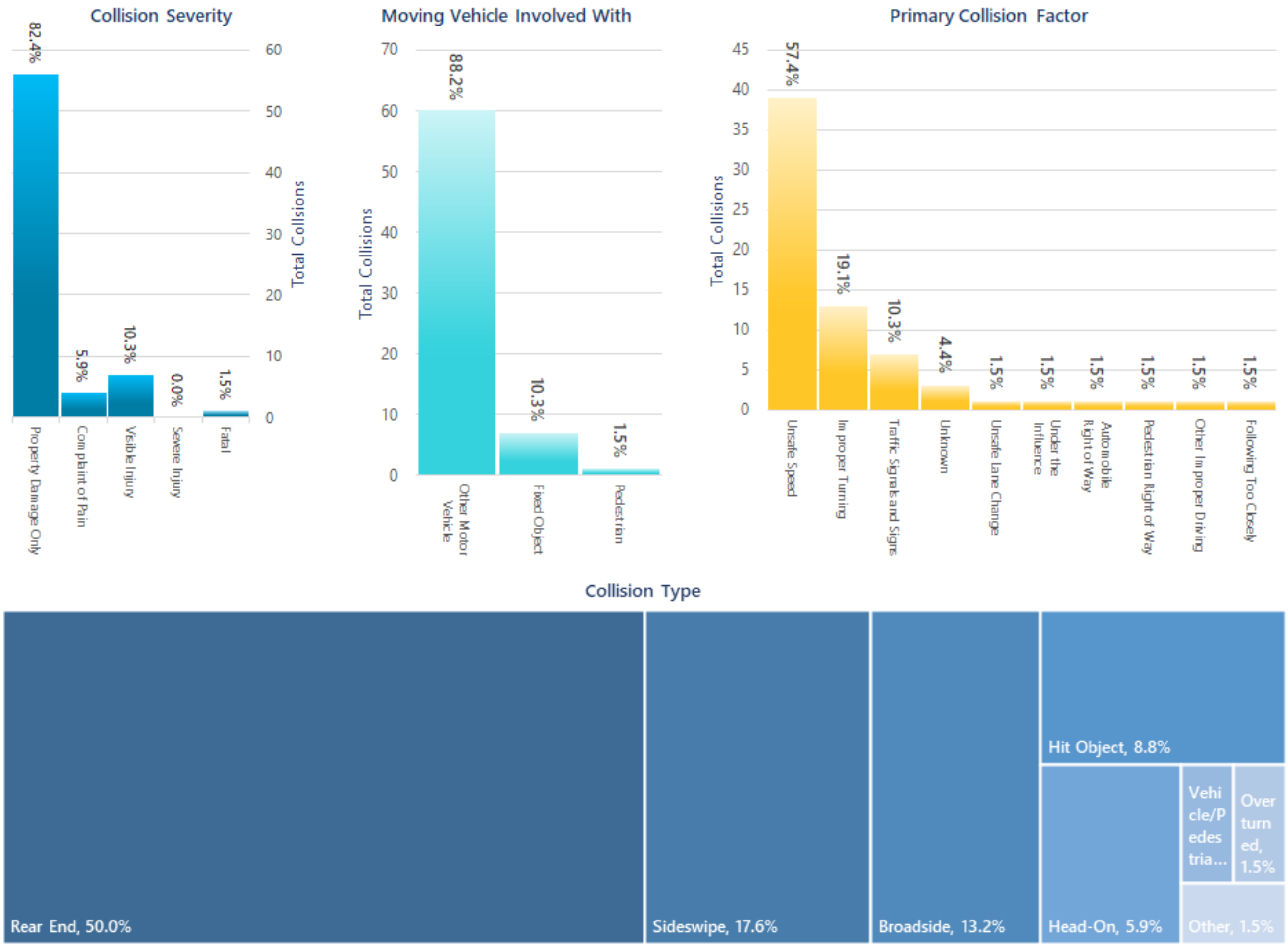
Figure 6.16: An Aerial View of the intersection of Jurupa Avenue and Sierra Avenue



Source: Google (2021)

A total of 68 collisions occurred at the intersection of Jurupa Avenue and Sierra Avenue from January 2016 and December 2020. The intersection ranks 16th by total collision frequency and 18th by the EPDO score. The top collision types consisted of rear end (34), sideswipe (12), and broadside (9). The most common primary collision factors are unsafe speed (39), improper turning (13), and traffic signals and signs (7). A total of 45 collisions occurred during daylight conditions and 21 collisions occurred at this intersection under the dark – with street lights condition. In total one collision was involved with a pedestrian and zero collisions occurred with a bicyclist. **Figure 6.17** shows collision statistics for this intersection.

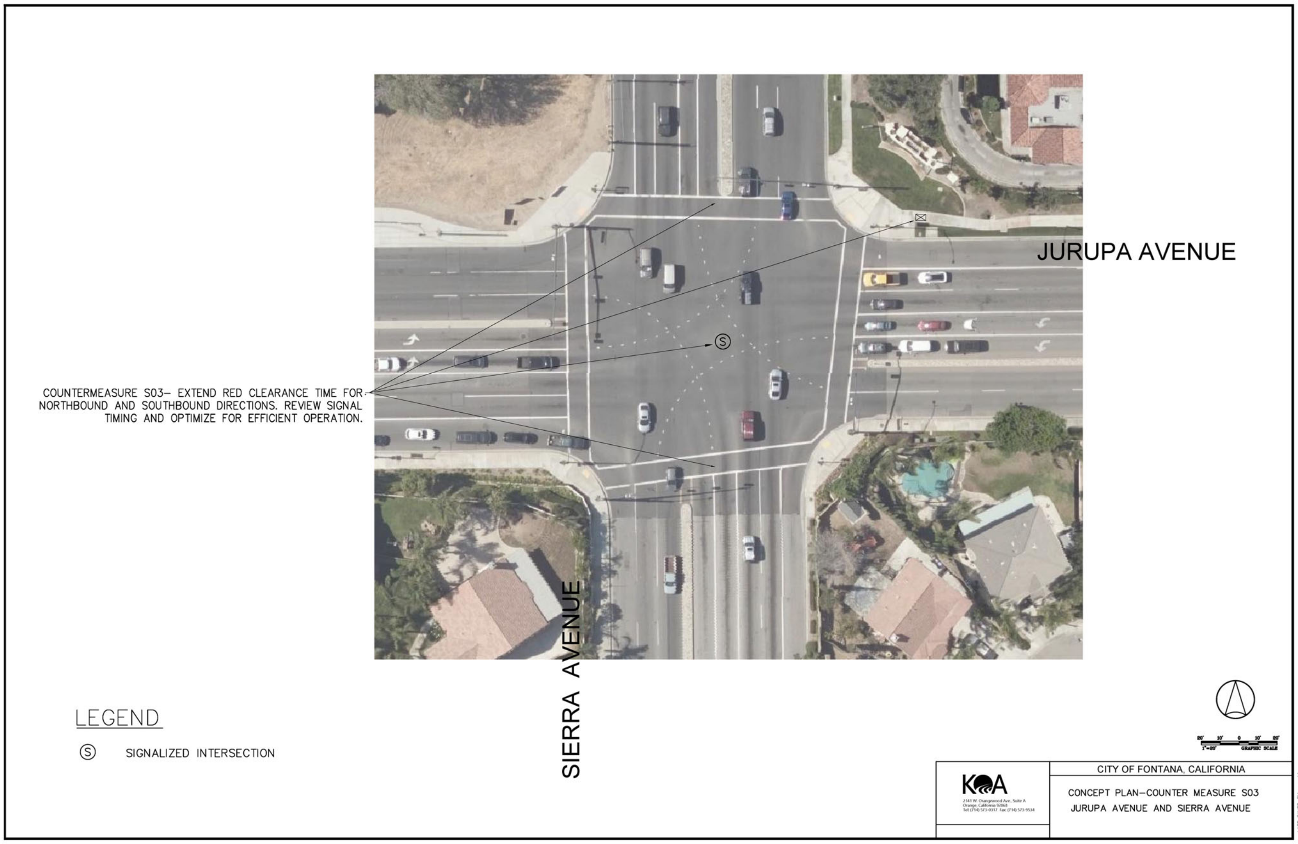
Figure 6.17: Collision Statistics – Jurupa Avenue & Sierra Avenue



The following safety countermeasures could be considered in this intersection and are shown in **Figure 6.18**.

- S03 – Extend red clearance time for northbound and southbound directions. Review signal timing and optimize for efficient operation.

Figure 6.18: Recommended Improvements – Jurupa Avenue & Sierra Avenue



6.4.5 Sierra Avenue and Orange Way

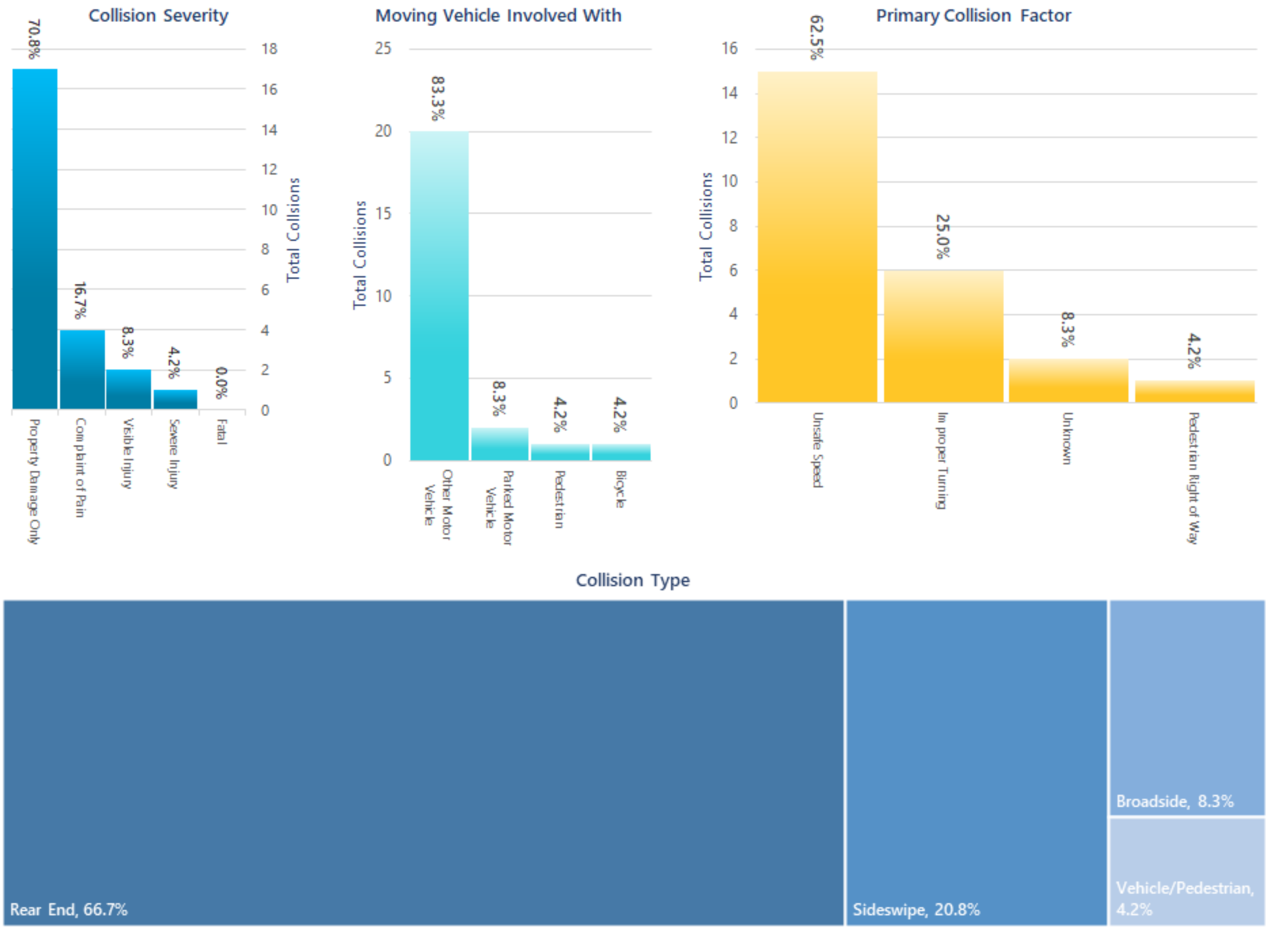
As shown in **Figure 6.19**, Sierra Avenue provides two lanes in each direction with a left-turn lane at the signalized intersection. Orange Way provides one lane in the westbound direction and two lanes in the eastbound direction. Both eastbound and westbound approaches have left-turn lanes. Both northbound and westbound approaches have right-turn pockets. There are bike lanes on Orange Way, west of Sierra Avenue, and on-street parking is allowed on Sierra Avenue, north of Orange Way, on the north side of Orange Way west of Sierra Avenue, and on Orange Way east of Sierra Avenue. Sierra Avenue has a speed limit of 30 mph and Orange Way has a speed limit of 35 mph. ADA ramps and decorative (pavers) marked crosswalks exist on all legs of the intersection. Commercial uses exists on the northeast corner. On the southwest corner sits a park and a transit hub. Residential uses in the form of apartments occupy the remaining northwest and southeast corners.

Figure 6.19: An Aerial View of the intersection of Sierra Avenue and Orange Way

Source: Google (2021)

A total of 24 collisions occurred at the intersection of Sierra Avenue and Orange Way from January 2016 and December 2020. The intersection ranks 95th by total collision frequency and 48th by the EPDO score. The top collision types consisted of rear end (16), sideswipe (5), and broadside (2). The most common primary collision factors are unsafe speed (15) and improper turning (6). A total of 19 collisions occurred during daylight conditions and five collisions occurred at this intersection under the dark – with street lights condition. In total one collision was involved with a pedestrian and one collision with a bicyclist. **Figure 6.20** shows collision statistics for this intersection.

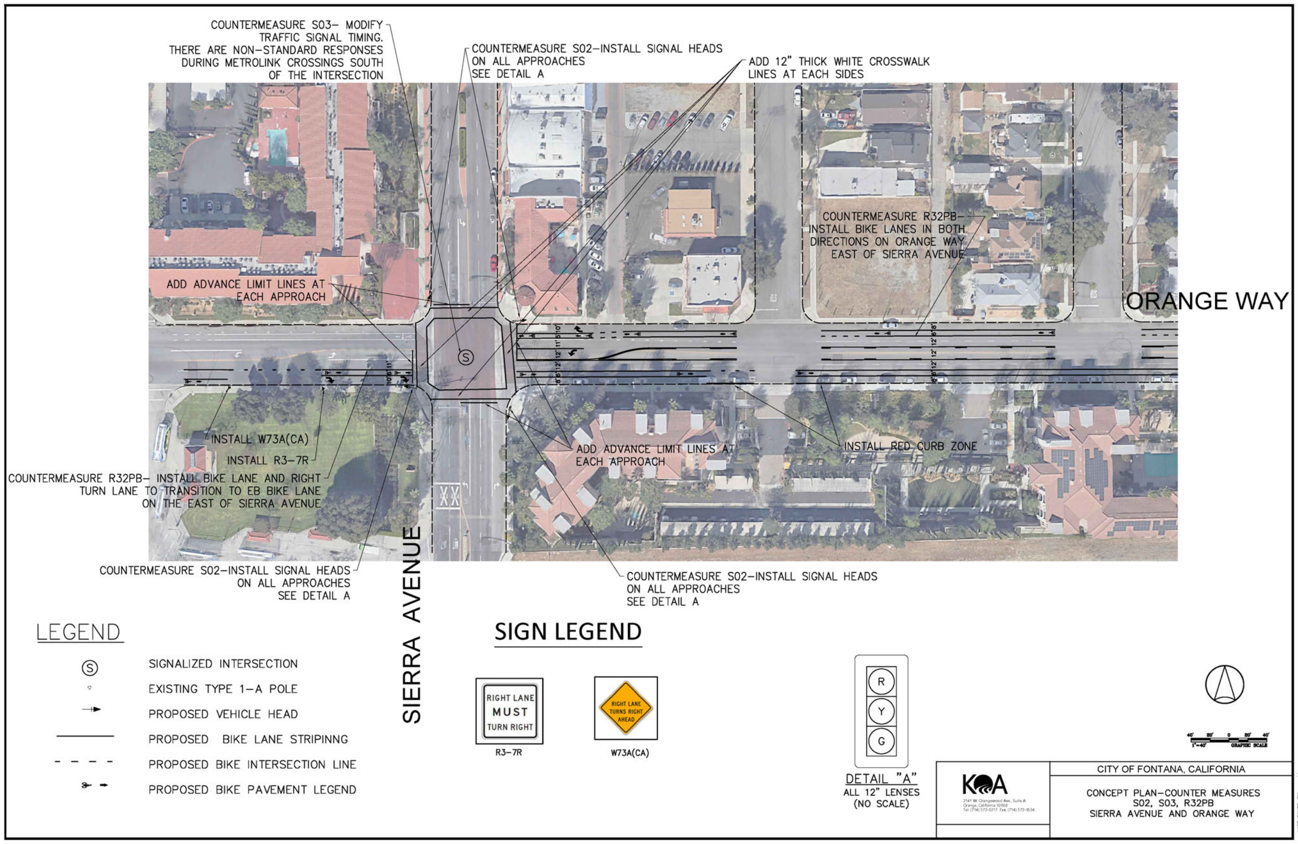
Figure 6.20: Collision Statistics – Sierra Avenue & Orange Way



The following safety countermeasures could be considered in this intersection and are shown in **Figure 6.21**.

- S02 – Add nearside signal heads on all approaches.
- S03 – Signal cycle is unusually long. There are non-standard responses during Metrolink crossings south of the intersection, such as cancelling pedestrian activation that is safe to occur despite the train crossing. Comprehensively review signal timing.
- R32PB – Add bike lane in both directions on Orange Way east of Sierra Avenue (bike lane currently terminates on the west side of Sierra Avenue).
- Add limit lines on each approach.

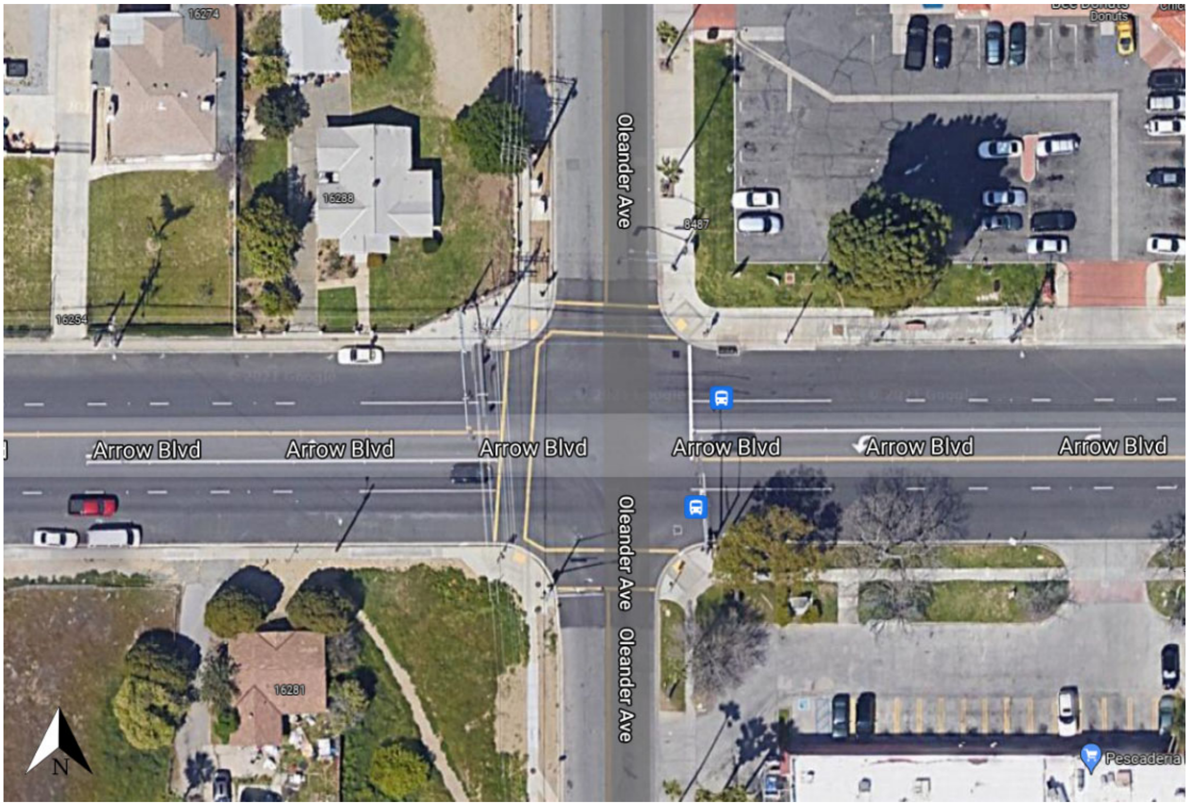
Figure 6.21: Recommended Improvements – Sierra Avenue & Orange Way



6.4.6 Arrow Boulevard and Oleander Avenue

As shown in **Figure 6.22**, the east and west legs of Arrow Boulevard and Oleander Avenue provide two lanes in each direction with a left-turn lane at the intersection, while the north and south legs provide just one through lane in each direction. There are no striped right-turn pockets at the intersection. There are no bike lanes and on-street parking is allowed on all sides of the intersection. Arrow Boulevard has a speed limit of 35 mph and Oleander Avenue has a speed limit of 40 mph. There are ADA ramps on all corners and standard crosswalks except for the east leg. Apartment complexes are the primary land use surrounding this intersection, with some strip mall retail on the northeast and southeast corner.

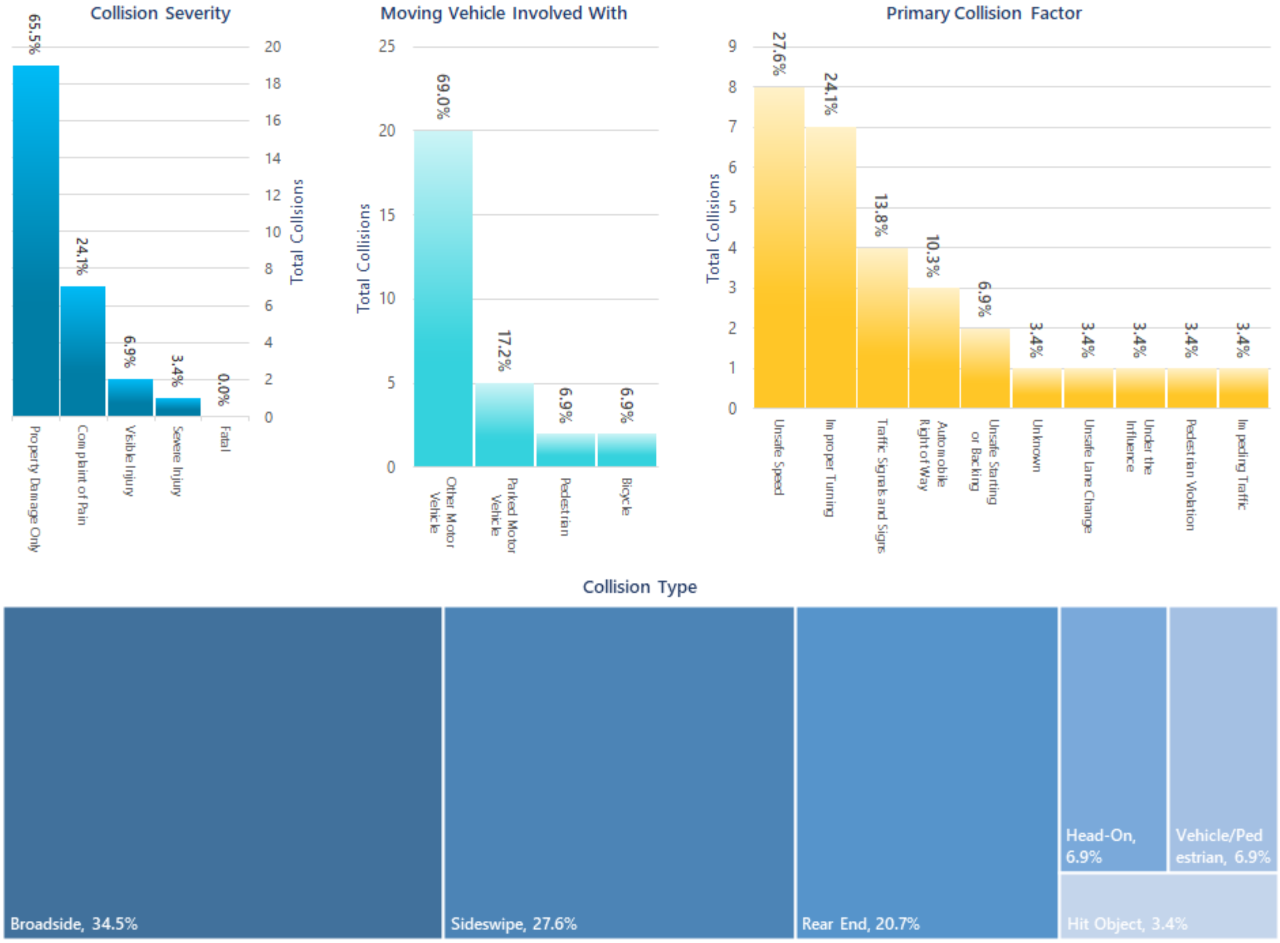
Figure 6.22: An Aerial View of the intersection of Arrow Boulevard and Oleander Avenue



Source: Google (2021)

A total of 29 collisions occurred at the intersection of Arrow Boulevard and Oleander Avenue from January 2016 and December 2020. The intersection ranks 74th by total collision frequency and 35th by the EPDO score. The top collision types consisted of broadside (12), rear end (9), and sideswipe (8). The most common primary collision factors are unsafe speed (8), improper turning (7), and traffic signals and signs (4). A total of 23 collisions occurred during daylight conditions and five collisions occurred at this intersection under the dark – with street lights condition. There were two collisions involving pedestrians and two collisions involving bicyclists. **Figure 6.23** shows collision statistics for this intersection.

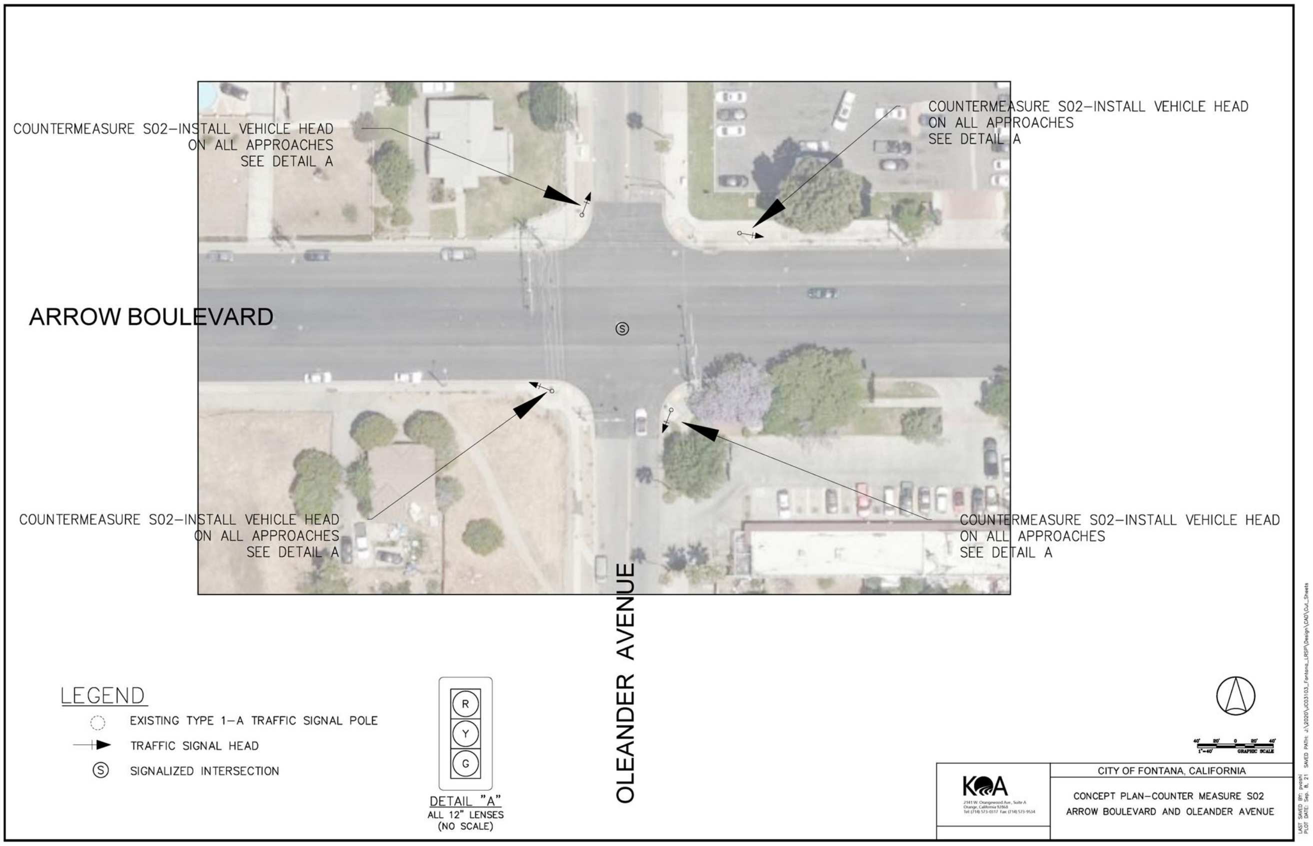
Figure 6.23: Collision Statistics – Arrow Boulevard and Oleander Boulevard



The following safety countermeasure that could be considered in this intersection are shown in **Figure 6.24**.

- S02 – Install nearside signal on all approaches.

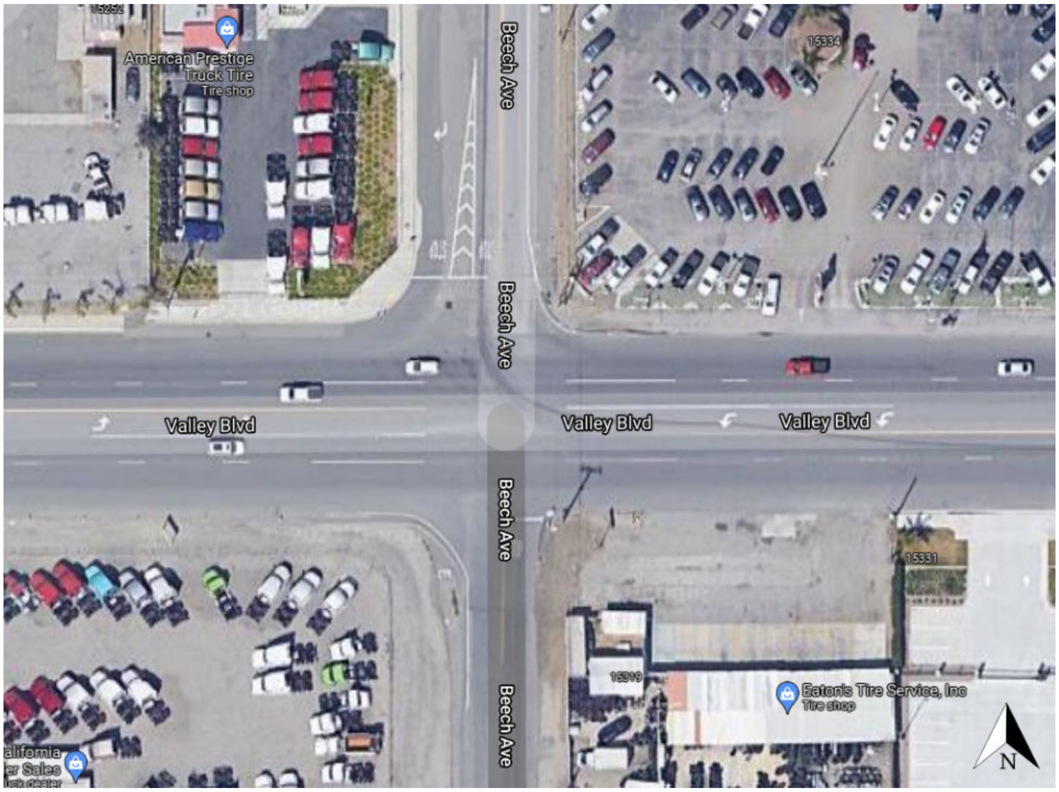
Figure 6.24: Recommended Improvements – Arrow Boulevard and Oleander Boulevard



6.4.7 Beech Avenue and Valley Boulevard

As shown in **Figure 6.25**, Beech Avenue provides one lane in each direction with no left-turn lanes. Valley Boulevard provides two lanes in each direction with a left-turn lane. The intersection is two-way stop-controlled in the northbound and southbound approaches. There is a striped right-turn pocket on the southbound approach of Beech Avenue. There are no bike lanes and on-street parking is allowed north of the intersection on Beech Avenue and west of the intersection on Valley Boulevard. Beech Avenue has a speed limit of 40 mph and Valley Boulevard has a speed limit of 45 mph. ADA ramps only exist on the northwest corner and there are no standard crosswalks at the intersection. A mix of commercial and light industrial uses are located at the four corners of the intersection.

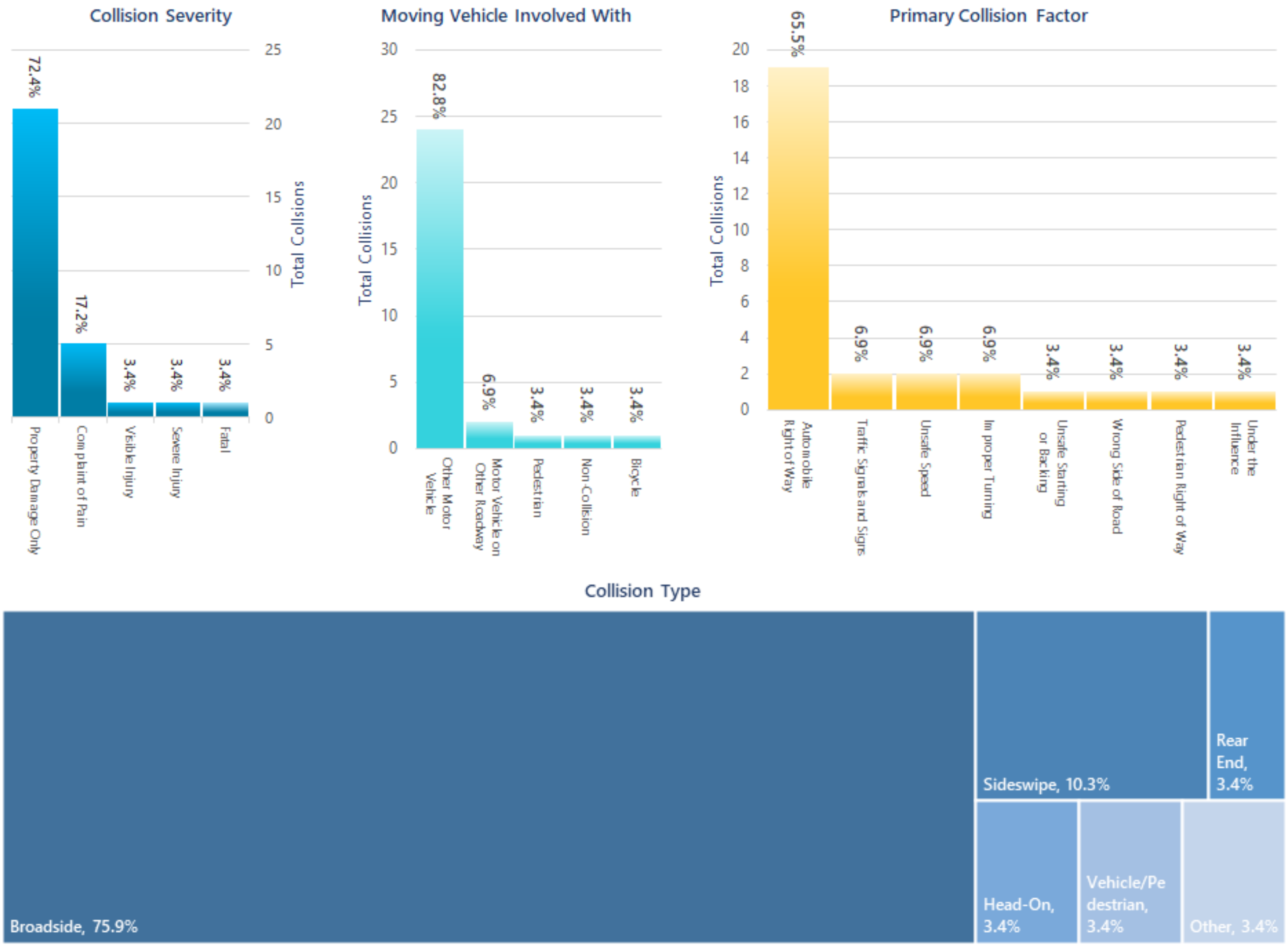
Figure 6.25: An Aerial View of the intersection of Beech Avenue and Valley Boulevard



Source: Google (2021)

A total of 29 collisions occurred at the intersection of Beech Avenue and Valley Boulevard from January 2016 and December 2020. The intersection ranks 8th by total collision frequency and 1st by the EPDO score. The top collision types consisted of broadside (22) and sideswipe (3). The most common primary collision factors are automobile right of way (19), improper turning (2), traffic signals and signs (2), and unsafe speed (2). A total of 20 collisions occurred during daylight conditions and seven collisions occurred at this intersection under the dark – with street lights condition. In total one collision involved a pedestrian and one collision with a bicyclist at the intersection. **Figure 6.26** shows collision statistics for this intersection.

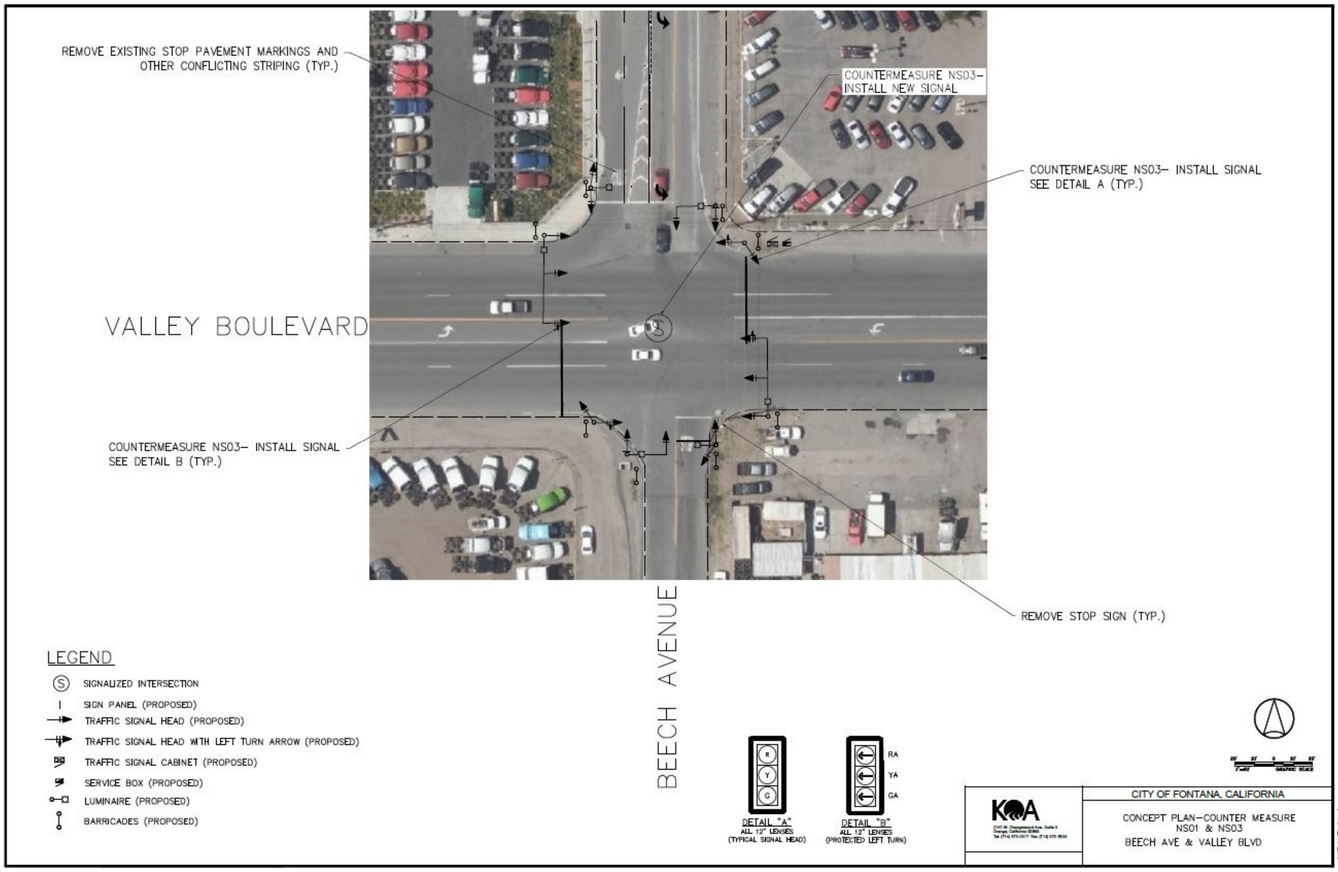
Figure 6.26: Collision Statistics – Beech Avenue & Valley Boulevard



The following safety countermeasures could be considered in this intersection and are shown in **Figure 6.27**.

- NS03 – Install traffic signal (warrant provided in Appendix E)

Figure 6.27: Recommended Improvements – Beech Avenue & Valley Boulevard



6.4.8 Cherry Avenue and Village Drive

As shown in **Figure 6.28**, Cherry Avenue provides two lanes in each direction with a left-turn lane and Village Drive provides one lane in each direction with a left-turn lane. The intersection is four-way stop-controlled. Village Drive westbound movement terminates at the Oakcrest Apartments, west end of the intersection. There are right-turn pockets on the northbound approaches of Cherry Avenue and the southbound approach of Village Drive. There are no bike lanes and on-street parking is not allowed on either direction. Cherry Avenue has a speed limit of 35 mph and Village Drive has a speed limit of 35 mph. Crosswalks are present on the south and east legs of the intersection. Residential uses exists on southwest, northwest, and northeast corners of the intersection. A shopping center exists at the southeast corner.

Figure 6.28: An Aerial View of the intersection of Cherry Avenue and Village Drive

Source: Google (2021)

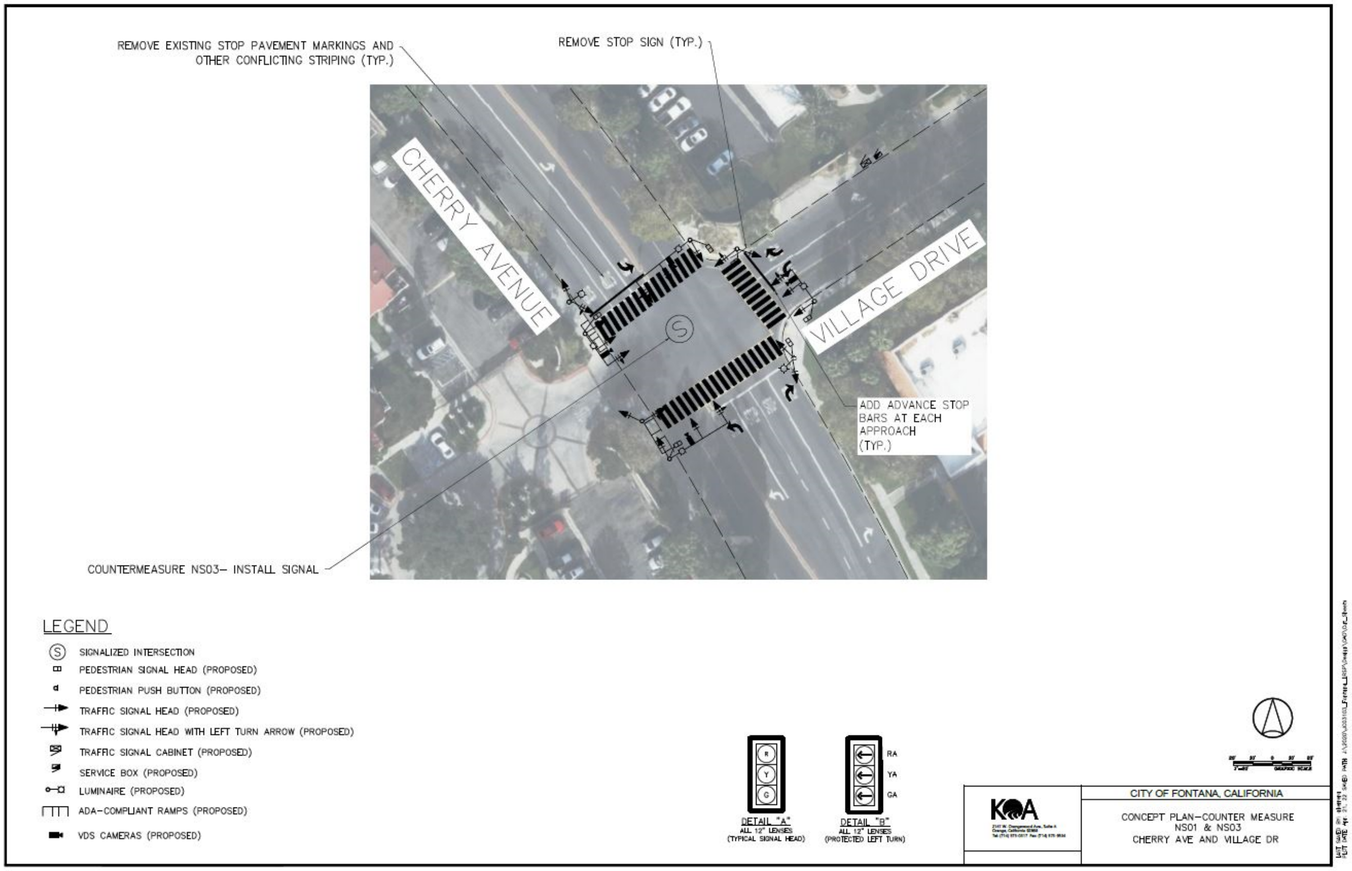
A total of 17 collisions occurred at the intersection of Cherry Avenue and Village Drive from January 2016 and December 2020. The intersection ranks 38th by total collision frequency and 3rd by the EPDO score. The top collision types consisted of broadside (11), rear end (2), and sideswipe (2). The most common primary collision factors are traffic signals and signs (6), automobile right of way (4), and improper turning (3). A total of 11 collisions occurred during daylight conditions and six collisions occurred at this intersection under the dark – with street lights condition. In total one collision was involved with a pedestrian and zero collisions with a bicyclist. **Figure 6.29** shows collision statistics for this intersection.

Figure 6.29: Collision Statistics – Cherry Avenue & Village Drive

A roundabout and a new traffic signal were both considered as safety improvements at this location. Due to intersection geometrics, it was determined that a roundabout would not be appropriate for the intersection. A signal warrant was conducted for the location. Counts were collected on January 25, 2022. The intersection passed Warrant 7 for a new traffic signal when following interim guidance released by the FHWA in 2017. The warrant can be found in Appendix E. The following safety countermeasure could be considered at this intersection and is shown in **Figure 6.30**.

- NS03 – Install signal

Figure 6.30: Recommended Improvements – Cherry Avenue & Village Drive



6.4.9 Hemlock Avenue and Slover Avenue

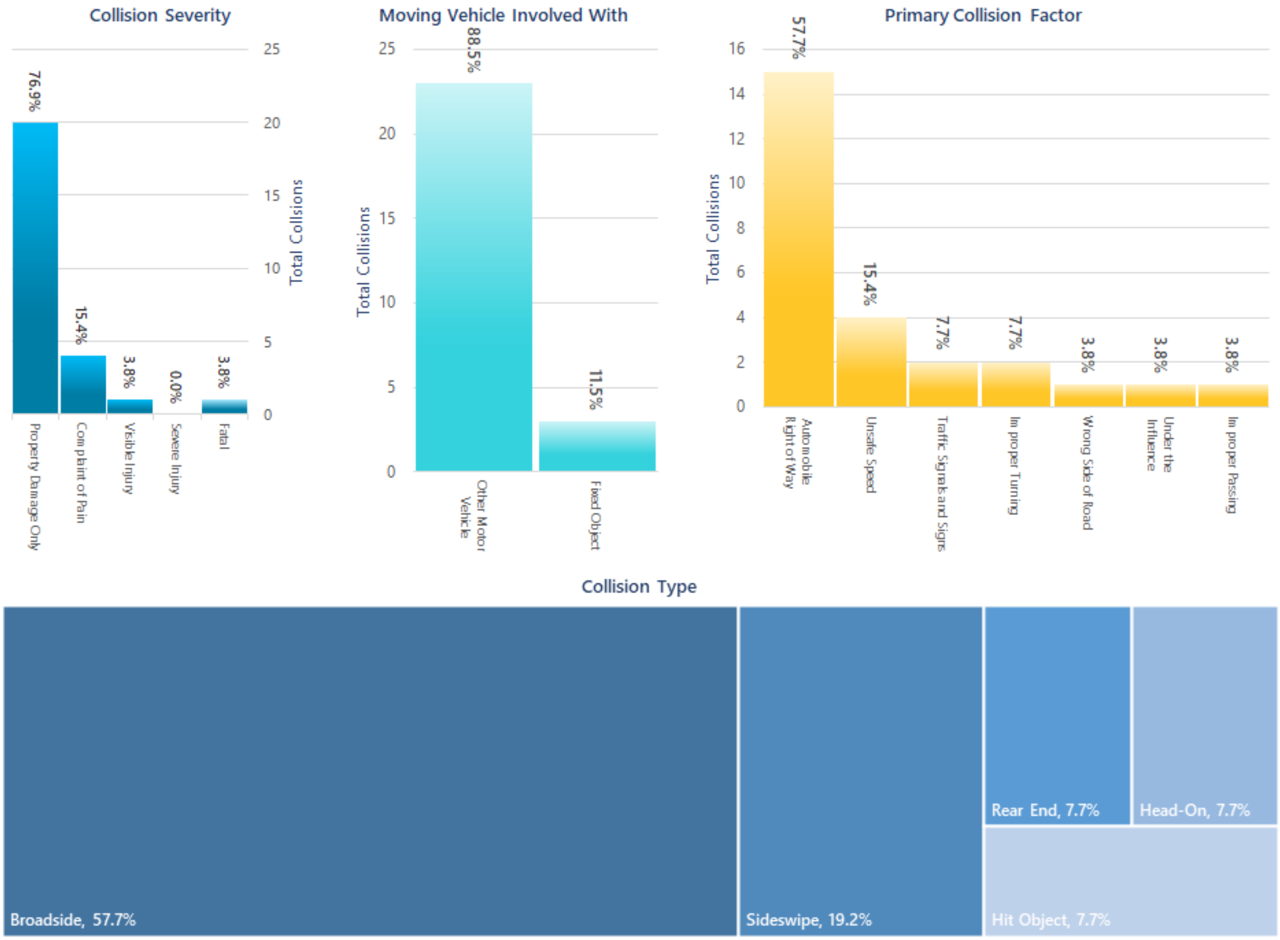
As shown in **Figure 6.31**, Hemlock Avenue provides a single lane in each direction with no left-turn lanes. Slover Avenue provides two lanes in each direction with a left-turn lane. The intersection is two-way stop-controlled with the control on northbound and southbound approaches. There are no right-turn pockets at the intersection. There are no bike lanes and on-street parking is allowed on Hemlock Avenue. Slover Avenue has a speed limit of 45 mph and Hemlock Avenue has a speed limit of 35 mph. ADA ramps exist on all corners of the intersection except on the southwest corner. There are no marked crosswalks at the intersection. Residential uses exists the northeast corner. A village market is located on the northwest corner. On the southeast corner is a large parking lot for auto auctions. The southwest corner is a vacant industrial lot.

Figure 6.31: An Aerial View of the intersection of Hemlock Avenue and Slover Avenue

Source: Google (2021)

A total of 26 collisions occurred at the intersection of Hemlock Avenue and Slover Avenue from January 2016 and December 2020. The intersection ranks 12th by total collision frequency and 10th by the EPDO score. The top collision types consist of broadsides (15) and sideswipes (5). The most common primary collision factors are automobile right of way (15) and unsafe speeds (4). A total of 19 collisions occurred during daylight conditions and five collisions occurred at this intersection under the dark – with street lights condition. There are no collisions involving pedestrians or bicyclists. **Figure 6.32** shows collision statistics for this intersection.

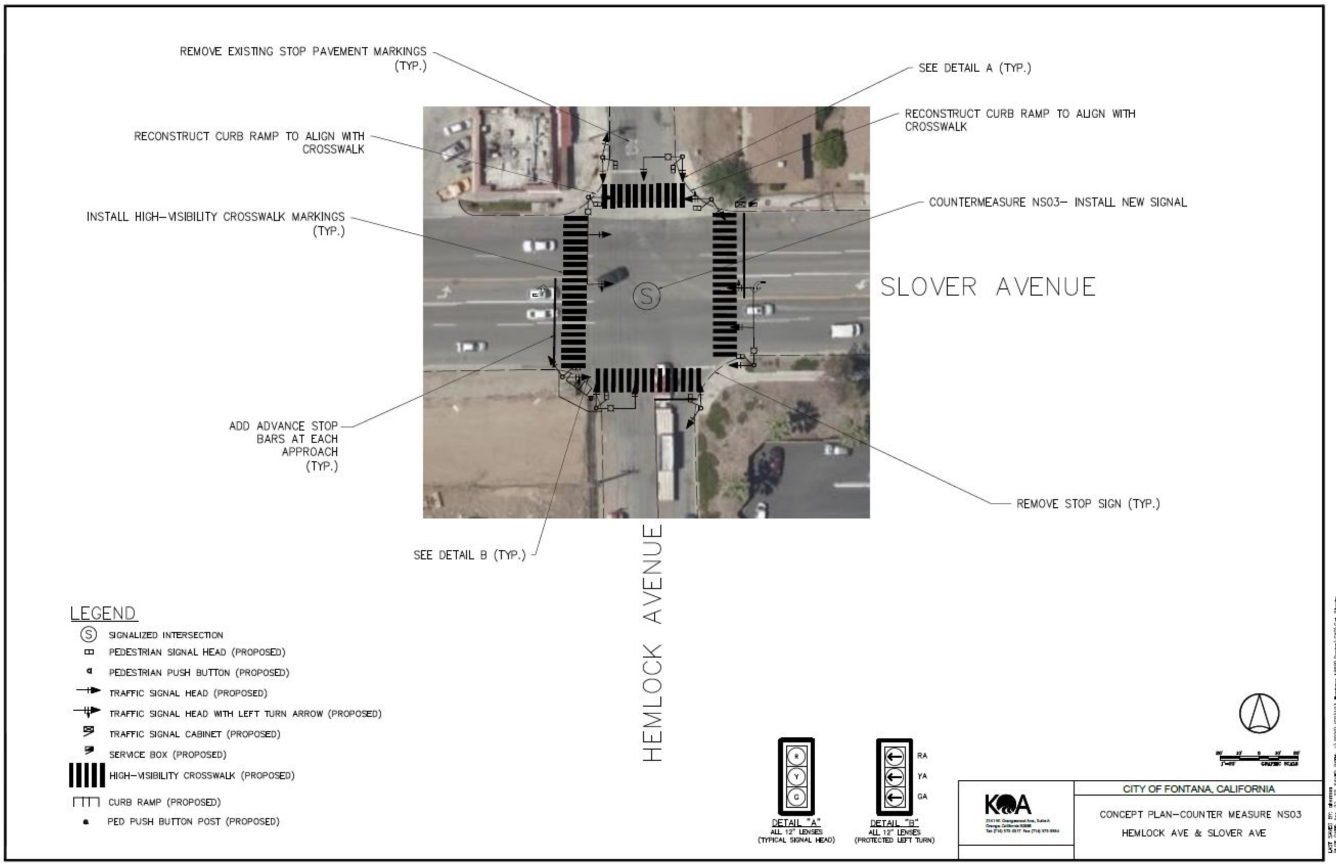
Figure 6.32: Collision Statistics – Hemlock Avenue & Slover Avenue



The following safety countermeasure could be considered in this intersection and is shown in **Figure 6.33**.

- NS03 – Install traffic signal (warrant located in Appendix E)

Figure 6.33: Recommended Improvements – Hemlock Avenue & Slover Avenue



6.4.10 S. Highland Avenue and Knox Avenue

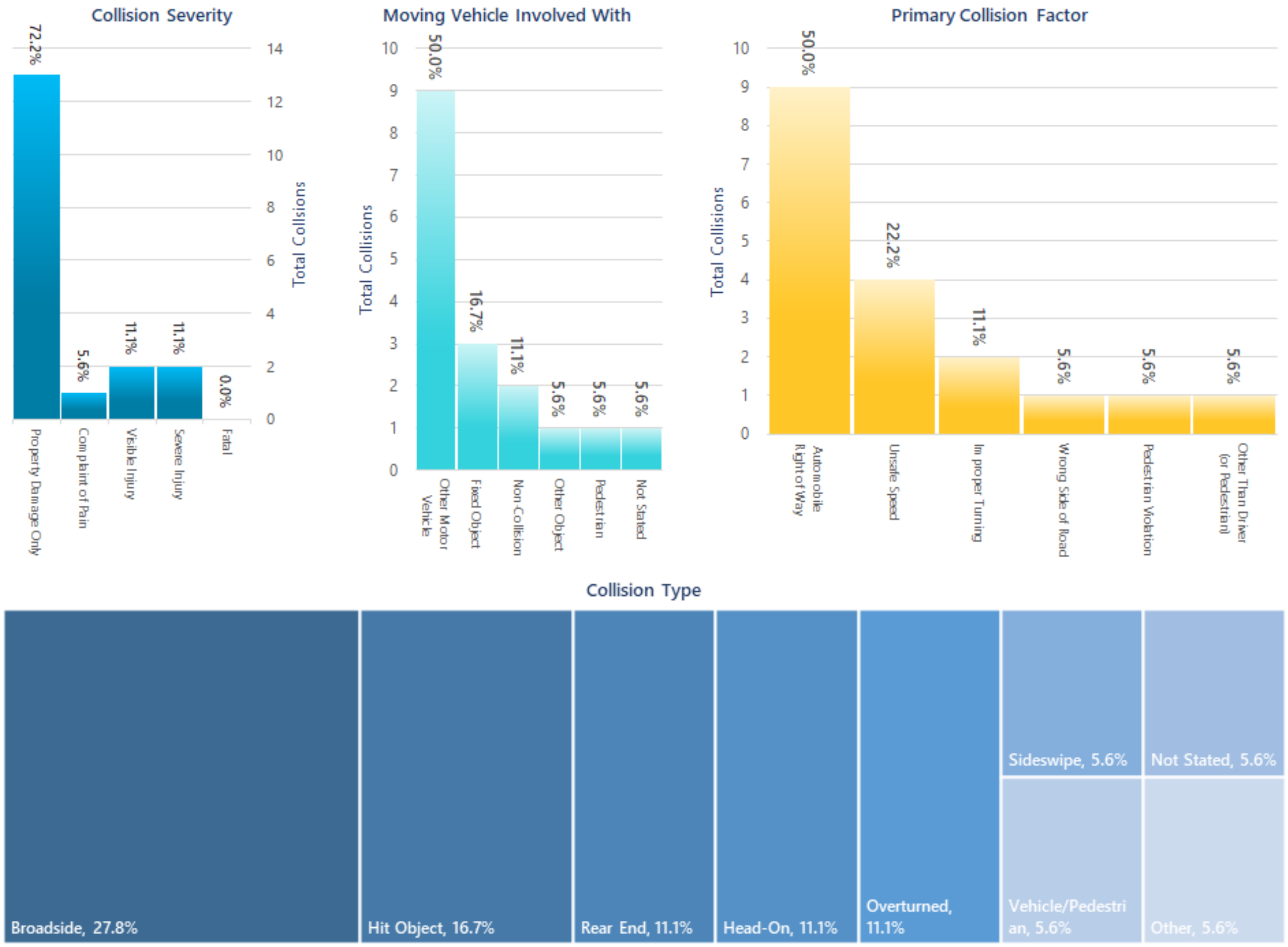
As shown in **Figure 6.34**, all legs of S. Highland Avenue and Knox Avenue provide a single lane in each direction with a two-way left-turn lane in the center (with no left-turn arrow markings). The intersection is two-way stop-controlled with the control on the northbound and southbound approaches. There are no marked right turn lanes at this intersection. There are bike lanes on both sides of the street beginning west of the intersection, but not approaching the intersection on any leg. On-street parking is not permitted. S. Highland Ave has a speed limit of 45 mph and Knox Avenue has a speed limit of 35 mph. There are no marked crosswalks or ADA ramps at the intersection. The intersection is primarily surrounded by vacant land, with low-density residential uses nearby.

Figure 6.34: An Aerial View of the intersection of S Highland Ave & Knox Ave

Source: Google (2021)

A total of 18 collisions occurred at the intersection of S. Highland Avenue and Knox Avenue from January 2016 and December 2020. The intersection ranks 34th by total collision frequency and 8th by the EPDO score. The most common collision types include broadsides (5), hit object (3), and overturned (2). The most common primary collision factors are automobile right of way (9) and unsafe speed (4). A total of 15 collisions occurred during daylight conditions and three collisions occurred at this intersection under the dark – with street lights condition. In total one collision was involved with a pedestrian and no collisions occurred with a bicyclist. **Figure 6.35** shows collision statistics for this intersection.

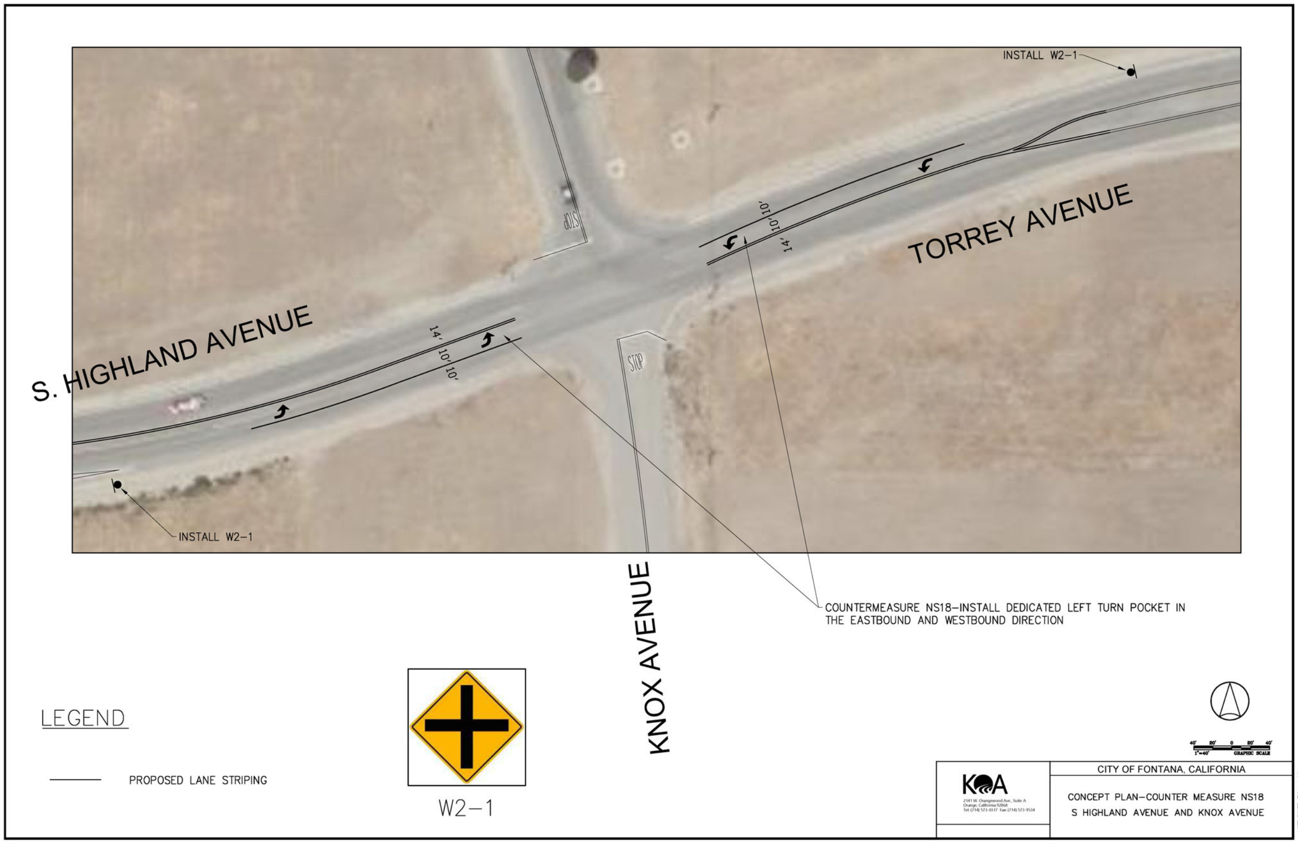
Figure 6.35: Collision Statistics – S Highland Ave & Knox Ave



The following safety countermeasure could be considered in this intersection and is shown in **Figure 6.36**.

- NS18 – Convert existing two-way left-turn lane on the east and west legs of the intersection to dedicated left-turn lanes with appropriate striping and tapers.

Figure 6.36: Recommended Improvements – S Highland Ave & Knox Ave



7.0 NON-ENGINEERING SAFETY MEASURES

This section presents the non-infrastructure solutions to Fontana roadway safety needs. The programs will promote safe behavior in each plan's identified transportation safety emphasis areas through education, law enforcement, and encouragement.

7.1 YOUNG DRIVERS

The collision analysis revealed that drivers under the age of 25 were at fault for more than a quarter of the collisions in Fontana. Younger drivers' relative lack of experience and judgment[1] makes them more likely to engage in risky behaviors, such as speeding or distracted driving. In Fontana, nearly 98 percent of households own at least one vehicle, and motorists are more inclined to acquire licenses at an earlier age as the City has few alternatives for travel. Therefore, educating young drivers on the importance of safe driving practices is a key pillar of the city's LRSP.

Youth drunk driving is a problem worth examining on its own. The collision data indicated that drivers under 25 were associated with 35 percent of DUI collisions in Fontana. Drivers younger than 21, the minimum legal drinking age in California, were associated with 7 percent of DUI collisions. The City may consider implementing programs warning youth about the dangers of drinking and driving.

The following safety (non-engineering) programs or program elements can be considered to address young drivers' safety risks.

7.1.1 Education

- Incentivize teens to attend the Start Smart Program[2] at the local Fontana California Highway Patrol (CHP) office.
- Expand the Healthy Fontana initiative to include information and programs related to making smart choices with drinking and driving.
- The Fontana Unified School District can consider incorporating Every 15 Minutes[3] into the curriculum. The Every 15 Minutes program is a two-day program focusing on high school juniors and seniors. The program challenges them to think about drinking, driving, personal safety, the responsibility of making decisions, and the impact their decisions have on their family, friends, and community. The Every 15 Minutes program is funded through the California Office of Traffic Safety, and the California Highway Patrol provides mini-grants to schools to implement the Every 15 Minutes program.

7.1.2 Enforcement

- Monitor local liquor stores and bars suspected of selling alcohol to minors.
- Set up police checkpoints at night to enforce DUI and California's Graduated Licensing Law. The Graduated Licensing Law prohibits children under age 18 from driving with someone under the age of 21 between 11 pm and 5 am without an adult (25 years or older) supervising.
- Provide training to sheriffs for finding DUIs and other driving behaviors.

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[1] *Johnson, "Why Is 18 the Age of Adulthood If the Brain Can Take 30 Years to Mature?" https://bigthink.com/mind-brain/adult-brain*
[2] *Start Smart Program, https://www.chp.ca.gov/programs-services/programs/youth-programs/start-smart-driving-smart-to-stay-safe*
[3] *https://www.chp.ca.gov/programs-services/programs/youth-programs/every-15-minutes*

7.1.3 Funding Sources

Table 7.1 presents potential funding sources for programs addressing safety challenges faced by young drivers.

Table 7.1: Young Driver Program Funding Sources

DESCRIPTION	RESPONSIBLE AGENCY	FUNDING SOURCE
EDUCATION		
Incentivize attendance of the Start Smart Program.	San Bernardino County Sheriff's Department, California Highway Patrol, Fontana Unified School District	OTS Grants
Expand Healthy Fontana's offerings to address drinking and driving.	San Bernardino County Sheriff's Department, Fontana Unified School District	OTS Grants
Establish and stage an Interactive Simulation program for high school students – Every 15 Minutes. The Interactive Simulation program aims to challenge high school juniors and seniors about drinking, driving, and mature decision-making.	Fontana Unified School District	OTS Grants
ENFORCEMENT		
Monitor local liquor stores and bars suspected of selling alcohol to minors.	City of Fontana, San Bernardino County Sheriff's Department	OTS Grants
Set up police checkpoints at night to enforce California's Graduated Licensing Law.	San Bernardino County Sheriff's Department	OTS Grants

7.2 REAR-ENDS AND SPEEDING

Speeding contributes significantly to crash frequency and severity. For instance, a car hitting a pedestrian is eight times more likely to kill that pedestrian when moving at 40 miles per hour than when moving at 20 miles per hour. In the local context, speeding is the most common primary collision factor and the most frequent cause of rear-end crashes. Driving at unsafe speeds caused 77 percent of total rear-end crashes that occurred in Fontana.

The following safety (non-engineering) programs or program elements can be considered to address rear ends and speeding-related crashes.

7.2.1 Education

- Create a social media campaign to help drivers become more aware of how their speed impacts the risk of death for vulnerable road users.

7.2.2 Enforcement

- Install radar speed feedback signs at periodic intervals along arterials with reported speeding. These technologies display passing drivers' travel speed below a sign with the posted speed limit, thus showing whether drivers are traveling over the speed limit[4,5].
- Deploy police officers equipped with radar or LIDAR technology at strategic locations to ticket speeding drivers.

7.2.3 Funding Sources

Table 7.2 presents potential funding sources for the programs addressing Rear-ends and Speeding.

Table 7.2: Rear-end and Speeding Program Funding Sources

DESCRIPTION	RESPONSIBLE AGENCY	FUNDING SOURCE
EDUCATION		
Create a social media campaign.	City of Fontana	OTS Grants
ENFORCEMENT		
Install Active Speed Monitors or Speed Trailers at periodic intervals along arterials with reported speeding.	Los Angeles County Sheriff's Department	OTS Grants, Advanced Transportation and Congestion Management Technologies Deployment Program
Deploy police officers equipped with radar or LIDAR technology at strategic locations to ticket speeding drivers.	Los Angeles County Sheriff's Department	OTS Grants

7.3 PEDESTRIANS AND BICYCLISTS

Collisions with pedestrians and bicycles are responsible for 33 percent of deaths related to collisions in Fontana. While the severity of some crashes can be reduced through changing roadway design or by better educating motorists about their behavior, measures to improve the safety awareness of pedestrians and bicyclists can also help.

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

7.3.1 Education

- Support adult bicycle rider skills classes, such as those offered by the League of American Bicyclists.
- Offer student pedestrian and bicycle traffic safety education in schools. Lessons related to walking can include the danger of walking with distractions, while bicycle lessons can include helmet and bicycle fit, hand signals, and riding safely with traffic.

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[4] SRTS Guide: Active Speed Monitors. (2015, July). http://guide.saferoutesinfo.org/enforcement/active_speed_monitor.cfm

[5] *SRTS Guide: Speed Trailers*. (2015, July). http://guide.saferoutesinfo.org/enforcement/speed_trailer.cfm

- Promote a billboard or social media campaign to "walk and bike smart" and ride in the same direction as traffic.

7.3.2 Enforcement

- Offer diversion classes for bicycle riders who have been cited for traffic violations. These classes would help bicyclists learn about rights and responsibilities.
- Offer free bicycle helmets or lights and schools or community centers.

7.3.3 Funding Sources

Table 7.3: Pedestrian and Bicycle Program Funding Sources

DESCRIPTION	RESPONSIBLE AGENCY	FUNDING SOURCE
EDUCATION		
Support adult bicycle rider skills classes.	City of Fontana, League of American Bicyclists	OTS Grants
Offer student pedestrian and bicycle traffic safety education.	Fontana Unified School District	OTS Grants
Promote a billboard or social media campaign.	City of Fontana	OTS Grants
ENFORCEMENT		
Offer diversion classes for bicycle riders.	City of Fontana, San Bernardino County Sheriff's Department	OTS Grants
Offer free bike helmets or lights.	City of Fontana	OTS Grants

7.4 EMERGENCY VEHICLES

A total of 50 collisions were related to an emergency vehicle in Fontana from 2016 to 2020. The City has contracted with the San Bernardino County Fire Protection District to provide all fire and emergency medical service needs.

Emergency Vehicle Preemption (EVP) systems may not be provided at all major intersections in the City. Signal preemption allows emergency vehicles to interrupt a normal signal cycle in order to proceed through the intersection more quickly and under safer conditions. An EVP system may assist emergency vehicles traveling through traffic prone areas when responding to an emergency call. Implementation of the EVP system citywide may improve the emergency response team's response time.

8.0 SAFETY PROJECTS

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

8.1 PROJECT SCOPES ANDBENEFIT CALCULATIONS

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

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

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

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

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

- Fatal and Severe Injury Combined (KA)- Signalized Intersection - $1,590,000
- Fatal and Severe Injury Combined (KA)- Non-Signalized Intersection - $2,530,000
- Fatal and Severe Injury Combined (KA)- Roadway - $2,190,000
- Evident - $142,300
- Possible Injury- Complaint of Pain (C) - $80,900
- Property Damage Only (O) - $13,300

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

The safety project scopes are listed in **Table 8.1**, including the applicable countermeasure category for each improvement and benefits calculated according to the method above.

Table 8.1: Safety Project Scopes

Project 1: Sierra Avenue & Valley Boulevard

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	No. of Preventable Collisions
S02	Upgrade signal hardware	Add nearside signal at all approaches.	All	15%	10	259
S03	Modify traffic signal timing	Optimize signal timing to incorporate LPIs and maximize flow.	All	15%	10	259
S21PB	Install leading pedestrian indicator (LPI0)	Add a leading pedestrian interval to all approaches. Prioritize implementation at east crosswalk.	P&B	60%	10	18

Project 2: Arrow Boulevard & Locust Avenue

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	No. of Preventable Collisions
R32PB	Install bike lanes	Add bike lanes on Locust Avenue from Arrow Boulevard to Pacific Electric trail.	P&B (bike)	35%	20	2
CUSTOM		Correct signing and striping on eastbound approach to intersection (right-turn lane should be marked).				
CUSTOM		Install right-turn lane in westbound direction.				

Project 3: Baseline Avenue & Mango Avenue

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	No. of Preventable Collisions
S02	Upgrade signal hardware	Add nearside signal on east approach and west approach. Remove any trees on west approach which may block nearside signal.	All (EB & WB)	15%	10	19

Project 4: Jurupa Avenue & Sierra Avenue

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	No. of Preventable Collisions
S03	Modify traffic signal timing	Extend red clearance time for northbound and southbound directions. Review signal timing and optimize for efficient operation.	All (NB & SB)	15%	10	54

Project 5: Sierra Avenue & Orange Way

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	No. of Preventable Collisions
S02	Upgrade signal hardware	Add nearside signal heads on all approaches.	All	15%	10	25
S03	Modify traffic signal timing	Signal cycle is unusually long. There are non-standard responses during Metrolink crossings south of the intersection, such as cancelling pedestrian activation that is safe to occur despite the train crossing. Comprehensively review signal timing.	All	15%	10	25
R32PB	Install bike lanes	Add bike lane in both directions on Orange Way east of Sierra Avenue (bike lane currently terminates on the west side of Sierra Avenue).	P&B (bike)	35%	20	1
CUSTOM		Add limit lines at each approach.				

Project 6: Arrow Boulevard & Oleander Avenue

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	No. of Preventable Collisions
S02	Upgrade signal hardware	Install nearside signal on all approaches.	All	15%	10	30

Project 7: Beech Avenue & Valley Boulevard

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	No. of Preventable Collisions
NS03	Install signal	Conduct warrant to install signal.	All	30%	20	31

Project 8: Cherry Avenue & Village Drive

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	No. of Preventable Collisions
NS03	Install signal	Install signal at this location.	All	30%	20	44

Project 9: Hemlock Avenue & Slover Avenue

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	No. of Preventable Collisions
NS03	Install signal	Install signal at this location.	All	30%	20	44

Project 10: Highland Avenue & Knox Avenue

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	No. of Preventable Collisions
NS18	Install left-turn lane	Install dedicated left-turn lane in the EB and WB direction.	All (EB & WB)	35%	20	14

Project 11: Foothill Boulevard from West Boundary to Citrus Avenue

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	No. of Preventable Collisions
R15	Widen shoulder	Widen shoulder from Hemlock to Almeria Avenue. Complete after replacing Pacific Electric bridge, elevating roadway, and demolishing tunnel.	All	30%	20	R15
R18	Flatten crest vertical curve	Improve sight distance by raising street and eliminating need for vertical curve (complete after finishing new	All	25%	20	R18

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	No. of Preventable Collisions
		Pacific Electric railway bridge and demolishing tunnel).				
R33PB	Install separated bike lanes	Install separated bike lanes with 2' buffer between Hemlock Avenue and Almeria Avenue.	P&B (bike)	45%	20	R33PB
R34PB	Install sidewalk	Construct sidewalk where missing from Hemlock Avenue to Almeria Avenue.	P&B	80%	20	R34PB

Project 12: Valley Boulevard from Eitwanda Avenue to East Boundary

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	No. of Preventable Collisions
R32PB	Install bike lanes	Add bike lanes from Banana Avenue to Alder Avenue. Keep parking if there is sufficient width to install with parking, if not, remove parking lane and restrict vehicles from parking and add bike lane. Use bike lane as opportunity to establish an edge line in corridors where roadway width is over 80 feet.	P&B (bike)	35%	20	4

Project 13: Citrus Avenue from Arrow Boulevard to Jurupa Avenue

CM #	Countermeasure Names	Description	Collision Type	CRF	Project Life (Years)	No. of Preventable Collisions
R32PB	Install bike lanes	Install bike lanes from Arrow to Valley	P&B (bike)	35%	20	1

8.2 COST ESTIMATE

Planning-level cost estimates were developed for each countermeasure. Cost estimates were prepared based on recent bid tabulations and estimates of current construction costs consisting of unit-based cost estimates and contingencies. The costs include construction costs and include engineering and administrative costs. A contingency is added to the construction cost of each project depending on the complexity of the scope. The engineering and administration cost is assumed to be 25 percent of the total construction cost, including the contingency. The cost estimates are included in Appendix C.

8.3 BENEFIT/COST RATIO

A Benefit/Cost Ratio (BCR) is the ratio of a project's benefits relative to its costs, and both are expressed in monetary terms. The BCR is calculated by taking a project's overall benefit and dividing it by the overall project cost. Projects with a higher BCR mean greater benefits relative to costs, while a lower BCR means fewer benefits than costs.

Based on Caltrans's need for a fair, data-driven, statewide project selection process for HSIP call-for-projects, the benefit and cost calculations were completed using the same process shown in the HSIP Analyzer to calculate the B/C ratio of the project. The B/C ratios were used to identify the projects with high cost-effectiveness that may have a greater chance of receiving federal funding in Caltrans call-for-projects. **Table 8.2** summarizes the B/C ratio proposed safety projects. The benefit/cost ratio is calculated according to the HSIP Analyzer from the HSIP grant application. The detail of the safety project summary table is provided in Appendix D.

Table 8.2: Benefits/Cost Ratio Analysis by Safety Project (for HSIP eligible safety projects)

ID	Location	CM #	Countermeasure Names	Collision Benefits	Cost ($) Estimation	Benefit/Cost Ratio (BCR)	HSIP Max Share	HSIP Amount	Local Amount
1	Sierra Avenue & Valley Boulevard	S02	Upgrade signal hardware	$2,847,030	$10,336	275.45	100%	$10,336	$0
		S03	Modify traffic signal timing	$2,847,030	$7,847	362.82	50%	$3,924	$3,924
		S21PB	Install leading pedestrian indicator (LPI)	$5,373,840	$7,847	684.83	100%	$7,847	$0
TOTAL				**$11,067,900**	**$24,628**	**449.40**		**$20,705**	**$3,924**
2	Arrow Boulevard & Locust Avenue	R32PB	Install bike lanes	$2,226,000	$28,309	78.63	90%	$25,478	$2,831
TOTAL				**$2,226,000**	**$28,309**	**78.63**		**$25,478**	**$2,831**
3	Baseline Avenue & Mango Avenue	S02	Upgrade signal hardware	$1,367,730	$19,427	70.40	100%	$19,427	$0
TOTAL				**$1,367,730**	**$17,868**	**76.55**		**$17,868**	**$0**
4	Jurupa Avenue & Sierra Avenue	S03	Modify traffic signal timing	$997,800	$7,847	127.16	50%	$3,924	$3,924
TOTAL				**$997,800**	**$7,847**	**127.16**		**$3,924**	**$3,924**
5	Sierra Avenue & Orange Way	S02	Upgrade signal hardware	$727,290	$7,519	96.73	100%	$7,519	$0
		S03	Modify traffic signal timing	$727,290	$7,847	92.68	50%	$3,924	$3,924

ID	Location	CM #	Countermeasure Names	Collision Benefits	Cost ($) Estimation	Benefit/Cost Ratio (BCR)	HSIP Max Share	HSIP Amount	Local Amount
		R32PB	Install bike lanes	$199,220	$37,230	5.35	90%	$33,507	$3,723
	TOTAL			**$1,653,800**	**$52,360**	**31.59**		**$44,737**	**$7,623**
6	Arrow Boulevard & Oleander Ave	S02	Upgrade signal hardware	$808,080	$7,519	107.47	100%	$7,519	$0
	TOTAL			**$808,080**	**$7,519**	**107.47**		**$7,519**	**$0**
7	Beech Avenue & Valley Boulevard	NS03	Install Signal	$7,063,320	$382,756	18.45	100%	$382,756	$0
	TOTAL			**$11,347,160**	**$390,131**	**125.33**		**$390,131**	**$0**
8	Cherry Ave & Village Drive	NS03	Install signal	$6,864,360	$459,876	14.93	100%	$459,876	$0
	TOTAL								
9	Hemlock Ave & Slover Ave	NS03	Install signal	$5,483,520	$412,545	13.29	100%	$412,545	$0
	TOTAL			**$5,483,520**	**$366,617**	**14.96**		**$366,617**	**$0**
10	Highland Ave & Knox Ave	NS18	Install left-turn lane	$4,221,280	$10,873	388.24	90%	$9,786	$1,087
	TOTAL			**$4,221,280**	**$10,873**	**388.24**		**$9,786**	**$1,087**
11	Foothill Blvd from West Boundary to Citrus Ave	R1	Add lighting	$7,105,140	$5,961	1191.94	100%	$5,961	$0
		R8	Install raised median	$8,216,200	$21,950,000	1.51	90%	$19,755,000	$2,195,000
		R15	Widen shoulder	$9,859,440					

ID	Location	CM #	Countermeasure Names	Collision Benefits	Cost ($) Estimation	Benefit/Cost Ratio (BCR)	HSIP Max Share	HSIP Amount	Local Amount
		R18	Flatten crest vertical curve	$8,216,200					
		R33PB	Install separated bike lanes	$401,760					
		R34PB	Install sidewalk	$14,730,240					
	TOTAL			**$48,528,980**	**$21,955,961**	**2.21**		**$19,760,961**	**$2,195,000**
12	Valley Blvd from Etiwanda Ave to East Boundary	R32PB	Install bike lanes	$530,320	$394,834	1.34	90%	$355,351	$39,483
	TOTAL			**$530,320**	**$394,834**	**1.34**		**$355,351**	**$39,483**
13	Citrus Ave from Arrow Blvd to Jurupa Ave	R32PB	Install bike lanes	$18,620	$313,169	0.06	90%	$281,852	$31,317
	TOTAL			**$18,620**	**$313,169**	**0.06**		**$281,852**	**$31,317**

The project with the highest B/C ratio is project #1, to upgrade signal hardware, modify traffic signal timing, and install leading pedestrian indicator at the intersection of Sierra Avenue and Valley Boulevard. The project with the lowest B/C ratio if project #13, to install bike lanes on Citrus Avenue, from Arrow Boulevard to Jurupa Avenue. The calculated BCR for each project summarizes the cost-effectiveness of the 13 proposed safety projects, without considering how the project would be funded.

8.4 PROJECT PRIORITIZATION

A prioritized list of safety projects for the HSIP application was identified. The B/C ratios may be used as a guide to identifying the projects with high cost-effectiveness that have the greatest chance of receiving federal funding in Caltrans call-for-projects.

BCR is not the only guide to prioritize and implement a countermeasure. The safety project list will be used as a reference on which safety project to implement first. The implementation timeline will be dependent on the City's goals and funding eligibility. The City may choose to move forward with any of these safety projects in any order, depending on funding availability. If the applications are approved for funding, these projects should not be applied for future HSIP cycles. If the safety projects are not funded by the HSIP Cycle 11, then those projects could be considered for reapplying for funding in future cycles.

Because HSIP grants are competitive, it is typically appropriate to apply only for projects with an estimated BCR considered high. According to the HSIP grant application guidelines, a safety project needs to be at least $100,000 and a minimum of 3.5 BCR to submit an HSIP Cycle 10 application. It is anticipated that similar minimum dollar value and BCR requirements will apply to future HSIP application cycles.

Taking the HSIP application into consideration, **Table 8.3** summarizes the BCR analysis for the safety project. The safety projects are categorized by countermeasure ID and are prioritized by BCR. The City may use the list from **Table 8.3** to determine which will be implemented based on the City's goals and funding availability.

Table 8.3: Benefits/Cost Ratio Analysis by Safety Project

Location	CM #	Countermeasure Names	Collision Benefits	Cost ($) Estimate	BCR
Foothill Blvd from West Boundary to Citrus Ave	R1	Add lighting	$7,105,140	$5,961	1191.94
Sierra Ave & Valley Blvd	S21PB	Install leading pedestrian indicator (LPI0)	$5,373,840	$7,847	684.83
Highland Ave & Knox Ave	NS18	Install left-turn lane	$4,221,280	$10,873	388.24
Sierra Ave & Valley Blvd	S03	Modify traffic signal timing	$2,847,030	$7,847	362.82
Sierra Ave & Valley Blvd	S02	Upgrade signal hardware	$2,847,030	$10,336	275.45
Jurupa Avenue & Sierra Avenue	S03	Modify traffic signal timing	$997,800	$7,847	127.16
Arrow Boulevard & Oleander Ave	S02	Upgrade signal hardware	$808,080	$7,519	107.47
Sierra Ave & Orange Way	S02	Upgrade signal hardware	$727,290	$7,519	96.73
Sierra Ave & Orange Way	S03	Modify traffic signal timing	$727,290	$7,847	92.68
Arrow Boulevard & Locust Avenue	R32PB	Install bike lanes	$2,226,000	$28,309	78.63
Baseline Avenue & Mango Avenue	S02	Upgrade signal hardware	$1,367,730	$19,427	70.40

Location	CM #	Countermeasure Names	Collision Benefits	Cost ($) Estimate	BCR
Beech Avenue & Valley Boulevard	NS03	Install Signal	$7,063,320	$382,756	18.45
Cherry Ave & Village Drive	NS03	Install signal	$6,864,360	$459,876	14.93
Hemlock Ave & Slover Ave	NS03	Install signal	$5,483,520	$412,545	13.29
Sierra Ave & Orange Way	R32PB	Install bike lanes	$199,220	$37,320	5.35
Foothill Blvd from West Boundary to Citrus Avenue	R8	Install raised median	$8,216,200	$21,950,000	1.51
Valley Blvd from Etiwanda Avenue to East Boundary	R32PB	Install bike lanes	$530,320	$394,834	1.34
Citrus Avenue from Arrow Blvd to Jurupa Ave	R32PB	Install bike lanes	$18,620	$313,169	0.06

The average BCR of HSIP 10 selected projects is 24.3 (the BCR cutoff was 12.0). The City can either select the eligible individual projects or group projects as a systemic improvement, as shown in **Table 8.3**, for the HSIP funding application. The City may also determine which project to be prioritized based on available funding sources, public support, and other factors.

8.5 FUNDING SOURCES

Several state and federal grant programs offer to fund engineering and non-engineering roadway safety projects. The California Department of Transportation's (Caltrans) Active Transportation Program (ATP) encourages bicycle and pedestrian use in the state by funding programs that increase bike or pedestrian mode share or improve bicycle or pedestrian safety. Caltrans also administers the Sustainable Communities Grant Program, which awards grants to municipal projects that reduce greenhouse gas emissions and support multi-modal transportation. The Sustainable Communities Program prioritizes projects that solicit stakeholder and community engagement and support state policies like the 2040 California Transportation Plan. The California Office of Traffic Safety awards grants for projects addressing any one or more of ten priority areas, including Driving Under the Influence, Distracted Driving, Pedestrian and Bicycle Safety, Police Enforcement, Safety Data Collection, and Marketing/Publicity Campaigns.

At the federal level, the Advanced Transportation and Congestion Management Technologies Deployment Program funds technology to promote safety and efficiency in the transportation system. The Highway Safety Improvement Program (HSIP) funds roadway improvements on any public roadway. **Table 8.4** provides a list of eligible programs and the funding sources for related to transportation safety.

Table 8.4: Transportation Safety Funding Sources Summary

Agency	Source	Eligible Programs	Areas Addressed
Federal Highway Administration (FHWA)	Highway Safety Improvement Program (HSIP)	Any work on public roads, bikeways and pedestrian paths/trails. For the most part, only engineering projects are eligible but the FAST act permits funding for data collection by law enforcement[1, 2].	Data Collection
Federal Highway Administration (FHWA)	Advanced Transportation and Congestion Management Technologies Deployment Program	Funds advanced transportation and congestion management technologies to improve safety, efficiency and performance. Examples of funded project types include advanced traveler information systems and data collection and analysis efforts[3].	Digital Enforcement; Technology Partnerships
California Department of Transportation (Caltrans)	Active Transportation Program (ATP)	Local government projects that improve the safety or increase the mode share of bicycling and walking. Additional program objectives include reducing emissions and enhancing public health[4].	Bicycle and Pedestrian Education and Enforcement
California Department of Transportation (Caltrans)	Sustainable Communities Grant Program	The program awards "Competitive Grants" to local governments. These grants prioritize projects that reduce Greenhouse Gas Emissions, support multi-modal transportation, involve stakeholder/ community engagement and support related plans like the California Transportation Plan and California Complete Streets Framework[5] .	Active Transportation Speed and Education
California Office of Traffic Safety	Office of Traffic Safety (OTS) Grants	Programs should address one of ten priority areas (six relevant ones listed to the right). Grant recipients should expect to wait up to 90 days before being reimbursed/funded, and should be able to provide traffic safety data to justify funded programs[6].	Driving under the Influence of Drugs/Alcohol (DUI), Distracted Driving, Ped/Bike Safety, Police Enforcement, Roadway Safety and Data Collection, and Social Media/Marketing

Sources:

1. *Highway Safety Improvement Program Guidelines, April 2016*
2. *Highway safety improvement program, Pub. L. No. 148, 23 US Code (2015). https://www.law.cornell.edu/uscode/text/23/148.*
3. *Advanced Transportation and Congestion Management Technologies Deployment. February 2016. https://www.fhwa.dot.gov/fastact/factsheets/advtranscongmgmtfs.cfm.*
4. *2021 Active Transportation Program Guidelines. March 25, 2020. Resolution G-20-31.*
5. *California Department of Transportation. Sustainable Transportation Planning Grant Program. December 2019.*
6. *California Office of Traffic Safety Grant Manual for Federal Fiscal Year 2020. December 2019.*

APPENDIX A – INTERSECTION AND ROADWAY SEGMENT RANKING

APPENDIX B – SEGMENT PROJECT CONCEPT PLANS

APPENDIX C – SAFETY PROJECT COST ESTIMATION

APPENDIX D – COLLISION REDUCTION BENEFITS TABLE

APPENDIX E – TRAFFIC SIGNAL WARRANTS