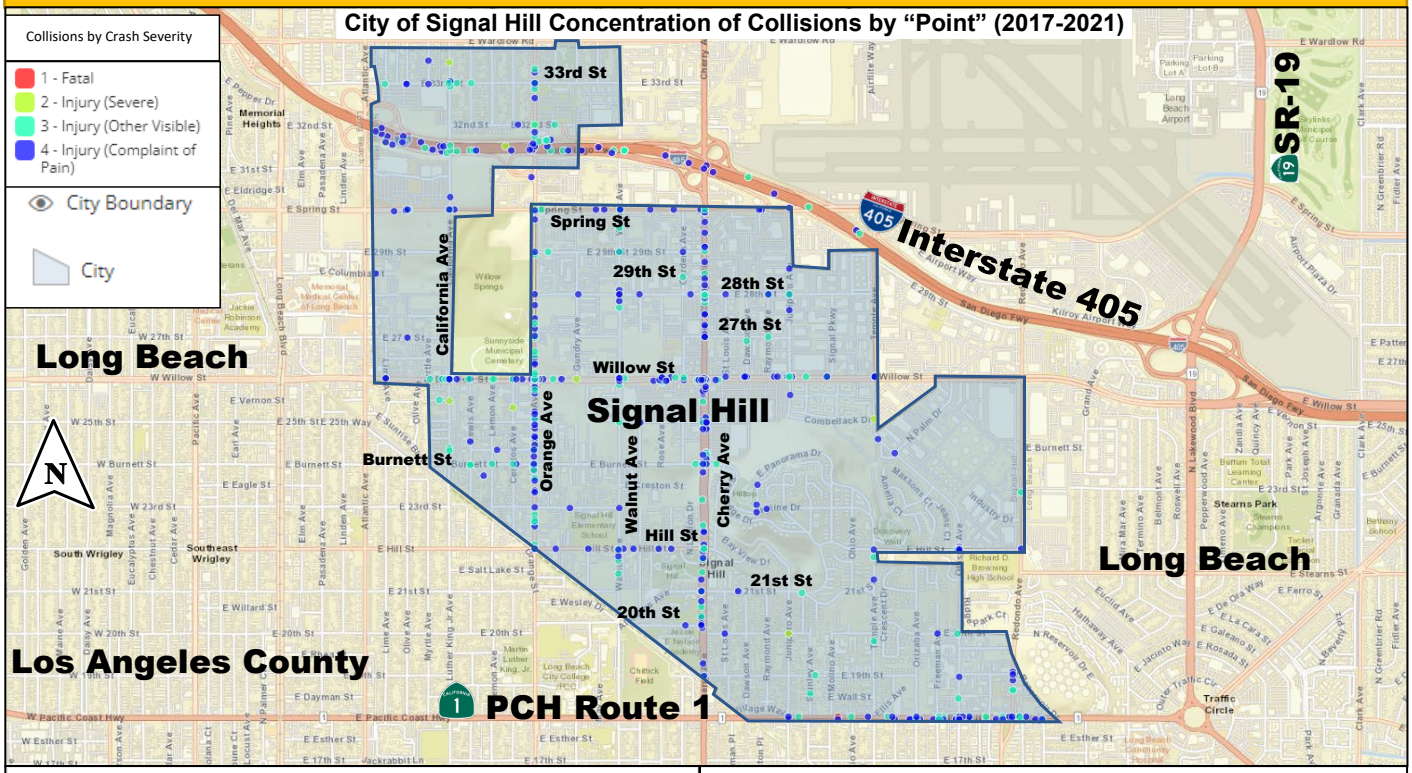
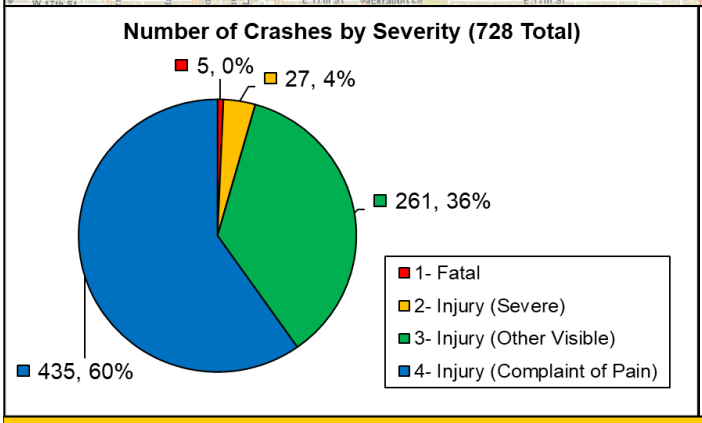
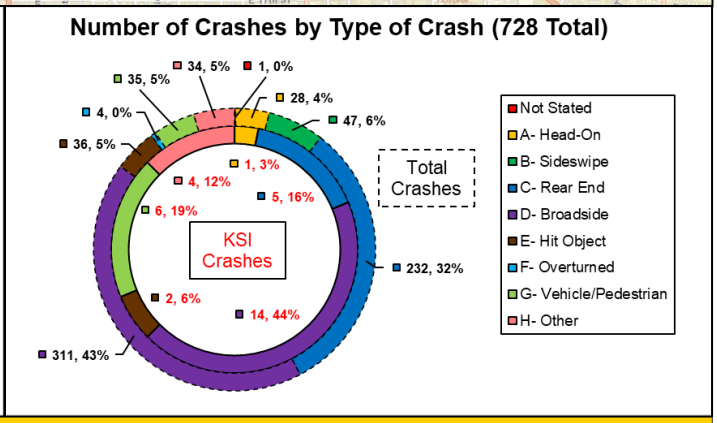
FINAL
Local Roadway Safety Plan (LRSP) Project
City of Signal Hill







PREPARED FOR:

City of Signal Hill
Department of Public Works
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PREPARED FOR:

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May 16, 2023

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ACKNOWLEDGEMENTS

CITY COUNCIL

Mayor: Keir Jones

Vice Mayor: Tina Hansen

Council Member: Robert Copeland

Council Member: Edward Wilson

Council Member: Lori Woods

PARTNERS

City Departments: Administration, Community Development, Police, Fire, Public Works

Caltrans District 7

Long Beach Public Works Department

Long Beach Unified School District

Los Angeles County Metropolitan Transportation Authority (Metro)

Long Beach Transit

Signal Hill Chamber of Commerce

General Public of the City of Signal Hill

CITY STAFF

Interim City Manager: Joe Hoefgen

Deputy City Manager: Scott Charney

Director of Public Works: Thomas Bekele

Director of Community Development: Colleen Doan

Contracts Manager: Patrick Kelley

Associate Engineer: Jesus Saldana

Assistant Engineer: Ethan Rucker

Planning Manager: Carlos Luis

Interim Police Chief: Carl Charles

Police Captain: Brian Leyn

Fire Assistant Chief: William Mayfield

Executive Summary

The objective of the City of Signal Hill Local Roadway Safety Plan (LRSP) is to establish a safe transportation environment that has safer roads, safer people, safer speeds, and safer vehicles. As part of this safety plan for the City of Signal Hill, Minagar & Associates, Inc. identified, prioritized, and analyzed roadway safety improvements on the City of Signal Hill's intersections and roadway segments. This safety plan also provides the proposed countermeasures that address collision patterns for both intersections and roadway segments, to ultimately reduce collisions in the City's high collision locations. From January 1, 2017 until December 31, 2021, there has been a total of 728 collisions that included 5 fatalities and 1121 injured victims. The most common types of collision were Broadside (311), Rear-End (232), and Sideswipe (47) Collisions. Primary Collision Factor (PCF) violations that caused the most collisions were Unsafe Speed (165), Automobile Right of Way (143), and Traffic Signals and Signs (139). Victims were mostly drivers (745) and passengers (308). There have been 40 collisions involved with pedestrians. The highest number of victims happened to be in the age range of 25 to 29 years old. A Local Road Safety Plan is a major element to ameliorate transportation and traffic safety within a city. This LRSP was prepared and developed in compliance with the State and Federal guidelines for eligibility to apply for the funding of Highway Safety Improvement Program (HSIP). In addition to the provided countermeasures for collision patterns, this Safety Plan also provides the corresponding cost estimates and benefit to cost ratios, to support applications for the Highway Safety Improvement Program (HSIP).

Statement of Protection of Data From Discovery and Admissions

Per Section 148 of Title 23, United States Code [23 U.S.C. §148(h) (4)] REPORTS DISCOVERY AND ADMISSION INTO EVIDENCE OF CERTAIN REPORTS, SURVEYS, AND INFORMATION—Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for any purpose relating to this section, shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location identified or addressed in the reports, surveys, schedules, lists, or other data.

Per Section 409 of Title 23, United States Code [23 U.S.C. §409] DISCOVERY AND ADMISSION AS EVIDENCE OF CERTAIN REPORTS AND SURVEYS—Notwithstanding any other provision of law, reports, surveys, schedules, lists, or data compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential accident sites, hazardous roadway conditions, or railway-highway crossings, pursuant to sections 130, 144, and 148 of this title or for the purpose of developing any highway safety construction improvement project which may be implemented utilizing Federal-aid highway funds shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.

List of Acronyms

AASHTO	American Association of State Highway and Transportation Officials
B/C Ratio	Benefit-Cost Ratio
Caltrans	California Department of Transportation
City	City of Signal Hill
CMF	Crash Modification Factor
CRF	Crash Reduction Factor
DUI	Driving Under the Influence
FHWA	Federal Highway Administration
HSIP	Highway Safety Improvement Program
HSM	Highway Safety Manual
KSI	Killed or Severely Injured
LRSM	Local Roadway Safety Manual (Version 1.6, April 2022)
LRSP	Local Roadway Safety Plan
MUTCD	Manual on Uniform Traffic Control Devices
PCF	Primary Collision Factor
SHSP	Strategic Highway Safety Plan
SWITRS	Statewide Integrated Traffic Records System
TIMS	Transportation Injury Mapping System
5Es	The 5Es of Traffic Safety: Education, Engineering, Enforcement, Emergency Medical Services, Emerging Technologies

1. Introduction

The City of Signal Hill is taking the initiative to improve the City's traffic safety by implementing a Local Roadway Safety Plan that aims to reduce traffic collisions by analyzing the factors that previously impacted prominent intersections and roadway segments in the City. This report documents the City of Signal Hill's work to assess and improve transportation safety conditions.

In this Safety Plan, a systemic approach was utilized to identify and analyze collision patterns that had impacted high collision intersections and roadway segments. For each high collision location, whether it was an intersection or a roadway segment, a table of number of collisions with the corresponding primary collision factor has been provided to understand the prominent collision factors. As part of the collision analysis, collision diagrams have been provided for high collision intersections and roadway segments in the City of Signal Hill.

Following the understanding and acknowledgement of collision patterns, countermeasures for each of the identified high collision intersections and roadway segments, were developed to potentially reduce traffic collisions in the future and ameliorate active transportation within the City. Furthermore, this Local Roadway Safety Plan includes collision data for high collision locations between January 1, 2017 and December 31, 2021, the analysis of collision data, and the proposed countermeasures for collision patterns. Depicted below in Figure 1 is the Local Road Safety Plan process provided by the Federal Highway Administration (FHWA).

Figure 1: Local Road Safety Plan – Your Map to Safer Roadways

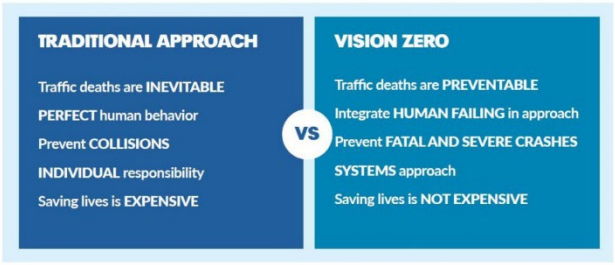
2. Vision and Goals

The objective of this plan is to strive towards a safer transportation environment by eliminating traffic fatalities and severe injuries while assuring efficient and equitable mobility for all road users. The City of Signal Hill plans to implement systemic countermeasures to target factors affecting citywide prominent intersections and roadways segments. This safety plan aims to reduce the risk of tragedies by taking a proactive, preventative approach that prioritizes traffic safety.

Vision Zero is an initiative approach to eliminate traffic fatalities and severe injuries. Road users will sometimes make mistakes however, the road system, traffic control devices, and traffic laws should be designed to minimize those unavoidable mistakes and reduce their probability to result in severe injuries or fatalities. Transportation and traffic engineers are expected to improve the general traffic environment by ameliorating existing traffic geometries and laws based on a good engineering judgement. However, the roadway users of the City of Signal Hill are still responsible for their mistakes and should follow all traffic laws.

Source: www.archive.kpcc.org

Vision Zero unifies diverse stakeholders who address the factors causing complexity when it comes to traffic safety. It recognizes that many factors contribute to safe mobility including roadway design, speeds, behaviors, technology, and enforced laws. As a result and as part of this safety plan, it sets goals to achieve zero fatalities and severe injuries.



Source: www.visionzeronetwrok.org

One of the City's visions is to collaborate with local agencies to promote a culture of continuous transportation safety improvement by coordinating with the Signal Hill Police Department, Los Angeles County Department of Public Health, and Long Beach Unified School District.

Source: U.S. Department of Transportation

The aforementioned Vision shall eliminate traffic fatalities and severe injuries by achieving the following goals:

- Obtain accurate collision databases. Systematically identify and prioritize the City's highest collision locations based on a 5-year collision history.
- Engage with the local community, stakeholders, and City management to better understand factors that are affecting the traffic safety within the City of Signal Hill.
- Utilize countermeasure strategies across all traffic safety disciplines, engineering, enforcement, education, emergency medical services, and emerging technologies.
- Strive to reduce the City's primary contributing factors in traffic collisions by ensuring the automobile right of way, maintaining a safe speed, and clear traffic signals and signs.

3. Safety Partners

To promote and create a safe transportation environment, collaboration across agencies known as safety partners is a necessity. Safety partners are the agencies, departments, and organizations whose input and support are foundational to a successful Local Roadway Safety Plan.

The safety leadership team is primarily comprised of City Departments that have key roles in the development, implementation, and operation of safety projects, programs, and policies. The safety leadership team is ultimately responsible for developing, adopting, and implementing the safety plan and program. The stakeholder team is distinguished from the leadership team. It comprises partner agencies and organizations who collaborate with the City and contribute to and assist with developing and implementing the plan. These agencies and their roles in the plan's development and implementation are provided below:

3.1 Safety Leadership

I. City Council

The legislative body which is ultimately responsible for approving and adopting the final plan, setting safety policies, and approving budget and funding levels.

II. Public Works Department

Public Works is the lead City Department in developing and producing the Safety Plan and its periodic updates. The Public Works Department is responsible for assembling other City Departments and collaborating with Stakeholders. Public Works is responsible for capital project implementation. The City's Public Works staff may also lead or collaborate in education campaigns.

III. Signal Hill Police Department

The Police Department maintains collision records and is responsible for carrying out enforcement practices and activities. The City's Police Department may also lead or collaborate in education campaigns.

IV. Los Angeles County Fire Department

The City's Fire Department serves in a support role in developing and producing the plan.

3.2 Stakeholders

I. Long Beach Unified School District
Collaboration with the Long Beach Unified School District to maintain and promote safety for all students within the City of Signal Hill.

II. Signal Hill Police Department
Roadways and functional areas of intersections require communication and collaboration. Collaboration with the Signal Hill Police Department over the course of the safety plan is needed to ensure that local safety goals and policies are met.

III. Los Angeles County Fire Department
The City's Fire Department serves in a support role in developing and producing the plan.

IV. Los Angeles County Metropolitan Transportation Authority (Metro)
Metro is unique among the nation's transportation agencies. It serves as the transportation planner and coordinator, designer, builder, and operator for the country's largest, most populous county. More than 10 million people – nearly one-fourth of California's residents – live, work and play within their 1,433-square-mile service area.

V. Caltrans District 7
The California Department of Transportation (Caltrans) is responsible for planning, design, construction, maintenance and operation of the state highway system. District 7, which includes Los Angeles and Ventura counties, has the second largest workforce of 12 Caltrans districts statewide. District 7 employs nearly 2,800 people with the largest workforce in construction and maintenance, and others in the administration, environmental, design, program/project management, planning, traffic operations, external affairs and right of way divisions.

VI. Signal Hill Chamber of Commerce
The Signal Hill Chamber of Commerce coordinates engagement with City businesses. The Chamber of Commerce provides feedback on recommended strategies and countermeasures to addressing traffic safety issues. Feedback from the Business community can provide valuable insight on the benefits and impacts of safety measures.

VII. General Public of the City of Signal Hill
The general public provides feedback and insight on recommended emphasis areas, high incident locations, collision factors, countermeasures, and implementation. Although collision records and statistics are foundational to this plan, public feedback is a critical supplement to that data. This feedback provides the safety plan with a holistic view of safety issues and a recommendation for what types of countermeasures are and are not desired by the community.

VIII. Signal Hill and Long Beach Public Works Department
In a joint effort, Signal Hill and Long Beach Public Works are to lead the City Department in developing and producing the Safety Plan and its periodic updates. Both respective city public works departments can benefit from each other in this joint effort.

4. Process

This section describes the steps involved in preparing the safety plan, including a systemic approach that involves the analysis of collision data to identify high crash locations and prioritize countermeasures.

4.1 Systemic Approach

The systemic approach in preparing the safety plan comprises the following steps:

I. Develop Plan Goals and Objectives

Review the City's existing planning documents to ensure the LRSP visions and goals align with planning effort and that the potential 5Es: Engineering, Education, Enforcement, Emergency Medical Services, and Emerging Technologies are consistent with local traffic safety and policies.

II. Analyze Collision Data

Obtain the latest 5-year collision data and analyze the collision factors. Determine high-risk intersections and roadway segments and identify significant risk factors.

III. Determine Focus Areas and Identify Crash Reduction Measures

Identify emphasis areas and recommend feasible countermeasures at high-risk locations. Evaluate Crash Reduction Factor (CRF) and the effectiveness of each countermeasure.

IV. Prioritize countermeasures/projects

Conduct Benefit-Cost Ratio (BCR) analysis on all countermeasures and projects. Prioritize projects that are most beneficial to the City's roadway and intersection safety using BCR.

V. Prepare the Local Roadway Safety Plan

Prepare the LRSP that includes effective and efficient measures and implementation plan. Identify priority projects for state or federal programming, grant funding opportunities, and implementation.

4.2 Public Outreach

The purpose of public outreach is to acquire the community's concerns that are related to the safety of traffic. Such concerns may include speeding, jay walking, traffic signs and signals, pedestrian and bicycle safety on collector roads, and arterial streets. Public outreach is an essential tool to identify and summarize high-risk locations and collision factors based on the community's concerns in addition to the collision analysis.

The target audience for the public outreach of this safety plan is the residents of the City of Signal Hill which include the following:

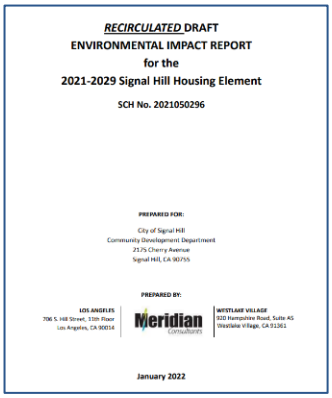
- **Signal Hill City Council**
- **Signal Hill Public Works**
- **Long Beach Public Works**
- **Signal Hill Police Department**
- **Los Angeles County Fire Department**
- **Long Beach Unified School District**
- **Caltrans District 7**
- **Los Angeles Metropolitan Transportation Authority (Metro)**
- **Long Beach Transit**
- **Signal Hill Chamber of Commerce**
- **General Public of the City of Signal Hill**

5. Existing Efforts

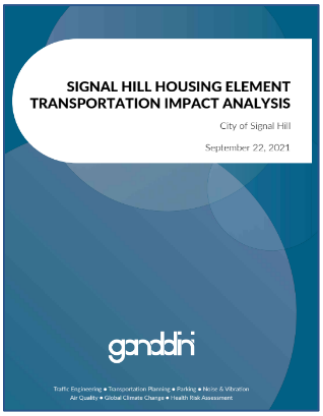
This section summarizes the findings from various planning documents for the City of Signal Hill. The purpose of reviewing existing planning efforts is to ensure the LRSP goals and objectives along with recommended improvements are aligned with recent planning efforts for transportation safety.

The City of Signal Hill has identified several goals, policies from the following documents:

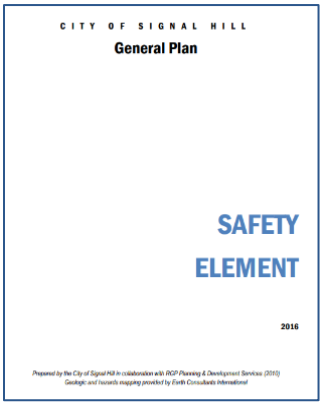
- **Recirculated Draft Environment Impact Report for the 2021-2029 Signal Hill Housing Element (2022)**
  Based on the Initial Study (see Appendix A), the City determined that preparation of an EIR was required to further evaluate potentially significant impacts related to: Air Quality, Cultural, Energy, Geology and Soils, Greenhouse Gas Emissions, Hazards and Hazardous Materials, Land Use, Noise, Population and Housing, Public Services, Transportation, and Tribal Cultural Resources. Impacts related to Aesthetics, Agricultural and Forestry Resources, Biology, Hydrology and Water Quality, Mineral Resources, Utilities and Service Systems, and Wildfire were determined to be less than significant and are not evaluated further in this Draft EIR.



- **Signal Hill Housing Element Transportation Impact Analysis (2021)**
  This study has been prepared in consultation with the City of Signal Hill and in accordance with both the City of Signal Hill and City of Long Beach methodologies for assessing transportation impacts at intersections located on the boundary between jurisdictions. For CEQA purposes, this study also evaluates the significance of project-related transportation impacts with respect to vehicle miles traveled (VMT) thresholds recommended by the State of California and, if necessary, identifies the appropriate measures to mitigate such impacts, if any.



- **City of Signal Hill General Plan Safety Element (2016)**
  The Safety Element is one of seven General Plan elements required by the State of California. This document provides the City of Signal Hill with background information on hazards and public safety services, and establishes goals, policy direction, and implementation measures intended to limit the community's exposure to a range of hazards.



6. Data Analysis and Summary

This section summarizes the results of a citywide collision analysis for the time period between January 1, 2017 and December 31, 2021. The purpose of studying the collision patterns and trends is to identify the factors that caused collisions to occur within the study timeframe. The focus is to identify high crash locations in the City in order to target the factors that are affecting these prominent locations.

As part of the City's Local Roadway Safety Plan, data that displays collisions on State Routes or Interstate Freeways will not be part of the overall data analysis as well as collision data that does not occur within the City's boundaries. Therefore, data used and analyzed will be 100% within city boundaries and on local roads, with an exception to Pacific Coast Highway Route 1.

6.1 Overall Summary

According to the University of California, Berkeley Transportation Injury Mapping System (TIMS) during the period of January 1, 2017 to December 31, 2021, there were 728 collisions in total, where collisions included fatal, serious injury, visible injury, and complaint of pain. 116 occurred on State Highways and 612 Occurred on local roadways. 5 victims were killed, and 1,121 victims were injured. There were 40 pedestrian collisions, 32 bike collisions, and 28 motorcycle collisions. A map from the University of California, Berkeley Transportation Injury Mapping System (TIMS) displays collisions by point as well as a map that displays collisions by cluster is shown in Figures 2 and 3.

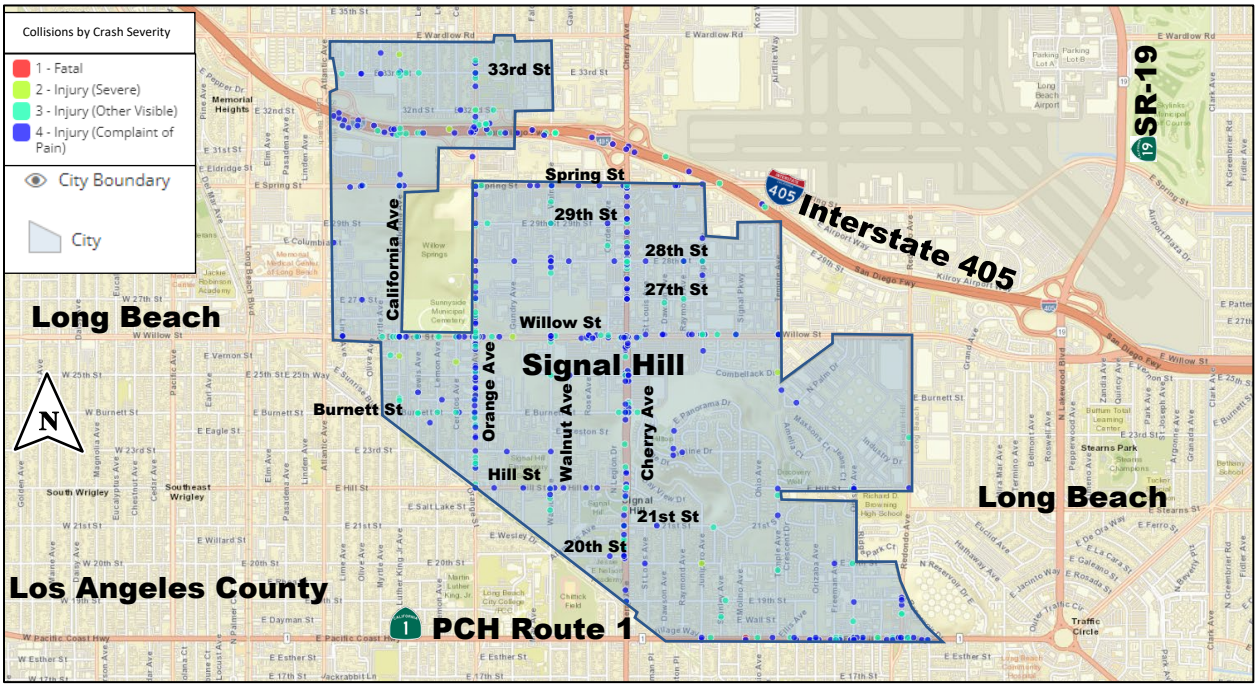


Figure 2: City of Signal Hill Display of Collisions by Point
(January 1, 2017 – December 31, 2021)

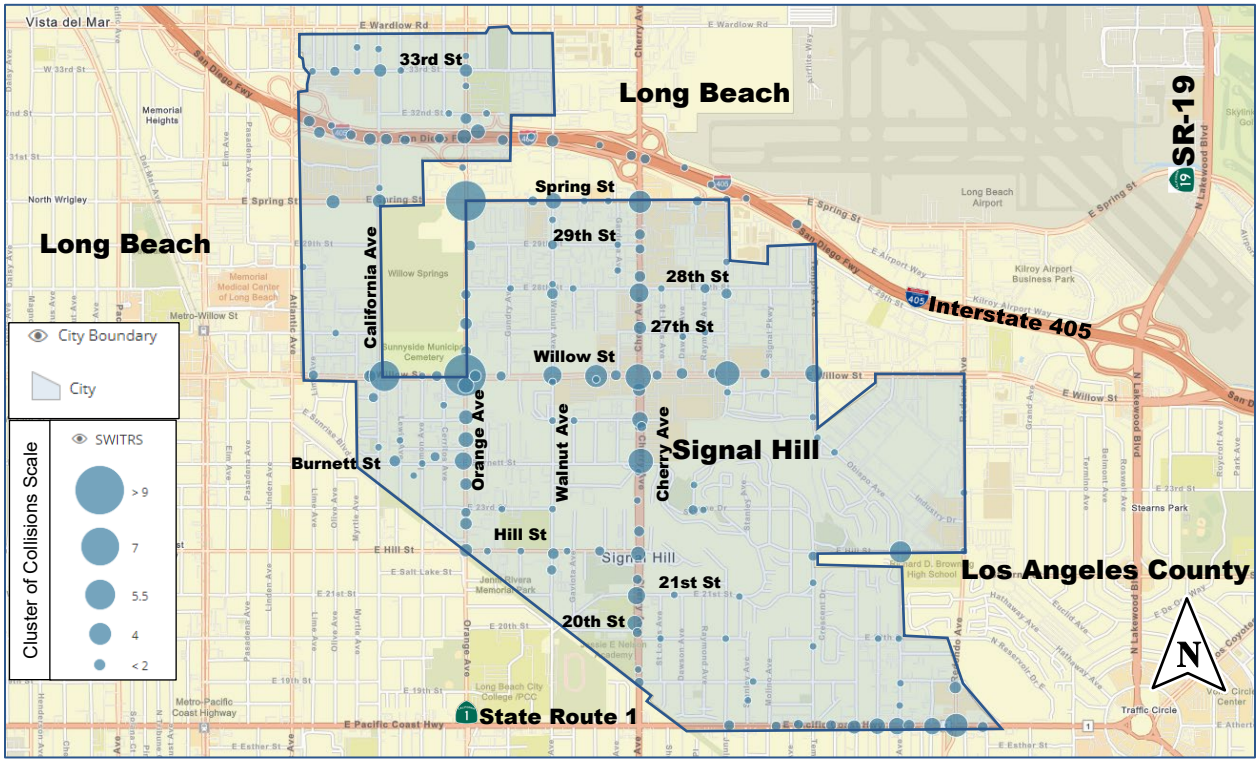


Figure 3: City of Signal Hill Display of Collisions by Cluster
(January 1, 2017 - December 31, 2021)

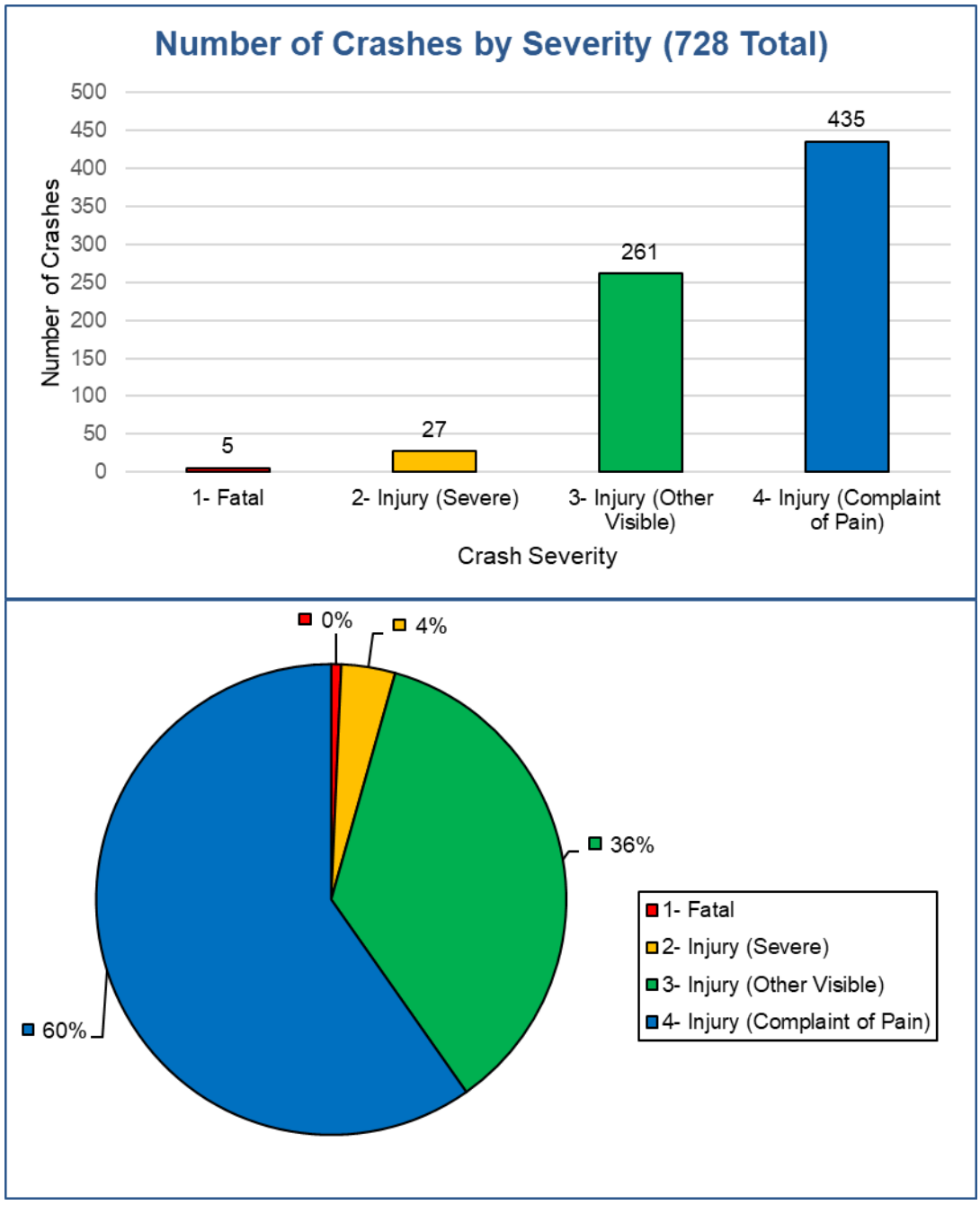


Figure 4: City of Signal Hill Number of Crashes by Crash Severity
(January 1, 2017 - December 31, 2021)

Figure 4 displays number of crashes by crash severity, where the data is retrieved from University of California, Berkeley Transportation Injury Mapping System (TIMS). From 2017 to 2021, there were 5 fatal collisions, which was 0.006% of total collisions; 27 injury (severe) collisions, which was 4% of total collisions; 261 injury (other visible) collisions (36% of total collisions); and lastly, 435 injury (complaint of pain) collisions (60%), which represented the greatest number of collisions in the 5-year span.

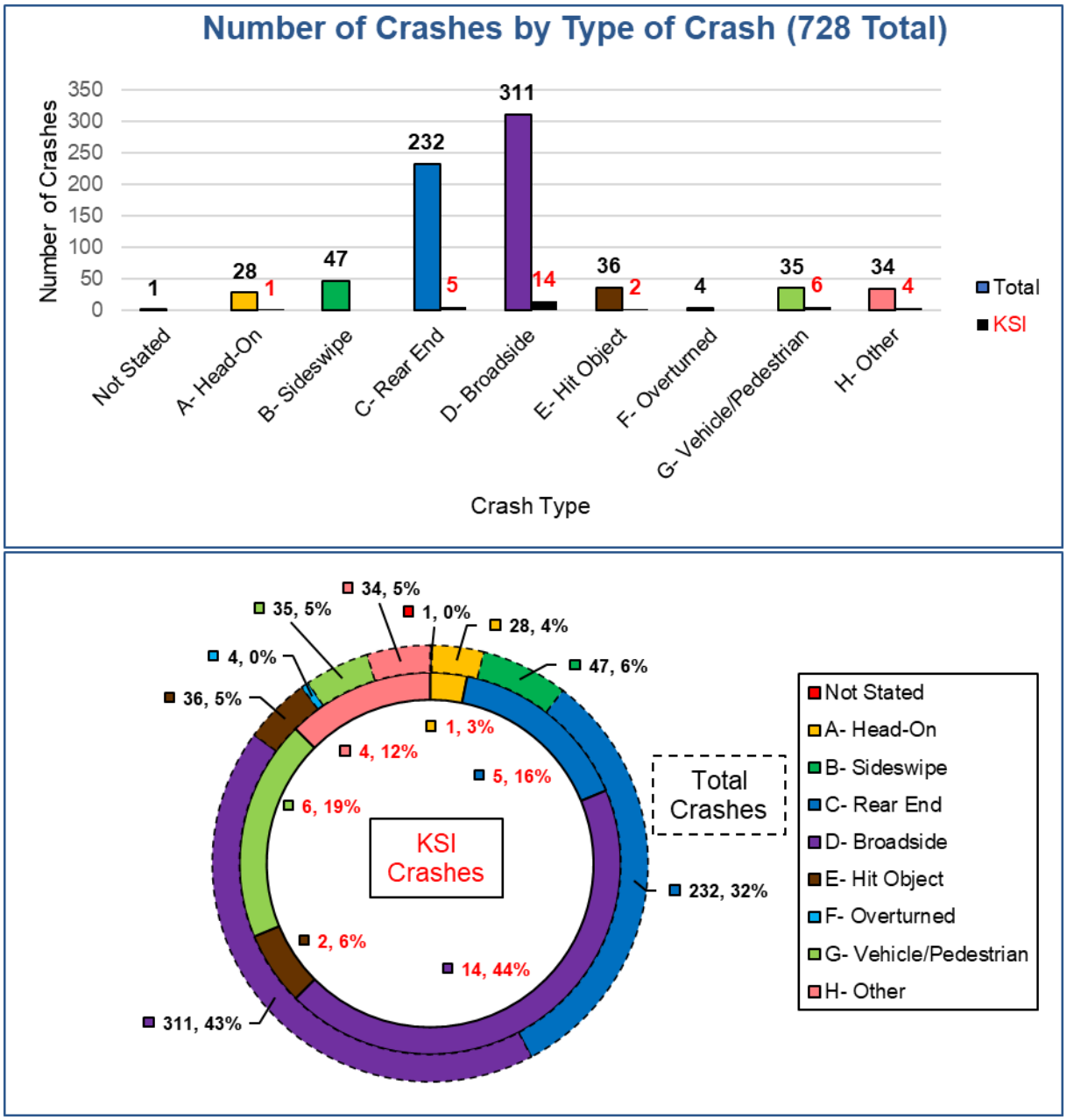


Figure 5: City of Signal Hill Number of Crashes by Type of Crash
(January 1, 2017 - December 31, 2021)

From 2017 to 2021, City of Signal Hill's types of collision were reported by University of California, Berkeley Transportation Injury Mapping System (TIMS). There were 311 Broadside collisions during the selected period of time. This was the most common type of collision, which was 43% of total collisions in the City of Signal Hill. Rear End was the second common type, which was 32% of the total (232 collisions). There were 47 Sideswipe collisions, making it the third common type of collision (6% of the total).

Table 1: Number of Crashes per Day of Week per Time
(January 1, 2017 - December 31, 2021)

Total Crashes (728)

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	SCALE
00:00 - 02:59	2	1	3	9	2	6	9	0
03:00 - 05:59	2	2	3	0	3	3	2	5
06:00 - 08:59	8	7	13	11	9	5	7	10
09:00 - 11:59	28	14	9	12	16	21	9	15
12:00 - 14:59	27	32	22	25	23	15	12	20
15:00 - 17:59	34	28	40	27	27	18	18	25
18:00 - 20:59	17	18	17	10	15	14	13	30
21:00 - 23:59	9	10	10	8	9	4	9	35
25:00 - Unknown	0	0	0	0	0	0	1	40

KSI Crashes* (32)

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	SCALE
00:00 - 02:59	0	0	1	1	1	0	1	0
03:00 - 05:59	0	0	0	0	0	0	0	1
06:00 - 08:59	0	0	1	0	0	0	0	2
09:00 - 11:59	1	0	0	1	1	0	0	
12:00 - 14:59	0	2	1	2	0	1	0	3
15:00 - 17:59	0	0	5	2	0	0	0	
18:00 - 20:59	0	0	1	0	1	2	0	4
21:00 - 23:59	3	2	0	1	0	0	1	
25:00 - Unknown	0	0	0	0	0	0	0	5

*Killed and Severely Injured (KSI) Crashes are included in the Total Number of Crashes (728)

Collisions in the City of Signal Hill were listed for different time periods for each day of the week. 2 collisions occurred on a Monday for the time period from 0:00 to 2:59 and 3:00 to 5:59. 8 collisions from 6:00 to 8:59 and 21:00 to 23:59. 28 collisions occurred in the period from 9:00 to 11:59. There were 27 collisions that occurred in the time period of 12:00 to 14:59, 34 collisions that occurred from 15:00 to 17:59, which was the most on Mondays, 17 collisions from 18:00 to 20:59, and 9 collisions from 21:00 to 23:59. Mondays had the most collisions of 127.

Tuesday from 0:00 to 2:59 had 1 collision, 2 collisions from 3:00 to 5:59, 7 collisions from 6:00 to 8:59, and 14 collisions from 9:00 to 11:59. In the afternoon, there were 32 collisions that occurred from 12:00 to 14:59, which was the highest of Tuesday, 28 collisions from 15:00 to 17:59, 18 collisions from 18:00 to 20:59, and 10 collisions from 21:00 to 23:59. There were 112 collisions, which made for third most in a day.

On Wednesdays, TIMS recorded 3 collisions from 0:00 to 2:59 and 3:00 to 5:59. 13 collisions from 6:00 to 8:59, 9 collisions from 9:00 to 11:59. 22 collisions occurred during the periods between 12:00 to 14:59 and 40 collisions from 15:00 to 17:59, the highest of any day or time of

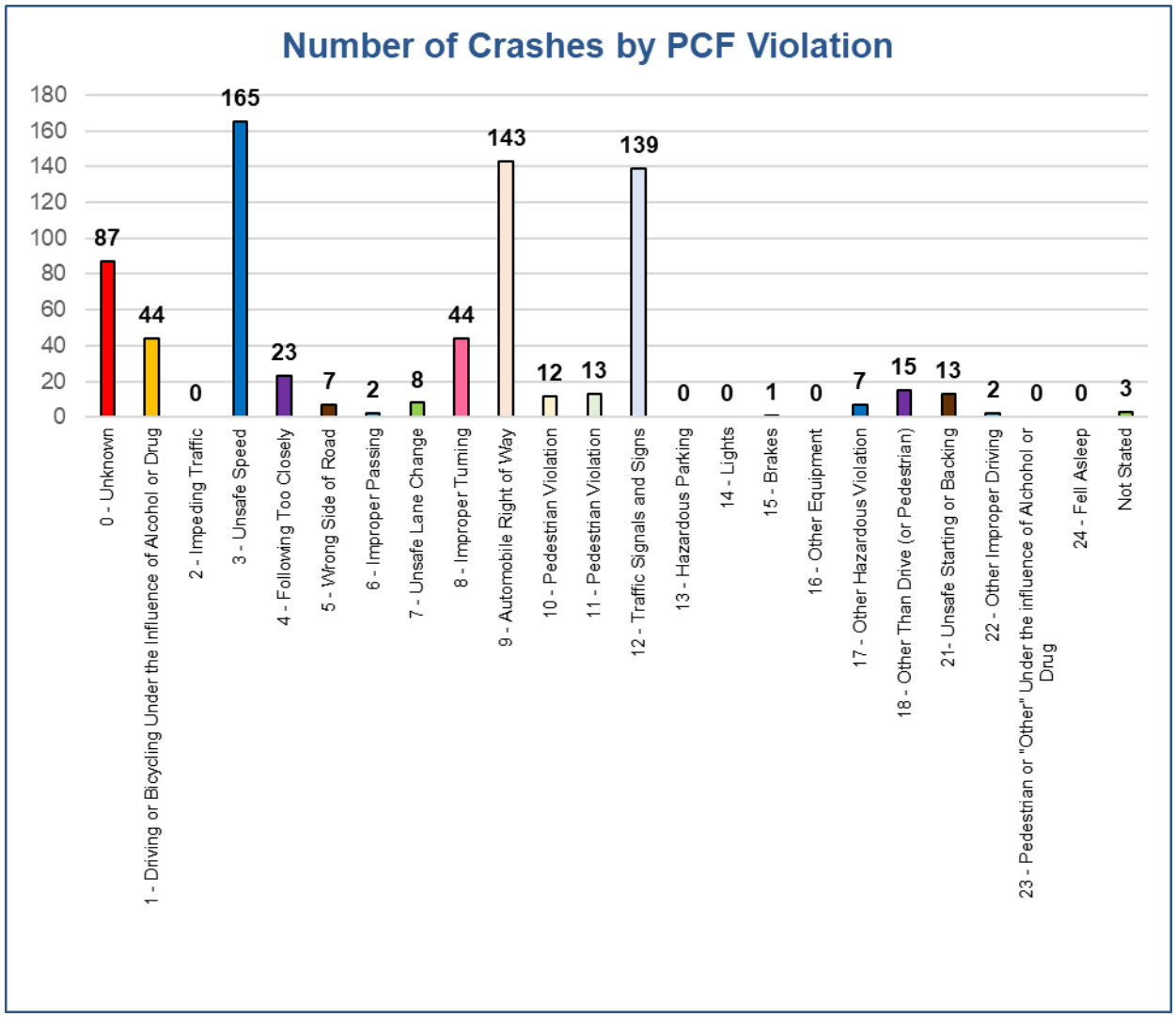
the week. 17 collisions occurred from 18:00 to 21:59, and 10 collisions occurred during the time of 21:00 to 23:59. Wednesday had 117 collisions, making the second highest day with collisions.

Thursdays had 9 collisions from 0:00 to 2:59, 11 collisions occur from 6:00 to 8:59, 12 collisions occur at 9:00 to 11:59, and 25 collisions occur during 12:00 to 14:59, 27 collisions from 15:00 to 17:59, 10 collisions from 18:00 to 20:59. Lastly, there were 8 collisions from 21:00 to 23:59.

There were 2 collisions from 0:00 to 2:59 and 3 collisions from 3:00 to 5:59 on Fridays, 9 collisions from 6:00 to 8:59, and 16 collisions 9:00 to 11:59. 23 collisions from 12:00 to 14:59, 27 collisions from 15:00 to 17:59, which was the most of Friday. 15 collisions during the periods 18:00 to 20:59, and 9 collisions from 21:00 to 23:59.

On Saturdays, 6 collisions occurred from 0:00 to 2:59, 3 collisions occurred from 3:00 to 5:59 and 5 collisions occurred during 6:00 to 8:59. 21 collisions occurred from 9:00 to 11:59, the most for Saturday. 15 collisions occurred from 12:00 to 14:59 and 18 collisions occurred from 15:00 to 17:59. There were 14 collisions happening between 18:00 to 20:59 and 4 collisions from 21:00 to 23:59.

There were 9 collisions was recorded from 0:00 to 2:59 and 21:00 to 23:59, 2 collisions from the time periods 3:00 to 5:59, and 7 collisions from 6:00 to 8:59 on Sunday. 9 collisions occurred from 9:00 to 11:59, 12 collisions from 12:00 to 14:59, 18 collisions from 15:00 to 17:59, and 13 collisions from 18:00 to 20:59. In addition, 9 collisions occurred from 21:00 to 23:59 and 1 collision 25:00/unknown.


Number of Crashes by PCF Violation
180
160
140
120
100
80
60
40
20
0
87
44
0
165
23
7
2
8
44
143
12
13
139
0
0
1
0
7
15
13
2
0
0
3
0 - Unknown
1 - Driving or Bicycling Under the Influence of Alcohol or Drug
2 - Impeding Traffic
3 - Unsafe Speed
4 - Following Too Closely
5 - Wrong Side of Road
6 - Improper Passing
7 - Unsafe Lane Change
8 - Improper Turning
9 - Automobile Right of Way
10 - Pedestrian Violation
11 - Pedestrian Violation
12 - Traffic Signals and Signs
13 - Hazardous Parking
14 - Lights
15 - Brakes
16 - Other Equipment
17 - Other Hazardous Violation
18 - Other Than Drive (or Pedestrian)
21- Unsafe Starting or Backing
22 - Other Improper Driving
23 - Pedestrian or "Other" Under the influence of Alchohol or Drug
24 - Fell Asleep
Not Stated

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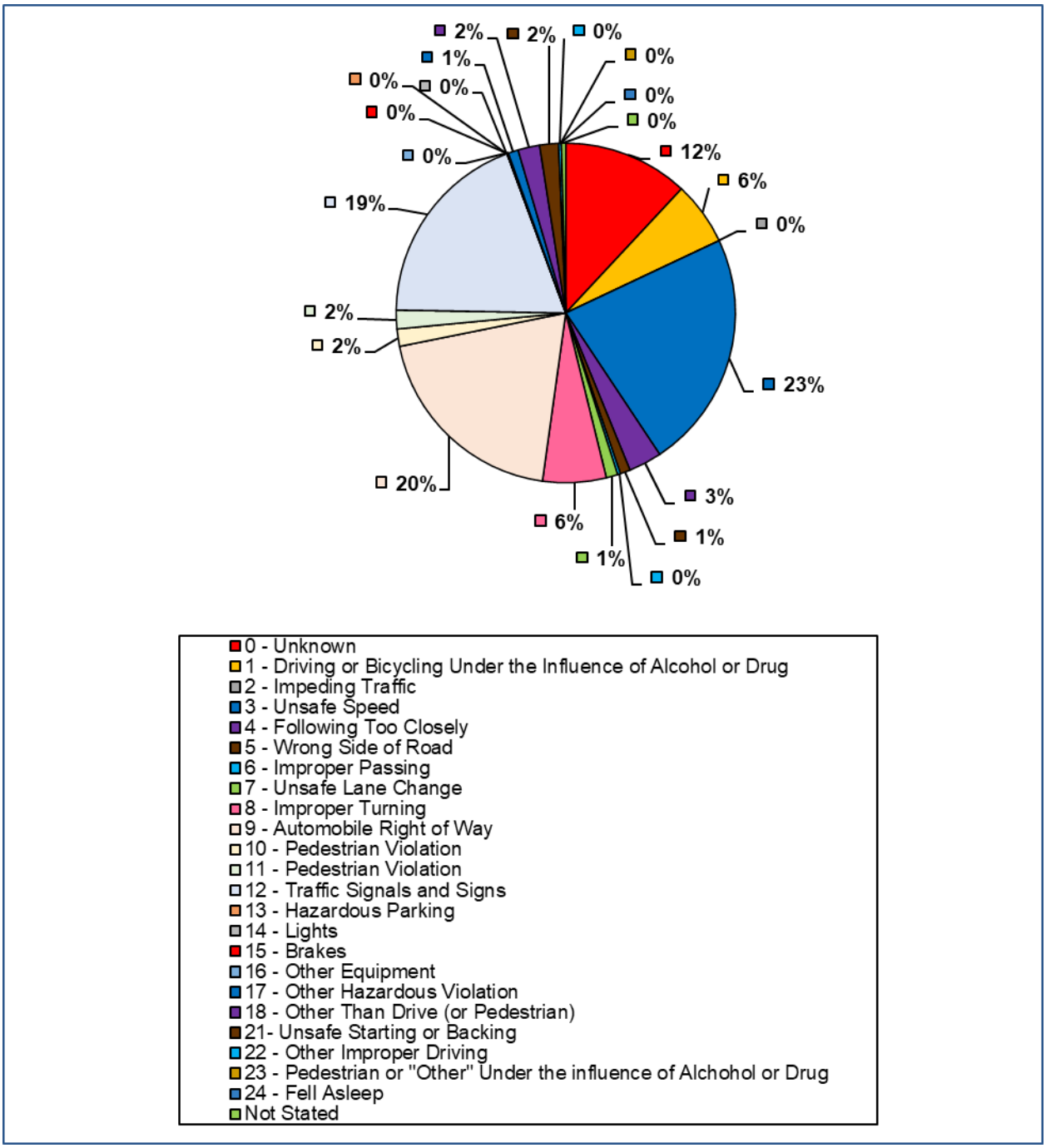


Figure 6: Number of Crashes by (PCF) Primary Crash Factor Violation
(January 1, 2017 - December 31, 2021)

According to CHP SWITRS, the Primary Collision Factor (PCF) violation that caused the most collisions in the City of Signal Hill (728 Crashes Total) were unsafe speeds, which resulted in 165 collisions (23%). The second most being 143 collisions were reported with Automobile Right of Way PCF violation (20%). Traffic signals and signs made up of 139 collisions (19%), being the third most.

6.2 Victim Summary

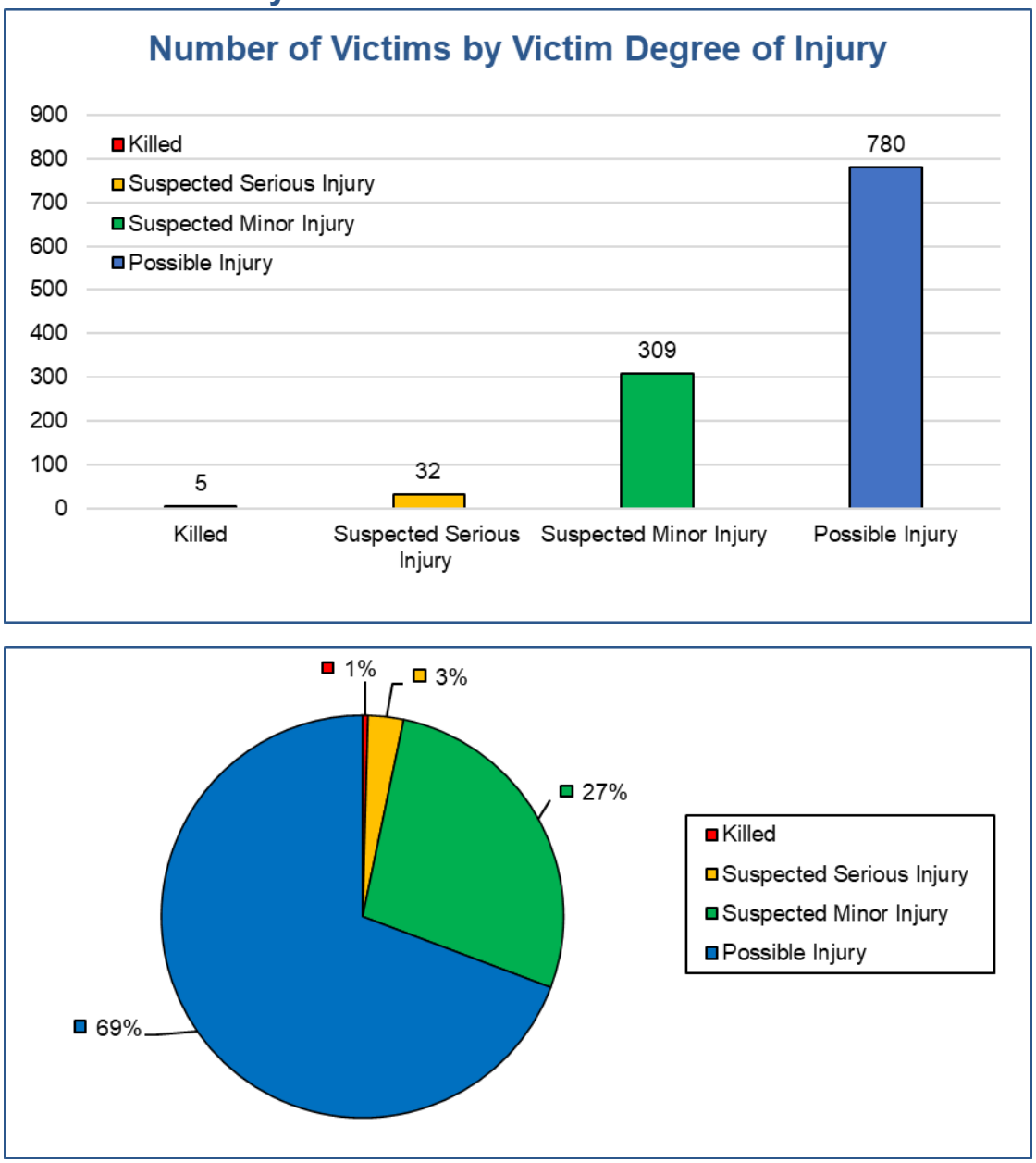


Figure 7: Number of Victims by Victim Degree of Injury
(January 1, 2017 - December 31, 2021)

There were 1,126 injured victims of traffic collisions in the City of Signal Hill from 2017 to 2021. 5 victims were killed (0.44%), 32 victims reported with suspected serious injury (2.84%), 309 victims reported with suspected minor injury (27.44%), and 780 victims were reported with possible injury (69.27%).

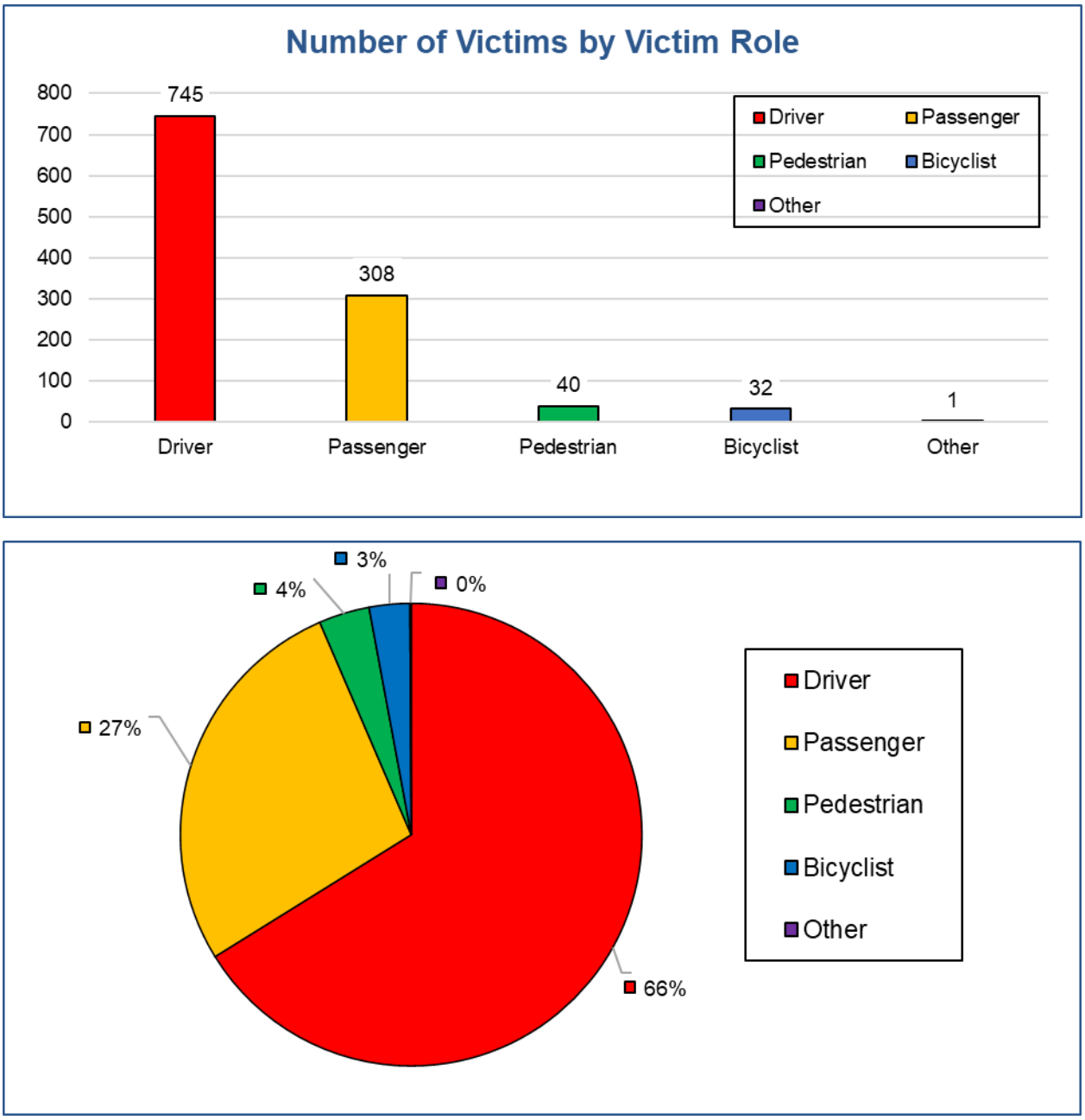


Figure 8: Number of Victims by Victim Role
(January 1, 2017 - December 31, 2021)

According to University of California, Berkeley Transportation Injury Mapping System (TIMS), of the collision injured victims, 745 were drivers (66.16%), 308 were passengers (27.35%), 40 were pedestrians (3.55%), 32 were bicyclists (2.84%), and 1 was other (0.09%).

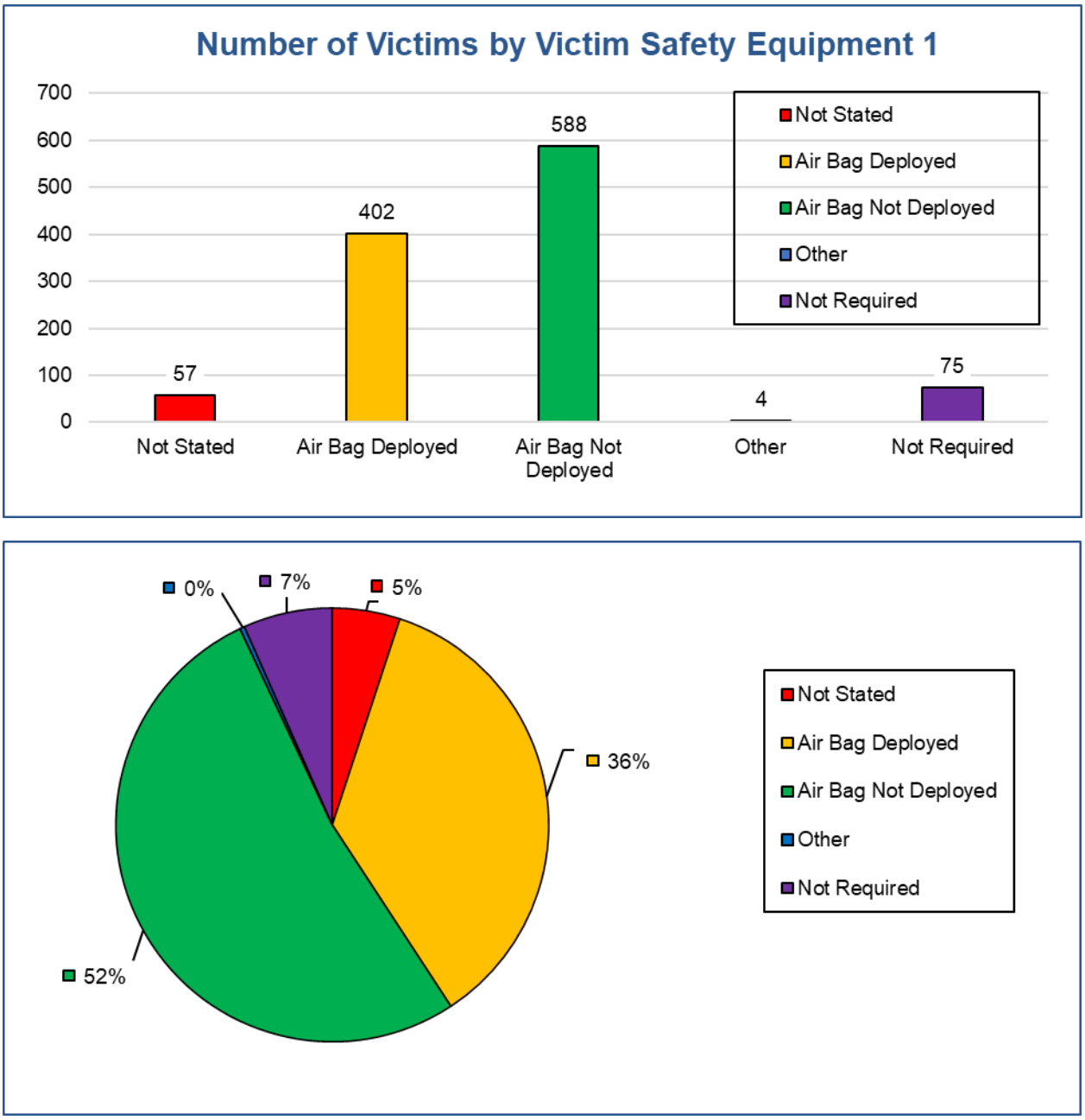


Figure 9: Number of Victims by Victim Safety Equipment
(January 1, 2017 - December 31, 2021)

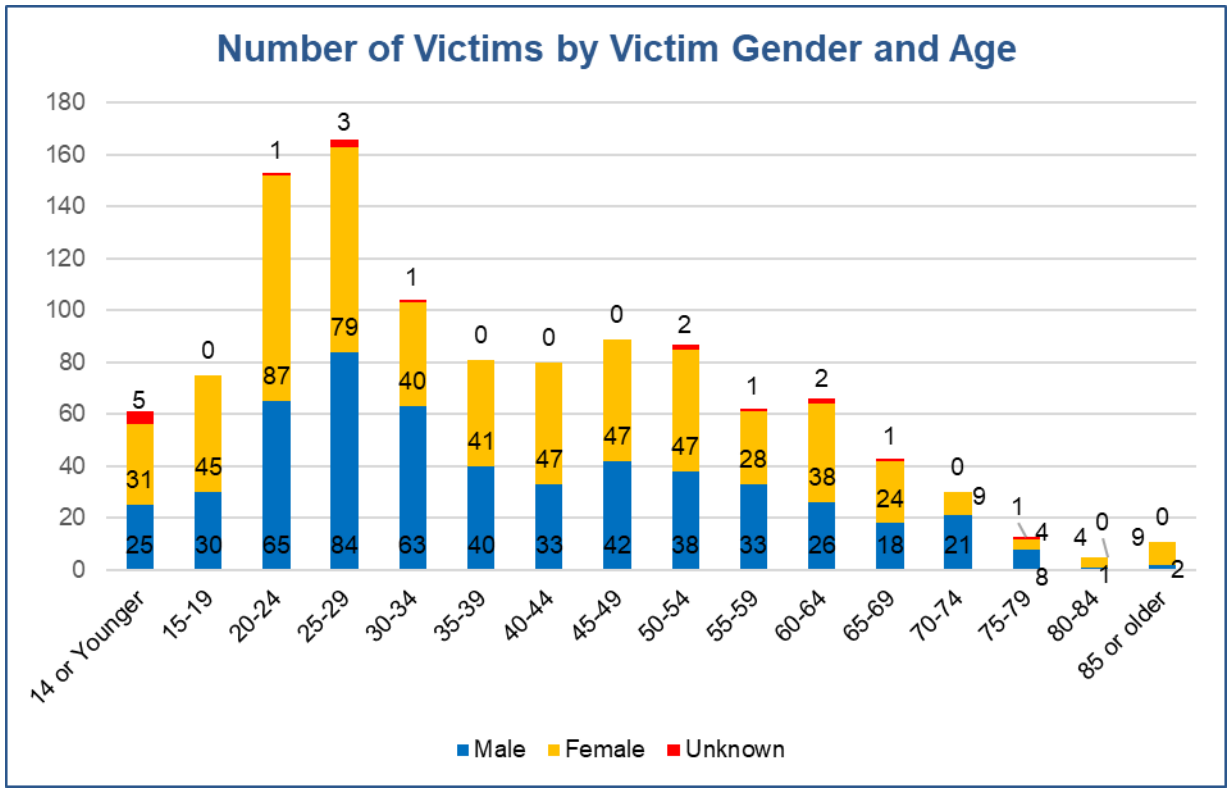
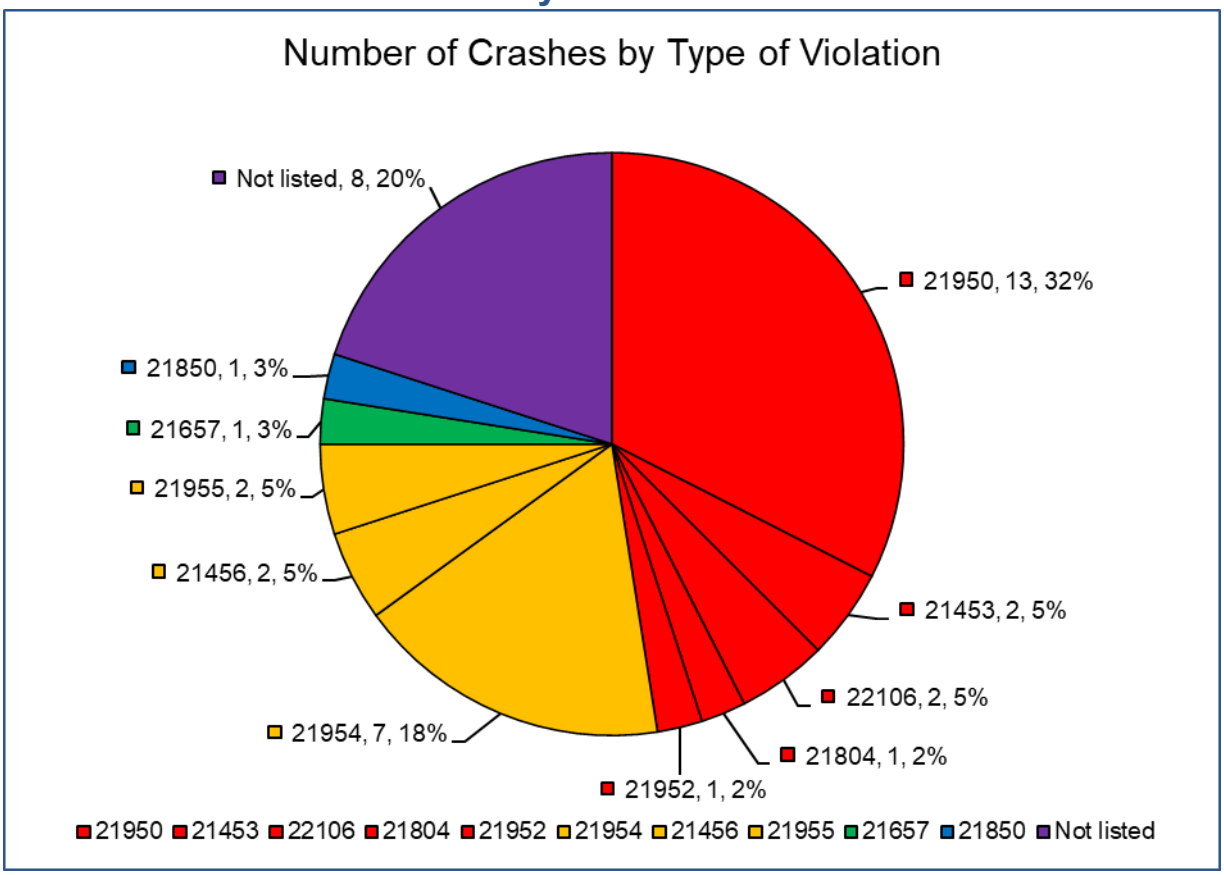


Figure 10: Number of Victims by Victim Gender and Age
(January 1, 2017 - December 31, 2021)

For the total of 1126 victims during the 5-year period, 52% of victims were females, 47% were males, and 2% were not stated. 61 victims were 14 years old or younger, 75 victims were 15-19 years old, 153 victims were 20-24 years old, 166 victims were 25-29 years old, which was the highest age range. 104 victims were 30-34 years old, 81 victims were 35-39 years old, 80 victims were 40-44 years old. 89 victims were in the age range of 45-49 years old, 87 victims were in the age range of 50-54 years old, 62 victims were in the age range of 55-59 years old, and 66 victims were in the age range of 60-64 years old. 43 victims were 65-69 years old, 30 victims were 70-74 years old, and 13 were 75-79 years old. Lastly, 5 victims were at the age between 80-84 years old and 11 victims age 85 or higher.

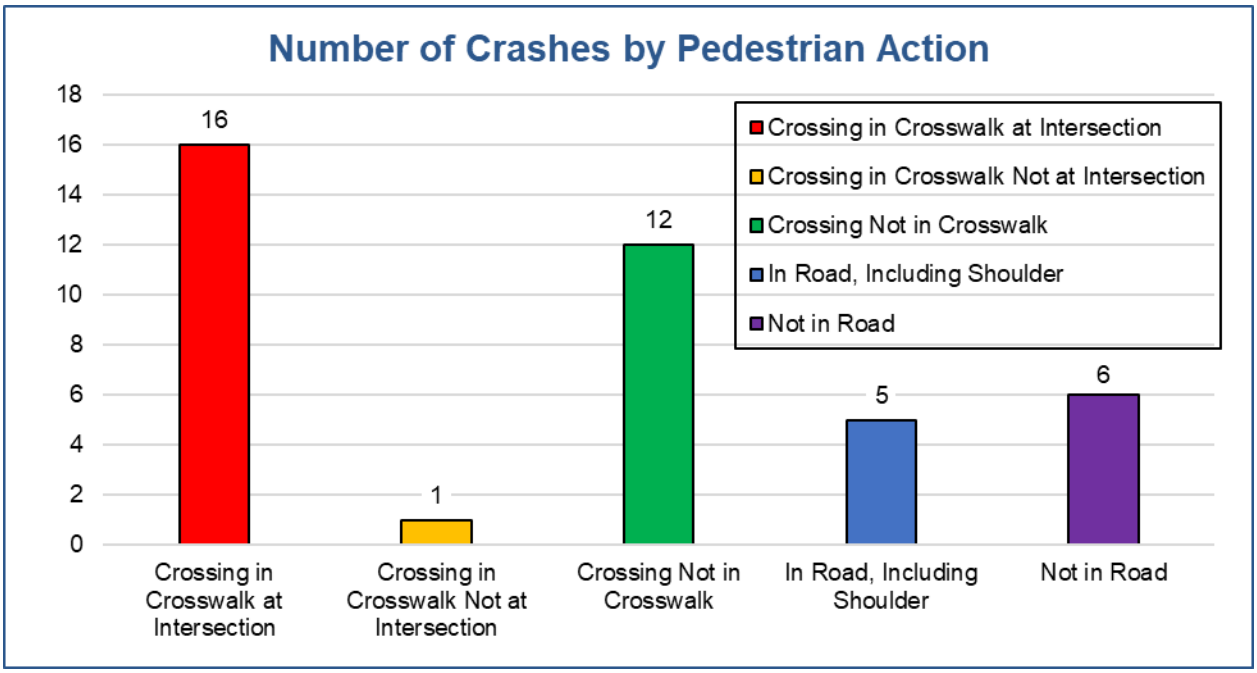
6.3 Pedestrian Crash Summary



Party Violation Classification	Type of Violation	Description	Count	%
Driver	21950	Driver failure to yield right-of-way to pedestrians at a marked or unmarked crosswalk	13	33%
Driver	21453	Failure to stop at a limit line or crosswalk at a red-light Failure to yield right-of-way to pedestrian when turning on a red light	2	5%
Driver	22106	Unsafe starting or backing of a vehicle on a highway	2	5%
Driver	21804	Driver failure to yield right-of-way when entering/crossing a highway	1	3%
Driver	21952	Driver failure to yield right-of-way to pedestrians on sidewalks	1	3%
Pedestrian	21954	Pedestrian failure to yield right-of-way to vehicles when crossing outside of a marked or unmarked crosswalk	7	18%

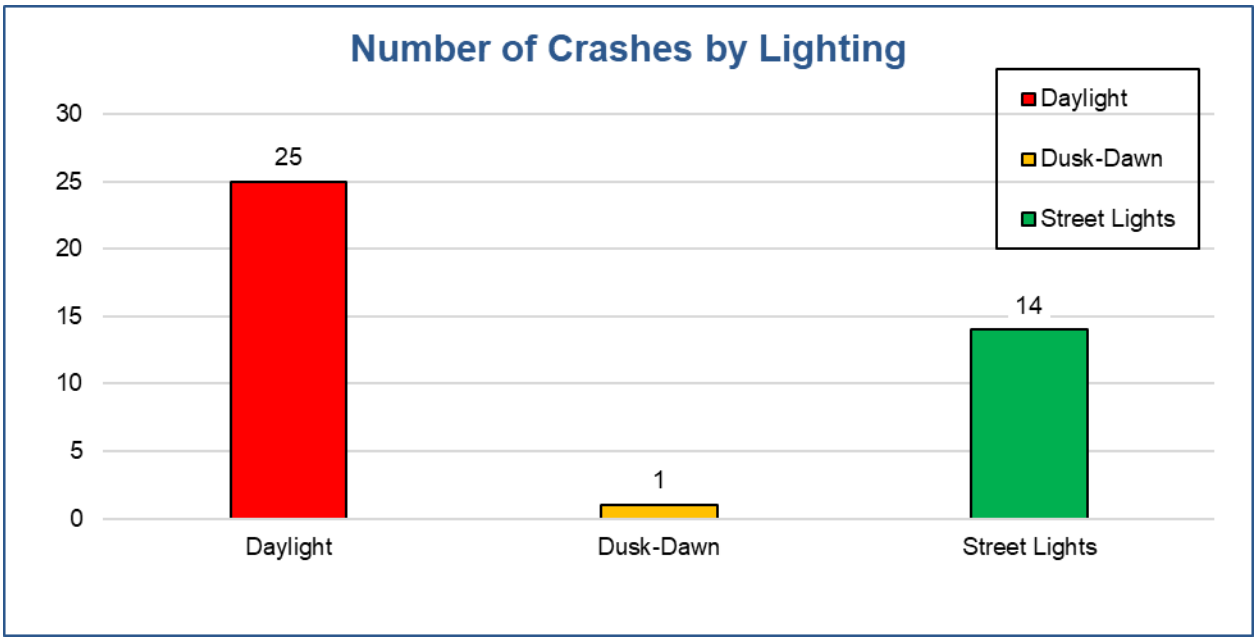
Party Violation Classification	Type of Violation	Description	Count	%
Pedestrian	21456	Pedestrian failure to yield right-of-way at traffic signal / Failure of pedestrian to yield right-of-way to vehicles already in intersection Failure to obey crosswalk symbols or finish crossing before "countdown" ends	2	5%
Pedestrian	21955	Pedestrian failure to cross at crosswalks between adjacent traffic signal-controlled intersections	2	5%
Unclear	21657	Failure to travel in the correct direction on designated one-way highways, roadways or lanes	1	3%
Others	Others	21850 (1)	1	3%
Not Listed	Not Listed	Violation code was not included in the crash	8	20%
Total			**40**	**100%**

Figure 11: City of Signal Hill Number of Crashes by Type of Violation
(January 1, 2017 - December 31, 2021)



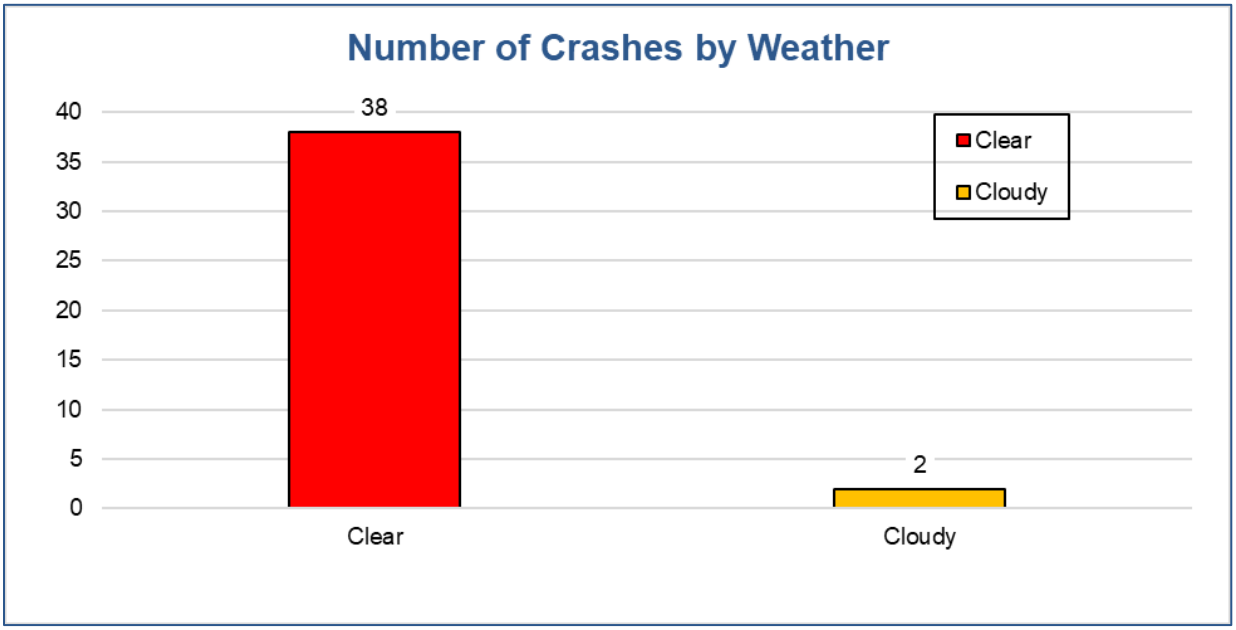
Pedestrian Action	Count	%
B - Crossing in Crosswalk at Intersection	16	40%
C - Crossing in Crosswalk Not at Intersection	1	3%
D - Crossing Not in Crosswalk	12	30%
E - In Road, Including Shoulder	5	13%
F - Not in Road	6	15%
Total	**40**	**100%**

Figure 12: City of Signal Hill Number of Crashes by Pedestrian Action
(January 1, 2017 - December 31, 2021)



Lighting	Count	%
A - Daylight	25	63%
B - Dusk - Dawn	1	3%
C - Dark - Street Lights	14	35%
Total	**40**	**100%**

Figure 13: City of Signal Number of Crashes by Lighting
(January 1, 2017 - December 31, 2021)



Weather	Count	%
A - Clear	38	95%
B - Cloudy	2	5%
Total	**40**	**100%**

Figure 14: City of Signal Hill Number of Crashes by Weather
(January 1, 2017 - December 31, 2021)

6.4 Active Transportation Program (ATP) Summary Data & Maps

From 2017 to 2021 there has been 40 pedestrian collisions and 32 bicycle collisions. Out of the 40 pedestrian collisions, there were 2 fatalities, 5 severe injuries, 20 visible injuries, and 13 complaints of pain. Out of the 32 bicycle collisions, 4 were severe injury, 18 were visible, and 10 were complaints of pain. The following figure displays the City's ATP heat map. There is one pedestrian and bicycle collision that has not yet been added or updated to the dataset yet.

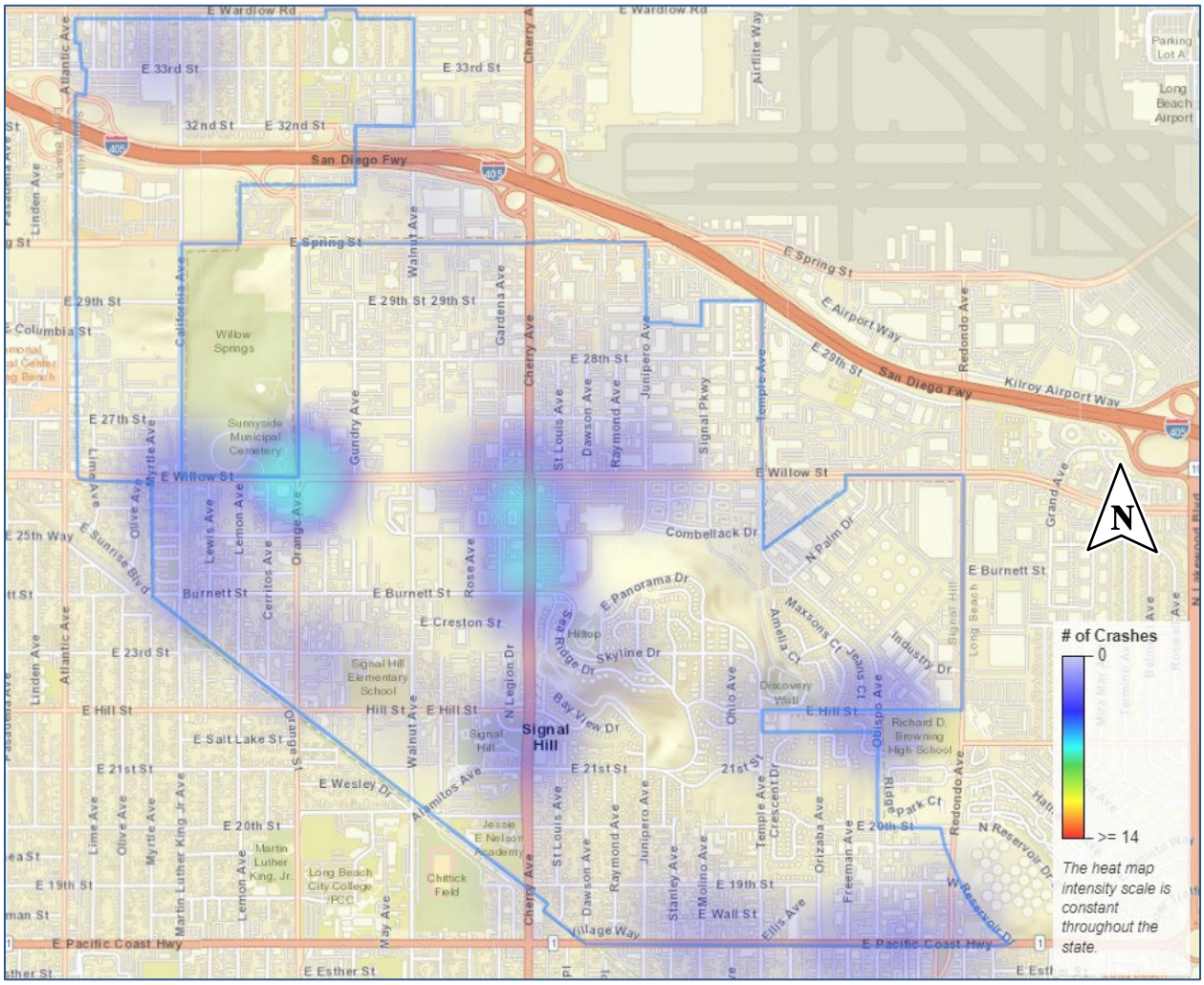


Figure 15: City of Signal Hill Active Transportation Program Heat Map
(January 1, 2017 - December 31, 2021)

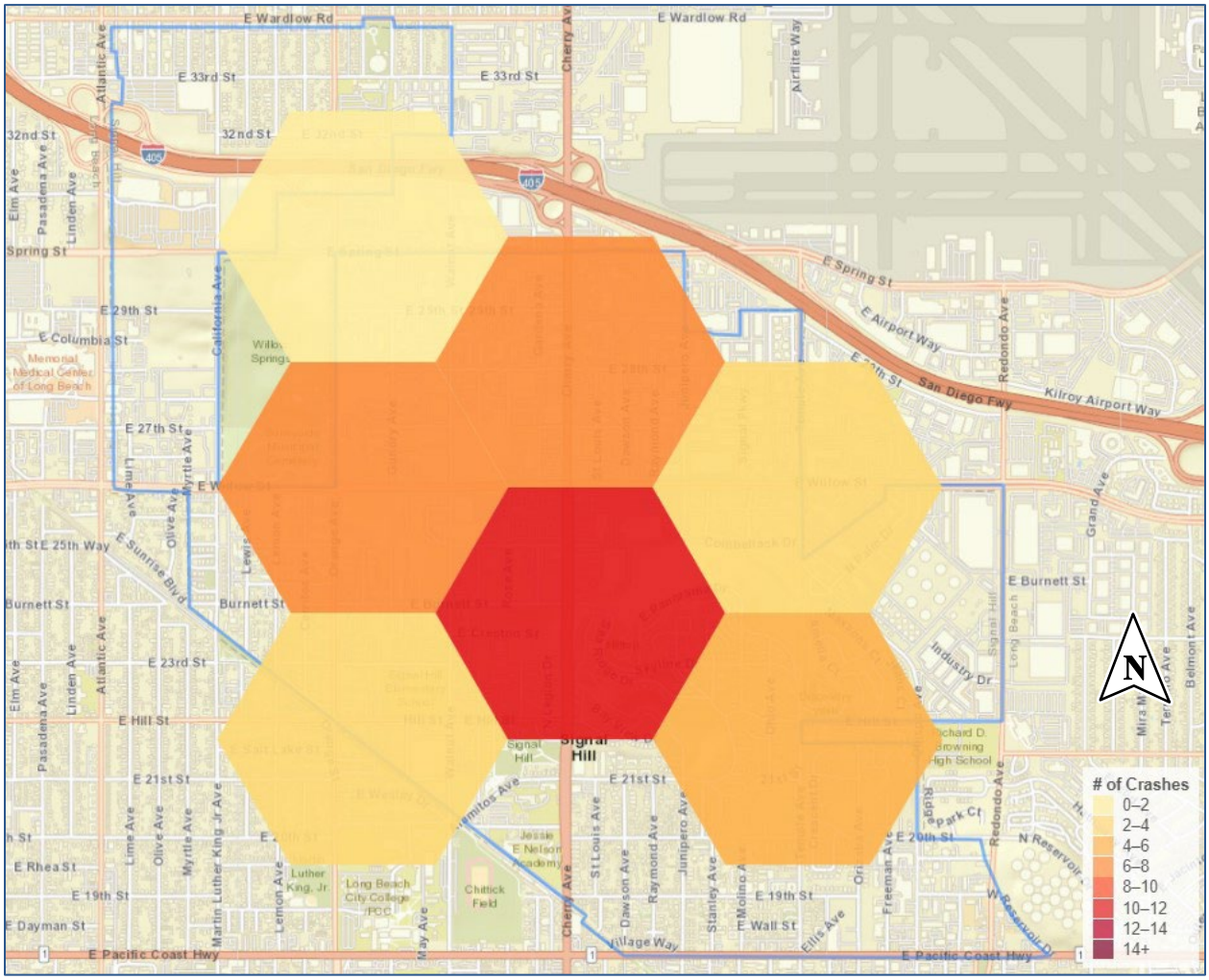


Figure 16: City of Signal Active Transportation Program Hexagonal Grid Map
(January 1, 2017 - December 31, 2021)

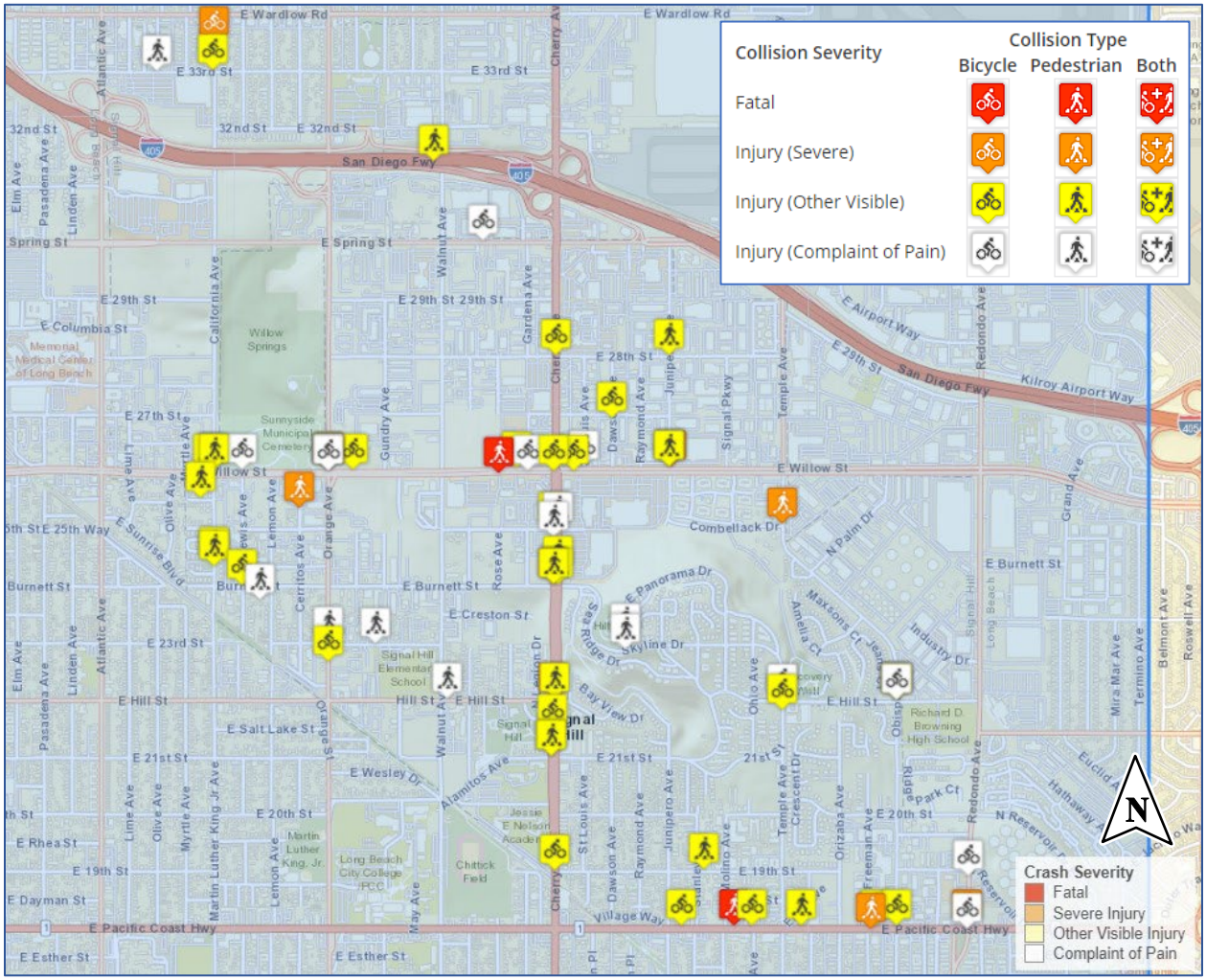
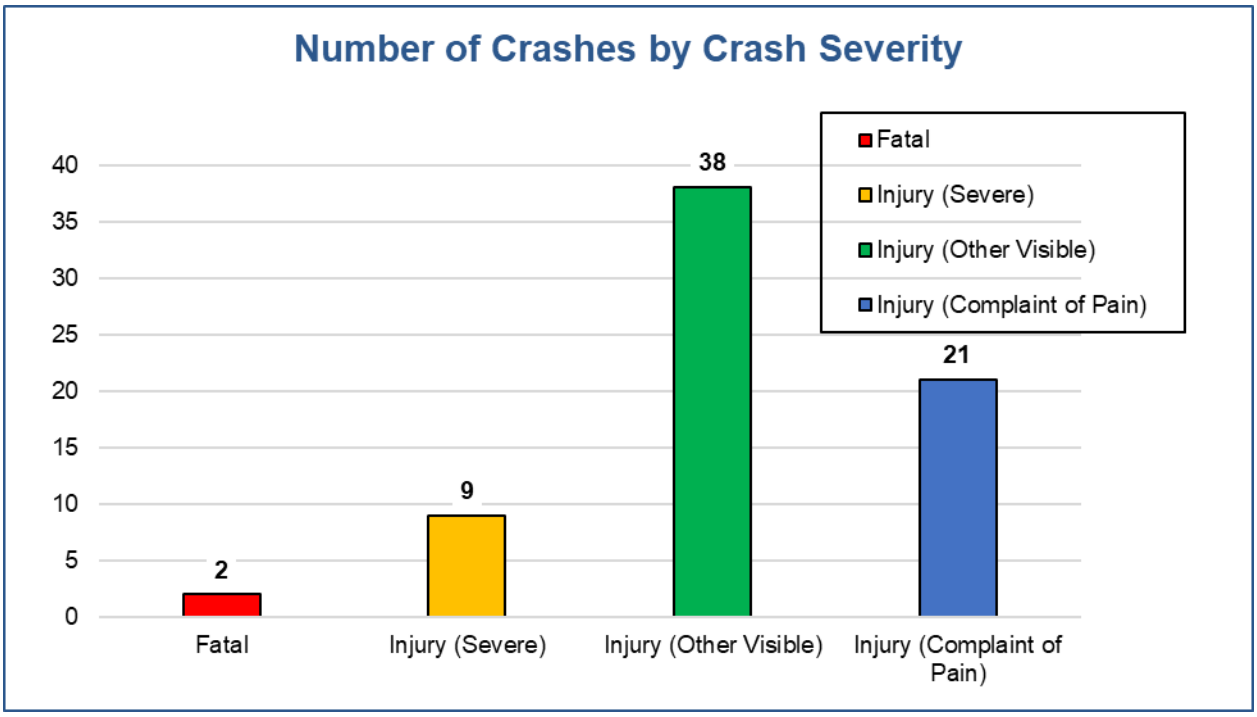


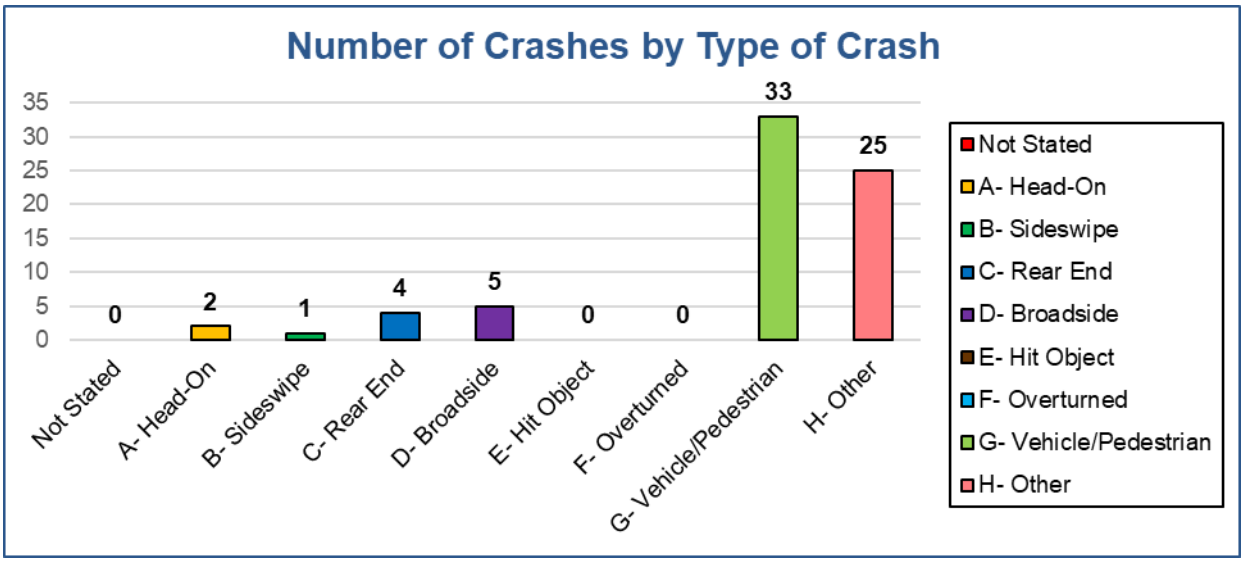
Figure 17: City of Signal Hill Active Transportation Program Specific Collision Map
(January 1, 2017 - December 31, 2021)



Crash Severity	Count	%
1 - Fatal	2	3%
2 - Injury (Severe)	9	9%
3 - Injury (Other Visible)	38	38%
4 - Injury (Complaint of Pain)	21	21%
Total	**70**	**100**

Figure 18: Active Transportation Program Number of Crashes by Crash Severity (January 1, 2017 - December 31, 2021)

According to University of California, Berkeley Transportation Injury Mapping System (TIMS), from 2017 to 2021, there was 2 fatal collisions (3%), 9 severe injury collisions (9%), 38 visible injury collisions (38%), and 21 was identified as of complaint of pain which counted for 21% of the total collisions.



Type of Crash	Count	%
Not Stated	0	0%
A - Head-On	2	3%
B - Sideswipe	1	1%
C - Rear End	4	6%
D - Broadside	5	7%
E - Hit Object	0	0%
F - Overturned	0	0%
G - Vehicle/Pedestrian	33	47%
H - Other	25	36%
Total	**70**	**100%**

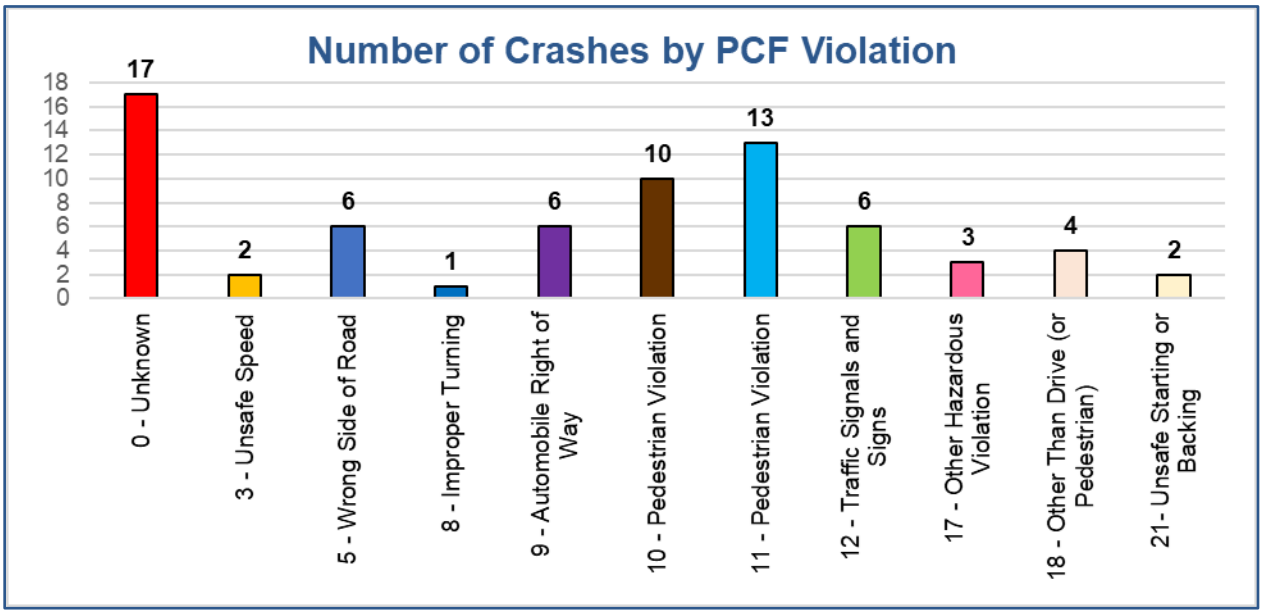
Figure 19: Active Transportation Program Number of Crashes by Type of Crash (January 1, 2017 - December 31, 2021)

There were 2 head-on collisions (3%), 1 sideswipe collision (1%), 4 rear end collisions (6%), 5 broadside collisions (7%), 33 vehicle/pedestrian collisions (47%) which makes up the majority type of collisions, and 25 other collisions (36%).

Table 2: Active Transportation Program Number of Crashes per Day of Week per Time

(January 1, 2017 - December 31, 2021)

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	SCALE
00:00 - 02:59	0	0	0	1	1	1	0	0
03:00 - 05:59	0	1	0	0	0	0	0	
06:00 - 08:59	0	2	1	1	1	0	0	2
09:00 - 11:59	4	0	1	3	2	1	1	
12:00 - 14:59	0	8	1	1	2	2	3	4
15:00 - 17:59	2	2	3	3	0	2	3	
18:00 - 20:59	4	2	2	0	3	0	0	6
21:00 - 23:59	2	1	1	0	0	0	1	
25:00 - Unknown	0	0	0	0	0	0	1	8

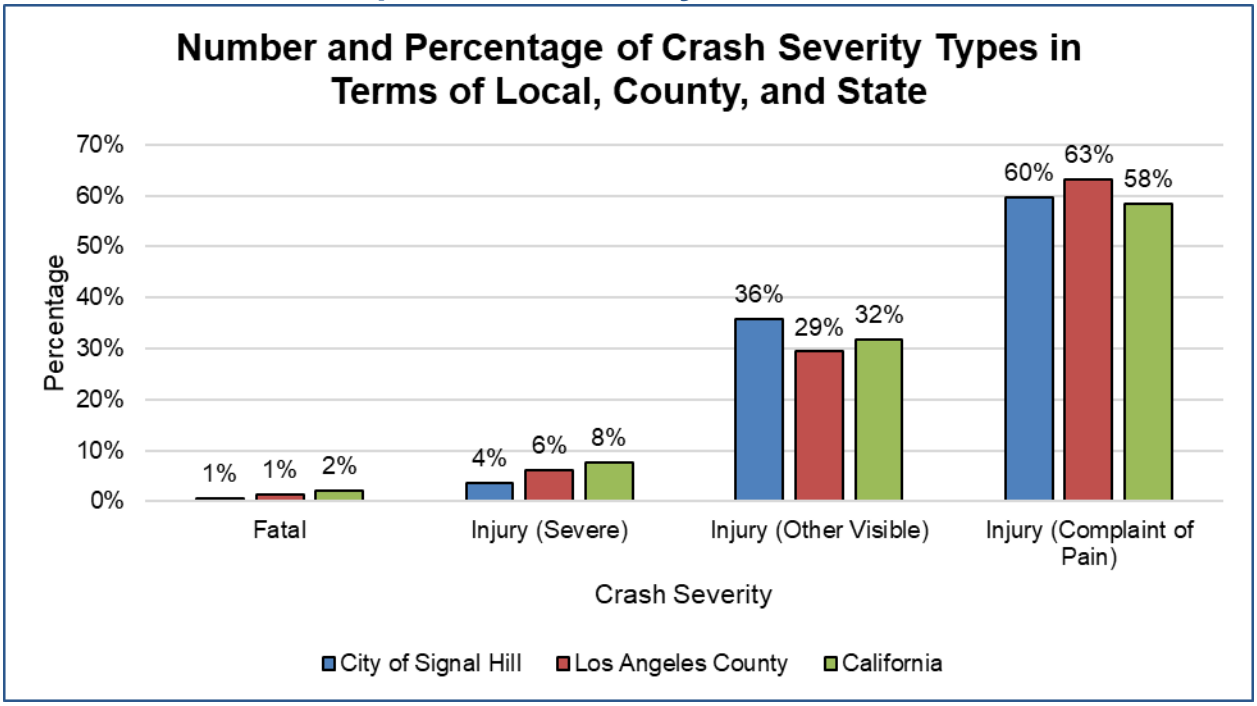


PCF Violation	Count	%
0 - Unknown	17	24%
3 - Unsafe Speed	2	3%
5 - Wrong Side of Road	6	9%
8 - Improper Turning	1	1%
9 - Automobile Right of Way	6	9%
10 - Pedestrian Right of Way	10	14%
11 - Pedestrian Violation	13	19%
12 - Traffic Signals and Signs	6	9%
17 - Other Hazardous Violation	3	4%
18 - Other Than Drive (or Pedestrian)	4	6%
21- Unsafe Starting or Backing	2	3%
Total	**70**	**100%**

Figure 20: Number of Crashes by Primary Crash Factor PCF Violation

According to University of California, Berkeley Transportation Injury Mapping System (TIMS) From 2017 to 2021, out of the 70 collisions, 17 collisions had (00-Unknown), 2 collisions had (03-Unsafe Speed), 6 collisions had (05-Wrong Side of Road), 1 collisions had (08-Improper Turning), 6 collisions had (09-Automobile Right of Way), 10 collisions had (10-Pedestrian Right of Way), 13 collisions had (11-Pedestrian Violation), 6 collisions had (12-Traffic Signals and Signs), 3 collisions had (17-Other Hazardous Violation), 4 collisions had (18-Other Than Driver (or pedestrian)), and finally 2 collisions had (21-Unsafe Starting or Backing) as PCF Violation.

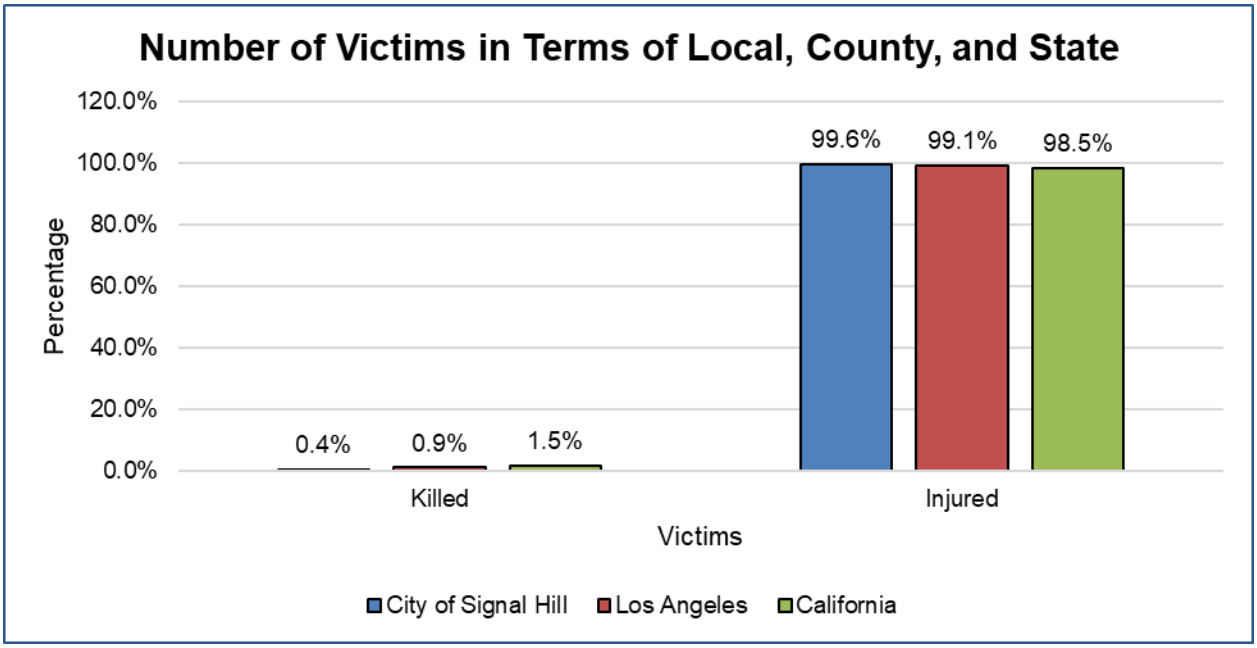
6.5 Crash Data Comparison and Analysis



Crash Severity	Count (%)		
	Signal Hill, CA	Los Angeles County	California
1 Fatal	5 (1%)	3,532 (1%)	17,815 (2%)
2 Injury (Severe)	27 (4%)	17,010 (6%)	68,669 (8%)
3 Injury (Other Visible)	261 (36%)	80,290 (29%)	283,632 (32%)
4 Injury (Complaint of Pain)	435 (60%)	172,579 (63%)	520,717 (58%)
Total	**728 (100%)**	**273,411 (100%)**	**890,833 (100%)**

Figure 21: TIMS Number and Percentage of Crash Severity Types in Terms of Local, County, and State
(January 1, 2017 - December 31, 2021)

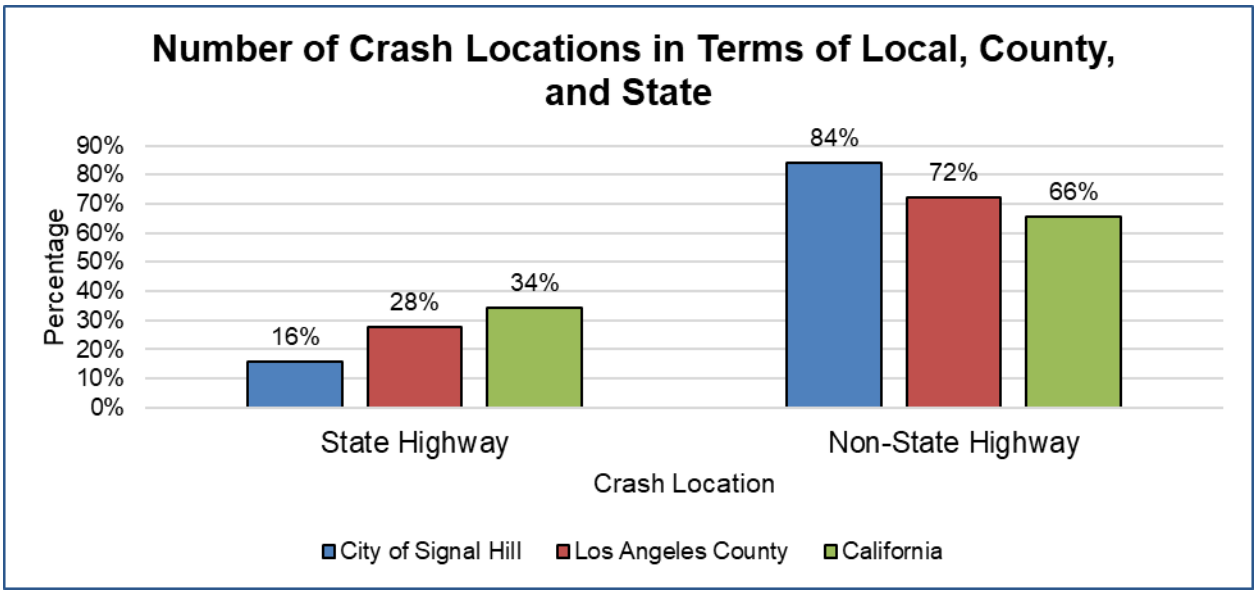
From the Transportation Injury Mapping System, the Statewide Integrated Traffic Records System contains crash data reported to California Highway Patrol (CHP) from the local and governmental agencies. From Figure 21, crash severity data is compared in the local, county, and state level. From the period between January 1, 2017 to December 31, 2021, City of Signal Hill percentage proportions for 3) Injury-Other Visible (36%) crash severity is higher than the county (29%) and state (32%) categories. The percentage of 2) Injury-Severe (4%) is lower than the county (6%) and state (8%) categories. The percentage of 1) Fatal (1%) crash severity is lower or equal to the county (1%) and state (2%). The crash severity 4) Injury-Complaint of Pain percentage (60%) is less than county (63%) and more than the state (58%). The data displayed shows a higher percentage of visible injuries and lower percentage of severe injuries in terms, compared to Los Angeles County and California.



Victims	Count (%)		
	Signal Hill, CA	Los Angeles County	California
Killed	5 (0.4%)	3,738 (0.9%)	19,330 (1.5%)
Injured	1121 (99.6%)	393,162 (99.1%)	1,248,201 (98.5%)
Total	**1,126 (100%)**	**396,900 (100%)**	**1,267,531 (100%)**

Figure 22: TIMS Number and Percentage of Victims in Terms of Local, County, and State (January 1, 2017 - December 31, 2021)

From the Transportation Injury Mapping System, the Statewide Integrated Traffic Records System contains crash data reported to California Highway Patrol (CHP) from the local and governmental agencies. From Figure 22, number of victims killed and injured is compared in the local, county, and state level. From the period between January 1, 2017 to December 31, 2021, the data displayed shows the proportion for killed in the City of Signal Hill with 0.4% less than the percentage of the county (0.9%) and state (1.5%).

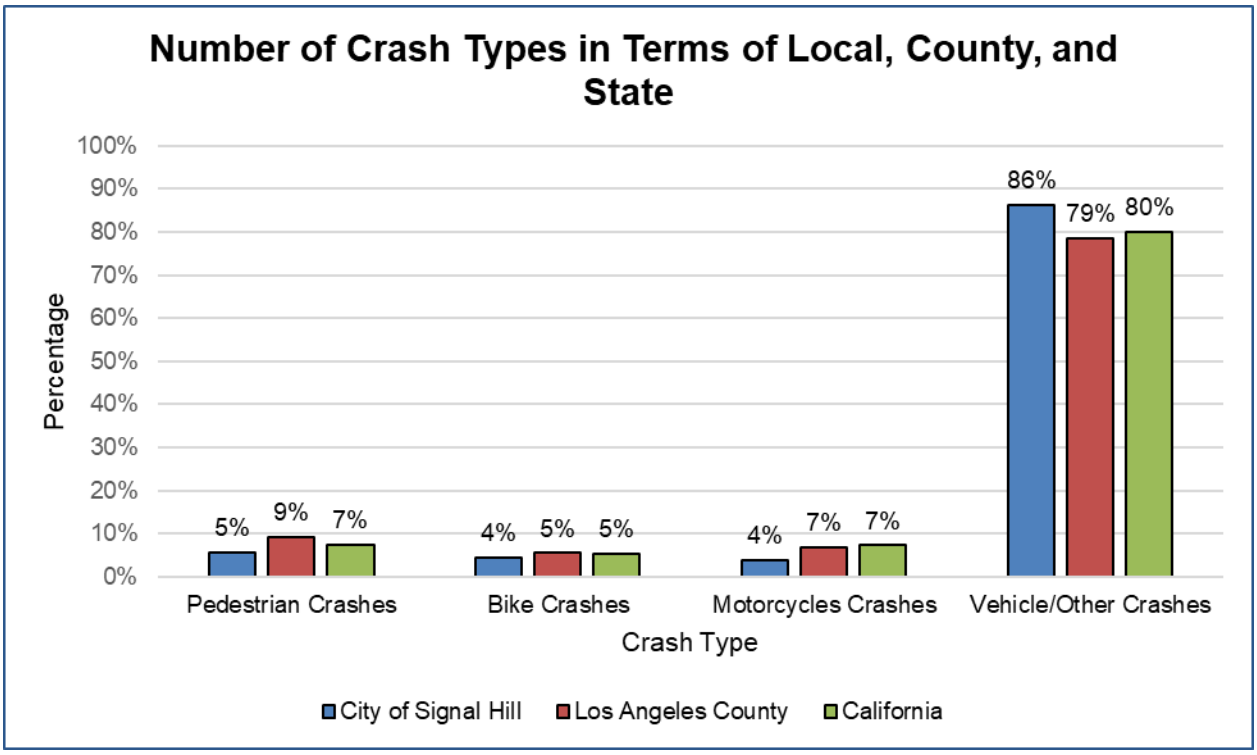


Crash Location	Count (%)		
	Signal Hill, CA	Los Angeles County	California
State Highway	116 (16%)	75,332 (28%)	304,365 (34%)
Non-State Highway	612 (84%)	198,079 (72%)	586,468 (66%)
Total	**728 (100%)**	**273,411 (100%)**	**890,833 (100%)**

Figure 23: TIMS Number and Percentage of Crash Locations in Terms of Local, County, and State

(January 1, 2017 - December 31, 2021)

From the Transportation Injury Mapping System, the Statewide Integrated Traffic Records System contains crash data reported to California Highway Patrol (CHP) from the local and governmental agencies. From Figure 23, crash location data is compared in the local, county, and state level. From the period between January 1, 2017 to December 31, 2021, City of Signal Hill percentage proportion for State highway crashes (16%) is lower than the county (28%) and state (34%) categories. The percentage Non-State Highway (local) (84%) is higher than the county (72%) and state (66%) categories. The data displayed shows a higher number of crashes that happened on local roadway than state highway in terms of percentage proportion for the City of Signal Hill, compared to Los Angeles County and California.



Crash Type	Count (%)		
	Signal Hill, CA	Los Angeles County	California
Pedestrian Crashes	40 (5%)	24,930 (9%)	65,666 (7%)
Bike Crashes	32 (4%)	14,922 (5%)	48,250 (5%)
Motorcycles Crashes	28 (4%)	18,566 (7%)	64,633 (7%)
Vehicle/Other Crashes	628 (86%)	214,993 (79%)	712,284 (80%)
Total	**728 (100%)**	**273,411 (100%)**	**890,833 (100%)**

Figure 24: TIMS Number and Percentage of Crash Types in Terms of Local, County, and State

(January 1, 2017 - December 31, 2021)

From the Transportation Injury Mapping System, the Statewide Integrated Traffic Records System contains crash data reported to California Highway Patrol (CHP) from the local and governmental agencies. From Figure 24, crash type data is compared in the local, county, and state level. From the period between January 1, 2017 to December 31, 2021, City of Signal Hill percentage proportion pedestrian crashes (5%), bike crashes (4%), and motorcycle crashes (4%) is lower than the county (9%, 5%, 7%) and state (7%, 5%, 7%). Meanwhile, the percentage for vehicle/other crashes (86%) is higher than the county (79%) and state (80%) categories. The data displayed shows a higher number of crashes that involved vehicles and other crashes and lower number of crashes for pedestrian, bike, and motorcycles crashes in terms of percentage proportion for the City of Signal Hill, compared to Los Angeles County and California.

6.5 California Office of Traffic Safety (OTS) Ranking

Table 3: City of Signal Hill OTS Crash Ranking Results 2020

Agency	Year	County	Group	Population (Avg)	DVMT
Signal Hill	2020	LOS ANGELES COUNTY	E	11702	249898

TYPE OF CRASH	VICTIMS KILLED & INJURED	OTS RANKING
Total Fatal and Injury	180	12/103
Alcohol Involved	6	42/103
Had Been Drinking Driver < 21	1	13/103
Had Been Drinking Driver 21 – 34	4	15/103
Motorcycles	4	34/103
Pedestrians	9	9/103
Pedestrians < 15	2	3/103
Pedestrians 65+	0	57/103
Bicyclists	5	35/103
Bicyclists < 15	0	27/103
Composite	66	7/103

TYPE OF CRASH	FATAL & INJURY CRASHES	OTS RANKING
Speed Related	22	12/103
Nighttime (9:00pm – 2:59am)	16	5/103
Hit and Run	17	7/103

TYPE OF ARRESTS	ARRESTS	OTS RANKING*
DUI Arrests	76	76/103

The OTS Rankings were developed so that individual cities could compare their city's traffic safety statistics to those of other cities with similar-sized populations. Cities could use these comparisons to see what areas they may have problems in and which they were doing well in. The results helped both cities and OTS identify emerging or on-going traffic safety problem areas in order to help plan how to combat the problems and help with the possibility of facilitating grants It should be noted that OTS rankings are only indicators of potential problems; there are many factors that may either understate or overstate a city/county ranking that must be evaluated based on local circumstances. City rankings are for incorporated cities only, for local streets in those cities, and state highways that run through cities with shared jurisdiction with the CHP and the city.

Crash rankings are based on the Empirical Bayesian Ranking Method, which adds weights to different statistical categories including observed crash counts, population and vehicle miles traveled. The crash counts reflect the aggregated impacts of all influential factors containing even the unrecognized or unmeasurable ones (e.g. level of enforcement), and the population and vehicle miles traveled represent the important traffic exposure factors that affect crash occurrence. Counties are assigned statewide rankings, while cities are assigned population group rankings. The first table: Population – estimates matched to "Year". DVMT – Daily Vehicle Miles Traveled. Caltrans estimate of the total number of miles all vehicles traveled on that city's streets on an average day during that year. The number of cities in each group varies by year.

Cities are grouped by 2020 population: Group A – 15 cities, populations over 250,000, Group B – 61 cities, population 100,001-250,000, Group C – 106 cities, population 50,001-100,000, Group D – 91cities, population 25,001-50,000, Group E – 103 cities, population 10,001-25,000, Group F – 74 cities, population 2,501-10,000, Group G – 32 cities, population 1-2,500. City of Signal Hill is in Group E with an average population of 11,702. Number 1 in the rankings is the highest, or "worst." For example, a ranking of 1/74 is the highest or worst, 45/74 is average, and 74/74 is the lowest or best.

- Center Table: Type of Crash – This column delineates the different types of crashes OTS has chosen to show in the rankings. These represent the types with larger percentages of total killed and injured and areas of focus for the OTS grant program. Victims Killed and Injured – This column shows the number of fatalities and injuries aggregated. Damage-only or fender-bender crashes are not included. Ranking – This column shows what ranking that city has as compared to other comparably sized incorporated cities in California for that particular type of crash. The first number is that city's ranking for that type of crash. The second number is the total number of cities/counties within that population grouping. Types of Crashes: Total Fatal and Injury – The total number of victims involved in all crashes where there were fatalities and/or injuries in that city/county. Alcohol Involved – Crashes in which there were victims killed or injured where a party (driver, pedestrian, bicyclist) was classified as "Had Been Drinking." Had Been Drinking Driver <21 – Crashes in which there were victims killed or injured where a driver who was under the age of 21 had been drinking. Had Been Drinking Driver 21-34 – Crashes in which there were victims killed or injured where a driver who was between the ages of 21 and 34 had been drinking. Motorcycles – Crashes in which there were victims killed or injured and a motorcycle was involved. Pedestrians – Crashes in which there were victims killed or injured and a pedestrian was

involved. Pedestrians <15 – Crashes in which there were victims killed or injured and a pedestrian under the age of 15 was involved. Pedestrians 65+ – Crashes in which there were victims killed or injured and a pedestrian age 65 and older was involved. Bicycles – Crashes in which there were victims killed or injured and a bicyclist was involved. Bicycles <15 – Crashes in which there were victims killed or injured and a bicyclist under age 15 was involved. Composite – Figures which show rankings only, an aggregate of several of the other rankings (Had Been Drinking 21-34, Had Been Drinking Under 21, Alcohol Involved, Hit & Run, Nighttime and Speed crashes). These figures are a means to give an indication of over-all traffic safety. Bottom table: Speed Related – Crashes in which there were victims killed or injured where speed was the primary factor. Bottom table: Nighttime (9:00pm – 2:59am) – Crashes in which there were victims killed or injured that occurred between those hours, which are prime hours for DUI, speeding and drowsy driving crashes. Hit and Run – Crashes in which there were victims killed or injured and a driver left the scene. *DUI Arrests – DUI arrest figures are shown for cities only, not counties. The number of cities ranked against may be different than from the number of cities in the other categories. Not all cities report DUI arrests to the Department of Justice.

The City of Signal Hill with a composite score of 7/103 (7th worst) is poor in comparison to other incorporated cities with similar population in the most recent OTS ranking as of 2020. Based on “Types of Crashes”, total fatal and injury resulted to be 180 victims killed and injured, which ranked 12/103, which places the city near the bottom. The City of Signal Hill performed poor in the speed related fatal and injury crashes with 22, ranking the city at 12/103. The city performed above average in terms of DUI arrests made, with 76 and placed the city at 76/103.

7. Emphasis Areas

The project team identified four major emphasis areas for the city by utilizing the aforementioned analysis that included primary collision factors. The Strategic Highway Safety Plan (SHSP) addresses the “5 Es” of traffic safety: Engineering, Enforcement, Education, Emergency Response, and Emerging Technologies. Each emphasis area utilizes the 5 Es addressed by SHSP, the following emphasis areas are discussed and analyzed in this section.

1. High Collision Intersections
2. High Collision Roadway Segments
3. Rear End Collisions Due to Unsafe Speeds
4. Broadside Collisions Due to Improper Turning or Automobile Right-of-Way

7.1 High Collision Intersections

The most prominent emphasis area is high collision intersections since most of the collisions in the City of Signal Hill occurred on intersections. Each intersection has its own unique geometry therefore, an analysis of each of the prominent fifteen (15) intersections in the City of Signal Hill was concluded to understand the factors leading to collisions.

Education

- Conduct public information and education campaign for safety laws regarding a safe approach to an intersection.
- Raise awareness of the necessity of abiding by the traffic safety laws.

Engineering

- Identify and rank high collision intersections within the City every two to three years. Consider information obtained from public input and feedback regarding unreported collisions to supplement crash data.
- Evaluate the primary factors leading to collisions at high collision roadway segments.
- Develop and implement countermeasures to tackle those factors.
- Assess and report collision patterns before and after implementation of countermeasures and adjust as necessary.
- Maintain roadway signing and striping.
- Consider improving night time lighting.

Enforcement

- Prioritize patrol patterns at high-risk intersections to monitor traffic law violations which include right of way violations, traffic signals and signs, unsafe speed, and DUI.
- When laws are enforced and awareness of abiding by traffic safety laws is raised, intersection collisions will reduce abundantly.

Emergency Medical Services

- Consider targeted training for responding to specific high collision intersections and immediate treatment of predominant injuries at those locations.

Emerging Technologies

- Develop new methods to integrate multisource transportation data for developing different measurements of traffic safety for road users and identify safety issues associated with emerging electrical and automated vehicles.

7.2 High Collision Roadway Segments

Applying safety improvements to high collision roadway segments is also a necessity. Each roadway segment has its own unique geometry therefore, an analysis of each of the prominent ten (10) roadway segments in the City of Signal Hill was concluded to understand the factors leading to collisions that occurred.

Education

- Conduct public information and education campaign for safety laws regarding safe speed, improper turning, unsafe lane change, and driving on the wrong side of the road
- Raise awareness of the necessity of abiding by the traffic safety laws.

Source: Beverly Samperio, The Arrow

Engineering

- Identify and rank high collision roadway segments within the City every two to three years. Consider information obtained from public input and feedback regarding unreported collisions to supplement crash data.
- Evaluate the primary factors leading to collisions at high collision roadway segments.
- Develop and implement countermeasures to tackle those factors.
- Assess and report collision patterns before and after implementation of countermeasures and adjust as necessary.
- Maintain roadway signing and striping.
- Consider improving night time lighting.

Enforcement

- Prioritize patrol patterns at high collision roadway segments to monitor traffic law violations which include unsafe speed and improper turning.
- When laws are enforced and awareness of abiding by traffic safety laws is raised, roadway segment collisions will reduce abundantly.

Emergency Medical Services

- Consider targeted training for responding to specific high collision roadway segments and immediate treatment of predominant injuries at those locations.

Emerging Technologies

- Develop new methods to integrate multisource transportation data for developing different measurements of traffic safety for road users and identify safety issues associated with emerging electrical and automated vehicles.

7.3 Broadside Collisions Due to Automobile Right-of-Way and Traffic Signals and Signs

Broadside collisions ranked the highest type of collisions with a total count of three hundred and eleven (311) collisions out of 728 total crashes (43%). Broadside collisions occurred due to the primary collision factor (PCF) of automobile right-of-way (118) and traffic signals and signs (127). Analysis was performed on these intersections that contained these specific traffic collisions.

Education

- Conduct public information and education campaign for safety laws regarding a proper turning
- Raise awareness of the necessity of abiding by the traffic safety laws to avoid broadside collisions that occur mostly due to improper turning by not give an automobile the right of way

Engineering

- Identify locations where broadside collisions due to automobile right-of-way and traffic signals and signs are occurring within the City every two to three years.
- Consider information obtained from public input and feedback regarding unreported collisions to supplement crash data.
- Develop and implement countermeasures to tackle broadside collisions due to automobile right-of-way and traffic signals and signs.
- Assess and report collision patterns before and after implementation of countermeasures and adjust as necessary.

Enforcement

- Prioritize patrol patterns at DUI and high-speed locations to monitor traffic law violations which include DUI not maintaining a safe speed while operating a vehicle.
- When laws are enforced and awareness of abiding by traffic safety laws and signs are raised, broadside collisions due to automobile right-of-way and traffic signals and signs will reduce.

Emergency Medical Services

- Consider targeted training for responding to high-speed locations and immediate treatment of predominant injuries at those locations.

Emerging Technologies

- Develop new methods to integrate multisource transportation data for developing different measurements of traffic safety for road users and identify safety issues associated with emerging electrical and automated vehicles.

7.4 Rear End Collisions Due to Unsafe Speeds

Rear End Collisions ranked the highest type of collision with a total count of two-hundred and thirty-two (232) collisions out of 728 total crashes (32%). Rear end collisions are due to primary collision factor (PCF) of unsafe speeds (145). Analysis was performed on high-collision intersections that have collisions.

Education

- Conduct public information and education campaign for safety laws regarding the undesired risks of drinking and driving and as well as maintaining a safe speed.
- Raise awareness of the necessity of not drinking while driving and maintaining a safe speed to avoid many undesired tragic events such as rear end collisions.

Engineering

- Identify locations where rear end collisions due to unsafe speeds are occurring within the city every two to three years.
- Consider information obtained from public input and feedback regarding unreported collisions to supplement crash data.
- Develop and implement countermeasures to tackle rear end collisions due to unsafe speeds.
- Assess and report collision patterns before and after implementation of countermeasures and adjust as necessary.
- Maintain roadway signing and striping.

Enforcement

- Prioritize patrol patterns at high collision intersections where rear end collisions due to unsafe speed are occurring mostly to monitor traffic law violations which include the failure of stopping and waiting for a safe gap to approach the road.
- When laws are enforced and awareness of abiding by traffic safety laws and signs are raised, rear end collisions due to unsafe speed will reduce abundantly.

Emergency Medical Services

- Consider targeted training for responding to high collision intersections where rear end collisions due to unsafe speeds are occurring mostly and immediate treatment of predominant injuries at those locations.

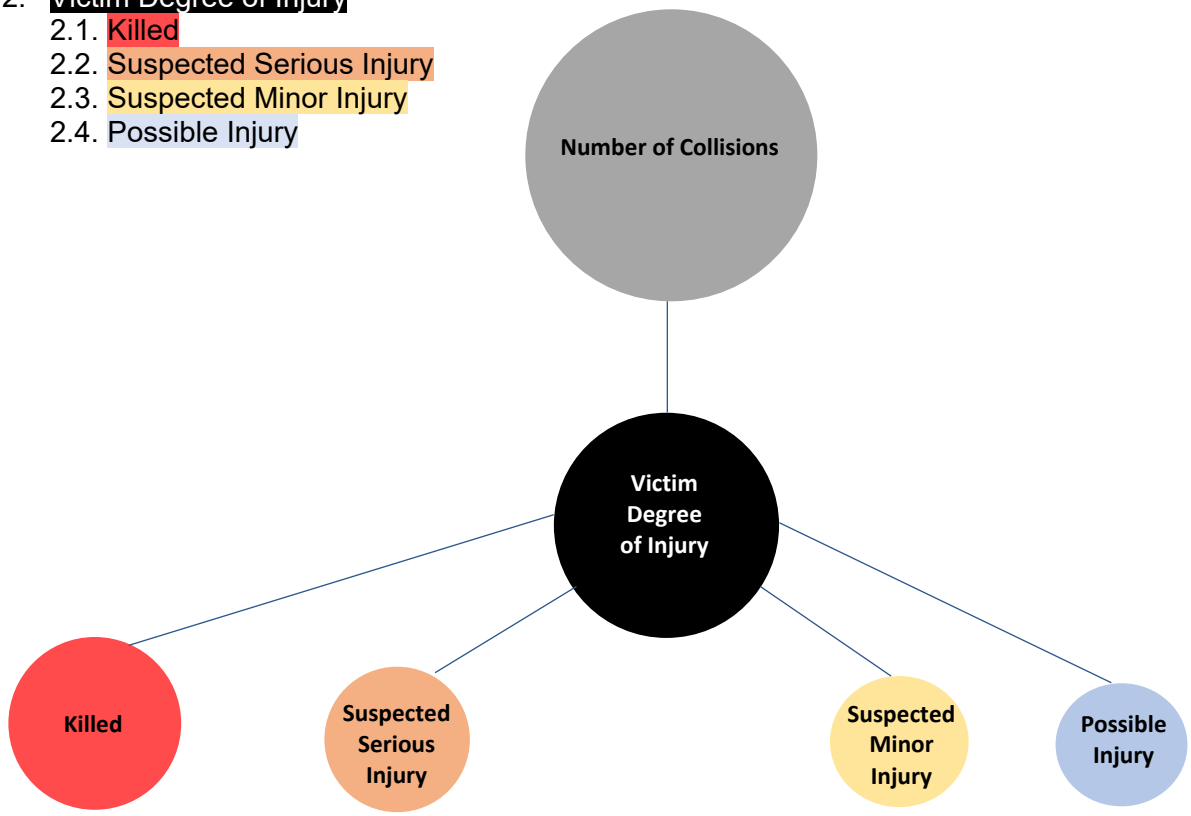
Emerging Technologies

- Develop new methods to integrate multisource transportation data for developing different measurements of traffic safety for road users and identify safety issues associated with emerging electrical and automated vehicles.

8. High Collision Locations Identification, Pattern Analysis, and Recommended Improvements

As part of the quantitative analysis, high collision intersections and roadway segments were identified and prioritized using the Crash Frequency methodology as described in the Local Roadway Safety Manual. Crash Frequency is defined as the number of crashes occurring within a determined study area. Minagar & Associates, Inc. took a further step and included the number of victims and their corresponding degree of injury for each intersection and roadway segment. As part of the qualitative analysis, Minagar & Associates, Inc. conducted a field assessment in the City of Signal Hill on November 18, 2022. The purpose of the field visit is to verify the characteristics and geometry of the existing intersection and roadway segment infrastructure and the viability of the recommended countermeasures. Conceptual plans were developed and updated with these safety countermeasures. For each of the identified high collision locations (intersections and roadway segments), prominent locations in the City were identified and ranked based on the following criteria:

1. Number of Collisions
2. Victim Degree of Injury
   - 2.1. Killed
   - 2.2. Suspected Serious Injury
   - 2.3. Suspected Minor Injury
   - 2.4. Possible Injury



Upon identifying and ranking prominent intersections and roadway segments, collisions were analyzed by identifying the Primary Collision Factor (PCF) that lead to the occurrence of each collision and the pattern. Upon completion of the analysis, recommendations were developed as safety mitigation measures to potentially mitigate similar collisions in the future. Countermeasures have been proposed in complaince with the California Manual on Uniform Traffic Control Devices. It is important to utilize Crash Modification Factor (CMF) when identifying potential systemic safety improvements. The CMF method is found in Part D of the American Association of State Highway and Transportation Officials (AASHTO) Highway Safety

Manual (HSM). CMFs are defined as the ratio of effectiveness of expected crashes with treatment in comparison to expected crashes without treatment. Furthermore, A CMF is a multiplicative factor used to determine the expected number of crashes after implementing the proposed countermeasures to ensure efficiency of utilizing and implementing the proposed countermeasures. Countermeasures with CMFs less than one are expected to reduce crashes. On the other hand, countermeasures with CMFs greater than one are expected to increase crashes. CMFs are calculated as follows:

$$CMF = \frac{\text{Expected Crashes WITH Treatment}}{\text{Expected Crashes WITHOUT Treatment}}$$

CMF < 1.0	Expected to reduce crashes
CMF = 1.0	Expected to have no impact on safety
CMF > 1.0	Expected to increase crashes

A Crash Reduction Factor (CRF) is similar and related to a CMF but stated in different terms. A CRF is defined as a percentage of crash reduction that might be expected after the implementation of a given countermeasure at a specific site. CRFs are calculated as follows:

$$CRF = (1 - CMF) \times 100$$

Appropriate CMFs shall be used with caution. CMFs should be selected from the HSM Part D, the LRSM, or from the FHWA CMF Clearinghouse website (http://www.cmfclearinghouse.org).

Table 4: City of Signal Hill Engineering Countermeasures Toolbox

LRSM No. [1]	Countermeasure Name	Crash Type			CMF [2]	CRF [3]	HSIP Funding Eligibility
		All	Night	Ped and Bike			
NS06	Install/upgrade larger or additional stop signs or other intersection warning/regulatory signs	X			0.85	15%	90%
NS07	Upgrade intersection pavement marking (NS.I.)	X			0.75	25%	90%
NS08	Install Flashing Beacons at Stop-Controlled Intersections	X			0.85	15%	90%
NS21PB	Install/upgrade pedestrian crossing at uncontrolled locations (with enhanced safety features)			X	0.65	35%	90%
R22	Install/upgrade signs with new fluorescent sheeting (regulatory or warning)	X			0.85	15%	90%
S02	Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number	X			0.85	15%	90%
S03	Improve signal timing (coordination, phases, red, yellow, or operation)	X			0.85	15%	50%
S07	Provide protected left turn phase (left turn lane already exists)	X			0.70	30%	90%
S09	Install raised pavement markers and striping (Through Intersection)	X			0.90	10%	90%
S18PB	Install Pedestrian Crossing (S.I.)			X	0.75	25%	90%

[1] Local Roadway Safety Manual Countermeasure Identification Number
- NS: Non-Signalized Intersection
- R: Roadway Segment
- S: Signalized Intersection

[2] Crash Modification Factor
[3] Crash Reduction Factor

8.1 High Collision Intersections

High collision intersections are critical intersections that require the most analytical focus since it is anticipated that many collisions will occur within a high collision intersection based on its crash history. Table 5 displays the fifteen (15) most prominent intersections in terms of number of collisions in the City of Signal Hill. Table 6 displays the fifteen (15) prominent intersections with their ranking methodology.

Table 5: List of High Collision Intersections

Intersection Identification Number*	Intersection Ranking Number**	Intersection	Control	Number of Collisions***
1	1	Spring St & Orange Ave	Signalized	36
2	2	Willow St & Orange Ave	Signalized	25
3	3	Willow St & Town Ctr	Signalized	24
4	4	Willow St & California Ave	Signalized	17
5	5	Willow St & Junipero Ave	Signalized	15
6	6	Hill St & Obispo Ave	Unsignalized	13
7	7	Spring St & Cherry Ave	Signalized	12
8	8	Burnett St/Skyline Dr & Cherry Ave	Signalized	12
9	9	Willow St & Temple Ave	Signalized	11
10	10	Willow St & Walnut Ave	Signalized	10
11	11	Route 1 & Redondo Ave	Signalized	10
12	12	Cherry Ave & 21st St	Signalized	10
13	13	Spring St & Walnut Ave	Signalized	10
14	14	Spring St & California Ave	Signalized	6
15	15	33rd St & California	Unsignalized	2

* Intersection Identification Number is an identification method utilized to avoid confusion with the Intersection Ranking Number.
** Intersection Ranking Number is based on the number of contiguous collisions within each intersection.
*** Total Number of Collisions during the 5-year period between January 1, 2017 and December 31, 2021.

Table 6: Intersection Number of Collisions and Ranking in the City of Signal Hill

Intersection Ranking Number*	Intersection	Number of Collisions**	Collision Severity			
			Killed	Severe Injury	Visible Injury	Complaint of Pain
1	Spring St & Orange Ave	36	1	2	18	15
2	Willow St & Orange Ave	25	0	1	9	15
3	Willow St & Town Ctr	24	1	1	9	13
4	Willow St & California Ave	17	0	0	7	10
5	Willow St & Junipero Ave	15	0	0	8	7
6	Hill St & Obispo Ave	13	0	0	3	10
7	Spring St & Cherry Ave	12	1	0	4	7
8	Burnett St/Skyline Dr & Cherry Ave	12	0	1	6	5
9	Willow St & Temple Ave	11	0	2	3	6
10	Willow St & Walnut Ave	10	1	0	5	4
11	Route 1 & Redondo Ave	10	0	1	1	8
12	Cherry Ave & 21st St	10	0	0	3	7
13	Spring St & Walnut Ave	10	0	0	3	7
14	Spring St & California Ave	6	0	1	2	3
15	33rd St & California Ave	2	0	0	0	2

* Intersection Ranking Number is based on the number of contiguous collisions within each intersection.
** Total Number of Collisions during the 5-year period between January 1, 2017 and December 31, 2021.

8.1.1 Intersection 1: Spring St & Orange Ave

Table 7: Intersection 1 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
19	Traffic Signals & Signs
15	Automobile Right of Way
1	Unsafe Speeds
1	Unknown
Total 36	

High Collision Recommendations:

1. N/A, due to Spring St & Orange Ave ongoing project.

8.1.2 Intersection 2: Willow St & Orange Ave

Table 8: Intersection 2 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
15	Traffic Signals & Signs
3	Unknown
2	Automobile Right of Way
2	Pedestrian Violation
1	Improper Passing
1	Following too Closely
1	Driving or Bicycling Under the Influence of Alcohol or Drug
Total 25	

High Collision Recommendations:

1. Repaint Intersection Pavement Arrow Marking
2. Repaint Intersection Pavement Word Marking
3. Upgrade Intersection Crosswalk Striping
4. Install/Upgrade with 12" Signal Lenses and Install/Upgrade with Retroreflective Borders
5. Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)
6. Install [R3-8b] Sign
7. Install [W3-3] Sign
8. Install [R4-7] & [N-1 (CA)] Sign

8.1.3 Intersection 3: Willow St & Town Ctr

Table 9: Intersection 3 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
11	Automobile Right of Way
10	Traffic Signals & Signs
2	Unknown
1	Wrong Side of Road
Total 24	

High Collision Recommendations:

1. Install/Repaint Traffic Striping
2. Install/Upgrade with Retroreflective Borders
3. Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)
4. Install [W3-3] Sign
5. Install [R2-1] (40) Sign
6. Install [R4-7] & [N-1 (CA)] Sign

8.1.4 Intersection 4: Willow St & California Ave

Table 10: Intersection 4 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
8	Traffic Signals & Signs
3	Unknown
2	Automobile Right of Way
2	Improper Turning
1	Pedestrian Violation
1	Driving or Bicycling Under the Influence of Alcohol or Drug
Total 17	

High Collision Recommendations:

1. Install/Repaint Traffic Striping
2. Install Protected Left Turn Phase (Left Turn Lane Already Exists)
3. Install Type 19-4-100 Pole and Case 4 Mast Arm
4. Install/Upgrade with 12" Signal Lenses and Retroreflective Borders
5. Install [W3-3] Sign
6. Install [R4-7] & [N-1 (CA)] Sign

8.1.5 Intersection 5: Willow St & Junipero Ave

Table 11: Intersection 5 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
8	Traffic Signals & Signs
2	Unknown
2	Automobile Right of Way
1	Pedestrian Right of Way
1	Unsafe Speed
1	Not Stated
Total 15	

High Collision Recommendations:

1. Install/Repaint Traffic Striping
2. Install/Upgrade with 12" Signal Lenses and Install/Upgrade with Retroreflective Borders
3. Install [W3-3] Sign
4. Install Type IV (L) Pavement Arrow Marking
5. Install [R10-12] Sign
6. Install [R2-1] (40) Sign
7. Install [R4-7] & [N-1 (CA)] Sign
8. Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)

8.1.6 Intersection 6: Hill St & Obispo Ave

Table 12: Intersection 6 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
6	Traffic Signals & Signs
3	Automobile Right of Way
2	Unknown
1	Pedestrian Right of Way
1	Driving or Bicycling Under the Influence of Alcohol or Drug
Total 13	

High Collision Recommendations:

1. Repaint Pedestrian Crosswalk
2. Install Type IV (L) Pavement Arrow Marking
3. Install (R1-3P) Sign

8.1.7 Intersection 7: Spring St & Cherry Ave

Table 13: Intersection 7 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
7	Traffic Signals & Signs
2	Driving or Bicycling Under the Influence of Alcohol or Drug
2	Unknown
1	Improper Turning
Total 12	

High Collision Recommendations:

1. Install [R4-7] & [N-1 (CA)] Sign
2. Repaint Intersection Striping
3. Install Type IV (L) Pavement Arrow Marking
4. Install/Upgrade with 12" Signal Lenses and Install/Upgrade with Retroreflective Borders
5. Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)

8.1.8 Intersection 8: Burnett St/Skyline Dr & Cherry Ave

Table 14: Intersection 8 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
4	Automobile Right of Way
4	Unknown
2	Traffic Signals & Signs
1	Pedestrian Right of Way
1	Other than Driver (or Pedestrian)
Total 12	

High Collision Recommendations:

1. Repaint Intersection Crosswalk
2. Install/Upgrade with 12" Signal Lenses and Install/Upgrade with Retroreflective Borders
3. Install [SW4-1 (CA)] & [W3-3] Sign
4. Install [W3-3] Sign
5. Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)
6. Install [R4-7] & [N-1 (CA)] Sign

8.1.9 Intersection 9: Willow St & Temple Ave

Table 15: Intersection 9 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
5	Automobile Right of Way
4	Traffic Signals & Signs
2	Unknown
Total 11	

High Collision Recommendations:

1. Install Protected Left Turn Phase (Left Turn Lane Already Exists)
2. Install Type 19-4-100 Pole and Case 4 Mast Arm
3. Install/Upgrade with 12" Signal Lenses and Retroreflective Borders
4. Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)
5. Install R73-3 (CA) Sign

8.1.10 Intersection 10: Willow St & Walnut Ave

Table 16: Intersection 10 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
4	Traffic Signals & Signs
4	Automobile Right of Way
2	Unknown
Total 10	

High Collision Recommendations:

1. Repaint Intersection Crosswalk
2. Install Protected Left Turn Phase (Left Turn Lane Already Exists)
3. Install Type 19-4-100 Pole and Case 4 Mast Arm
4. Install/Upgrade with 12" Signal Lenses and Retroreflective Borders
5. Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)
6. Replace/Upgrade with R73-3 (CA) Sign
7. Install [R4-7] & [N-1 (CA)] Sign
8. Install W3-3 Sign
9. Install R73-2 (CA) Sign

8.1.11 Intersection 11: PCH Route 1 & Redondo Ave

Table 17: Intersection 11 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
5	Automobile Right of Way
3	Traffic Signals & Signs
2	Unknown
Total 10	

High Collision Recommendations:

1. Upgrade Intersection Crosswalk Striping (Ladder)
2. Improve Signal Hardware: Back-plates with Retroreflective Borders
3. Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)
4. Install Type IV (L) Pavement Arrow Marking
5. Install Type IV (R) Pavement Arrow Marking

8.1.12 Intersection 12: Cherry Ave & 21st St

Table 18: Intersection 12 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
3	Unknown
2	Automobile Right of Way
2	Driving or Bicycling Under the Influence of Alcohol or Drug
1	Unsafe Speed
1	Traffic Signals & Signs
1	Pedestrian Right of Way
Total 10	

High Collision Recommendations:

1. Upgrade Intersection Crosswalk Striping (Ladder)
2. Install/Upgrade with 12" Signal Lenses and Install/Upgrade with Retroreflective Borders
3. Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)

8.1.13 Intersection 13: Spring St & Walnut Ave

Table 19: Intersection 13 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
6	Traffic Signals & Signs
4	Automobile Right of Way
Total 10	

High Collision Recommendations:

1. Install Protected Left Turn Phase (Left Turn Lane Already Exists)
2. Install Type 19-4-100 Pole and Case 4 Mast Arm
3. Install/Upgrade with 12" Signal Lenses and Retroreflective Borders
4. Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)
5. Install R73-2 (CA) Sign
6. Install R10-12 Sign

8.1.14 Intersection 14: Spring St & California Ave

Table 20: Intersection 14 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
3	Traffic Signals & Signs
2	Automobile Right of Way
1	Unsafe Speed
Total 6	

High Collision Recommendations:

1. Install Protected Left Turn Phase (Left Turn Lane Already Exists)
2. Install Type 19-4-100 Pole and Case 4 Mast Arm
3. Install/Upgrade with Retroreflective Borders
4. Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)
5. Install R73-2 (CA) Sign
6. Replace R3-4 Sign with Fluorescent Sheeting

8.1.15 Intersection 15: 33rd St & California Ave

Table 21: Intersection 15 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions		Primary Collision Factor
2		Traffic Signals & Signs
Total	2	

High Collision Recommendations:

1. Install LED Flashing Stop Sign
2. Install R1-3P Sign

8.2 High Collision Roadway Segments

High collision roadway segments are critical segments that require focus since it is anticipated that collisions will occur within a high collision roadway segment based on its crash history. Table 22 displays the ten (10) most prominent roadway segments in the City of Signal Hill. Table 23 displays the ten (10) prominent roadway segments with their ranking methodology.

Table 22: List of High Collision Roadway Segments

Roadway Segment Identification Number*	Roadway Segment Ranking Number**	Roadway Segment	Number of Collisions***
1	1	Orange Ave (Willow St to 25th St)	18
2	2	Orange Ave (28th St to Willow St)	16
3	3	Orange Ave (Nevada St to 25th St)	10
4	4	Cherry Ave (27th St to 28th St)	10
5	5	Willow St (Orange Ave to Gundry Ave)	9
6	6	Cherry Ave (Crescent Heights St to Burnett St)	9
7	6	Cherry Ave (21st St to 20th St)	8
8	8	Willow St (Junipero Ave to Signal Pkwy)	7
9	9	Orange Ave (Burnett St to 23rd St)	7
10	10	Cherry Ave (Willow St to Crescent Heights St)	7

* Roadway Segment Identification Number is merely an identification method utilized to avoid confusion with the Roadway Segment Ranking Number.
** Roadway Segment Ranking Number is based on the number of collisions that occurred on a roadway segment.
*** Total Number of Collisions during the 5-year period between January 1, 2017 and December 31, 2021.

Table 23: Roadway Segment Number of Collisions and Ranking in the City of Signal Hill

Roadway Segment Ranking Number*	Roadway Segment	Number of Collisions**	Collision Severity			
			Killed	Severe Injury	Visible Injury	Complaint of Pain
1	Orange Ave (Willow St to 25th St)	18	0	0	4	14
2	Orange Ave (28th St to Willow St)	16	0	0	7	9
3	Orange Ave (Nevada St to 25th St)	10	0	1	1	8
4	Cherry Ave (27th St to 28th St)	10	0	0	3	7
5	Willow St (Orange Ave to Gundry Ave)	9	0	1	3	5
6	Cherry Ave (Crescent Heights St to Burnett St)	9	0	0	2	7
7	Cherry Ave (21st St to 20th St)	8	0	0	3	5
8	Willow St (Junipero Ave to Signal Pkwy)	7	0	1	3	3
9	Orange Ave (Burnett St to 23rd St)	7	0	0	3	4
10	Cherry Ave (Willow St to Crescent Heights St)	7	0	0	2	5

* Roadway Segment Ranking Number is based on the number of collisions that occurred on a roadway segment.
** Total Number of Collisions during the 5-year period between January 1, 2017 and December 31, 2021.

8.2.1 Roadway Segment 1: Orange Ave (Willow St to 25th St)

Table 24: Roadway Segment 1 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
8	Unsafe Speed
4	Unknown
3	Driving or Bicycling Under the Influence of Alcohol or Drug
2	Other Improper Driving
1	Unsafe Starting or Backing
Total 18	

Pattern: Motorists did not maintain proper safe speeds when making turns and have been driving under the influence.

High Collision Recommendations:

1. Install Pavement Word Marking and Lines
2. Install [R10-7] Sign
3. Install [W3-3] Sign
4. Install [W3-4] Sign

8.2.2 Roadway Segment 2: Orange Ave (28th St to Willow St)

Table 25: Roadway Segment 2 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
10	Unsafe Speed
2	Improper Turning
1	Driving or Bicycling Under the Influence of Alcohol or Drug
1	Automobile Right of Way
1	Improper Passing
1	Unknown
Total 16	

Pattern: Motorists are not maintaining proper safe speeds or turning improperly.

High Collision Recommendations:

1. Repaint Pavement Arrow Marking
2. Install [SW4-1 (CA)] Sign
3. Install [W1-7] & [N-1 (CA)] Sign

8.2.3 Roadway Segment 3: Orange Ave (Nevada St to 25th St)

Table 26: Roadway Segment 3 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
5	Unsafe Speed
4	Following Too Closely
1	Automobile Right of Way
Total 10	

Pattern: Motorists did not maintain proper safe speeds and are following too closely.

High Collision Recommendations:

1. Repaint Pavement Arrow Marking
2. Install [W1-7] & [N-1 (CA)] Sign
3. Install [R2-1] (40) Sign

8.2.4 Roadway Segment 4: Cherry Ave (27th St to 28th St)

Table 27: Roadway Segment 4 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
5	Unsafe Speed
2	Unknown
1	Other Hazardous Violation
1	Automobile Right of Way
1	Improper Turning
Total 10	

Pattern: Motorists did not maintain proper safe speeds.

High Collision Recommendations:

1. Install [W2-1] Sign
2. Install [R2-1] (40) Sign
3. Install [W3-3] Sign

8.2.5 Roadway Segment 5: Willow St (Orange Ave to Gundry Ave)

Table 28: Roadway Segment 5 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
5	Unsafe Speed
1	Other than Driver (or Pedestrian)
1	Traffic Signals & Signs
1	Following Too Closely
1	Unknown
Total 9	

Pattern: Motorists did not maintain proper safe speeds.

High Collision Recommendations:

1. Install [R2-1] (40) Sign
2. Install [W2-2L] Sign
3. Install [W2-2R] Sign
4. Install [W1-7] & [N-1 (CA)] Sign
5. Install Pavement Word Marking

8.2.6 Roadway Segment 6: Cherry Ave (Crescent Heights St to Burnett St)

Table 29: Roadway Segment 6 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
4	Automobile Right of Way
3	Unsafe Speed
1	Following Too Closely
1	Pedestrian Violation
Total 9	

Pattern: Motorists are not yielding properly to vehicles and are driving at unsafe speeds.

High Collision Recommendations:

1. Install [R2-1] (40) Sign
2. Install [W3-3] Sign
3. Install [R4-7] & [N-1 (CA)] Sign

8.2.7 Roadway Segment 7: Cherry Ave (21st St to 20th St)

Table 30: Roadway Segment 7 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
3	Unsafe Speed
2	Driving or Bicycling Under the Influence of Alcohol or Drug
1	Improper Turning
1	Following Too Closely
1	Unknown
Total 8	

Pattern: Motorists are driving at unsafe speeds and are under the influence..

High Collision Recommendations:

1. Install [W3-3] Sign
2. Install [R30A (CA)] Custom Sign
3. Install Pavement Word Marking

8.2.8 Roadway Segment 8: Willow St (Junipero Ave to Signal Pkwy)

Table 31: Roadway Segment 8 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
3	Unsafe Speed
1	Following Too Closely
1	Improper Turning
1	Pedestrian Right of Way
1	Other than Driving (or Pedestrian)
Total 7	

Pattern: This collision occurred as a result of speeding and not giving enough space between the vehicle in front.

High Collision Recommendations:

1. Install [R2-1] (40) Sign
2. Install [W3-3] Sign
3. Install [W2-2L] Sign
4. Install [W1-7] & [N-1 (CA)] Sign
5. Install [R4-7] & [N-1 (CA)] Sign
6. Install Pavement Word Marking

8.2.9 Roadway Segment 9: Orange Ave (Burnett St to 23rd St)

Table 32: Roadway Segment 9 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
2	Unsafe Speed
2	Unknown
1	Driving or Bicycling Under the Influence of Alcohol or Drug
1	Improper Turning
1	Unsafe Starting or Backing
Total 7	

Pattern: Motorists did not maintain proper safe speeds.

High Collision Recommendations:

1. Install [R2-1] (35) Sign
2. Install [W3-3] Sign
3. Install Pavement Word Marking

8.2.10 Roadway Segment 10: Cherry Ave (Willow St to Crescent Heights St)

Table 33: Roadway Segment 10 Number of Collisions and Corresponding Primary Collision Factor

Number of Collisions	Primary Collision Factor
2	Improper Turning
2	Unknown
1	Unsafe Speed
1	Unsafe Starting of Backing
1	Following Too Closely
Total 7	

Pattern: Motorists are turning improperly.

High Collision Recommendations:

1. Install [R2-1] (40) Sign
2. Install [W3-3] Sign
3. Install [R4-7] & [N-1] (CA) Sign

9. Collision Diagrams, Preliminary Conceptual Plans for Recommended Improvements at High Collision Intersections and High Collision Roadway Segments, Cost Estimates, and Benefit Cost Ratios

At each of the aforementioned high collision intersections and roadway segments, the collision patterns have been evaluated and countermeasures to those patterns have been developed through a preliminary conceptual plan and the preliminary cost of those measures has been estimated. This section of this report summarizes those results.

This Local Safety Plan is funded through a Highway Safety Improvement Program (HSIP) grant from the California Department of Transportation (Caltrans). HSIP grant funding is prioritized and awarded based on the grant funding's economic effectiveness, which is established by a benefit to cost ratio. Under the current HSIP Cycle 11 call for projects, the minimum Benefit to Cost Ratio is 3.5. A summary of the benefit to cost ratios is provided in this section. Project cost estimates are calculated on a line-item basis using the Caltrans Contract Cost Database. In some cases, recent construction bids and benefit values are calculated based on Caltrans established countermeasure values. A summation of the total construction cost of all intersections and road segments are displayed at the end of the report.

Depending on the City’s priorities, it is highly recommended that multiple projects as provided below are grouped into one HSIP application to maximize potential funding allocations.

9.1 High Collision Intersections

9.1.1 Intersection 1: Spring St & Orange Ave

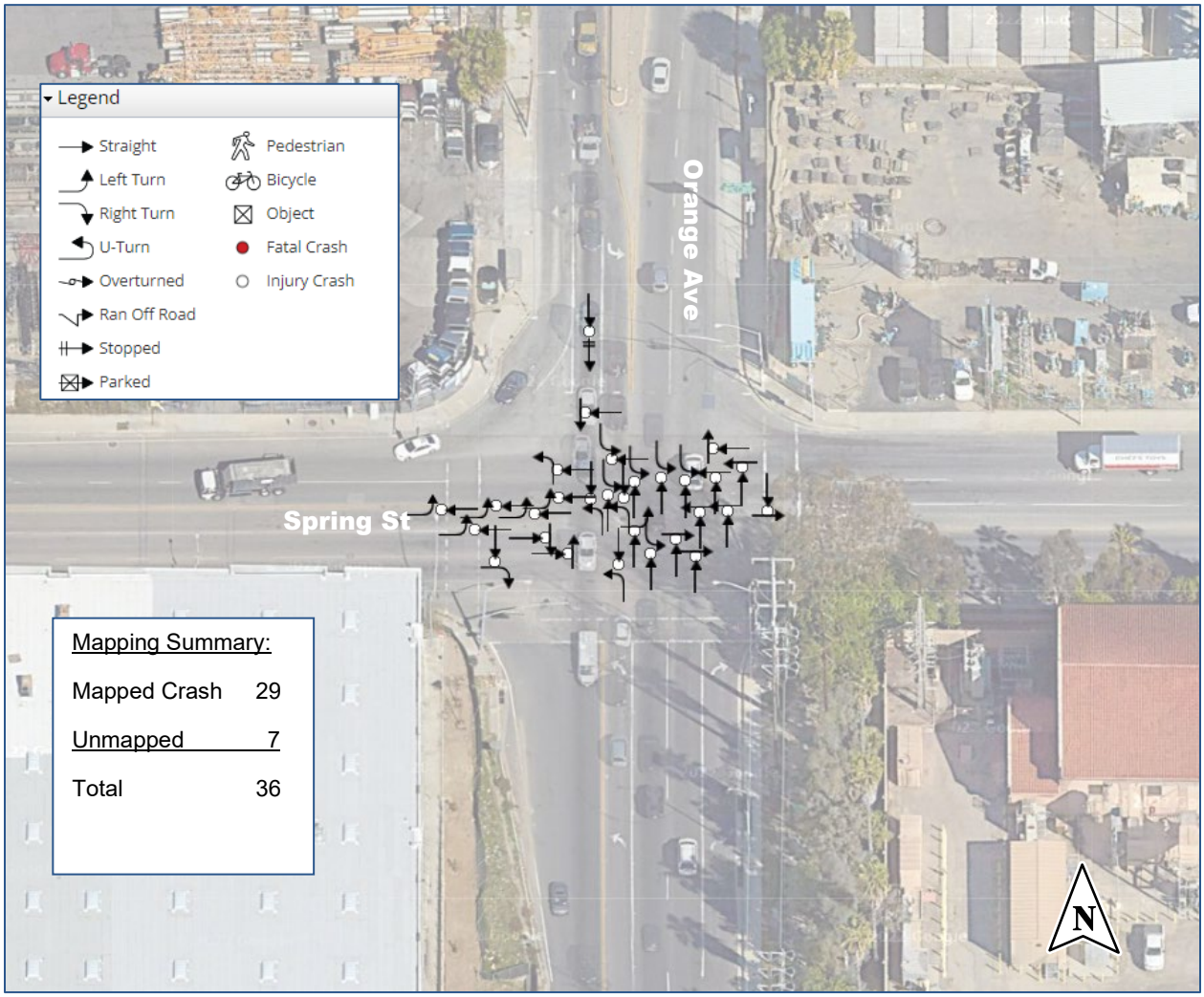


Figure 25: Intersection 1 Crash Diagram- 36 Collisions
(January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions

9.1.1.1 Intersection 1 Cost Estimate and Cost/Benefit Analysis

Due to the City's ongoing improvement project on the Spring St and Orange Ave Intersection, the recommended safety countermeasures and benefit-cost-analysis will not be applied to this intersection.

Improvements that will be made to this intersection includes providing traffic striping, object markers, and/or traffic signs to control merging of southbound through traffic on Orange Avenue. Traffic signal improvements include 8" traffic signal indications upgrading to 12" LED units, vehicular detection to be installed on all approaches to the signalized intersection. Pedestrian indications shall be upgraded to LED countdown modules with all pedestrian crossings. Pedestrian push buttons shall be upgraded to the most current standard and signalized intersections will require the installation of Emergency Vehicle Pre-Emption (EVPE) equipment. The traffic signal controller will be upgraded to a new traffic signal controller. Existing crosswalks of the intersection will be upgraded to continental style crosswalks. An addition of protected turn lanes from and onto Orange Avenue at the intersection with Spring Street will be added. Construction of turn lane protection medians on Orange Avenue and bicycle lane striping and signage to include road markings will be provided.

Figure 26: Spring St & Orange Ave Improvement Project
(Source: field inspection as of November 18, 2022)

9.1.2 Intersection 2: Willow St & Orange Ave

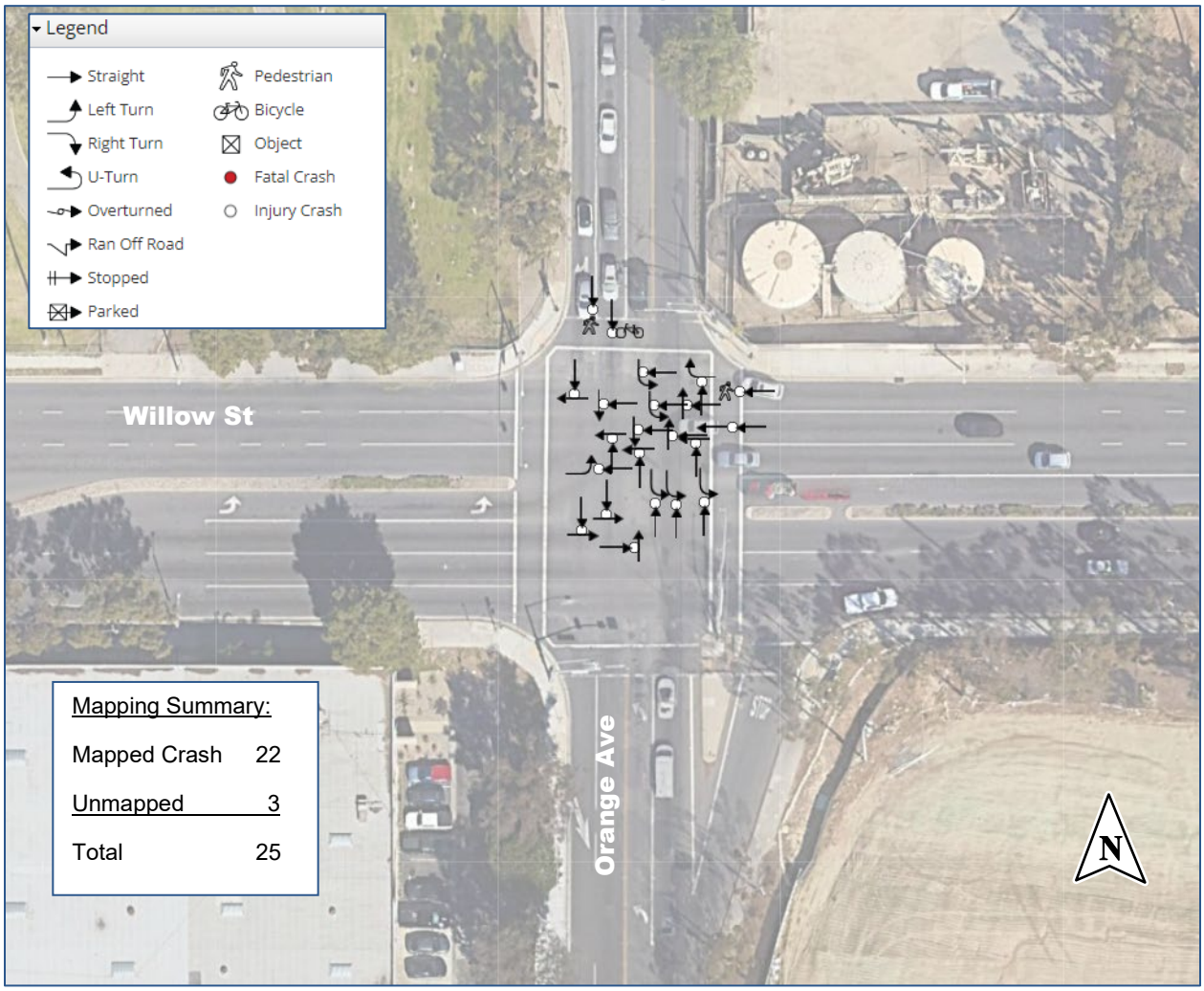
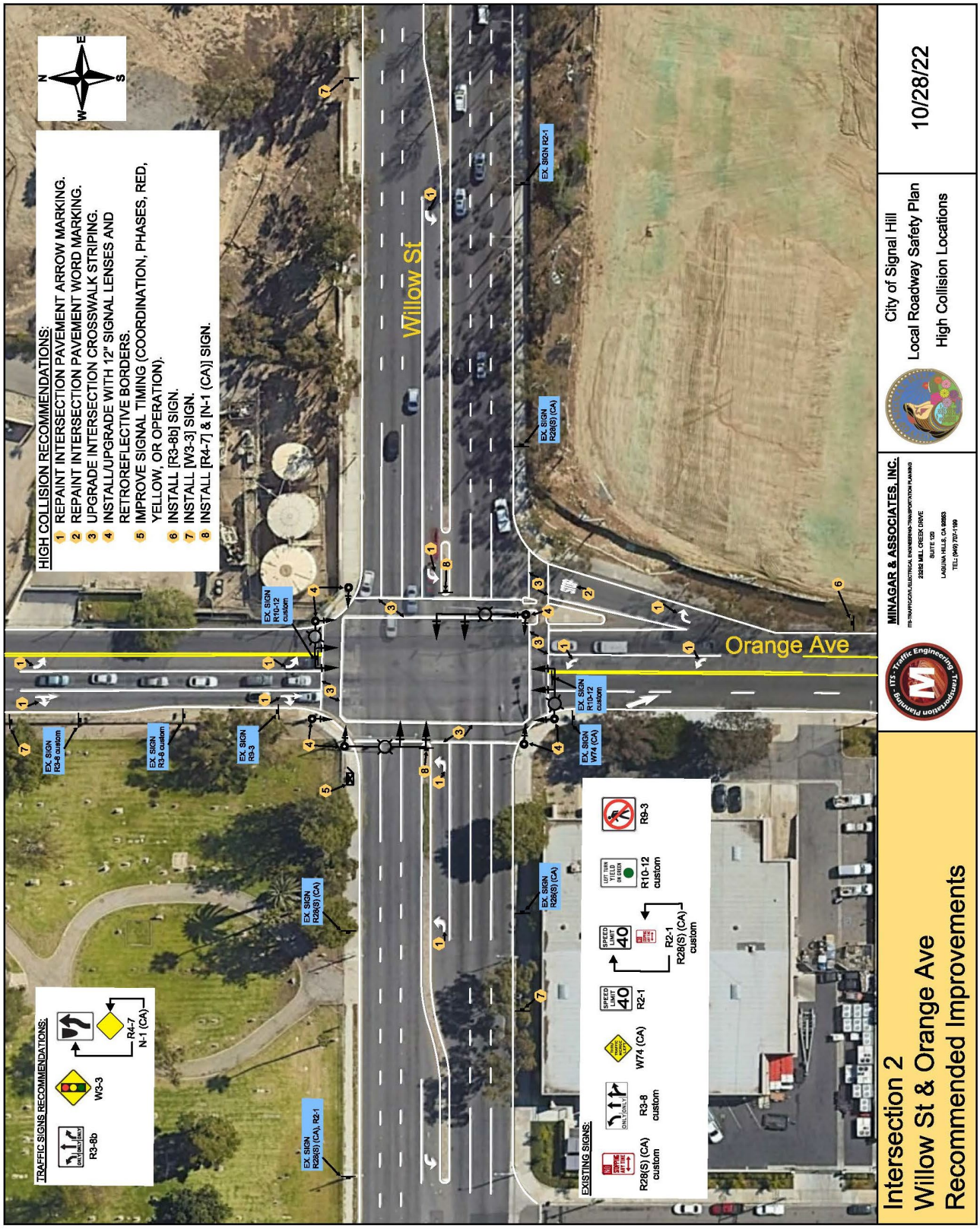


Figure 27: Intersection 2 Crash Diagram- 25 Collisions
(January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions

The intersection of Willow St and Orange Ave is part of a development plan of the City. It is currently only under the preliminary design phase; however, Minagar & Associates, Inc. have provided countermeasures and cost estimates independent from the preliminary design phase.


HIGH COLLISION RECOMMENDATIONS:
1 REPAINT INTERSECTION PAVEMENT ARROW MARKING.
2 REPAINT INTERSECTION PAVEMENT WORD MARKING.
3 UPGRADE INTERSECTION CROSSWALK STRIPING.
4 INSTALL/UPGRADE WITH 12" SIGNAL LENSES AND RETROREFLECTIVE BORDERS.
5 IMPROVE SIGNAL TIMING (COORDINATION, PHASES, RED, YELLOW, OR OPERATION).
6 INSTALL [R3-8b] SIGN.
7 INSTALL [W3-3] SIGN.
8 INSTALL [R4-7] & [N-1 (CA)] SIGN.
TRAFFIC SIGNS RECOMMENDATIONS:
R3-8b
W3-3
R4-7
N-1 (CA)
EXISTING SIGNS:
R28(S) (CA) custom
R3-8 custom
W74 (CA)
R2-1
R10-12 custom
R2-1
R28(S) (CA) custom
R9-3
Willow St
Orange Ave
EX. SIGN R3-8 custom
EX. SIGN R3-8 custom
EX. SIGN R9-3
EX. SIGN R10-12 custom
EX. SIGN R10-12 custom
EX. SIGN W74 (CA)
EX. SIGN R28(S) (CA)
EX. SIGN R28(S) (CA)
EX. SIGN R28(S) (CA)
EX. SIGN R28(S) (CA), R2-1
EX. SIGN R2-1
Intersection 2
Willow St & Orange Ave
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
ITS · Traffic Engineering · Transportation Planning
ITS-TRANSPORTATION, ELECTRICAL ENGINEERING-TRANSPORTATION PLANNING
23282 MILL CREEK DRIVE
SUITE 120
LAGUNA HILLS, CA 92653
TEL: (949) 707-1199
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
10/28/22

9.1.2.1 Intersection 2 Cost Estimate and Cost/Benefit Analysis

Construction Cost Estimate:

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Table 34: Intersection 2 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility			
						LRSM CM No. (S18PB)*	LRSM CM No. (S02)*	LRSM CM No. (S03)*	OS**
1	Install Intersection Pavement Arrow Marking	SQFT	189	$ 14.00	$ 2,646.00				0%
2	Install Intersection Pavement Word Marking	SQFT	22	$ 14.00	$ 308.00				0%
3	Upgrade Intersection Crosswalk Striping	LF	666	$ 3.50	$ 2,331.00	90%			
4	Install/Upgrade with 12" Signal Lenses	EA	2	$ 800.00	$ 1,600.00		90%		
	Install/Upgrade with Retroreflective Borders	EA	16	$ 110.00	$ 1,760.00				
5	Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)	LS	1	$ 50,000.00	$ 50,000.00			50%	
6	Install [R3-8b] Sign	EA	1	$ 575.00	$ 575.00				0%
7	Install [W3-3] Sign	EA	3	$ 575.00	$ 1,725.00				0%
8	Install [R4-7] & [N-1 (CA)] Sign	EA	2	$ 1,150.00	$ 2,300.00				0%
				Total	$ 63,245.00				
				Weighted Percentage (%)	100%	3.7%	5.3%	79.1%	11.9%

* Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)
**OS: Other Safety-Related Improvements

Total Construction Cost:	$	63,245.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 12,649.00
Total Construction Cost (Including Contingencies):	$	75,894.00

Total Cost and Benefit:

The project's total cost is estimated at $75,894 which does not include the design and engineering costs. The estimated benefit of these improvements is $3,690,503 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 48.63.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 48.63, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$3,680,987
Travel Time	$8,471
Vehicle Operating Cost	$880
Emissions	$165
Total Benefits	**$3,690,503**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$75,894
Present Value Benefits ($ Dollars)	$3,690,503
Net Present Value ($ Dollars)	$3,614,609
Benefit / Cost Ratio	48.63

9.1.3 Intersection 3: Willow St & Town Ctr

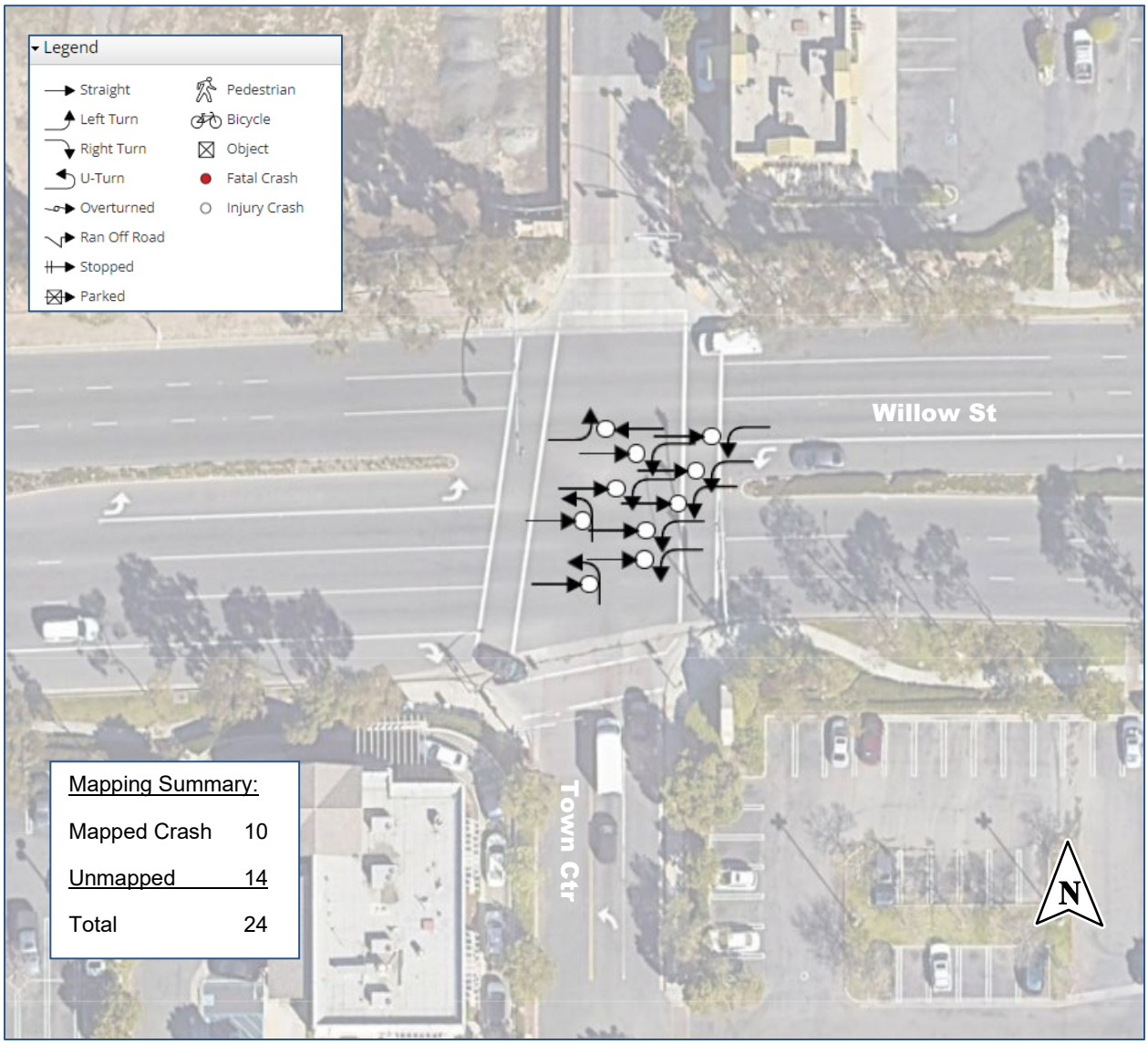


Figure 28: Intersection 3 Crash Diagram- 24 Collisions
(January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 RESTRIPE INTERSECTION TRAFFIC STRIPING.
2 INSTALL/UPGRADE WITH RETROREFLECTIVE BORDERS.
3 IMPROVE SIGNAL TIMING (COORDINATION, PHASES, RED, YELLOW, OR OPERATION).
4 INSTALL [W3-3] SIGN.
5 INSTALL [R2-1] (40) SIGN.
6 INSTALL [R4-7] & [N-1 (CA)] SIGN.
TRAFFIC SIGNS RECOMMENDATIONS:
R4-7 N-1 (CA)
W3-3
W3-3 R28(S) (CA) custom
R2-1
R2-1 R28(S) (CA) custom
EXISTING SIGNS:
R28(S) (CA) custom
R100B (CA)
R10-12
EX. SIGN R28(S) (CA) custom
EX. SIGN R100B (CA)
EX. SIGN R10-12
Willow St
Town Ctr
Intersection 3
Willow St & Town Ctr
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
ITS - Traffic Engineering Transportation Planning
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
10/31/22

9.1.3.1 Intersection 3 Cost Estimate and Cost/Benefit Analysis

Construction Cost Estimate:

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Table 35: Intersection 3 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility			
						LRSM CM No. (S09)*	LRSM CM No. (S02)*	LRSM CM No. (S03)*	OS**
1	Install/Repaint Traffic Striping	LF	521	$ 3.50	$ 1,823.50	90%			
2	Install/Upgrade with Retroreflective Borders	EA	16	$ 110.00	$ 1,760.00		90%		
3	Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)	LS	1	$ 50,000.00	$ 50,000.00			50%	
4	Install [W3-3] Sign	EA	2	$ 575.00	$ 1,150.00				0%
5	Install [R2-1] (40) Sign	EA	2	$ 575.00	$ 1,150.00				0%
6	Install [R4-7] & [N-1 (CA)] Sign	EA	2	$ 1,150.00	$ 2,300.00				0%
				Total	$ 58,183.50				
				Weighted Percentage (%)	100%	3.1%	3.0%	85.9%	7.9%

* Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)
**OS: Other Safety-Related Improvements

Total Construction Cost:	$	58,183.50
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 11,636.70
Total Construction Cost (Including Contingencies):	$	69,820.20

Total Cost and Benefit:

The project's total cost is estimated at $69,820 which does not include the design and engineering costs. The estimated benefit of these improvements is $9,319,783 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 133.48.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 133.48, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$9,310,260
Travel Time	$8,789
Vehicle Operating Cost	$632
Emissions	$102
Total Benefits	**$9,319,783**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$69,820
Present Value Benefits ($ Dollars)	$9,319,783
Net Present Value ($ Dollars)	$9,249,963
Benefit / Cost Ratio	133.48

9.1.4 Intersection 4: Willow St & California Ave

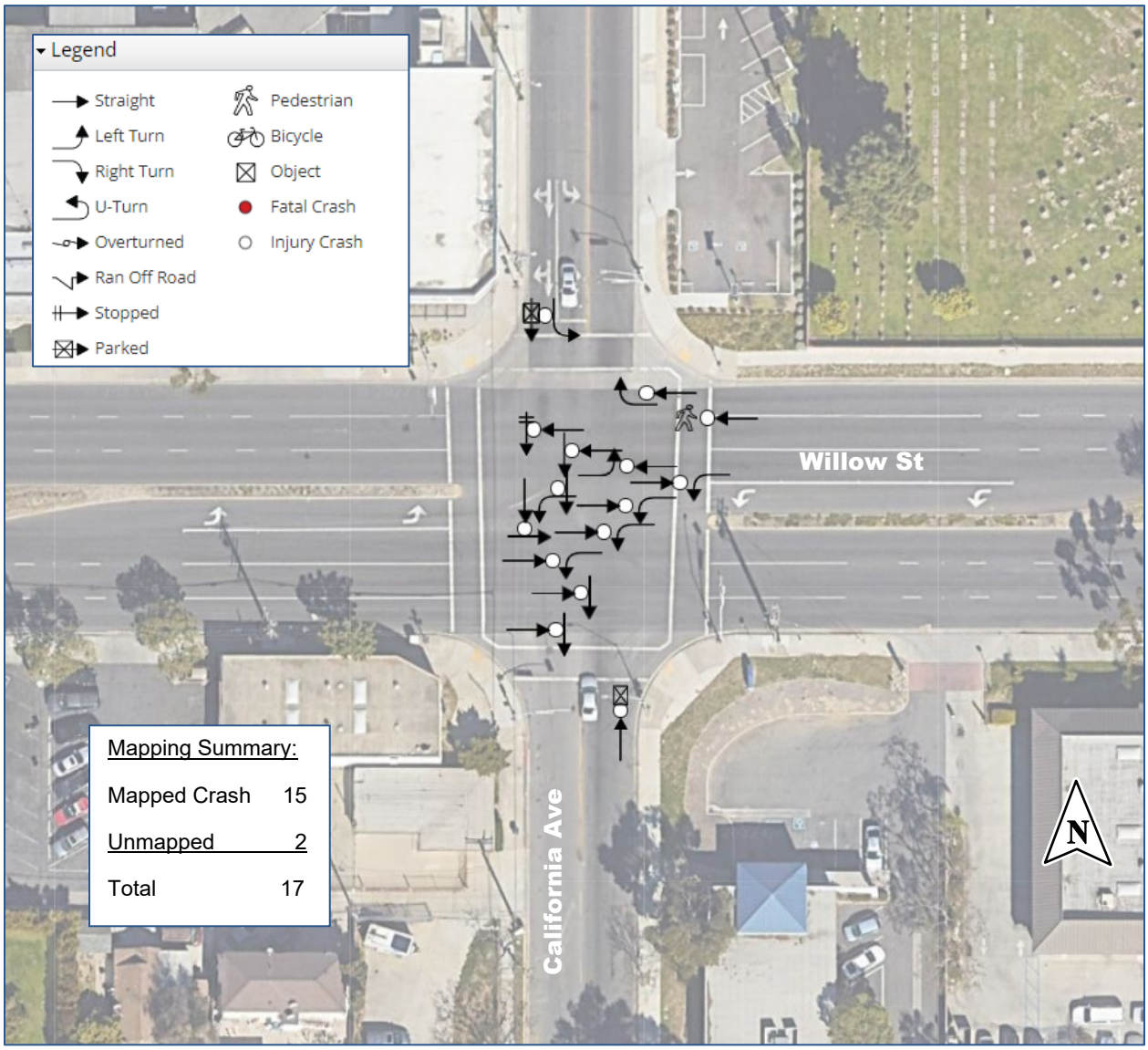
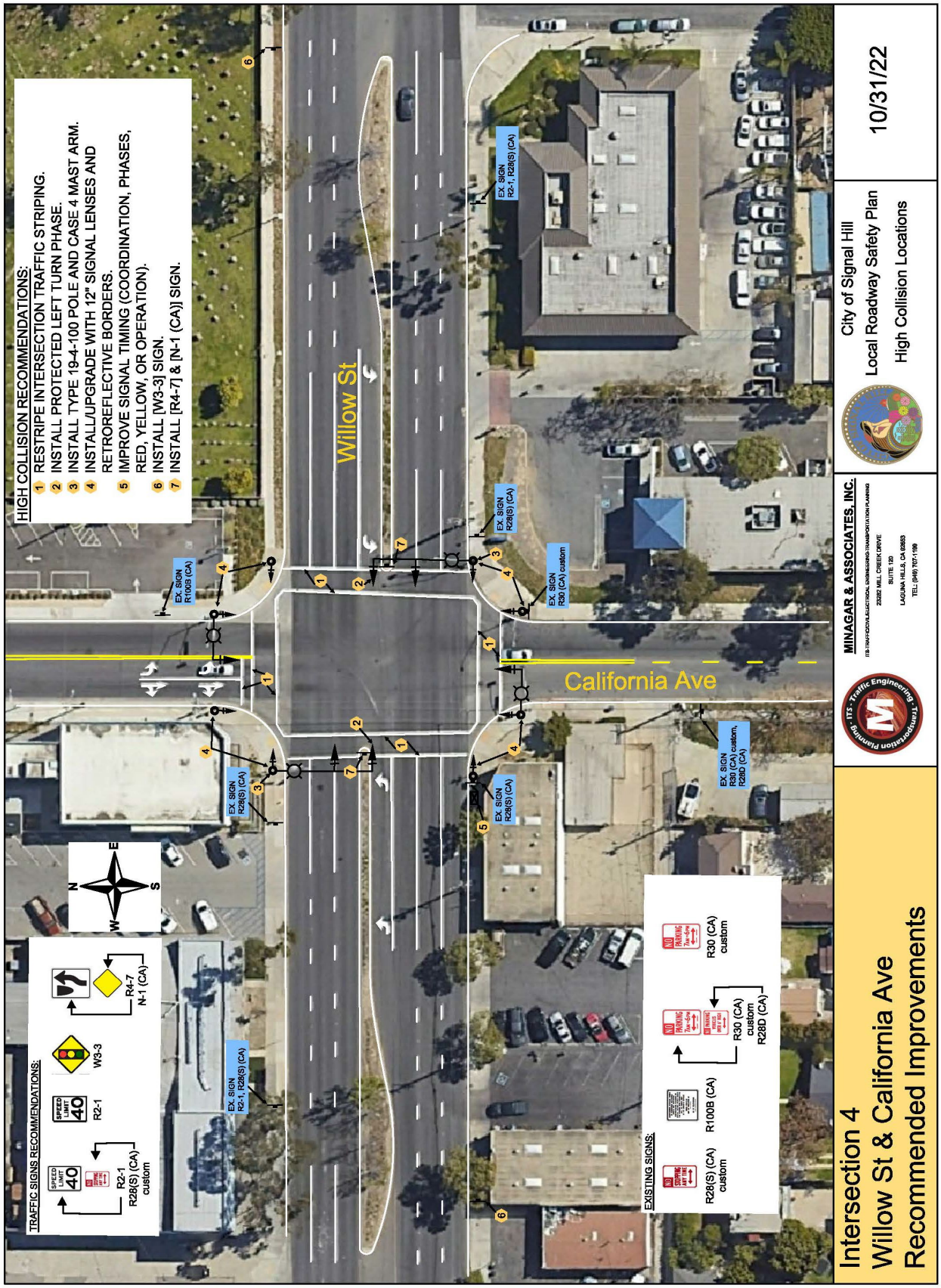


Figure 29: Intersection 4 Crash Diagram- 17 Collisions
(January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 RESTRIPE INTERSECTION TRAFFIC STRIPING.
2 INSTALL PROTECTED LEFT TURN PHASE.
3 INSTALL TYPE 19-4-100 POLE AND CASE 4 MAST ARM.
4 INSTALL/UPGRADE WITH 12" SIGNAL LENSES AND RETROREFLECTIVE BORDERS.
5 IMPROVE SIGNAL TIMING (COORDINATION, PHASES, RED, YELLOW, OR OPERATION).
6 INSTALL [W3-3] SIGN.
7 INSTALL [R4-7] & [N-1 (CA)] SIGN.
Willow St
California Ave
EX. SIGN R2-1, R28(S) (CA)
EX. SIGN R100B (CA)
EX. SIGN R28(S) (CA)
EX. SIGN R30 (CA) custom
EX. SIGN R30 (CA) custom, R28D (CA)
TRAFFIC SIGNS RECOMMENDATIONS:
R2-1
R28(S) (CA) custom
W3-3
R4-7
N-1 (CA)
EXISTING SIGNS:
R28(S) (CA) custom
R100B (CA)
R30 (CA) custom
R30 (CA) custom
R28D (CA)
Intersection 4
Willow St & California Ave
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
ITS-TRAFFIC/ITS/ELECTRICAL ENGINEERING-TRANSPORTATION PLANNING
23282 MILL CREEK DRIVE
SUITE 120
LAGUNA HILLS, CA 92653
TEL: (949) 707-1199
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
10/31/22

9.1.4.1 Intersection 4 Cost Estimate and Cost/Benefit Analysis

Construction Cost Estimate:

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Table 36: Intersection 4 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility			
						LRSM CM No. (S09)*	LRSM CM No. (S07)*	LRSM CM No. (S03)*	OS**
1	Install/Repaint Traffic Striping	LF	620	$ 3.50	$ 2,170.00	90%			
2	Install Protected Left Turn Phase (Left Turn Lane Already Exists)	LS	1	$ 104,000.00	$ 104,000.00		90%		
3	Install Type 19-4-100 Pole and Case 4 Mast Arm								
4	Install/Upgrade with 12" Signal Lenses and Retroreflective Borders								
5	Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)	LS	1	$ 50,000.00	$ 50,000.00			50%	
6	Install [W3-3] Sign	EA	2	$ 575.00	$ 1,150.00				0%
7	Install [R4-7] & [N-1 (CA)] Sign	EA	2	$ 1,150.00	$ 2,300.00				0%
				Total	$ 159,620.00				
				Weighted Percentage (%)	100%	1.4%	65.2%	31.3%	2.2%

* Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)
**OS: Other Safety-Related Improvements

Total Construction Cost:	$	159,620.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 31,924.00
Total Construction Cost (Including Contingencies):	$	191,544.00

Total Cost and Benefit:

The project's total cost is estimated at $191,544 which does not include the design and engineering costs. The estimated benefit of these improvements is $1,604,100 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 8.37.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 8.37, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$1,599,503
Travel Time	$4,094
Vehicle Operating Cost	$425
Emissions	$78
Total Benefits	**$1,604,100**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$191,544
Present Value Benefits ($ Dollars)	$1,604,100
Net Present Value ($ Dollars)	$1,412,556
Benefit / Cost Ratio	8.37

9.1.5 Intersection 5: Willow St & Junipero Ave

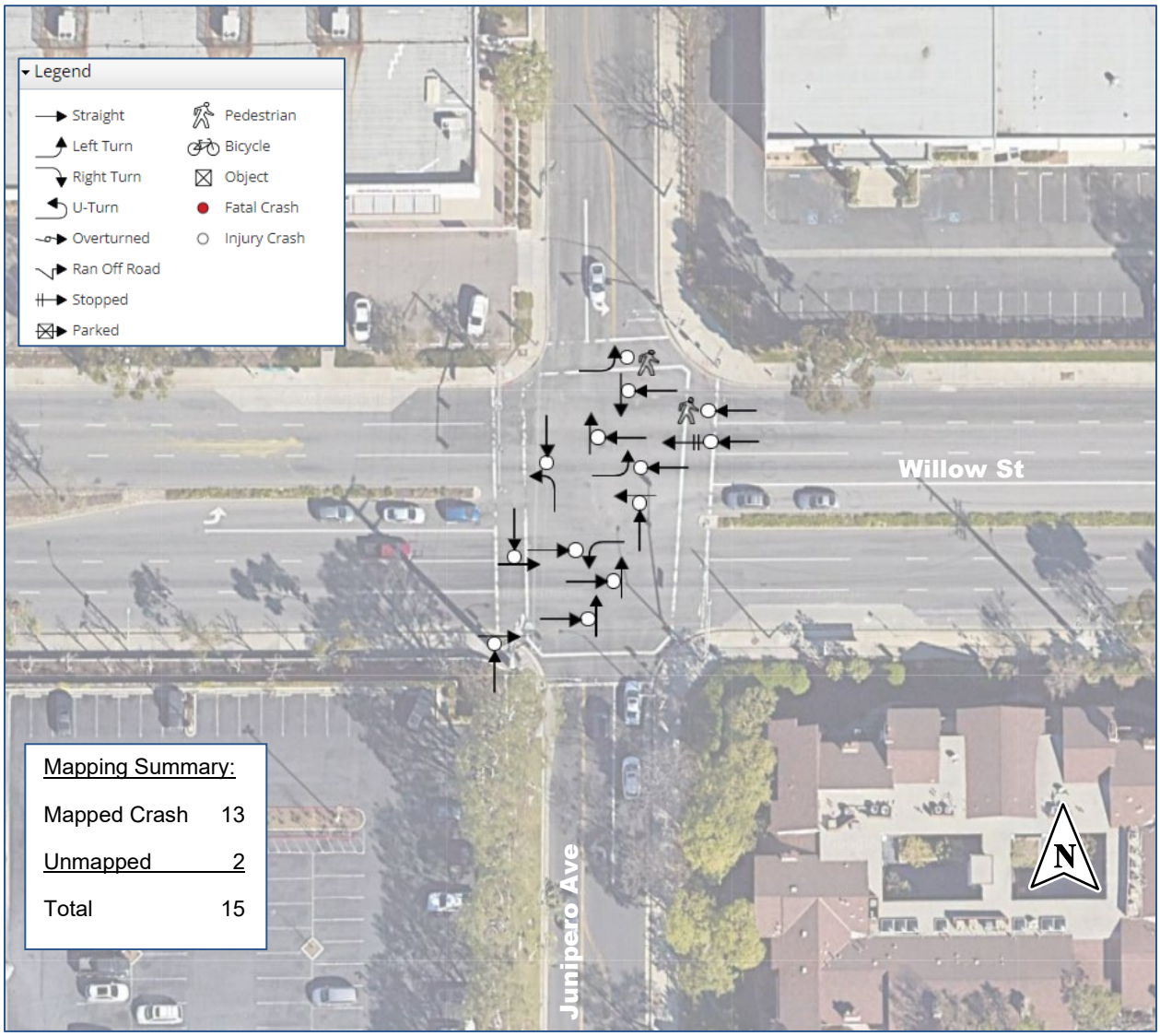


Figure 30: Intersection 5 Crash Diagram- 15 Collisions
(January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 REPAINT INTERSECTION CROSSWALK STRIPING.
2 UPGRADE SIGNAL HARDWARE WITH LENSES, BACK-PLATES WITH RETROREFLECTIVE BORDERS.
3 INSTALL [W3-3] SIGN.
4 INSTALL TYPE IV (L) PAVEMENT ARROW MARKING.
5 INSTALL [R10-12] SIGN.
6 INSTALL [R2-1] (40) SIGN.
7 INSTALL [R4-7] & [N-1 (CA)] SIGN.
8 IMPROVE SIGNAL TIMING (COORDINATION, PHASES, RED, YELLOW, OR OPERATION).
TRAFFIC SIGNS RECOMMENDATIONS:
W3-3
R10-12
R2-1
R28(S) (CA) custom
R4-7
N-1 (CA)
EXISTING SIGNS:
R28(S) (CA) custom
R30 (CA) custom
R28S (CA)
R28 (CA)
R2-1
R28(S) (CA) custom
EX. SIGN R2-1 (35)
EX. SIGN R28(S) (CA)
EX. SIGN R28(S) (CA) custom
EX. SIGN R2-1 (40), R28(S) (CA)
EX. SIGN R28 (CA)
EX. SIGN R28 (CA) custom
Willow St
Junipero Ave
MINAGAR & ASSOCIATES, INC.
ITS · TRAFFIC/ELECTRICAL ENGINEERING TRANSPORTATION PLANNING
25281 MILL CREEK DRIVE
SUITE 120
LAGUNA HILLS, CA 92653
TEL: (949) 707-1199
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/1/22
Intersection 5
Willow St & Junipero Ave
Recommended Improvements

9.1.5.1 Intersection 5 Cost Estimate and Cost/Benefit Analysis

Construction Cost Estimate:

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Table 37: Intersection 5 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility			
						LRSM CM No. (S18PB)*	LRSM CM No. (S02)*	LRSM CM No. (S03)*	OS**
1	Install/Repaint Traffic Striping	LF	567	$ 3.50	$ 1,984.50	90%			
2	Install/Upgrade with 12" Signal Lenses	EA	6	$ 800.00	$ 4,800.00		90%		
	Install/Upgrade with Retroreflective Borders	EA	14	$ 110.00	$ 1,540.00				
3	Install [W3-3] Sign	EA	2	$ 575.00	$ 1,150.00				0%
4	Install Type IV (L) Pavement Arrow Marking	SQFT	15	$ 14.00	$ 210.00				0%
5	Install [R10-12] Sign	EA	2	$ 575.00	$ 1,150.00				0%
6	Install [R2-1] (40) Sign	EA	1	$ 575.00	$ 575.00				0%
7	Install [R4-7] & [N-1 (CA)] Sign	EA	2	$ 1,150.00	$ 2,300.00				0%
8	Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)	LS	1	$ 50,000.00	$ 50,000.00			50%	
				Total	$ 63,709.50				
				Weighted Percentage (%)	100%	3.1%	10.0%	78.5%	8.5%

* Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)
**OS: Other Safety-Related Improvements

Total Construction Cost:		$ 63,709.50
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 12,741.90
Total Construction Cost (Including Contingencies):		$ 76,451.40

Total Cost and Benefit:

The project's total cost is estimated at $76,451 which does not include the design and engineering costs. The estimated benefit of these improvements is $2,105,140 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 27.54.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 27.54, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$2,099,452
Travel Time	$5,083
Vehicle Operating Cost	$528
Emissions	$77
Total Benefits	**$2,105,140**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$76,451
Present Value Benefits ($ Dollars)	$2,105,140
Net Present Value ($ Dollars)	$2,028,689
Benefit / Cost Ratio	27.54

9.1.6 Intersection 6: Hill St & Obispo St

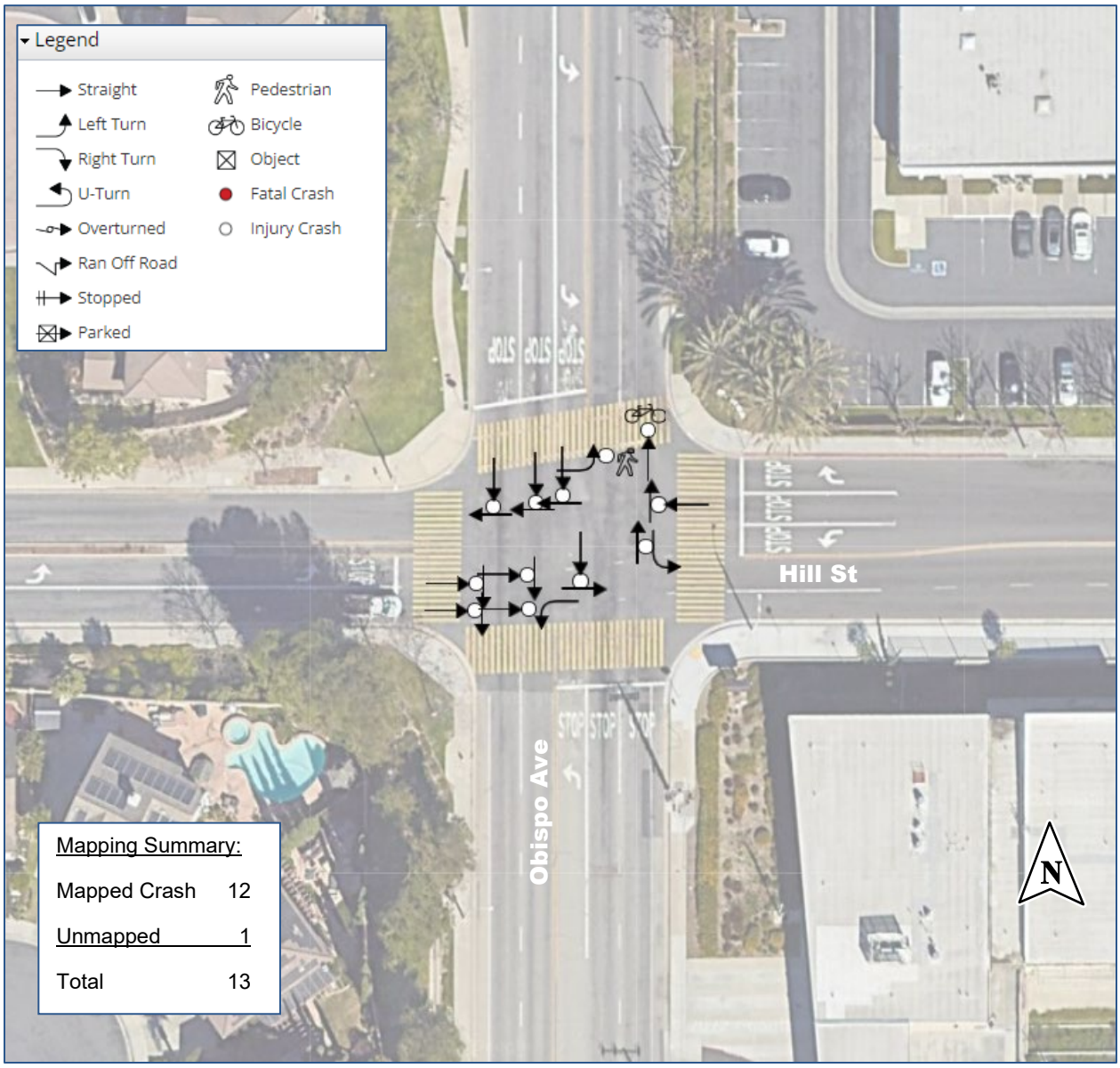
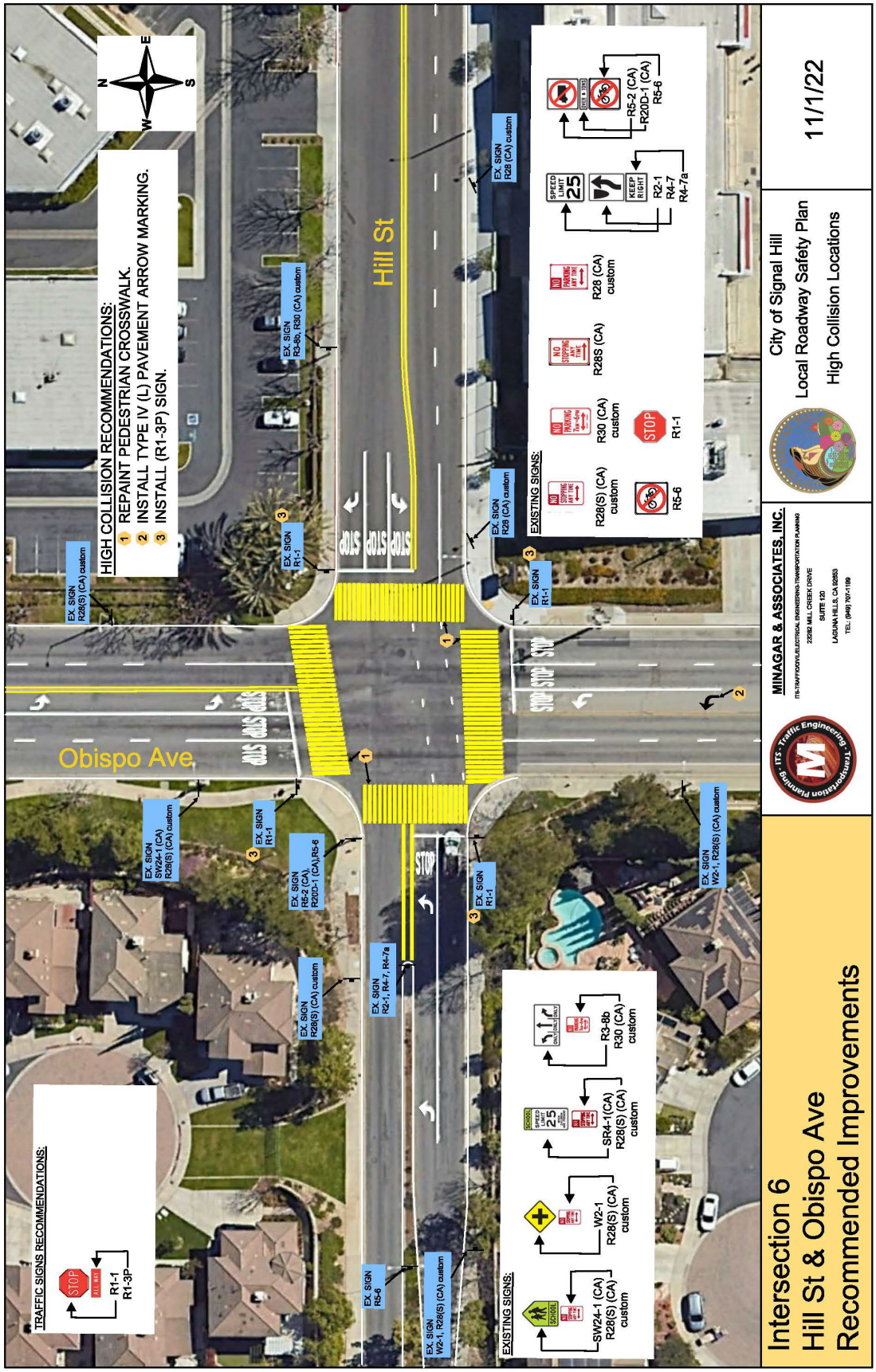


Figure 31: Intersection 6 Crash Diagram- 13 Collisions
(January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 REPAINT PEDESTRIAN CROSSWALK.
2 INSTALL TYPE IV (L) PAVEMENT ARROW MARKING.
3 INSTALL (R1-3P) SIGN.
TRAFFIC SIGNS RECOMMENDATIONS:
R1-1
R1-3P
EXISTING SIGNS:
SW24-1 (CA) R28(S) (CA) custom
W2-1 R28(S) (CA) custom
SR4-1(CA) R28(S) (CA) custom
R3-8b R30 (CA) custom
EXISTING SIGNS:
R28(S) (CA) custom
R30 (CA) custom
R1-1
R28S (CA)
R28 (CA) custom
R5-6
R5-2 (CA) R20D-1 (CA) R5-6
R2-1 R4-7 R4-7a
Obispo Ave
Hill St
STOP
EX. SIGN R28(S) (CA) custom
EX. SIGN R3-8b, R30 (CA) custom
EX. SIGN R1-1
EX. SIGN R28 (CA) custom
EX. SIGN SW24-1 (CA) R28(S) (CA) custom
EX. SIGN R5-2 (CA), R20D-1 (CA), R5-6
EX. SIGN R2-1, R4-7, R4-7a
EX. SIGN R5-6
EX. SIGN W2-1, R28(S) (CA) custom
Intersection 6
Hill St & Obispo Ave
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/1/22

9.1.6.1 Intersection 6 Cost Estimate and Cost/Benefit Analysis

Construction Cost Estimate:

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Table 38: Intersection 6 Cost Estimate

Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility		
					LRSM CM No. (NS21PB)*	LRSM CM No. (NS07)*	LRSM CM No. (NS06)*
Repaint Pedestrian Crosswalk	LF	2497.5	$ 5.00	$ 12,487.50	90%		
Install Type IV (L) Pavement Arrow Marking	SQFT	15	$ 14.00	$ 210.00		90%	
Install [R1-3P] Sign	EA	4	$ 575.00	$ 2,300.00			90%
			Total	$ 14,997.50			
			Weighted Percentage (%)	100%	83.3%	1.4%	15.3%
* Unsignalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)							
**OS: Other Safety-Related Improvements							

Total Construction Cost:	$	14,997.50
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 2,999.50
Total Construction Cost (Including Contingencies):	$	17,997.00

Total Cost and Benefit:

The project's total cost is estimated at $17,997 which does not include the design and engineering costs. The estimated benefit of these improvements is $1,579,831 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 87.78.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 87.78, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$1,574,879
Travel Time	$4,405
Vehicle Operating Cost	$457
Emissions	$110
Total Benefits	**$1,579,831**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$17,997
Present Value Benefits ($ Dollars)	$1,579,831
Net Present Value ($ Dollars)	$1,561,834
Benefit / Cost Ratio	87.78

9.1.7 Intersection 7: Spring St & Cherry Ave

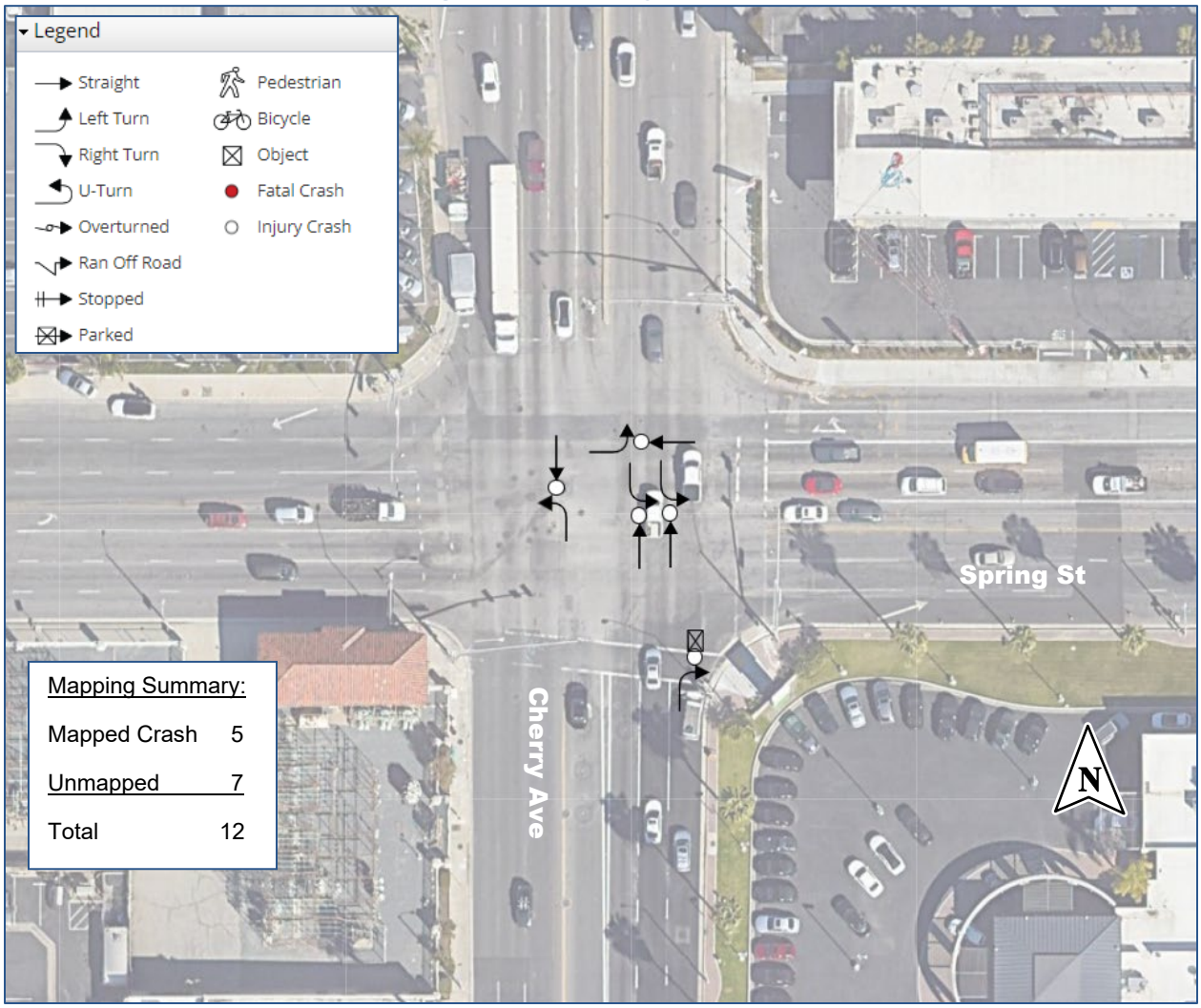


Figure 32: Intersection 7 Crash Diagram- 12 Collisions
(January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 INSTALL [R4-7] & [N-1 (CA)] SIGN.
2 REPAINT INTERSECTION STRIPING.
3 REPAINT PAVEMENT ARROW MARKING.
4 INSTALL/UPGRADE WITH 12" SIGNAL LENSES AND RETROREFLECTIVE BORDERS.
5 IMPROVE SIGNAL TIMING (COORDINATION, PHASES, RED, YELLOW, OR OPERATION).
TRAFFIC SIGNS RECOMMENDATIONS:
R4-7
N-1 (CA)
EXISTING SIGNS:
W9-2L
R28(S) (CA) custom
R28S (CA)
R61 (CA) custom
W4-2
R73-2 (CA)
G77-4 (CA)
R9-3
R9-3aP
R9-3bP (L)
R9-3
R9-3aP
R9-3bP (R)
Spring St
Cherry Ave
EX. SIGN R61 (CA) custom
EX. SIGN W4-2, R28(S) (CA) custom
EX. SIGN R28(S) (CA) custom
EX. SIGN R28(S) (CA)
EX. SIGN R9-3, R9-3aP, R9-3bP (R)
EX. SIGN R73-2
EX. SIGN R9-3, R9-3aP, R9-3bP (L)
EX. SIGN R28(S) (CA) custom
EX. SIGN G77-4 (CA)
EX. SIGN W9-2L
Intersection 7
Spring St & Cherry Ave
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/2/22

9.1.7.1 Intersection 7 Cost Estimate and Cost/Benefit Analysis

Construction Cost Estimate:

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Table 39: Intersection 7 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility			
						LRSM CM No. (S09)*	LRSM CM No. (S02)*	LRSM CM No. (S03)*	OS**
1	Install [R4-7] & [N-1 (CA)] Sign	EA	1	$ 1,150.00	$ 1,150.00				0%
2	Repaint Intersection Striping	LF	1241	$ 3.50	$ 4,343.50	90%			
3	Install Type IV (L) Pavement Arrow Marking	SQFT	30	$ 14.00	$ 420.00				0%
4	Install/Upgrade with 12" Signal Lenses	EA	6	$ 800.00	$ 4,800.00		90%		
	Install/Upgrade with Retroreflective Borders	EA	19	$ 110.00	$ 2,090.00				
5	Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)	LS	1	$ 50,000.00	$ 50,000.00			50%	
				Total	$ 62,803.50				
				Weighted Percentage (%)	100%	6.9%	7.6%	79.6%	2.5%

* Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)
**OS: Other Safety-Related Improvements

Total Construction Cost:	$	62,803.50
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 12,560.70
Total Construction Cost (Including Contingencies):	$	75,364.20

Total Cost and Benefit:

The project's total cost is estimated at $75,364 which does not include the design and engineering costs. The estimated benefit of these improvements is $7,864,073 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 104.35.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 104.35, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$7,857,787
Travel Time	$5,899
Vehicle Operating Cost	$332
Emissions	$55
Total Benefits	**$7,864,073**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$75,364
Present Value Benefits ($ Dollars)	$7,864,073
Net Present Value ($ Dollars)	$7,788,709
Benefit / Cost Ratio	104.35

9.1.8 Intersection 8: Burnett St/Skyline Dr & Cherry Ave

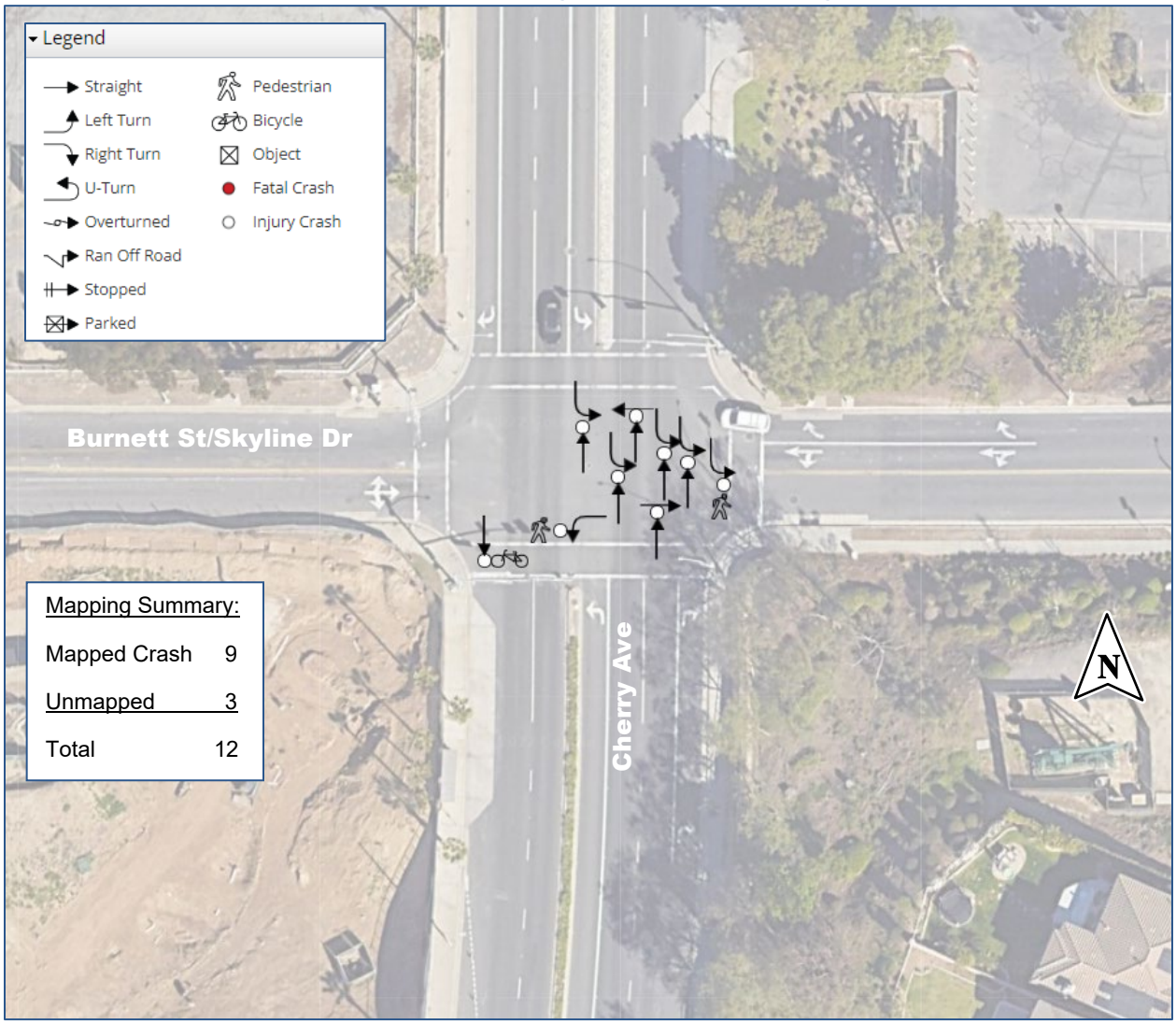
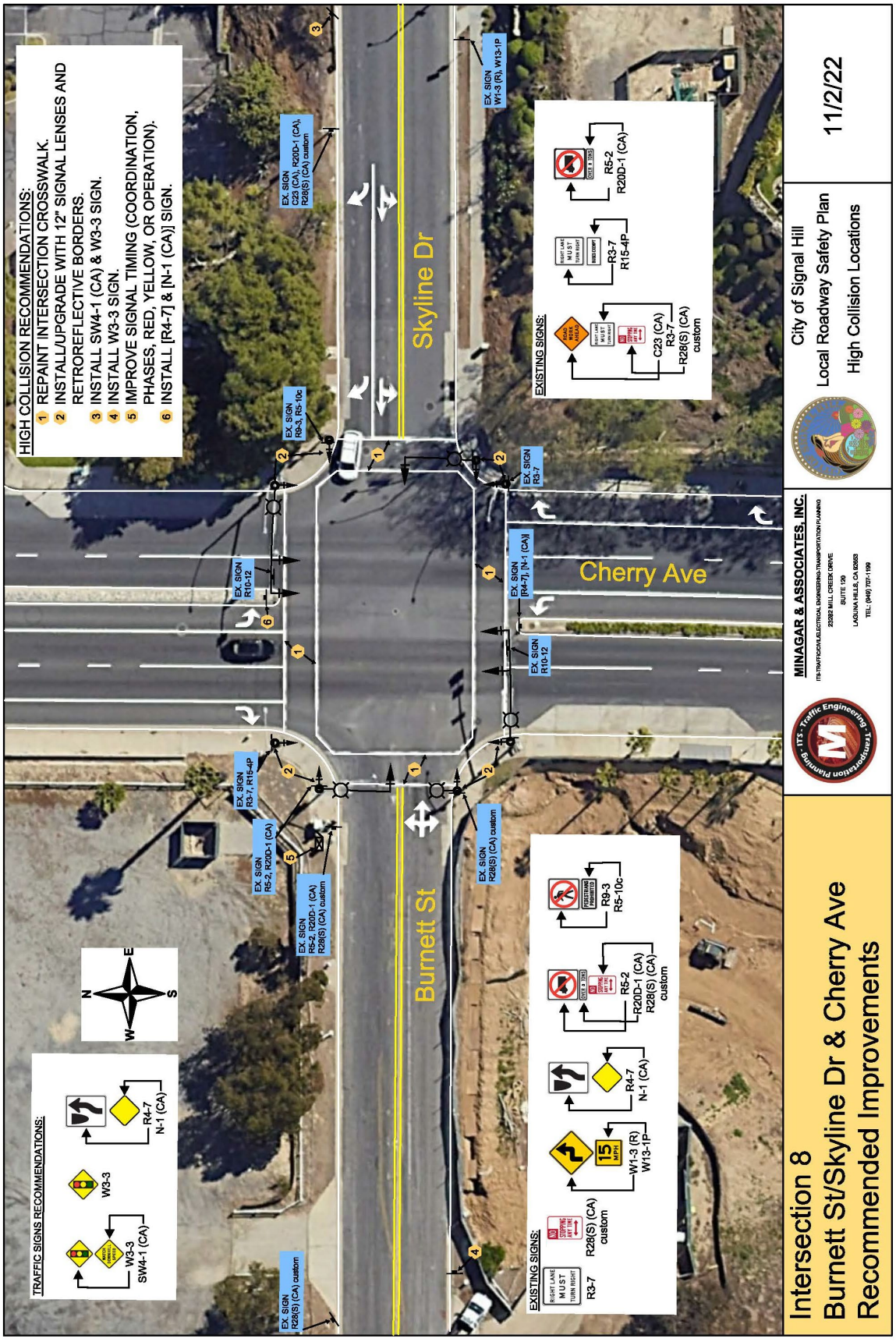


Figure 33: Intersection 8 Crash Diagram- 12 Collisions (January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 REPAINT INTERSECTION CROSSWALK.
2 INSTALL/UPGRADE WITH 12" SIGNAL LENSES AND RETROREFLECTIVE BORDERS.
3 INSTALL SW4-1 (CA) & W3-3 SIGN.
4 INSTALL W3-3 SIGN.
5 IMPROVE SIGNAL TIMING (COORDINATION, PHASES, RED, YELLOW, OR OPERATION).
6 INSTALL [R4-7] & [N-1 (CA)] SIGN.
TRAFFIC SIGNS RECOMMENDATIONS:
W3-3
SW4-1 (CA)
W3-3
R4-7
N-1 (CA)
EXISTING SIGNS:
R3-7
R28(S) (CA) custom
W1-3 (R)
W13-1P
15 MPH
R4-7
N-1 (CA)
R5-2
R20D-1 (CA)
R28(S) (CA) custom
R9-3
R5-10c
EXISTING SIGNS:
C23 (CA)
R3-7
R28(S) (CA) custom
R3-7
R15-4P
R5-2
R20D-1 (CA)
Skyline Dr
Burnett St
Cherry Ave
EX. SIGN R28(S) (CA) custom
EX. SIGN R5-2, R20D-1 (CA), R28(S) (CA) custom
EX. SIGN R5-2, R20D-1 (CA)
EX. SIGN R3-7, R15-4P
EX. SIGN R10-12
EX. SIGN R3-9, R5-10c
EX. SIGN C23 (CA), R20D-1 (CA), R28(S) (CA) custom
EX. SIGN W1-3 (R), W13-1P
EX. SIGN R3-7
EX. SIGN [R4-7], [N-1 (CA)]
EX. SIGN R10-12
EX. SIGN R28(S) (CA) custom
N
E
S
W
Intersection 8
Burnett St/Skyline Dr & Cherry Ave
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
ITS · Traffic Engineering · Transportation Planning
ITS-TRAFFIC/VALELECTRICAL ENGINEERING-TRANSPORTATION PLANNING
22082 MILL CREEK DRIVE
SUITE 120
LAGUNA HILLS, CA 92653
TEL: (949) 707-1199
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/2/22

9.1.8.1 Intersection 8 Cost Estimate and Cost/Benefit Analysis

Construction Cost Estimate:

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Table 40: Intersection 8 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility			
						LRSM CM No. (S18PB)*	LRSM CM No. (S02)*	LRSM CM No. (S03)*	OS**
1	Repaint Intersection Crosswalk	LF	533	$ 3.50	$ 1,865.50	90%			
2	Install/Upgrade with 12" Signal Lenses	EA	6	$ 800.00	$ 4,800.00		90%		
	Install/Upgrade with Retroreflective Borders	EA	14	$ 110.00	$ 1,540.00				
3	Install [SW4-1] (CA) & [W3-3] Sign	EA	1	$ 1,150.00	$ 1,150.00				0%
4	Install [W3-3] Sign	EA	1	$ 575.00	$ 575.00				0%
5	Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)	LS	1	$ 50,000.00	$ 50,000.00			50%	
6	Install [R4-7] & [N-1 (CA)] Sign	EA	1	$ 1,150.00	$ 1,150.00				0%
				Total	$ 61,080.50				
				Weighted Percentage (%)	100%	3.1%	10.4%	81.9%	4.7%

* Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)
**OS: Other Safety-Related Improvements

Total Construction Cost:	$	61,080.50
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 12,216.10
Total Construction Cost (Including Contingencies):	$	73,296.60

Total Cost and Benefit:

The project's total cost is estimated at $73,297 which does not include the design and engineering costs. The estimated benefit of these improvements is $2,110,672 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 28.80.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 28.80, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$2,106,128
Travel Time	$4,066
Vehicle Operating Cost	$422
Emissions	$55
Total Benefits	**$2,110,672**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$73,297
Present Value Benefits ($ Dollars)	$2,110,672
Net Present Value ($ Dollars)	$2,037,375
Benefit / Cost Ratio	28.80

9.1.9 Intersection 9: Willow St & Temple Ave

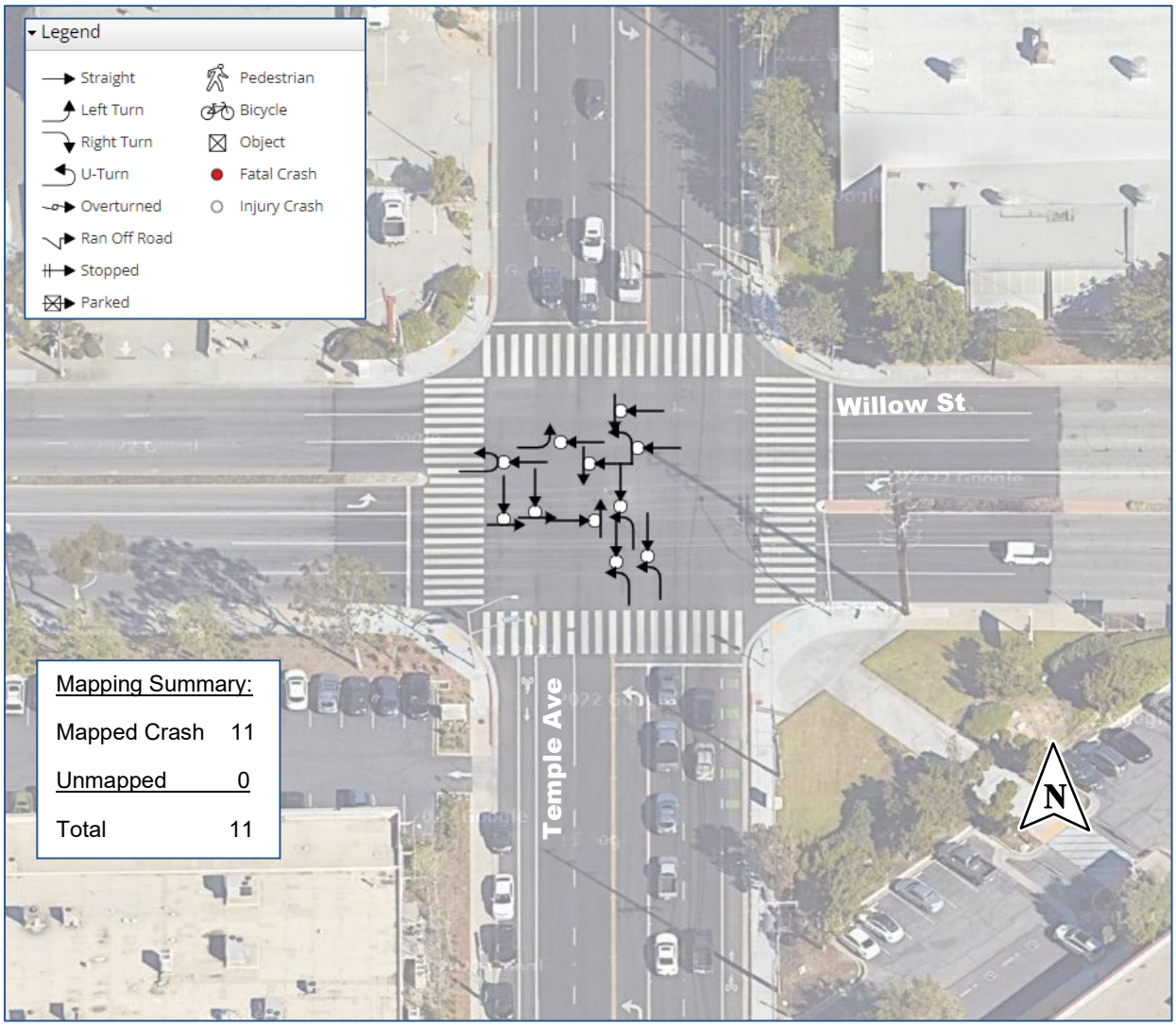
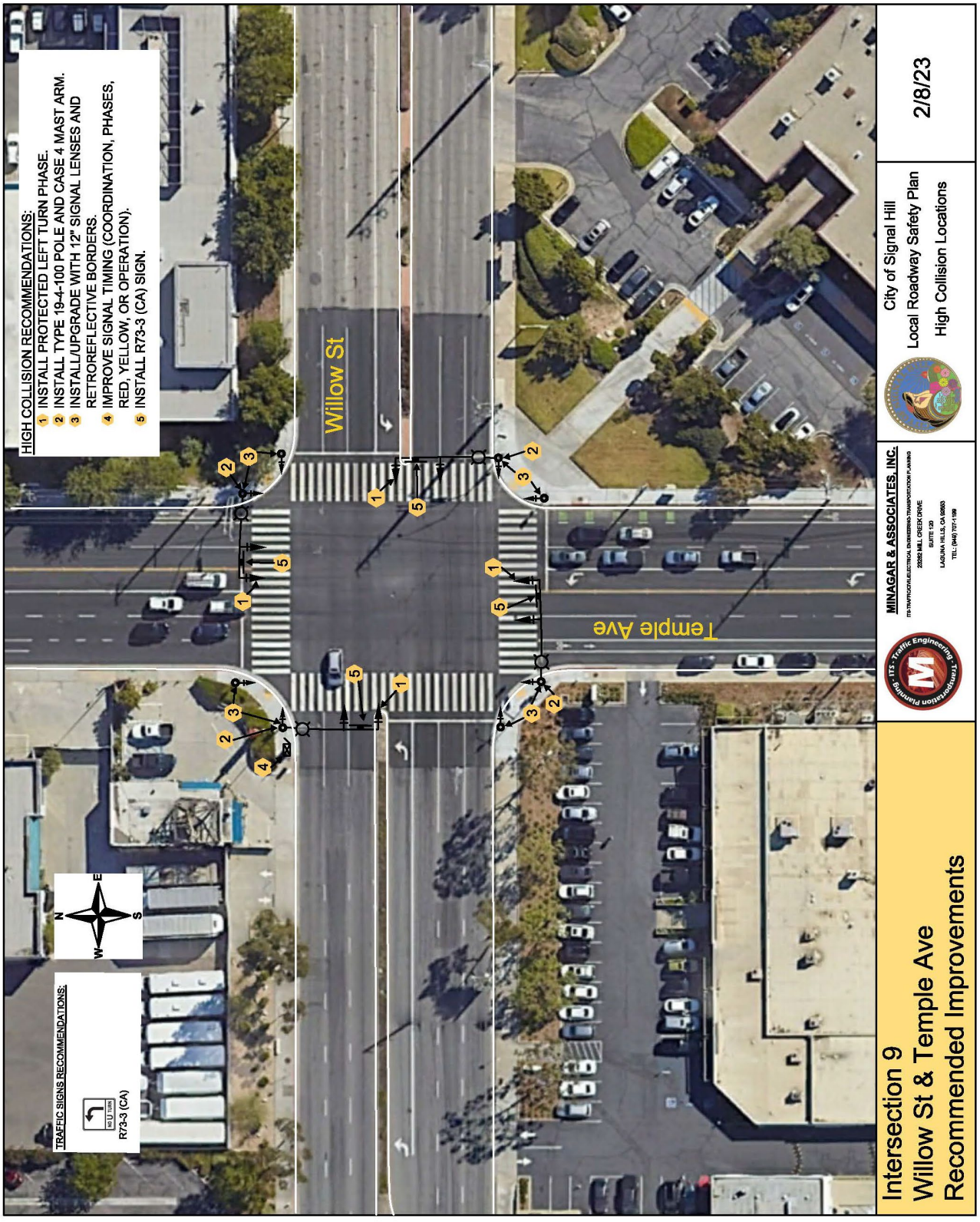


Figure 34: Intersection 9 Crash Diagram- 11 Collisions
(January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 INSTALL PROTECTED LEFT TURN PHASE.
2 INSTALL TYPE 19-4-100 POLE AND CASE 4 MAST ARM.
3 INSTALL/UPGRADE WITH 12" SIGNAL LENSES AND RETROREFLECTIVE BORDERS.
4 IMPROVE SIGNAL TIMING (COORDINATION, PHASES, RED, YELLOW, OR OPERATION).
5 INSTALL R73-3 (CA) SIGN.
TRAFFIC SIGNS RECOMMENDATIONS:
R73-3 (CA)
Willow St
Temple Ave
N
E
S
W
Intersection 9
Willow St & Temple Ave
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
2/8/23

9.1.9.1 Intersection 9 Cost Estimate and Cost/Benefit Analysis

Construction Cost Estimate:

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Table 41: Intersection 9 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility		
						LRSM CM No. (S07)*	LRSM CM No. (S03)*	OS**
1	Install Protected Left Turn Phase (Left Turn Lane Already Exists)	LS	1	$ 200,000.00	$ 200,000.00	90%		
2	Install Type 19-4-100 Pole and Case 4 Mast Arm							
3	Install/Upgrade with 12" Signal Lenses and Retroreflective Borders							
4	Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)	LS	1	$ 50,000.00	$ 50,000.00		50%	
5	Install R73-3 (CA) Sign	EA	4	$ 575.00	$ 2,300.00			0%
				Total	$ 252,300.00			
				Weighted Percentage (%)	100%	79.3%		0.9%

* Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)
**OS: Other Safety-Related Improvements

Total Construction Cost:	$	252,300.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 50,460.00
Total Construction Cost (Including Contingencies):	$	302,760.00

Total Cost and Benefit:

The project's total cost is estimated at $302,760 which does not include the design and engineering costs. The estimated benefit of these improvements is $1,547,957 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 5.11.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 5.11, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$1,544,506
Travel Time	$3,063
Vehicle Operating Cost	$318
Emissions	$70
Total Benefits	**$1,547,957**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$302,760
Present Value Benefits ($ Dollars)	$1,547,957
Net Present Value ($ Dollars)	$1,245,197
Benefit / Cost Ratio	5.11

9.1.10 Intersection 10: Willow St & Walnut Ave

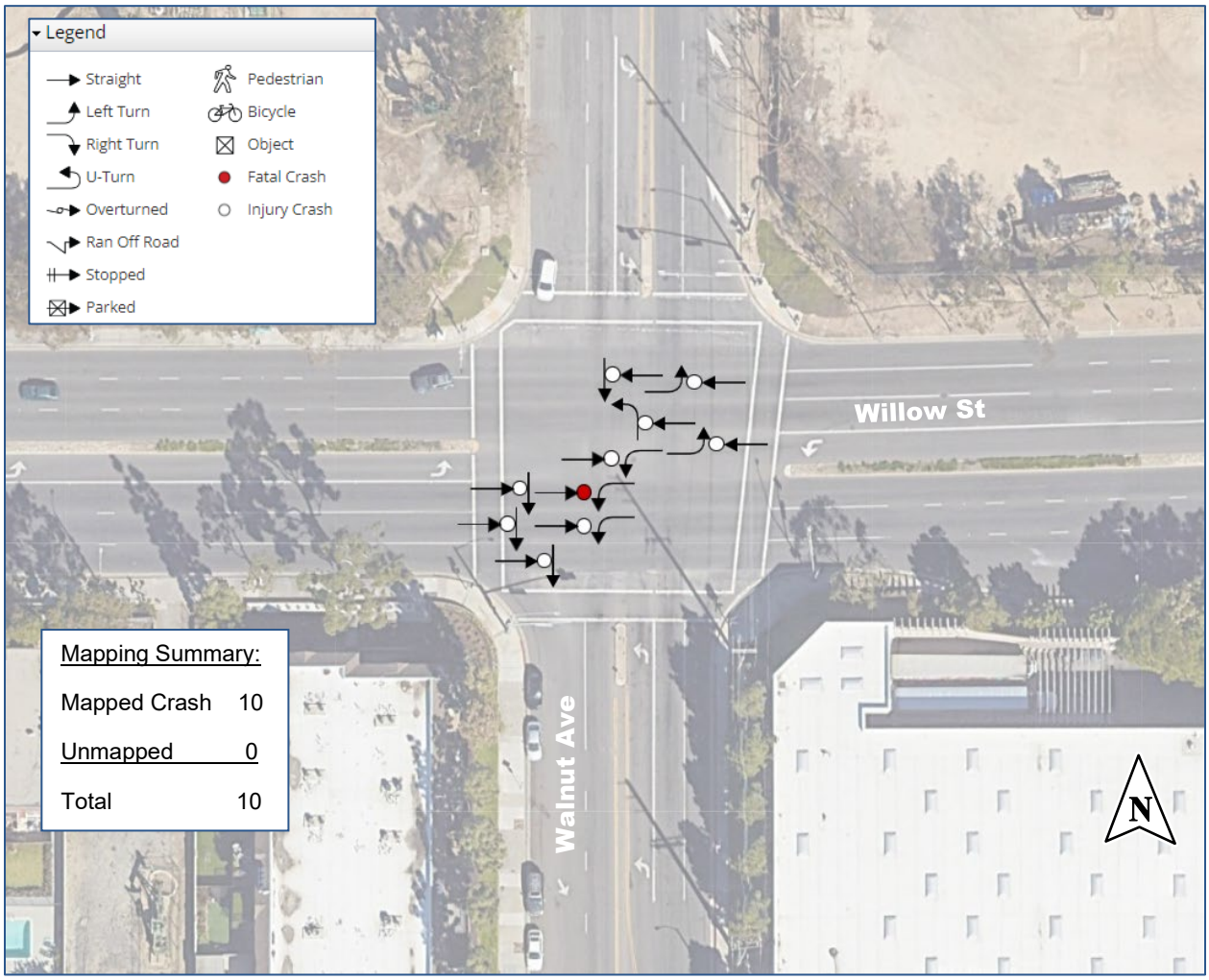
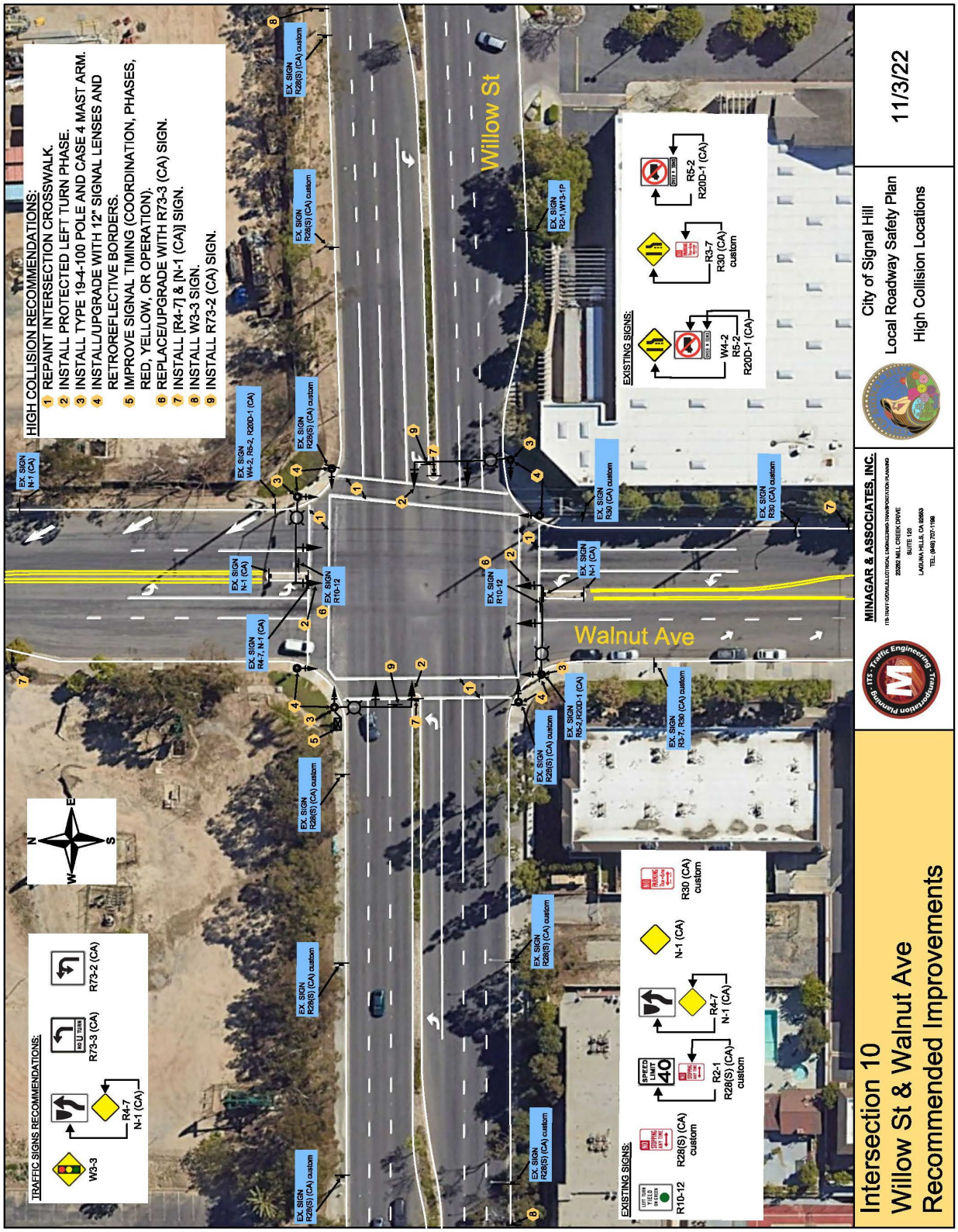


Figure 35: Intersection 10 Crash Diagram- 10 Collisions
(January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 REPAINT INTERSECTION CROSSWALK.
2 INSTALL PROTECTED LEFT TURN PHASE.
3 INSTALL TYPE 19-4-100 POLE AND CASE 4 MAST ARM.
4 INSTALL/UPGRADE WITH 12" SIGNAL LENSES AND RETROREFLECTIVE BORDERS.
5 IMPROVE SIGNAL TIMING (COORDINATION, PHASES, RED, YELLOW, OR OPERATION).
6 REPLACE/UPGRADE WITH R73-3 (CA) SIGN.
7 INSTALL [R4-7] & [N-1 (CA)] SIGN.
8 INSTALL W3-3 SIGN.
9 INSTALL R73-2 (CA) SIGN.
TRAFFIC SIGNS RECOMMENDATIONS:
W3-3
R4-7
N-1 (CA)
R73-3 (CA)
R73-2 (CA)
EXISTING SIGNS:
R10-12
R28(S) (CA) custom
R2-1
R28(S) (CA) custom
SPEED LIMIT 40
R4-7
N-1 (CA)
N-1 (CA)
R30 (CA) custom
EXISTING SIGNS:
W4-2
R5-2
R20D-1 (CA)
R3-7
R30 (CA) custom
R5-2
R20D-1 (CA)
Willow St
Walnut Ave
EX. SIGN N-1 (CA)
EX. SIGN W4-2, R5-2, R20D-1 (CA)
EX. SIGN R28(S) (CA) custom
EX. SIGN R4-7, M-1 (CA)
EX. SIGN R10-12
EX. SIGN R2-1,W13-1P
EX. SIGN R30 (CA) custom
EX. SIGN R5-2 R20D-1 (CA)
EX. SIGN R3-7, R30 (CA) custom
N
E
S
W
MINAGAR & ASSOCIATES, INC.
ITS · Traffic Engineering · Transportation Planning
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/3/22
Intersection 10
Willow St & Walnut Ave
Recommended Improvements

9.1.10.1 Intersection 10 Cost Estimate and Cost/Benefit Analysis

Construction Cost Estimate:

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Table 42: Intersection 10 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility			
						LRSM CM No. (S18PB)*	LRSM CM No. (S07)*	LRSM CM No. (S03)*	OS**
1	Repaint Intersection Crosswalk	LF	533	$ 3.50	$ 1,865.50	90%			
2	Install Protected Left Turn Phase (Left Turn Lane Already Exists)	LS	1	$ 200,000.00	$ 200,000.00		90%		
3	Install Type 19-4-100 Pole and Case 4 Mast Arm								
4	Install/Upgrade with 12" Signal Lenses and Retroreflective Borders								
5	Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)	LS	1	$ 50,000.00	$ 50,000.00			50%	
6	Replace/Upgrade with R73-3 (CA) Sign	EA	2	$ 575.00	$ 1,150.00				0%
7	Install [R4-7] & [N-1 (CA)] Sign	EA	2	$ 1,150.00	$ 2,300.00				0%
8	Install W3-3 Sign	EA	2	$ 575.00	$ 1,150.00				0%
9	Install R73-2 (CA) Sign	EA	2	$ 575.00	$ 1,150.00				0%
				Total	$ 257,615.50				
				Weighted Percentage (%)	100%	0.7%	77.6%	19.4%	2.2%

* Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)
**OS: Other Safety-Related Improvements

Total Construction Cost:	$	257,615.50
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 51,523.10
Total Construction Cost (Including Contingencies):	$	309,138.60

Total Cost and Benefit:

The project's total cost is estimated at $309,139 which does not include the design and engineering costs. The estimated benefit of these improvements is $10,914,191 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 35.31.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 35.31, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$10,906,125
Travel Time	$7,624
Vehicle Operating Cost	$397
Emissions	$44
Total Benefits	**$10,914,191**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$309,139
Present Value Benefits ($ Dollars)	$10,914,191
Net Present Value ($ Dollars)	$10,605,052
Benefit / Cost Ratio	35.31

9.1.11 Intersection 11: PCH Route 1 & Redondo Ave

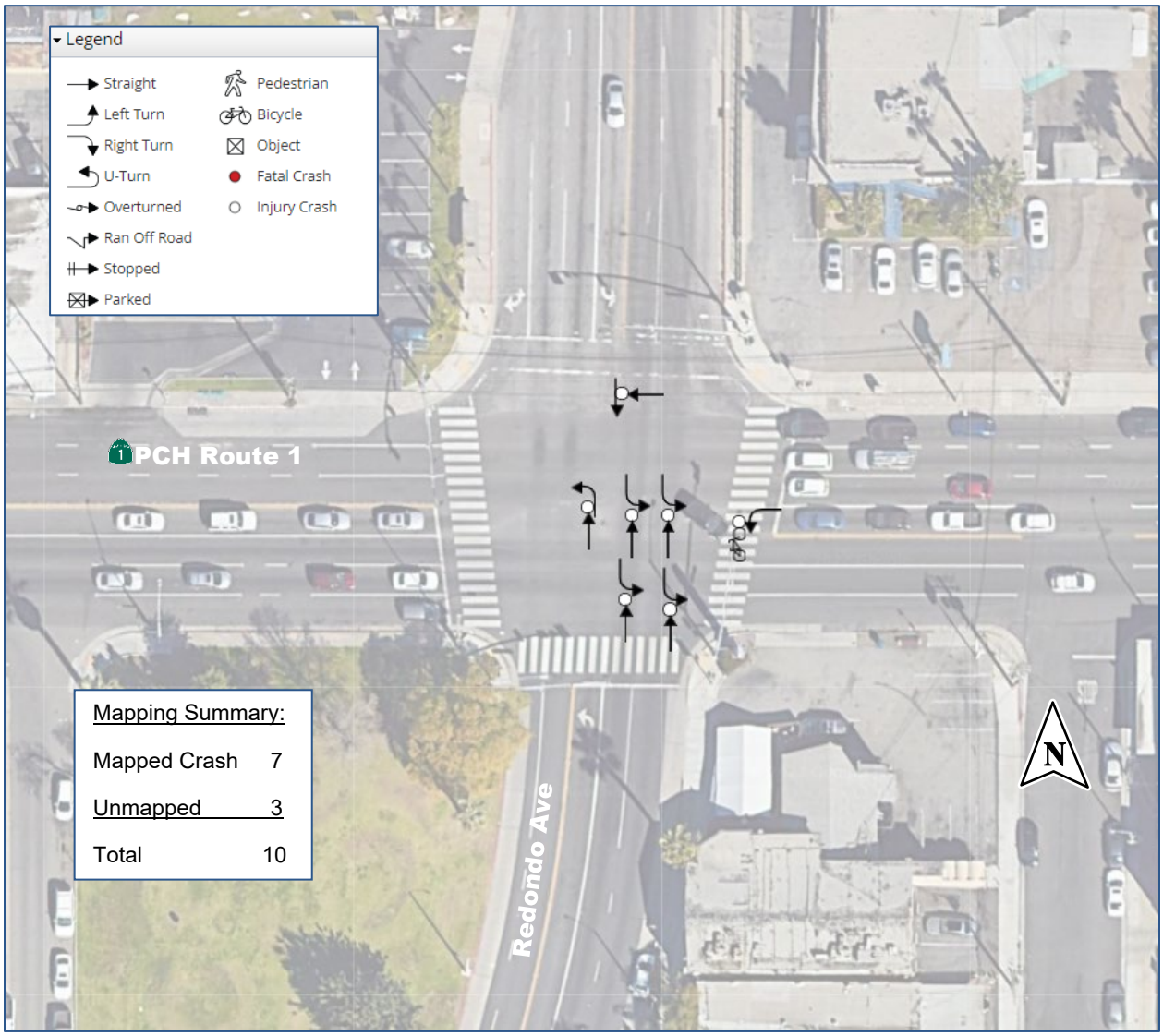


Figure 36: Intersection 11 Crash Diagram- 10 Collisions
(January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 UPGRADE INTERSECTION CROSSWALK STRIPING (LADDER).
2 INSTALL/UPGRADE WITH RETROREFLECTIVE BORDERS.
3 IMPROVE SIGNAL TIMING (COORDINATION, PHASES, RED, YELLOW, OR OPERATION).
4 INSTALL TYPE IV (L) PAVEMENT ARROW MARKING.
5 INSTALL TYPE IV (R) PAVEMENT ARROW MARKING.
N
E
S
W
Redondo Ave
PCH Route 1
EX. SIGN R26L (CA)
EX. SIGN R14-1
EX. SIGN R3-4
EX. SIGN R10-12
EX. SIGN R3-7
EX. SIGN R30A (CA), R38 (CA)
EXISTING SIGNS:
R10-12
R30A (CA) R38 (CA)
R3-4
R26L (CA)
R3-7
R30 (CA) custom
R14-1
Intersection 11
PCH Route 1 & Redondo Ave
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
ITS-TRAFFIC/CIVIL/ELECTRICAL ENGINEERING-TRANSPORTATION PLANNING
22292 MILL CREEK DRIVE
SUITE 120
LAGUNA HILLS, CA 92653
TEL: (949) 707-1199
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/4/22

9.1.10.1 Intersection 11 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Construction Cost Estimate:

Table 43: Intersection 11 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility			
						LRSM CM No. (S18PB)*	LRSM CM No. (S02)*	LRSM CM No. (S03)*	OS**
1	Upgrade Intersection Crosswalk Striping (Ladder)	LF	325	$ 5.00	$ 1,625.00	90%			
2	Improve Signal Hardware: Back-plates with Retroreflective Borders	EA	18	$ 110.00	$ 1,980.00		90%		
3	Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)	LS	1	$ 50,000.00	$ 50,000.00			50%	
4	Install Type IV (L) Pavement Arrow Marking	SQFT	30	$ 14.00	$ 420.00				0%
5	Install Type IV (R) Pavement Arrow Marking	SQFT	15	$ 14.00	$ 210.00				0%
				Total	$ 54,235.00				
				Weighted Percentage (%)	100%	3.0%	3.7%	92.2%	1.2%

* Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)
**OS: Other Safety-Related Improvements

Total Construction Cost:	$	54,235.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 10,847.00
Total Construction Cost (Including Contingencies):	$	65,082.00

Total Cost and Benefit:

The project's total cost is estimated at $65,082 which does not include the design and engineering costs. The estimated benefit of these improvements is $1,585,363 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 24.36.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 24.36, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$1,581,535
Travel Time	$3,389
Vehicle Operating Cost	$352
Emissions	$88
Total Benefits	**$1,585,363**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$65,082
Present Value Benefits ($ Dollars)	$1,585,363
Net Present Value ($ Dollars)	$1,520,281
Benefit / Cost Ratio	24.36

9.1.12 Intersection 12: Cherry Ave & 21st St

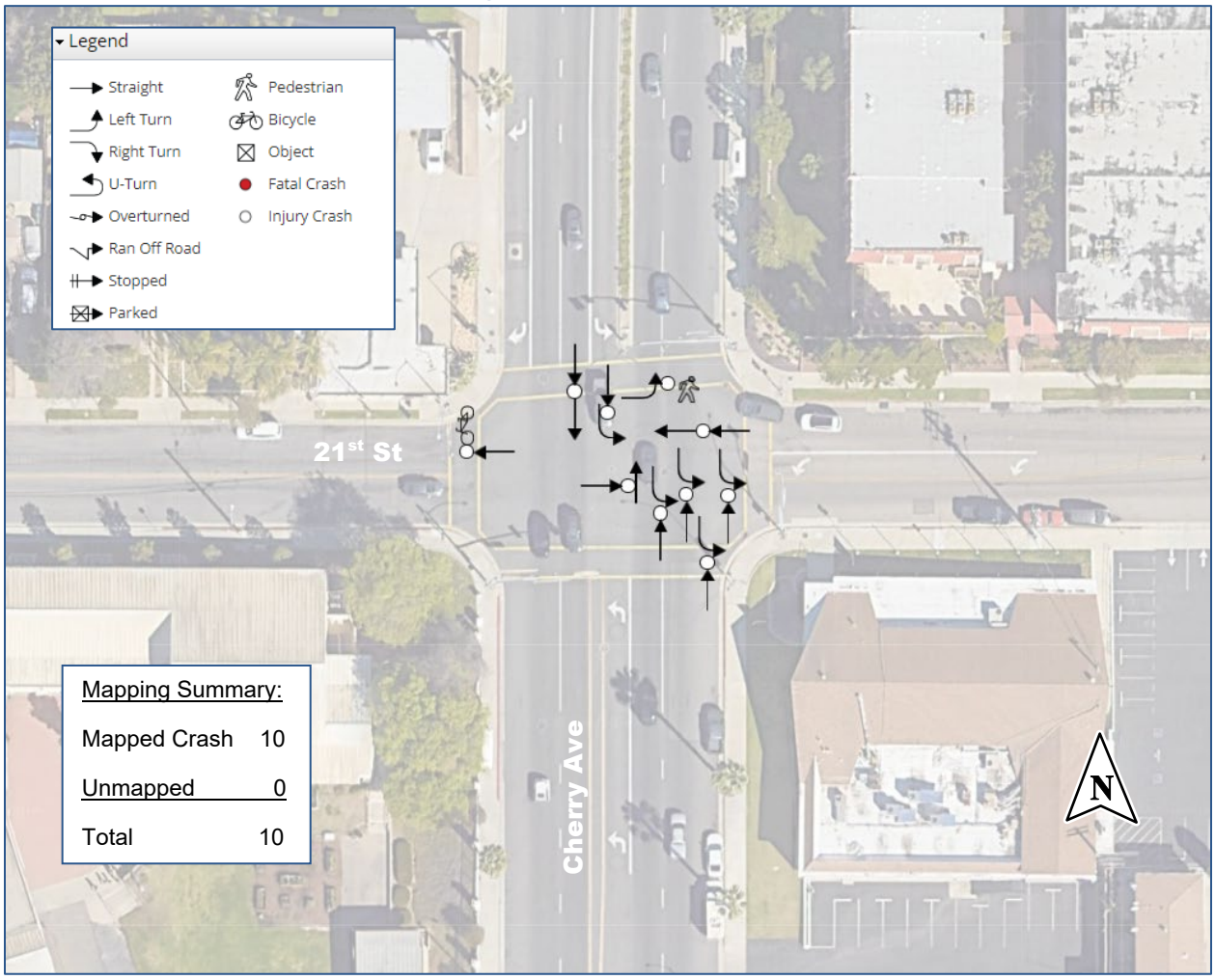


Figure 37: Intersection 12 Crash Diagram- 10 Collisions (January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 UPGRADE INTERSECTION CROSSWALK STRIPING (LADDER).
2 UPGRADE SIGNAL HARDWARE WITH LENSES, BACK-PLATES WITH RETROREFLECTIVE BORDERS.
3 MODIFY SIGNAL PHASING TO IMPLEMENT A LEADING PEDESTRIAN INTERVAL (LPI).
21st St
Cherry Ave
EXISTING SIGNS:
R10-12
R2-1
R30 (CA) custom
R4-7
N-1 (CA)
R3-7
W1-2L
EXISTING SIGNS:
R2-1
R25E (CA)
R5-2
R20D-1 (CA)
R30 (CA) custom
EX. SIGN W1-2L
EX. SIGN R2-1 (25), R30 (CA) custom
EX. SIGN R3-7
EX. SIGN R4-7, N-1 (CA)
EX. SIGN R10-12
EX. SIGN R30 (CA) custom
EX. SIGN R25E (CA)
EX. SIGN R5-2, R20D-1 (CA), R30 (CA) custom
EX. SIGN R2-1 (25)
Intersection 11
Cherry Ave & 21st St
Recommended Improvements
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/3/22
MINAGAR & ASSOCIATES, INC.

9.1.12.1 Intersection 12 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Construction Cost Estimate:

Table 44: Intersection 12 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility		
						LRSM CM No. (S18PB)*	LRSM CM No. (S02)*	LRSM CM No. (S03)*
1	Upgrade Intersection Crosswalk Striping (Ladder)	LF	1562.5	$ 5.00	$ 7,812.50	90%		
2	Install/Upgrade with 12" Signal Lenses	EA	6	$ 800.00	$ 4,800.00		90%	
	Install/Upgrade with Retroreflective Borders	EA	14	$ 110.00	$ 1,540.00		90%	
3	Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)	LS	1	$ 50,000.00	$ 50,000.00			50%
				Total	$ 64,152.50			
				Weighted Percentage (%)	100%	12.2%	7.5%	77.9%

* Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)
**OS: Other Safety-Related Improvements

Total Construction Cost:	$	64,152.50
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 12,830.50
Total Construction Cost (Including Contingencies):	$	76,983.00

Total Cost and Benefit:

The project's total cost is estimated at $76,983 which does not include the design and engineering costs. The estimated benefit of these improvements is $1,258,311 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 16.35.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 16.35, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$1,254,494
Travel Time	$3,389
Vehicle Operating Cost	$352
Emissions	$77
Total Benefits	**$1,258,311**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$76,983
Present Value Benefits ($ Dollars)	$1,258,311
Net Present Value ($ Dollars)	$1,181,328
Benefit / Cost Ratio	16.35

9.1.13 Intersection 13: Spring St & Walnut Ave

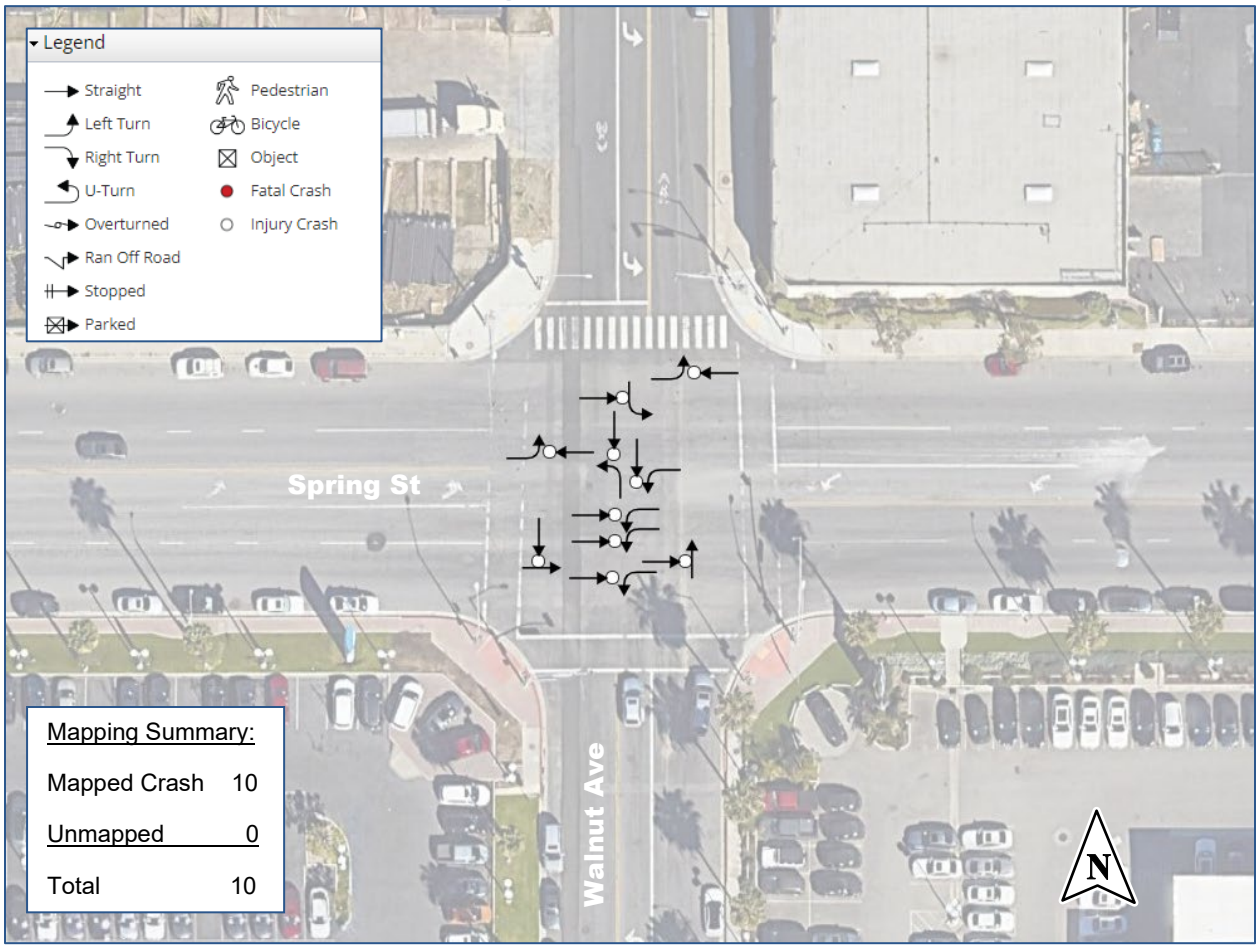
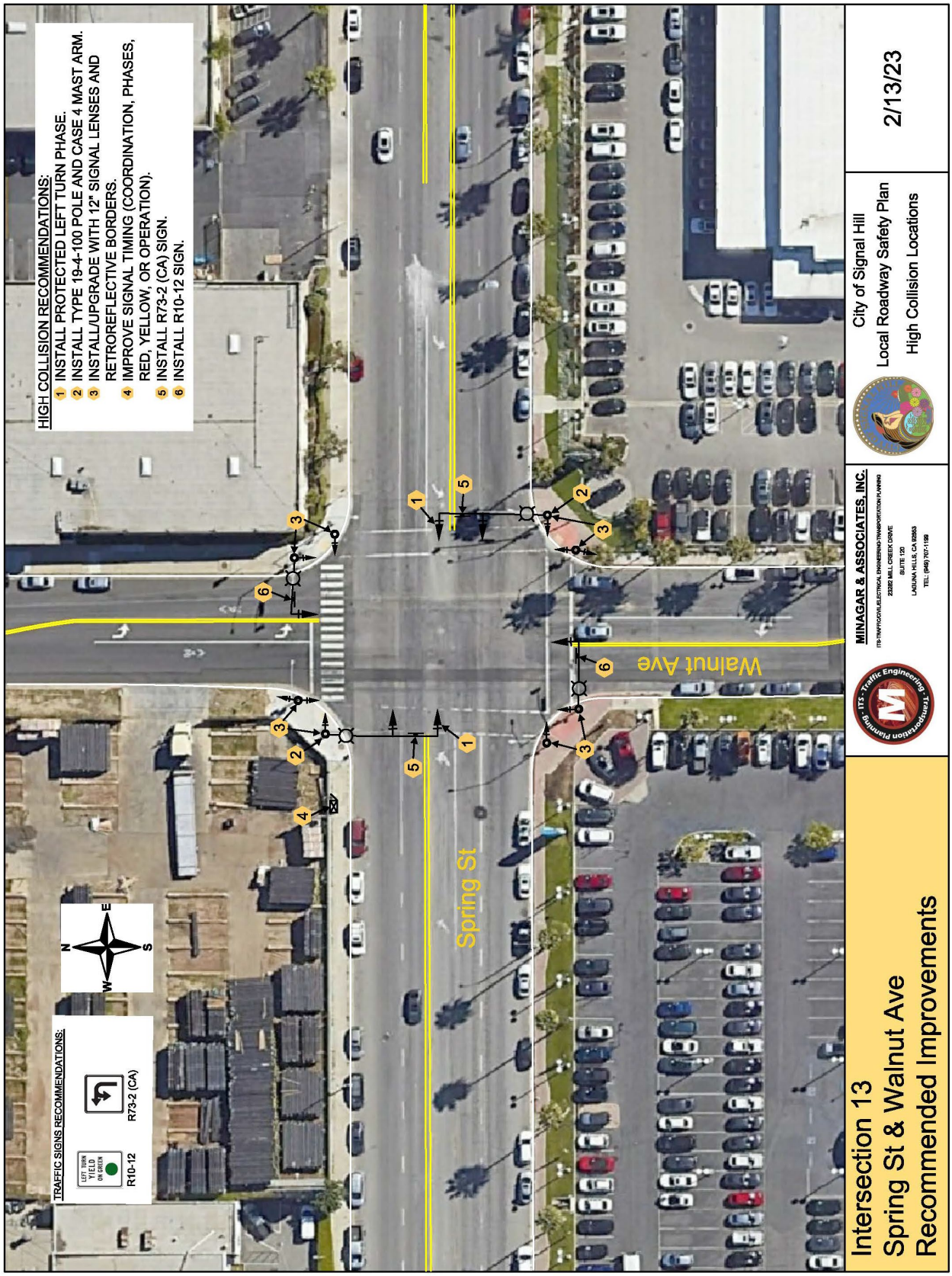


Figure 38: Intersection 13 Crash Diagram- 10 Collisions (January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 INSTALL PROTECTED LEFT TURN PHASE.
2 INSTALL TYPE 19-4-100 POLE AND CASE 4 MAST ARM.
3 INSTALL/UPGRADE WITH 12" SIGNAL LENSES AND RETROREFLECTIVE BORDERS.
4 IMPROVE SIGNAL TIMING (COORDINATION, PHASES, RED, YELLOW, OR OPERATION).
5 INSTALL R73-2 (CA) SIGN.
6 INSTALL R10-12 SIGN.
TRAFFIC SIGNS RECOMMENDATIONS:
R10-12
LEFT TURN YIELD ON GREEN
R73-2 (CA)
N
E
S
W
Spring St
Walnut Ave
Intersection 13
Spring St & Walnut Ave
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
ITS · Traffic Engineering · Transportation Planning
2/13/23
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations

9.1.13.1 Intersection 13 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Construction Cost Estimate:

Table 45: Intersection 13 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility		
						LRSM CM No. (S07)*	LRSM CM No. (S03)*	OS**
1	Install Protected Left Turn Phase (Left Turn Lane Already Exists)	LS	1	$ 106,000.00	$ 106,000.00	90%		
2	Install Type 19-4-100 Pole and Case 4 Mast Arm							
3	Install/Upgrade with 12" Signal Lenses and Retroreflective Borders							
4	Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)	LS	1	$ 50,000.00	$ 50,000.00		50%	
5	Install R73-2 (CA) Sign	EA	2	$ 575.00	$ 1,150.00			0%
6	Install R10-12 Sign	EA	2	$ 575.00	$ 1,150.00			0%
	Total				$ 158,300.00			
	Weighted Percentage (%)				100%	67.0%	31.6%	1.5%

* Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)
**OS: Other Safety-Related Improvements

Total Construction Cost:		$ 158,300.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 31,660.00
Total Construction Cost (Including Contingencies):		$ 189,960.00

Total Cost and Benefit:

The project's total cost is estimated at $189,960 which does not include the design and engineering costs. The estimated benefit of these improvements is $1,338,059 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 7.04.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 7.04, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$1,334,000
Travel Time	$3,603
Vehicle Operating Cost	$374
Emissions	$82
Total Benefits	**$1,338,059**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$189,960
Present Value Benefits ($ Dollars)	$1,338,059
Net Present Value ($ Dollars)	$1,148,099
Benefit / Cost Ratio	7.04

9.1.14 Intersection 14: Spring St & California Ave

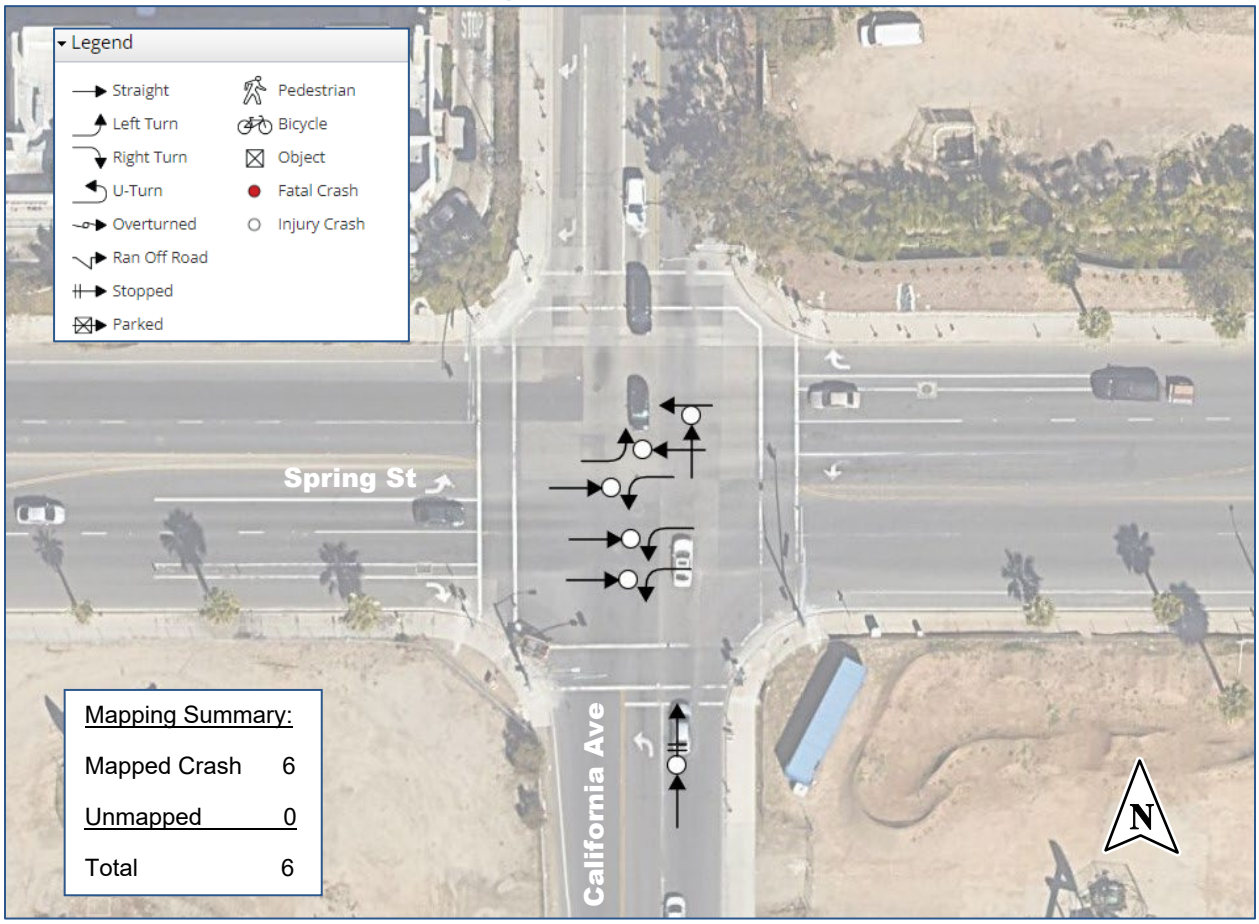
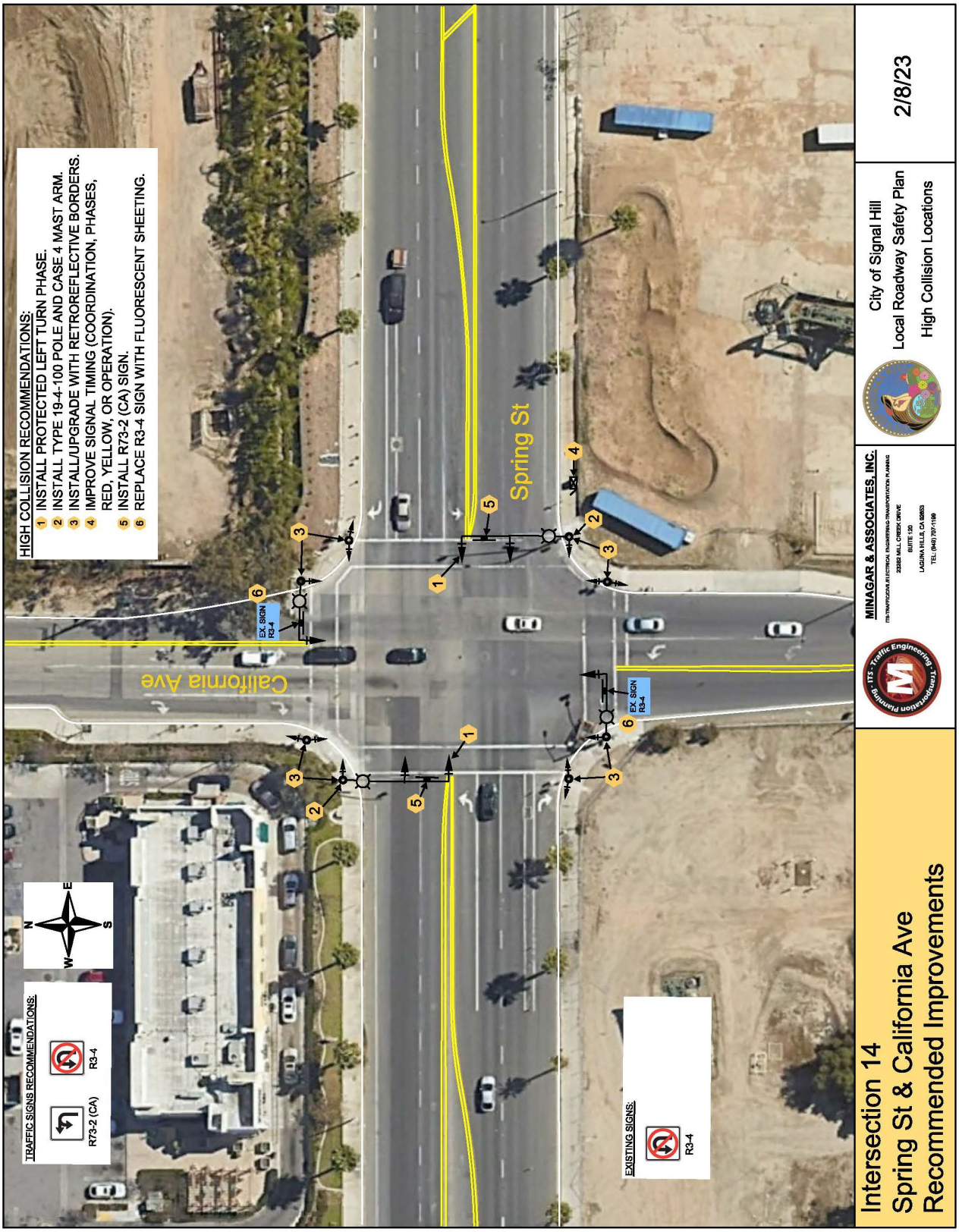


Figure 39: Intersection 14 Crash Diagram- 6 Collisions
(January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 INSTALL PROTECTED LEFT TURN PHASE.
2 INSTALL TYPE 19-4-100 POLE AND CASE 4 MAST ARM.
3 INSTALL/UPGRADE WITH RETROREFLECTIVE BORDERS.
4 IMPROVE SIGNAL TIMING (COORDINATION, PHASES, RED, YELLOW, OR OPERATION).
5 INSTALL R73-2 (CA) SIGN.
6 REPLACE R3-4 SIGN WITH FLUORESCENT SHEETING.
TRAFFIC SIGNS RECOMMENDATIONS:
R73-2 (CA)
R3-4
EXISTING SIGNS:
R3-4
EX. SIGN R3-4
EX. SIGN R3-4
California Ave
Spring St
N
E
S
W
Intersection 14
Spring St & California Ave
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
ITS-TRAFFIC/CIVIL/ELECTRICAL ENGINEERING-TRANSPORTATION PLANNING
22382 MILL CREEK DRIVE
SUITE 120
LAGUNA HILLS, CA 92653
TEL: (949) 707-1199
ITS - Traffic Engineering - Transportation Planning
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
2/8/23

9.1.14.1 Intersection 14 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Construction Cost Estimate:

Table 46: Intersection 14 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility		
						LRSM CM No. (S07)*	LRSM CM No. (S03)*	OS**
1	Install Protected Left Turn Phase (Left Turn Lane Already Exists)	LS	1	$ 101,000.00	$ 101,000.00	90%		
2	Install Type 19-4-100 Pole and Case 4 Mast Arm							
3	Install/Upgrade with Retroreflective Borders							
4	Improve Signal Timing (Coordination, Phases, Red, Yellow, or Operation)	LS	1	$ 50,000.00	$ 50,000.00		50%	
5	Install R73-2 (CA) Sign	EA	2	$ 575.00	$ 1,150.00			0%
6	Replace R3-4 Sign with Fluorescent Sheeting	EA	2	$ 575.00	$ 1,150.00			0%
	Total				$ 153,300.00			
	Weighted Percentage (%)				100%	65.9%	32.6%	1.5%

* Signalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)
**OS: Other Safety-Related Improvements

Total Construction Cost:	$	153,300.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 30,660.00
Total Construction Cost (Including Contingencies):	$	183,960.00

Total Cost and Benefit:

The project's total cost is estimated at $183,960 which does not include the design and engineering costs. The estimated benefit of these improvements is $1,296,110 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 7.05.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 7.05, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$1,293,688
Travel Time	$2,162
Vehicle Operating Cost	$224
Emissions	$35
Total Benefits	**$1,296,110**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$183,960
Present Value Benefits ($ Dollars)	$1,296,110
Net Present Value ($ Dollars)	$1,112,150
Benefit / Cost Ratio	7.05

9.1.15 Intersection 15: 33rd St & California Ave

Figure 40: Intersection 15 Crash Diagram- 2 Collisions
(January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 INSTALL LED FLASHING STOP SIGN.
2 INSTALL (R1-3P) SIGN.
TRAFFIC SIGNS RECOMMENDATIONS:
STOP
ALL WAY
R1-1
R1-3P
EXISTING SIGNS:
STOP
R1-1
EX. SIGN R1-1
STOP
33rd St
California Ave
N
S
E
W
Intersection 15
33rd St & California Ave
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
ITS-TRAFFIC/CIVIL/ELECTRICAL ENGINEERING/TRANSPORTATION PLANNING
22382 MILL CREEK DRIVE
SUITE 120
LAGUNA HILLS, CA 92653
TEL: (949) 707-1160
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
2/14/23

9.1.15.1 Intersection 15 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Construction Cost Estimate:

Table 47: Intersection 15 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility	
						LRSM CM No. (NS08)*	LRSM CM No. (NS06)*
1	Install LED Flashing Stop Sign	EA	4	$ 2,500.00	$ 10,000.00	90%	
2	Install R1-3P Sign	EA	4	$ 575.00	$ 2,300.00		90%
				Total	$ 12,300.00		
				Weighted Percentage (%)	100%	81.3%	18.7%

*Unsignalized Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)
**OS: Other Safety-Related Improvements

Total Construction Cost:	$	12,300.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 2,460.00
Total Construction Cost (Including Contingencies):	$	14,760.00

Total Cost and Benefit:

The project's total cost is estimated at $14,760 which does not include the design and engineering costs. The estimated benefit of these improvements is $90,285 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 6.12.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 6.12, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$89,961
Travel Time	$285
Vehicle Operating Cost	$30
Emissions	$9
Total Benefits	**$90,285**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$14,760
Present Value Benefits ($ Dollars)	$90,285
Net Present Value ($ Dollars)	$75,525
Benefit / Cost Ratio	6.12

9.2 High Collision Roadway Segments

9.2.1 Roadway Segment 1: Orange Ave (Willow St to 25th St)

Figure 41: Roadway Segment 1 Crash Diagram – 18 Collisions (January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 INSTALL PAVEMENT WORD MARKING AND LINES.
2 INSTALL [R10-7] SIGN.
3 INSTALL [W3-3] SIGN.
4 INSTALL [W3-4] SIGN.
EXISTING SIGNS
R30 (CA) custom
R3-7
R3-5R
W74 (CA)
R1-1
TRAFFIC SIGNS RECOMMENDATIONS:
R10-7
W3-3
W3-4
EX. SIGN R1-1
EX. SIGN R3-5 R
EX. SIGN W74 (CA)
EX. SIGN W74 (CA)
EX. SIGN R3-7
EX. SIGN R30 (CA) custom
WILLOW ST
ORANGE AVE
25TH ST
CLEAR
KEEP
Roadway Segment 1
Orange Ave (Willow St to 25th St)
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/8/22

9.2.1.1 Roadway Segment 1 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Construction Cost Estimate:

Table 48: Roadway Segment 1 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility	
						LRSM CM No. (R22)*	OS**
1	Install Pavement Word Marking and Lines	SQFT	151	$ 14.00	$ 2,114.00		0%
2	Install [R10-7] Sign	EA	1	$ 575.00	$ 575.00	90%	
3	Install [W3-3] Sign	EA	1	$ 575.00	$ 575.00	90%	
4	Install [W3-4] Sign	EA	1	$ 575.00	$ 575.00	90%	
				Total	$ 3,839.00		
				Weighted Average (%)	100%	44.9%	55.1%
	* Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)						
	**OS: Other Safety-Related Improvements						

Total Construction Cost:	$	3,839.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 767.80
Total Construction Cost (Including Contingencies):	$	4,606.80

Total Cost and Benefit:

The project's total cost is estimated at $4,607 which does not include the design and engineering costs. The estimated benefit of these improvements is $1,140,036 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 247.46.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 247.46, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$1,136,431
Travel Time	$3,193
Vehicle Operating Cost	$331
Emissions	$81
Total Benefits	**$1,140,036**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$4,607
Present Value Benefits ($ Dollars)	$1,140,036
Net Present Value ($ Dollars)	$1,135,429
Benefit / Cost Ratio	247.46

9.2.2 Roadway Segment 2: Orange Ave (28th St to Willow St)

Figure 42: Roadway Segment 2 Crash Diagram- 16 Collisions (January 1, 2017 – December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 REPAINT PAVEMENT ARROW MARKING.
2 INSTALL [SW4-1 (CA)] SIGN.
3 INSTALL [W1-7] & [N-1 (CA)] SIGN.
N
W
E
S
28TH ST
ORANGE AVE
WILLOW ST
EX. SIGN R3-8 custom
EX. SIGN R28(S) (CA)
EX. SIGN R2-1 (40)
EX. SIGN SW60 (CA)
EX. SIGN W3-3, W3-3P
EX. SIGN R9-3
EX. SIGN R28(S) (CA)
TRAFFIC SIGNS RECOMMENDATIONS:
SW4-1 (CA)
W1-7
N-1 (CA)
EXISTING SIGNS
R3-8 custom
SW60 (CA)
R28(S) (CA)
R30 (CA) custom
R9-3
W3-4
W74 (CA)
W3-3
W3-3P
R2-1
Roadway Segment 2
Orange Ave (28th St to Willow St)
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/8/22

9.2.2.1 Roadway Segment 2 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Construction Cost Estimate:

Table 49: Roadway Segment 2 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility	
						LRSM CM No. (R22)*	OS**
1	Repaint Pavement Arrow Marking	SQFT	60	$ 14.00	$ 840.00		0%
2	Install [SW4-1 (CA)] Sign	EA	1	$ 575.00	$ 575.00	90%	
3	Install [W1-7] & [N-1 (CA)] Sign	EA	2	$ 1,150.00	$ 2,300.00	90%	
				Total	$ 3,715.00		
				Weighted Average (%)	100%	77.4%	22.6%
	* Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)						
	**OS: Other Safety-Related Improvements						

Total Construction Cost:		$ 3,715.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 743.00
Total Construction Cost (Including Contingencies):		$ 4,458.00

Total Cost and Benefit:

The project's total cost is estimated at $4,458 which does not include the design and engineering costs. The estimated benefit of these improvements is $1,125,499 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 252.47.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 252.47, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$1,122,315
Travel Time	$2,838
Vehicle Operating Cost	$295
Emissions	$52
Total Benefits	**$1,125,499**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$4,458
Present Value Benefits ($ Dollars)	$1,125,499
Net Present Value ($ Dollars)	$1,121,041
Benefit / Cost Ratio	252.47

9.2.3 Roadway Segment 3: Orange Ave (Nevada St to 25th St)

Figure 43: Roadway Segment 3 Crash Diagram- 10 Collisions (January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 REPAINT PAVEMENT ARROW MARKING.
2 INSTALL [W1-7] & [N-1 (CA)] SIGN.
3 INSTALL [R2-1] (40) SIGN.
ORANGE AVE
25TH ST
NEVADA ST
EX. SIGN R1-1
EX. SIGN R2-1
EX. SIGN R30 (CA) custom
TRAFFIC SIGNS RECOMMENDATIONS:
SPEED LIMIT 35 R2-1
W1-7 N-1 (CA)
EXISTING SIGNS
STOP R1-1
NO R7-1
R30 (CA) custom
Roadway Segment 3
Orange Ave (Nevada St to 25th St)
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/8/22

9.2.3.1 Roadway Segment 3 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Construction Cost Estimate:

Table 50: Roadway Segment 3 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility	
						LRSM CM No. (R22)*	OS**
1	Repaint Pavement Arrow Marking	SQFT	30	$ 14.00	$ 420.00		0%
2	Install [W1-7] & [N-1 (CA)] Sign	EA	2	$ 1,150.00	$ 2,300.00	90%	
3	Install [R2-1] (40) Sign	EA	1	$ 575.00	$ 575.00	90%	
				Total	$ 3,295.00		
				Weighted Average (%)	100%	87.3%	12.7%
	* Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)						
	**OS: Other Safety-Related Improvements						

Total Construction Cost:		$ 3,295.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 659.00
Total Construction Cost (Including Contingencies):		$ 3,954.00

Total Cost and Benefit:

The project's total cost is estimated at $3,954 which does not include the design and engineering costs. The estimated benefit of these improvements is $829,872 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 209.88.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 209.88, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$827,868
Travel Time	$1,774
Vehicle Operating Cost	$184
Emissions	$46
Total Benefits	**$829,872**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$3,954
Present Value Benefits ($ Dollars)	$829,872
Net Present Value ($ Dollars)	$825,918
Benefit / Cost Ratio	209.88

9.2.4 Roadway Segment 4: Cherry Ave (27th St to 28th St)

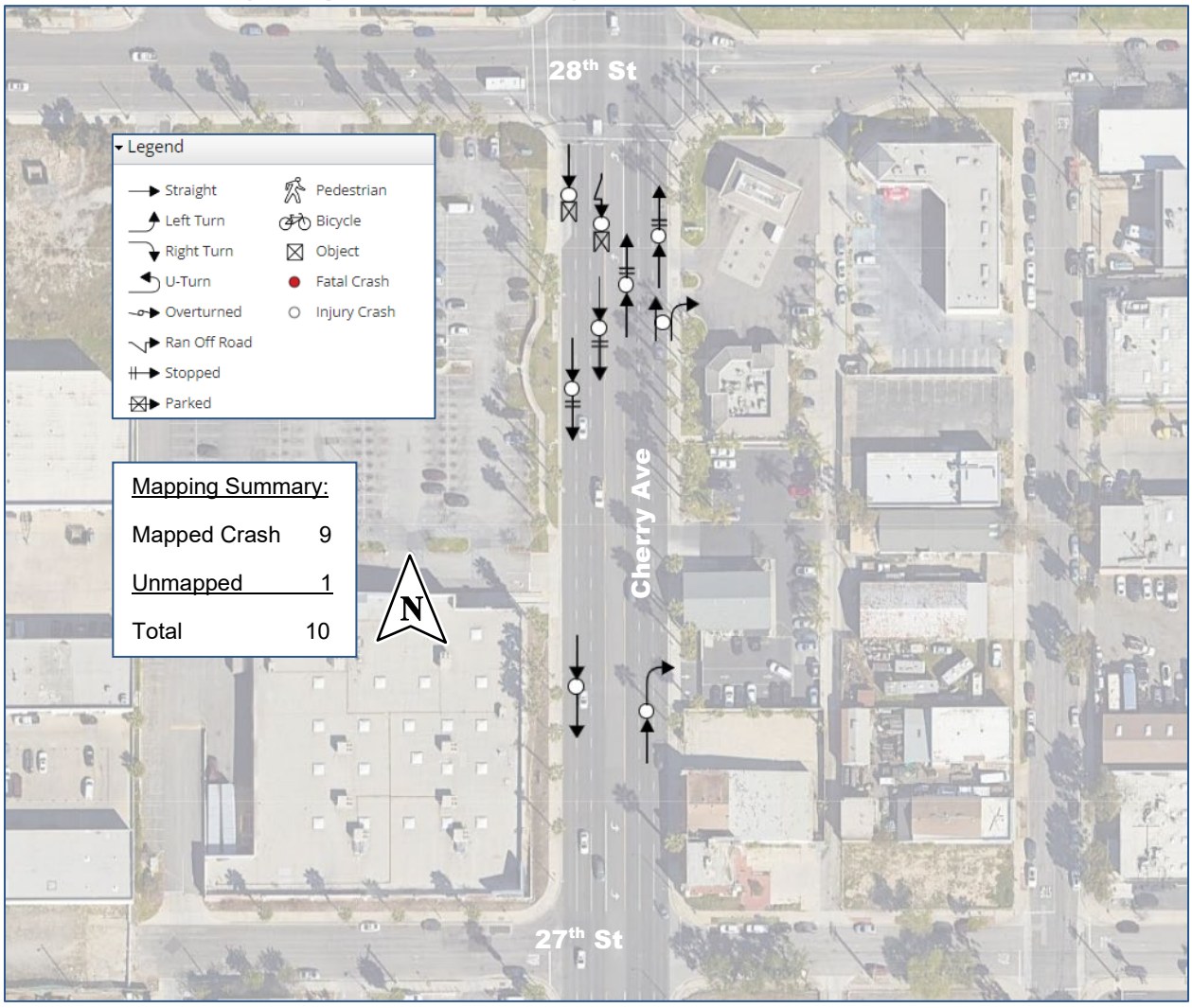


Figure 44: Roadway Segment 4 Crash Diagram- 10 Collisions (January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


28TH ST
CHERRY AVE
27TH ST
N
W
E
S
HIGH COLLISION RECOMMENDATIONS:
1 INSTALL [W2-1] SIGN.
2 INSTALL [R2-1] (40) SIGN.
3 INSTALL [W3-3] SIGN.
TRAFFIC SIGNS RECOMMENDATIONS:
W3-3
W2-1
R2-1
SPEED LIMIT 40
EXISTING SIGNS
R1-1
STOP
"NOT A THROUGH STREET"
R28(S) (CA)
R2-1
R28 (S) (CA)
EX. SIGN R2-1 (40), R28(S) (CA)
EX. SIGN R28(S) (CA)
EX. SIGN "NOT A THROUGH STREET"
EX. SIGN R1-1
Roadway Segment 4
Cherry Ave (27th St to 28th St)
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
ITS · Traffic Engineering · Transportation Planning
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/9/22

9.2.4.1 Roadway Segment 4 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Construction Cost Estimate:

Table 51: Roadway Segment 4 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility LRSM CM No. (R22)*
1	Install [W2-1] Sign	EA	1	$ 575.00	$ 575.00	90%
2	Install [R2-1] (40) Sign	EA	1	$ 575.00	$ 575.00	90%
3	Install [W3-3] Sign	EA	1	$ 575.00	$ 575.00	90%
				Total	$ 1,725.00	
				Weighted Average (%)	100%	100.0%
	* Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)					
	**OS: Other Safety-Related Improvements					

Total Construction Cost:		$ 1,725.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 345.00
Total Construction Cost (Including Contingencies):		$ 2,070.00

Total Cost and Benefit:

The project's total cost is estimated at $2,070 which does not include the design and engineering costs. The estimated benefit of these improvements is $658,674 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 318.2.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 318.2, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$656,676
Travel Time	$1,774
Vehicle Operating Cost	$184
Emissions	$40
Total Benefits	**$658,674**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$2,070
Present Value Benefits ($ Dollars)	$658,674
Net Present Value ($ Dollars)	$656,604
Benefit / Cost Ratio	318.2

9.2.5 Roadway Segment 5: Willow St (Orange Ave to Gundry Ave)

Figure 45: Roadway Segment 5 Crash Diagram- 9 Collisions (January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


GUNDRY AVE
GUNDRY AVE
WILLOW ST
ORANGE AVE
HIGH COLLISION RECOMMENDATIONS:
1 INSTALL [R2-1] (40) SIGN.
2 INSTALL [W2-2L] SIGN.
3 INSTALL [W2-2R] SIGN.
4 INSTALL [W1-7] & [N-1] (CA) SIGN.
5 INSTALL PAVEMENT WORD MARKING.
TRAFFIC SIGNS RECOMMENDATIONS:
EXISTING SIGNS
Roadway Segment 5
Willow St (Orange Ave to Gundry Ave)
Recommended Improvements
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/9/22
MINAGAR & ASSOCIATES, INC.

9.2.5.1 Roadway Segment 5 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Construction Cost Estimate:

Table 52: Roadway Segment 5 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility	
						LRSM CM No. (R22)*	OS**
1	Install [R2-1] (40) Sign	EA	1	$ 575.00	$ 575.00	90%	
2	Install [W2-2L] Sign	EA	1	$ 575.00	$ 575.00	90%	
3	Install [W2-2R] Sign	EA	2	$ 575.00	$ 1,150.00	90%	
4	Install [W1-7] & [N-1] (CA) Sign	EA	2	$ 1,150.00	$ 2,300.00	90%	
5	Install Pavement Word Marking	SQFT	189	$ 14.00	$ 2,646.00		0%
				Total	$ 7,246.00		
				Weighted Average (%)	100%	63.5%	36.5%
	* Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)						
	**OS: Other Safety-Related Improvements						

Total Construction Cost:	$	7,246.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 1,449.20
Total Construction Cost (Including Contingencies):	$	8,695.20

Total Cost and Benefit:

The project's total cost is estimated at $8,695 which does not include the design and engineering costs. The estimated benefit of these improvements is $838,882 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 96.48.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 96.48, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$837,091
Travel Time	$1,596
Vehicle Operating Cost	$166
Emissions	$29
Total Benefits	**$838,882**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$8,695
Present Value Benefits ($ Dollars)	$838,882
Net Present Value ($ Dollars)	$830,187
Benefit / Cost Ratio	96.48

9.2.6 Roadway Segment 6: Cherry Ave (Crescent Heights St to Burnett St)

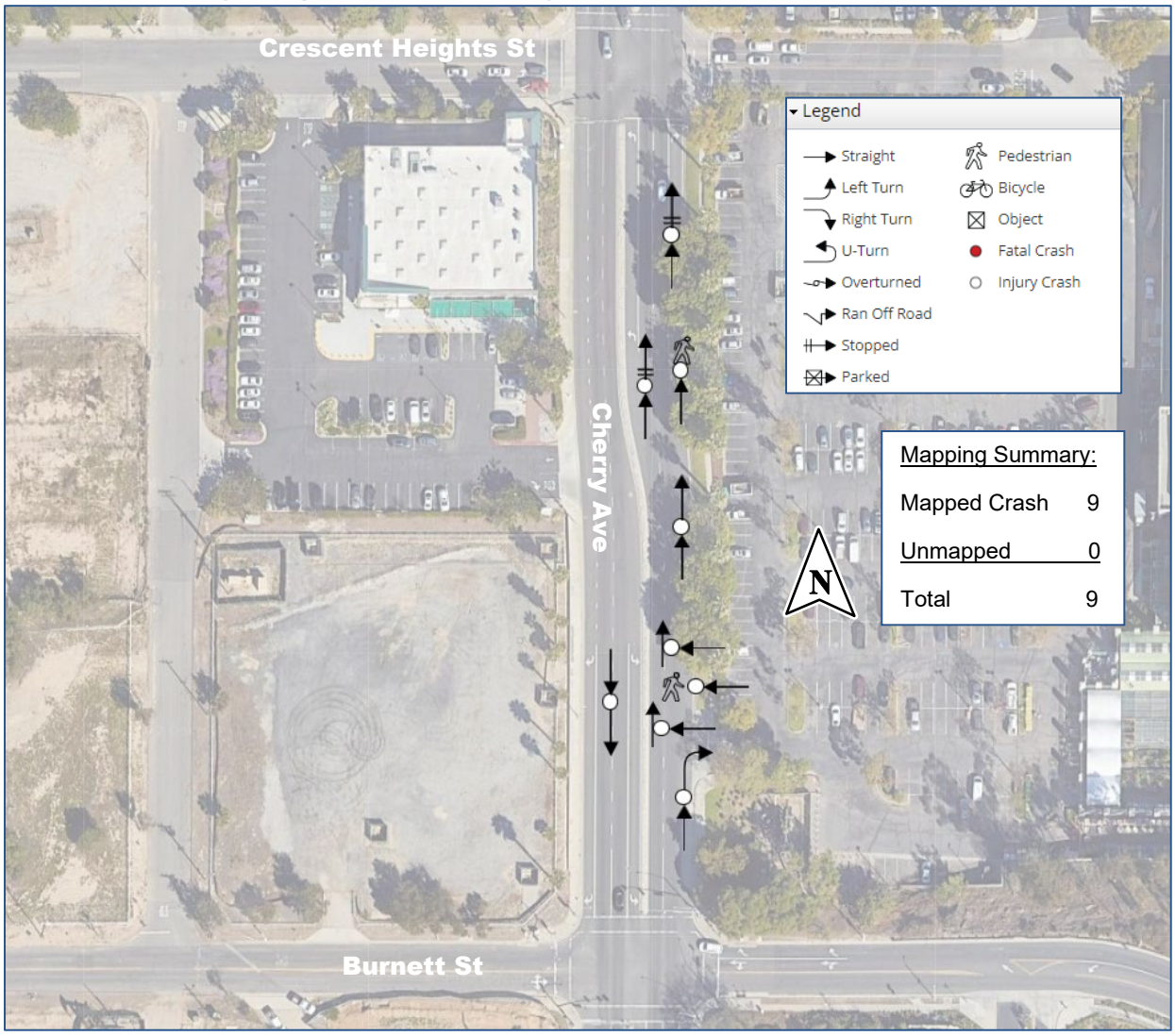


Figure 46: Roadway Segment 6 Crash Diagram- 9 Collisions (January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


CRESCENT HEIGHTS ST
CHERRY AVE
BURNETT ST
N
S
E
W
HIGH COLLISION RECOMMENDATIONS:
1 INSTALL [R2-1] (40) SIGN.
2 INSTALL [W3-3] SIGN.
3 INSTALL [R4-7] & [N-1] (CA) SIGN.
TRAFFIC SIGNS RECOMMENDATIONS:
R2-1
W3-3
R4-7
N-1 (CA)
EXISTING SIGNS
G20-2
R2-1
R3-7
R28(S) (CA)
W5-1
W11-1
W16-1P
R28(S) (CA)
W74 (CA)
R28(S) (CA)
R28(S) (CA)
EX. SIGN R3-7
EX. SIGN W5-1, W11-1, W16-1P, R28(S) (CA)
EX. SIGN R28(S) (CA)
EX. SIGN G20-2, R2-1 (40)
EX. SIGN R3-7
EX. SIGN R3-7, R28(S) (CA)
EX. SIGN R3-7
Roadway Segment 6
Cherry Ave (Crescent Heights St to Burnett St)
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/10/22

9.2.6.1 Roadway Segment 6 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Construction Cost Estimate:

Table 53: Roadway Segment 6 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility LRSM CM No. (R22)*
1	Install [R2-1] (40) Sign	EA	1	$ 575.00	$ 575.00	90%
2	Install [W3-3] Sign	EA	2	$ 575.00	$ 1,150.00	90%
3	Install [R4-7] & [N-1] (CA) Sign	EA	2	$ 1,150.00	$ 2,300.00	90%
				Total	$ 4,025.00	
				Weighted Average (%)	100%	100.0%
	* Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)					
	**OS: Other Safety-Related Improvements					

Total Construction Cost:	$	4,025.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 805.00
Total Construction Cost (Including Contingencies):	$	4,830.00

Total Cost and Benefit:

The project's total cost is estimated at $4,830 which does not include the design and engineering costs. The estimated benefit of these improvements is $570,018 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 118.02.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 118.02, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$569,215
Travel Time	$1,596
Vehicle Operating Cost	$166
Emissions	$40
Total Benefits	**$570,018**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$4,830
Present Value Benefits ($ Dollars)	$570,018
Net Present Value ($ Dollars)	$565,188
Benefit / Cost Ratio	118.02

9.2.7 Roadway Segment 7: Cherry Ave (21st St to 20th St)

Figure 47: Roadway Segment 7 Crash Diagram- 8 Collisions (January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


HIGH COLLISION RECOMMENDATIONS:
1 INSTALL [W3-3] SIGN.
2 INSTALL [R30A] (CA) CUSTOM SIGN.
3 INSTALL PAVEMENT WORD MARKING.
TRAFFIC SIGNS RECOMMENDATIONS:
W3-3
R30A (CA) custom
EXISTING SIGNS
SR4-1 (CA)
SR4-1 (CA) Vehicle Speed Feedback Sign
S1-1
W11-2
R30A (CA) custom
CHERRY ST
21ST ST
20TH ST
EX. SIGN 30(A) (CA) CUSTOM
EX. SIGN W11-2
EX. SIGN S1-1
EX. SIGN SR4-1
EX. SIGN SR4-1 Vehicle Speed Feedback Sign
HEAD AREA
SIGNS
STRIPES
MINAGAR & ASSOCIATES, INC.
ITS-TRAFFIC/CIVIL/ELECTRICAL ENGINEERING-TRANSPORTATION PLANNING
22982 MILL CREEK DRIVE
SUITE 190
LAGUNA HILLS, CA 92653
TEL: (949) 707-1199
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/11/22
Roadway Segment 7
Cherry Ave (21st St to 20th St)
Recommended Improvements

9.2.7.1 Roadway Segment 7 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Construction Cost Estimate:

Table 54: Roadway Segment 7 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility	
						LRSM CM No. (R22)*	OS**
1	Install [W3-3] Sign	EA	2	$ 575.00	$ 1,150.00	90%	
2	Install [R30A] (CA) Custom Sign	EA	5	$ 575.00	$ 2,875.00	90%	
3	Install Pavement Word Marking	SQFT	252	$ 14.00	$ 3,528.00		0%
				Total	$ 7,553.00		
				Weighted Average (%)	100%	53.3%	46.7%
	* Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)						
	**OS: Other Safety-Related Improvements						

Total Construction Cost:	$	7,553.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 1,510.60
Total Construction Cost (Including Contingencies):	$	9,063.60

Total Cost and Benefit:

The project's total cost is estimated at $9,064 which does not include the design and engineering costs. The estimated benefit of these improvements is $546,472 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 60.29.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 60.29, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$544,877
Travel Time	$1,419
Vehicle Operating Cost	$147
Emissions	$29
Total Benefits	**$546,472**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$9,064
Present Value Benefits ($ Dollars)	$546,472
Net Present Value ($ Dollars)	$537,408
Benefit / Cost Ratio	60.29

9.2.8 Roadway Segment 8: Willow St (Junipero Ave to Signal Pkwy)

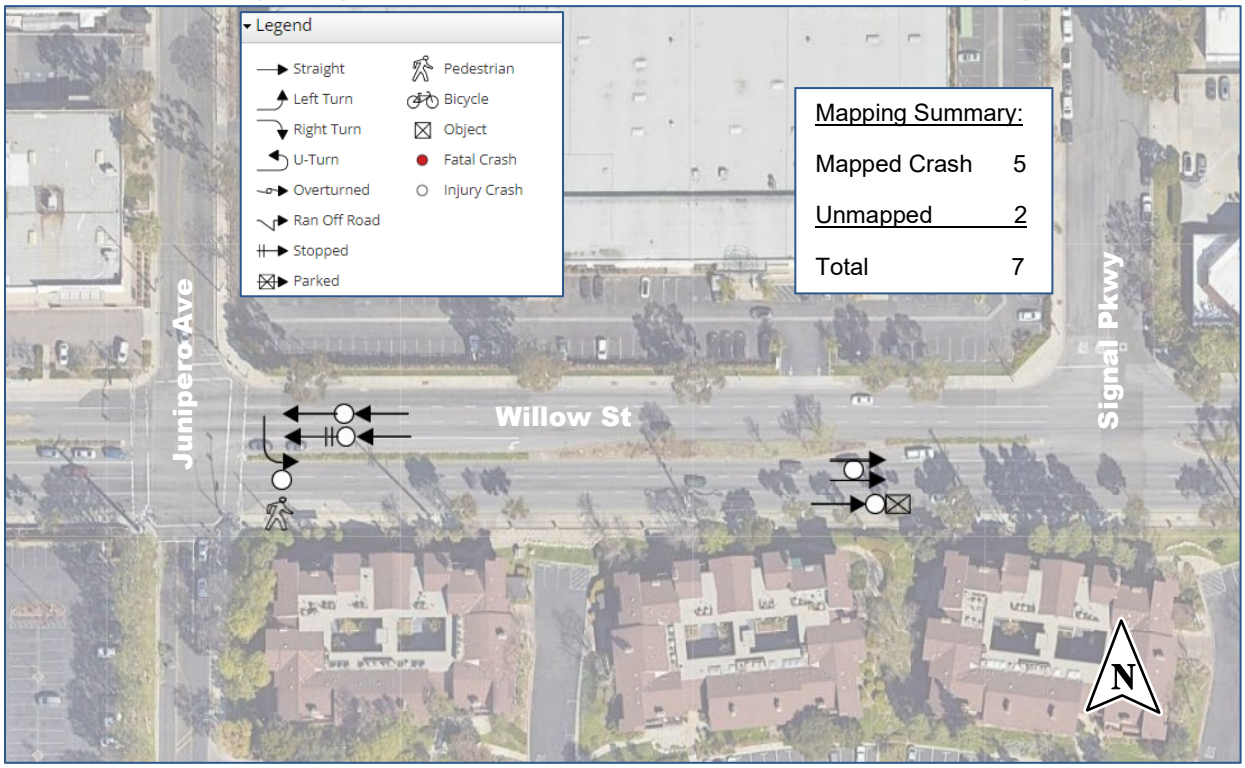
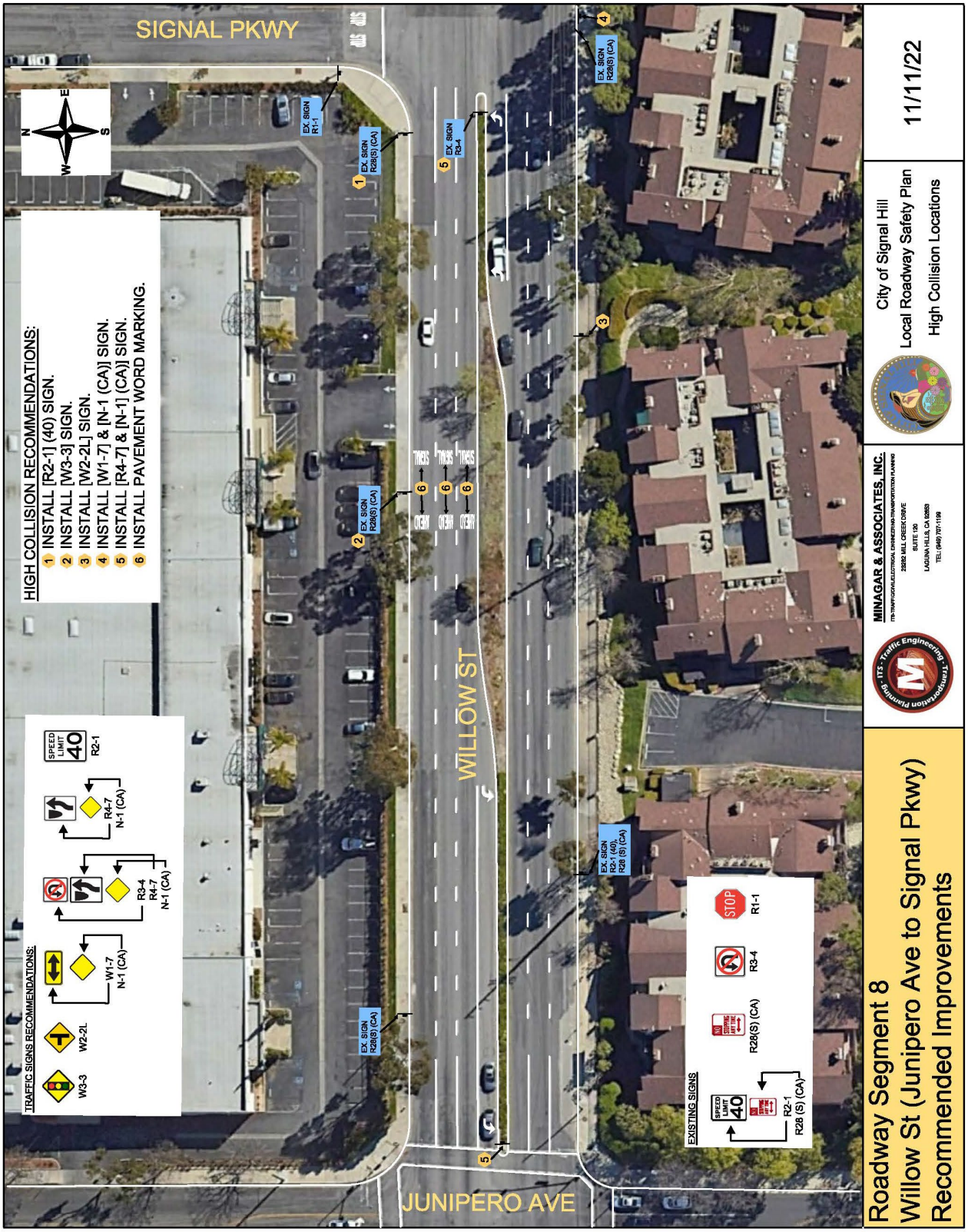


Figure 48: Roadway Segment 8 Crash Diagram- 7 Collisions (January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


SIGNAL PKWY
WILLOW ST
JUNIPERO AVE
HIGH COLLISION RECOMMENDATIONS:
1 INSTALL [R2-1] (40) SIGN.
2 INSTALL [W3-3] SIGN.
3 INSTALL [W2-2L] SIGN.
4 INSTALL [W1-7] & [N-1 (CA)] SIGN.
5 INSTALL [R4-7] & [N-1] (CA)] SIGN.
6 INSTALL PAVEMENT WORD MARKING.
TRAFFIC SIGNS RECOMMENDATIONS:
W3-3
W2-2L
W1-7 N-1 (CA)
R3-4 R4-7 N-1 (CA)
R4-7 N-1 (CA)
SPEED LIMIT 40 R2-1
EXISTING SIGNS
SPEED LIMIT 40
R2-1 R28 (S) (CA)
R28(S) (CA)
R3-4
STOP R1-1
EX. SIGN R28(S) (CA)
EX. SIGN R1-1
EX. SIGN R3-4
EX. SIGN R2-1 (40) R28 (S) (CA)
SIGNAL AHEAD
Roadway Segment 8
Willow St (Junipero Ave to Signal Pkwy)
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/11/22

9.2.8.1 Roadway Segment 8 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Construction Cost Estimate:

Table 55: Roadway Segment 8 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility	
						LRSM CM No. (R22)*	OS**
1	Install [R2-1] (40) Sign	EA	1	$ 575.00	$ 575.00	90%	
2	Install [W3-3] Sign	EA	1	$ 575.00	$ 575.00	90%	
3	Install [W2-2L] Sign	EA	1	$ 575.00	$ 575.00	90%	
4	Install [W1-7] & [N-1 (CA)] Sign	EA	1	$ 1,150.00	$ 1,150.00	90%	
5	Install [R4-7] & [N-1 (CA)] Sign	EA	2	$ 1,150.00	$ 2,300.00	90%	
6	Install Pavement Word Marking	SQFT	189	$ 14.00	$ 2,646.00		0%
				Total	$ 7,821.00		
				Weighted Average (%)	100%	58.8%	33.8%
	* Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)						
	**OS: Other Safety-Related Improvements						

Total Construction Cost:	$	7,821.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 1,564.20
Total Construction Cost (Including Contingencies):	$	9,385.20

Total Cost and Benefit:

The project's total cost is estimated at $9,385 which does not include the design and engineering costs. The estimated benefit of these improvements is $726,680 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 77.43.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 77.43, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$725,292
Travel Time	$1,242
Vehicle Operating Cost	$129
Emissions	$17
Total Benefits	**$726,680**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$9,385
Present Value Benefits ($ Dollars)	$726,680
Net Present Value ($ Dollars)	$717,295
Benefit / Cost Ratio	77.43

9.2.9 Roadway Segment 9: Orange Ave (Burnett St to 23rd St)

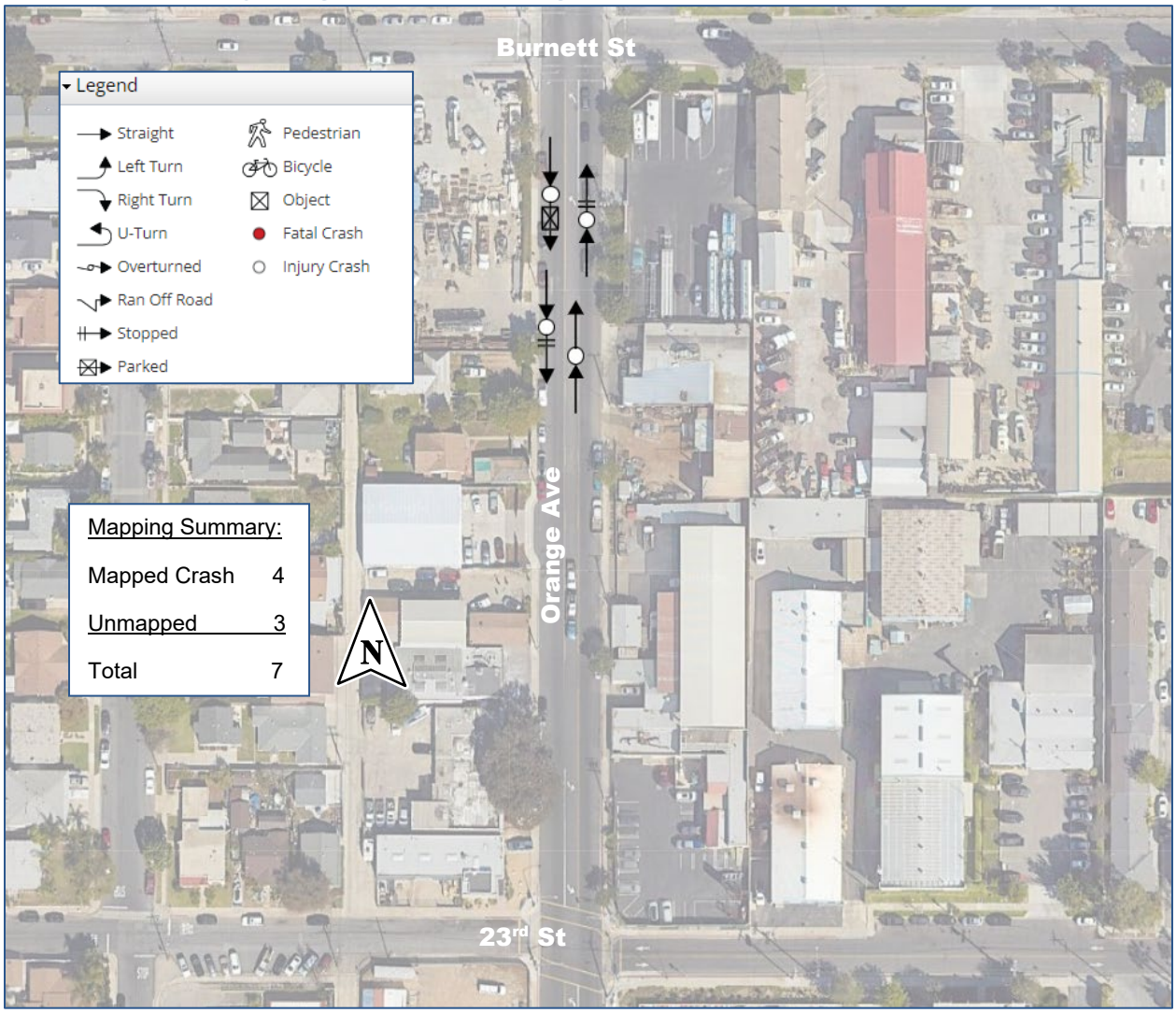


Figure 49: Roadway Segment 9 Crash Diagram- 7 Collisions (January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


WILLOW ST
CHERRY AVE
CRESCENT HEIGHTS ST
N
W
E
S
HIGH COLLISION RECOMMENDATIONS:
1 INSTALL [R2-1] (40) SIGN.
2 INSTALL [W3-3] SIGN.
3 INSTALL [R4-7] & [N-1] (CA) SIGN.
TRAFFIC SIGNS RECOMMENDATIONS:
R2-1
W3-3
R4-7
N-1 (CA)
EXISTING SIGNS
R28(S) (CA)
R9-3
R9-3bP L
R28 (S) (CA)
R9-3
R9-3bP R
R3-7
R28(S) (CA)
C23 (CA)
EX. SIGN R28 (S) (CA)
EX. SIGN R28(S) (CA)
EX. SIGN R9-3, R9-3bP R
EX. SIGN R9-3, R9-3bP L
EX. SIGN R3-7, R28(S) (CA)
Roadway Segment 10
Cherry Ave (Willow St to Crescent Heights St)
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
ITS-TRANSPORTATION/ELECTRICAL ENGINEERING-TRANSPORTATION PLANNING
25292 MILL CREEK DRIVE
SUITE 150
LAGUNA HILLS, CA 92653
TEL: (949) 707-1199
ITS · Traffic Engineering · Transportation Planning
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/10/22

9.2.9.1 Roadway Segment 9 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Construction Cost Estimate:

Table 56: Roadway Segment 9 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility	
						LRSM CM No. (R22)*	OS**
1	Install [R2-1] (35) Sign	EA	1	$ 575.00	$ 575.00	90%	
2	Install [W3-3] Sign	EA	2	$ 575.00	$ 1,150.00	90%	
3	Install Pavement Word Marking	SQFT	126	$ 14.00	$ 1,764.00		0%
				Total	$ 3,489.00		
				Weighted Average (%)	100%	49.4%	50.6%
	* Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)						
	**OS: Other Safety-Related Improvements						

Total Construction Cost:	$	3,489.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 697.80
Total Construction Cost (Including Contingencies):	$	4,186.80

Total Cost and Benefit:

The project's total cost is estimated at $4,187 which does not include the design and engineering costs. The estimated benefit of these improvements is $490,371 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 117.12.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 117.12, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$488,978
Travel Time	$1,242
Vehicle Operating Cost	$129
Emissions	$23
Total Benefits	**$490,371**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$4,187
Present Value Benefits ($ Dollars)	$490,371
Net Present Value ($ Dollars)	$486,184
Benefit / Cost Ratio	117.12

9.2.10 Roadway Segment 10: Cherry Ave (Willow St to Crescent Heights St)

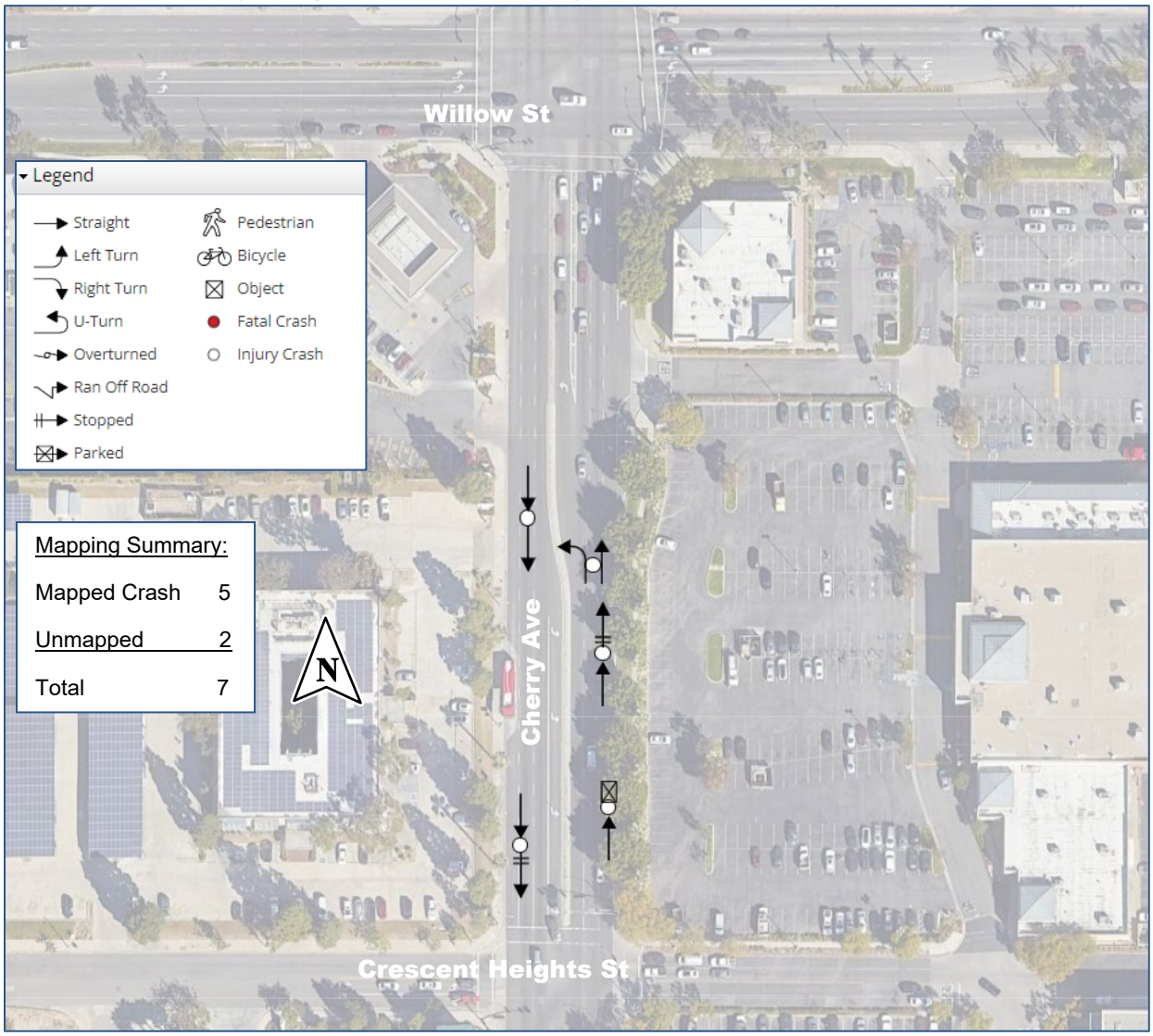


Figure 50: Roadway Segment 10 Crash Diagram- 7 Collisions (January 1, 2017 - December 31, 2021)

Source: University of California, Berkeley Transportation Injury Mapping System (TIMS)
*Collision Locations are approximate due to the size and overlapping of collisions


WILLOW ST
CHERRY AVE
CRESCENT HEIGHTS ST
HIGH COLLISION RECOMMENDATIONS:
1 INSTALL [R2-1] (40) SIGN.
2 INSTALL [W3-3] SIGN.
3 INSTALL [R4-7] & [N-1] (CA) SIGN.
TRAFFIC SIGNS RECOMMENDATIONS:
R2-1
W3-3
R4-7
N-1 (CA)
EXISTING SIGNS
R28(S) (CA)
R9-3
R9-3bP L
R28 (S) (CA)
R9-3
R9-3bP R
R3-7
R28(S) (CA)
C23 (CA)
EX. SIGN R28 (S) (CA)
EX. SIGN R28(S) (CA)
EX. SIGN R3-3, R9-3bP R
EX. SIGN R9-3, R9-3bP L
EX. SIGN R3-7, R28(S) (CA)
Roadway Segment 10
Cherry Ave (Willow St to Crescent Heights St)
Recommended Improvements
MINAGAR & ASSOCIATES, INC.
City of Signal Hill
Local Roadway Safety Plan
High Collision Locations
11/10/22

9.2.10.1 Roadway Segment 10 Cost Estimate and Cost/Benefit Analysis

The following table represents the preliminary line-item cost for the proposed countermeasures. Line-item costs are derived from the Caltrans contract cost database for District 7.

Construction Cost Estimate:

Table 57: Roadway Segment 10 Cost Estimate

No.	Item Description	Unit	Quantity	Unit Cost	Total	HSIP Funding Eligibility LRSM CM No. (R22)*
1	Install [R2-1] (40) Sign	EA	2	$ 575.00	$ 1,150.00	90%
2	Install [W3-3] Sign	EA	2	$ 575.00	$ 1,150.00	90%
3	Install [R4-7] & [N-1] (CA) Sign	EA	2	$ 1,150.00	$ 2,300.00	90%
				Total	$ 4,600.00	
				Weighted Average (%)	100%	50.0%
	* Roadway Countermeasure Identification of Local Roadway Safety Manual (Version 1.6, April 2022)					
	**OS: Other Safety-Related Improvements					

Total Construction Cost:		$ 4,600.00
Contingencies percentage of the aforementioned Total Construction Cost:	20%	$ 920.00
Total Construction Cost (Including Contingencies):		$ 5,520.00

Total Cost and Benefit:

The project's total cost is estimated at $5,520 which does not include the design and engineering costs. The estimated benefit of these improvements is $457,816 based on the Highway Safety Benefit-Cost Analysis Model (Version 2.0). The resulting Benefit-Cost ratio is 82.94.

The current HSIP Cycle 11 program has a required minimum B/C ratio (BCR) of 3.5 for a BCR Application. With a B/C ratio of 82.94, the proposed intersection improvement project is eligible for HSIP funding and is considered a competitive HSIP project.

Itemized Benefits	
Safety	$456,417
Travel Time	$1,242
Vehicle Operating Cost	$129
Emissions	$29
Total Benefits	**$457,816**

Summary of Total Cost & Benefit	
Present Value Costs ($ Dollars)	$5,520
Present Value Benefits ($ Dollars)	$457,816
Net Present Value ($ Dollars)	$452,296
Benefit / Cost Ratio	82.94

Table 58: Total Construction Cost of Intersections and Roadway Segments

Intersection/ Roadway Segment	Street Name(s)	Benefit/Cost Ratio (3.5 minimum)	Total Construction Cost (Including Contingencies)	HSIP Amount (Including Contingencies)	Local Amount (Including Contingencies)
Intersection 1	Spring St & Orange Ave	N/A	N/A	N/A	N/A
Intersection 2	Willow St & Orange Ave	48.63	$ 75,894.00	$ 45,211.08	$ 30,682.92
Intersection 3	Willow St & Town Ctr	133.48	$ 69,820.20	$ 39,390.18	$ 30,430.02
Intersection 4	Willow St & California Ave	8.37	$ 191,544.00	$ 148,803.60	$ 42,740.40
Intersection 5	Willow St & Junipero Ave	27.54	$ 76,451.40	$ 45,452.46	$ 30,998.94
Intersection 6	Hill St & Obispo Ave	87.78	$ 17,997.00	$ 16,197.30	$ 1,799.70
Intersection 7	Spring St & Cherry Ave	104.35	$ 75,364.20	$ 44,016.18	$ 31,348.02
Intersection 8	Burnett St/Skyline Dr & Cherry Ave	28.8	$ 73,296.60	$ 42,311.94	$ 30,984.66
Intersection 9	Willow St & Temple Ave	5.11	$ 302,760.00	$ 248,760.00	$ 54,000.00
Intersection 10	Willow St & Walnut Ave	35.31	$ 309,138.60	$ 254,914.74	$ 54,223.86
Intersection 11	Route 1 & Redondo Ave	24.36	$ 65,082.00	$ 34,649.40	$ 30,432.60
Intersection 12	Cherry Ave & 21st St	16.35	$ 76,983.00	$ 75,284.70	$ 1,698.30
Intersection 13	Spring St & Walnut Ave	7.04	$ 189,960.00	$ 147,240.00	$ 42,720.00
Intersection 14	Spring St & California Ave	7.05	$ 183,960.00	$ 141,840.00	$ 42,120.00
Intersection 15	33rd St & California Ave	6.12	$ 14,760.00	$ 13,284.00	$ 1,476.00
Roadway Segment 1	Orange Ave (Willow St to 25th St)	247.46	$ 4,606.80	$ 4,399.80	$ 207.00
Roadway Segment 2	Orange Ave (28th St to Willow St)	252.47	$ 4,458.00	$ 4,113.00	$ 345.00
Roadway Segment 3	Orange Ave (Nevada St to 25th St)	209.88	$ 3,954.00	$ 3,609.00	$ 345.00
Roadway Segment 4	Cherry Ave (27th St to 28th St)	318.2	$ 2,070.00	$ 1,863.00	$ 207.00
Roadway Segment 5	Willow St (Orange Ave to Gundy Ave)	96.48	$ 8,695.20	$ 8,143.20	$ 552.00
Roadway Segment 6	Cherry Ave (Crescent Heights St to Burnett St)	118.02	$ 4,830.00	$ 4,347.00	$ 483.00
Roadway Segment 7	Cherry Ave (21st St to 20th St)	60.29	$ 9,063.60	$ 8,580.60	$ 483.00
Roadway Segment 8	Willow St (Junipero Ave to Signal Pkwy)	77.43	$ 9,385.20	$ 8,764.20	$ 621.00
Roadway Segment 9	Orange Ave (Burnett St to 23rd St)	117.12	$ 4,186.80	$ 3,979.80	$ 207.00
Roadway Segment 10	Cherry Ave (Willow St to Crescent Heights St)	82.94	$ 5,520.00	$ 4,968.00	$ 552.00
Total			**$ 1,779,780.60**	**$1,350,123.18**	**$ 429,657.42**

10.1 City of Signal Hill Stakeholders Meeting Minutes

Date: Monday, October 24th, 2022

Time: 10 AM to 12 PM

Facilitator: Patrick Kelley- Project Manager, City of Signal Hill

Attendees:

- Don Moreno- Signal Hill Police Department
- Adrian Jimenez- Signal Hill Police Department
- Tim Bauer- Los Angeles County Fire Department
- Patrick Kelley- Signal Hill Public Works
- Jesus Saldana- Signal Hill Public Works
- Ethan Rucker- Signal Hill Public Works
- Paul Van Dyk- Long Beach Public Works
- Ricardo Light- Long Beach Public Works
- Christopher Cordero- WGZE
- Tracy Nishihira- Long Beach Unified School District
- Fred Minagar- Minagar & Associates, Inc.
- Phillip Nguyen- Minagar & Associates, Inc.

Meeting Agenda:

Project Manager Fred Minagar of Minagar & Associates Inc. presented the City of Signal Hill Local Roadway Plan “LRSP” Presentation to Stakeholders and attendees of the meeting. Fred gave an introduction of the LRSP where he discusses the mission, vision, and goals of the LRSP. Along with that, contents of the LRSP data and statistics were displayed in the presentation with top collision intersections and roadway segments. Lastly, countermeasure development and project timeline were discussed in terms of the next steps in finalizing the LRSP.

After the conclusion of the presentation, Minagar and Associates, Inc. opened up for questions. Officer Moreno asked about the daytime transit traffic versus the nighttime transit traffic. Fred Minagar responded that the subject would be something taken a look into. Tim Bauer of LA County Fire Department added a comment that vehicles tend to be involved in red light running-related collisions. Jesus Saldana asked if the next stakeholders meeting will have countermeasures. Fred Minagar responded that the completed Draft LRSP will be discussed in the next stakeholders meeting. Tim Bauer of LA County Fire Department mentioned that oftentimes, drivers are driving under the influence, whether it was alcohol or drugs. Paul Van Dyk of Long Beach Public Works offered some countermeasures that were done for the City of Long Beach and offered the Safe Streets Long Beach Plan as reference for the development of Signal Hill’s LRSP.

The meeting was concluded and a completed Draft report of the LRSP will be presented for the next stakeholders meeting.

11.1 Sources of Funding

The City should continue to seek available funding and grant opportunities from local, state, and federal resources to expedite the process in implementing safety improvements. Below are the main funding programs and grants for which the City of Signal Hill can apply.

1) Highway Safety Improvement Program (HSIP)

The Highway Safety Improvement Program (HSIP) is a Federal program operating under the Fixing America's Surface Transportation (FAST) Act. This program apportions funding as a lump sum for each state, which is then divided among apportioned programs. These funds can be used for projects to preserve or improve safety conditions and performance on any Federal-aid highway, bridge projects on any public road, facilities for non-motorized transportation, and other project types. Safety improvement projects eligible for this funding include new or upgraded traffic signals, upgraded guard rails, pedestrian warning flashing beacons, and marked crosswalks. California's local HSIP focuses on infrastructure projects with national recognized crash reduction factors. Additional information about this program at the Federal level can be found on https://highways.dot.gov/safety/hsip . California specific HSIP information can be found on https://dot.ca.gov/programs/local-assistance/fed-and-state-programs/highway-safety-improvement-program .

2) Caltrans Active Transportation Program (ATP)

Caltrans Active Transportation Program (ATP) is a statewide funding program created in 2013, consolidating several federal and state programs. The ATP funds projects that encourage increased mode share for walking and bicycling, improve mobility and safety for non0motorized users, enhance public health, and decrease greenhouse gas emissions. Projects that are eligible for this funding include bicycle and pedestrian infrastructure projects, bicycle and pedestrian planning projects (safe routes to schools), and non-infrastructure programs (education and enforcement). Additional information about this program can be found on https://dot.ca.gov/programs/local-assistance/fed-and-state-programs/active-transportation-program .

3) State Transportation Improvement Program (STIP)

The State Transportation Improvement Program (STIP) provides state and federal gas tax money for improvements both on and off the state highway system. STIP programming occurs every two years. The programming cycle begins with the release of a proposed fund estimate, followed by California Transportation Commission (CTC) adoption of the fund estimate. The fund estimate serves to identify the amount of new funds available for the programming of transportation projects. Caltrans prepares the Interregional Transportation Improvement Program (ITIP) using Interregional Improvement Program (IIP) funds, and regional agencies prepare Regional Transportation Improvement Programs (RTIPs)using Regional Improvement Program (RIP) funds. The STIP is then adopted by the CTC. Additional information about this program can be found on https://dot.ca.gov/programs/local-assistance/fed-and-state-programs/state-transportation-improvement-program .

4) California Senate Bill 1 (SB 1)

SB 1 is a landmark transportation investment to rebuild California by fixing neighborhood streets, freeways, and bridges in communities across California and targeting funds toward transit and congested trade and commute corridor improvements. The legislative package invests $54 billion over the next decade and puts more dollars towards transit and safety. SB 1 provides the first significant, stable, and ongoing increase in state transportation funding in over two decades. It allows local agencies and Caltrans to fix California's roads and bridges, reduce traffic delays, improve goods movement, and increase options for transit, intercity rail, and active transportation. SB 1 increases funding for California's transportation system by an average of $5.4 billion annually, split between state and local investments. SB 1 invests more than $5 billion annually directly for maintenance, repair, and safety improvements on state highways, local streets and roads, bridges, tunnels and overpasses; $1.5 billion of which will be allocated towards local streets and roads. Additional information about this program can be found on http://rebuildingca.ca.gov/ .

5) California Office of Traffic Safety (OTS) Grants

This program has funding for projects related to traffic safety, including transportation safety education and encouragement activities. Grants applications must be supported by local crash data and must relate to the following priority program areas such as alcohol impaired driving, distracted driving, drug-impaired emergency medical services, motorcycle safety, occupant protection, pedestrian and bicycle safety, police traffic services, public relations, advertising, and marketing program, and roadway safety and traffic records. Additional information about this program can be found on https://www.ots.ca.gov/grants/ .

12.1 Recommended Intersection & Street Segment Enhancements Matrix

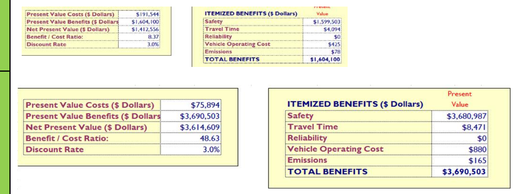
Signal Hill Local Roadways Safety Program
Recommended Safety Enhancements

LOCAL ROAD SAFETY PLANS: Your Map to Safer Roadways

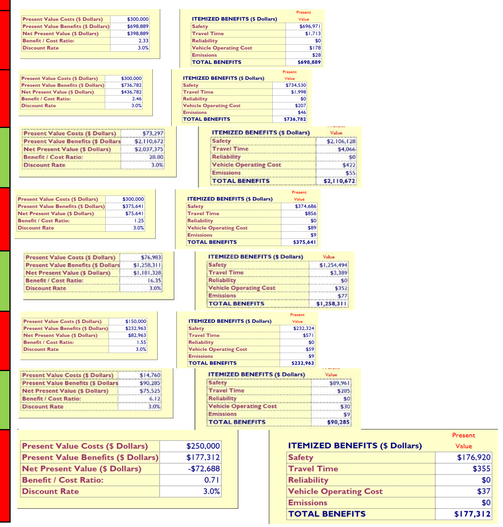
INTERSECTION ENHANCEMENTS

5/16/2023

No.	LRSP Intersection Ranking Number	Street	Street	City's Recommendations	City's Suggested Cost	City's Suggested Cost/Intersection	City's Comments	Countermeasure Number(s) Per Caltrans LRSM Version 1.6, April 2022	UPDATED Minagar & Associates Recommendations	UPDATED Minagar & Associates Suggested Cost	UPDATED Minagar & Associates Suggested Cost/Intersection	Benefit-Cost Ratio (See LRSP Report with other Countermeasures and Cost Estimate Table)
1	4	Willow Street	California Avenue	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 200,000.00 $ 50,000.00	$ 250,000.00	Accident reduction Accident reduction	S02 S03	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 100,000.00 $ 50,000.00	$ 100,000.00 $ 50,000.00	8.37
2	2	Willow Street	Orange Avenue	Reduce southbound vertical curve Increase southbound left turn pocket Add southbound high visibility signal head Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 4,000,000.00 $ 10,000.00 $ 1,500.00 $ 300,000.00 $ 50,000.00	$ 4,361,500.00	Reduce blind curve and increase sight distance Reduce blind curve and increase sight distance Reduce blind curve and increase sight distance Accident reduction Accident reduction	R18 N/A S02 S02 S03	Upgrade Traffic Signal Operations	$ 50,000.00	$ 50,000.00	48.63
3	10	Willow Street	Walnut Avenue	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 200,000.00 $ 50,000.00	$ 250,000.00	Currently under design/Construction Currently under design/Construction	S02 S03	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 200,000.00 $ 50,000.00	$ 200,000.00 $ 50,000.00	35.31
4	3	Willow Street	Town Center Drive	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 200,000.00 $ 50,000.00	$ 250,000.00	Accident reduction Accident reduction	S02 S03	Upgrade Traffic Signal Operations	$ 50,000.00	$ 50,000.00	133.48
5	N/A	Willow Street	Cherry Avenue	Add westbound right turn land Add eastbound right turn lane Add northbound 2nd left turn lane Upgrade Traffic Signal Upgrade Traffic Signal Operations		$ -	Currently under design/Construction Currently under design/Construction Currently under design/Construction Currently under design/Construction Currently under design/Construction	 S02 S03				
6	N/A	Willow Street	Dawson Avenue	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 200,000.00 $ 50,000.00	$ 250,000.00	Accident reduction Accident reduction	S02 S03				0.72
7	5	Willow Street	Junipero Avenue	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 200,000.00 $ 50,000.00	$ 250,000.00	Accident reduction Accident reduction	S02 S03	Upgrade Traffic Signal Operations	$ 50,000.00	$ 50,000.00	27.54
8	9	Willow Street	Temple Avenue	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 250,000.00 $ 50,000.00	$ 300,000.00	Accident reduction Accident reduction	S02 S03	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 200,000.00 $ 50,000.00	$ 200,000.00 $ 50,000.00	5.11
9	N/A	Spring Street	Olive Avenue	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 200,000.00 $ 50,000.00	$ 250,000.00	Accident reduction Accident reduction	S02 S03				1.5
10	14	Spring Street	California Avenue	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 250,000.00 $ 50,000.00	$ 300,000.00	Accident reduction Accident reduction	S02 S03	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 100,000.00 $ 50,000.00	$ 100,000.00 $ 50,000.00	7.05
11	1 (Under Construction)	Spring Street	Orange Avenue	Add northbound right turn lane Add southbound 2nd left turn lane Upgrade Traffic Signal Upgrade Traffic Signal Operations		$ -	Accident reduction Accident reduction Accident reduction Accident reduction	 S02 S03				N/A
12	13	Spring Street	Walnut Avenue	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 250,000.00 $ 50,000.00	$ 300,000.00	Accident reduction Accident reduction	S02 S03	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$100,000.00 $50,000.00	$100,000.00 $50,000.00	7.04
13	7	Spring Street	Cherry Avenue	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 300,000.00 $ 50,000.00	$ 350,000.00	Accident reduction Accident reduction	S02 S03	Upgrade Traffic Signal Operations	$ 50,000.00	$ 50,000.00	104.35
14	N/A	Orange Avenue	33rd Street	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 200,000.00 $ 50,000.00	$ 250,000.00	Accident reduction Accident reduction	S02 S03				1.5
15	N/A	Orange Avenue	32nd Street	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 200,000.00 $ 50,000.00	$ 250,000.00	Accident reduction Accident reduction	S02 S03				2.45
16	N/A	Orange Avenue	Burnett Street	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 200,000.00 $ 20,000.00	$ 220,000.00	Accident reduction Accident reduction	S02 S03				2.12
17	N/A	Orange Avenue	23rd Street	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 200,000.00 $ 20,000.00	$ 220,000.00	Accident reduction Accident reduction	S02 S03				0.41
18	N/A	Orange Avenue	Hill Street	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 200,000.00 $ 20,000.00	$ 220,000.00	Accident reduction Accident reduction	S02 S03				2.12



No.	LRSP Intersection Ranking Number	Street	Street	City's Recommendations	City's Suggested Cost	City's Suggested Cost/Intersection	City's Comments	Number(s) Per Caltrans LRSM Version 1.6,	UPDATED Minagar & Associates Recommendations	UPDATED Minagar & Associates Suggested Cost	& Associates Suggested Cost/Intersection	LRSP Report with other Countermeasures and Cost Estimate Table)
19	N/A	Walnut Avenue	28th Street			$ -	Accident reduction Accident reduction					
20	N/A	Cherry Avenue	28th Street	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 250,000.00 $ 50,000.00	$ 300,000.00	Accident reduction Accident reduction	S02 S03				2.33
21	N/A	Cherry Avenue	Crescent Street	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 250,000.00 $ 50,000.00	$ 300,000.00	Accident reduction Accident reduction	S02 S03				2.46
22	8	**Cherry Avenue**	**Burnett Street/Skyline Drive**	**Upgrade Traffic Signal** **Upgrade Traffic Signal Operations**	**$ 250,000.00** **$ 50,000.00**	**$ 300,000.00**	**Accident reduction** **Accident reduction**	S02 S03	Upgrade Traffic Signal Operations	$ 50,000.00	$ 50,000.00	28.8
23	N/A	Cherry Avenue	Hill Street	Upgrade Traffic Signal Upgrade Traffic Signal Operations	$ 250,000.00 $ 50,000.00	$ 300,000.00	Accident reduction Accident reduction	S02 S03				1.25
24	12	**Cherry Avenue**	**21st Street**	**Upgrade Traffic Signal** **Upgrade Traffic Signal Operations**	**$ 250,000.00** **$ 50,000.00**	**$ 300,000.00**	**Accident reduction** **Accident reduction**	S02 S03	Upgrade Traffic Signal Operations	$ 50,000.00	$ 50,000.00	16.35
25	N/A	Cherry Avenue	20th Street	Modify the signal operations	$ 150,000.00	$ 150,000.00	Accident reduction	S03				1.55
26	15	**33rd Street**	**California Avenue**	**Install northbound flashing stop sign** **Install eastbound flashing stop sign**	**$ 2,500.00** **$ 2,500.00**	**$ 5,000.00**	**Accident reduction** **Accident reduction**	NS08 NS08	Install flashing stop sign in all directions Install R1-3P sign in all directions	2500(4) 575(4)	$ 10,000.00 $ 2,300.00	6.12
27	N/A	20th Street	Redondo Avenue	Install traffic signal with countdown ped heads	$ 250,000.00	$ 250,000.00	Enhance pedestrian crossing	NS03	Install Signals	$ 250,000.00	$ 250,000.00	0.71
		Total Intersection investment			**$ 10,176,500.00**			**Total Chosen Intersection Investment**			**$ 1,262,300.00**	



STREET SEGMENT ENHANCEMENTS

No.	LRSP Intersection/Segment Number	Limit	Limit	City's Recommendations	Units	City's Suggested Cost/Street Segment Unit	City's Comments	Minagar & Associates Inc. Responses
1	N/A	**Spring Street** West City Limits	East City Limits	Upgrade Communication system Synchronize traffic signals	6500 5	**$ 350,000.00** $ 325,000.00 $ 25,000.00	Accident reduction Accident reduction	1. Based on safety data assessment for all the segments within the City's boundary, this segment is excluded from the LRSP's top 10 High Collision Roadway Segment ranking (Table 18, Page 66 of LRSP Draft Report) therefore, no further countermeasures and cost estimates will be provided. 2. It should be noted that the City's recommended enhancements/Countermeasures are not listed in LRSM.
2	N/A	**Willow Street** West City Limits	East City Limits	Upgrade Communication system Synchronize traffic signals	7900 8	**$ 435,000.00** $ 395,000.00 $ 40,000.00	Accident reduction Accident reduction	It should be noted that the City's recommended enhancements/Countermeasures are not listed in LRSM.
3	N/A	**Burnett Street/Skyline Drive** Walnut Avenue	Temple Avenue	Install missing sidewalk gaps Install bike lanes	LS	**$ 2,820,000.00** $ 2,820,000.00	Accident reduction Accident reduction	Based on safety data assessment for all the segments within the City's boundary, this segment is excluded from the LRSP's top 10 High Collision Roadway Segment ranking (Table 18, Page 66 of LRSP Draft Report) therefore, no further countermeasures and cost estimates will be provided.
4	N/A	**Cherry Avenue** North City Limits	South City Limits	Upgrade Communication system Synchronize traffic signals	7500 6	**$ 405,000.00** $ 375,000.00 $ 30,000.00	Accident reduction Accident reduction	It should be noted that the City's recommended enhancements/Countermeasures are not listed in LRSM.
5	N/A	**Orange Avenue** Spring Street	Hill Street	Upgrade Communication system Synchronize traffic signals	5280 4	**$ 284,000.00** $ 264,000.00 $ 20,000.00	Accident reduction Accident reduction	It should be noted that the City's recommended enhancements/Countermeasures are not listed in LRSM.
6	N/A	**Temple Avenue/Obispo Avenue** Combellack Drive	Hathaway Court	Remove center median Install center concrete median Install concrete barriers at curb	2700 400 200	**$ 87,000.00** $ 27,000.00 $ 40,000.00 $ 20,000.00	Accident reduction Accident reduction Accident reduction	Based on safety data assessment for all the segments within the City's boundary, this segment is excluded from the LRSP's top 10 High Collision Roadway Segment ranking (Table 18, Page 66 of LRSP Draft Report) therefore, no further countermeasures and cost estimates will be provided.
		Total Segment Enhancements			**$ 4,381,000.00**			

Legend:

Intersection/Roadway Segment Included in LRSP Report

Intersection/Roadway Segment Excluded in LRSP Report

N/A — Not part of LRSP Report Top 15 Intersections and/or Top 10 Roadway Segments

MINAGAR & ASSOCIATES, INC.

ITS - Traffic/Civil/Electrical Engineering - Transportation Planning - Homeland Security - CEM

2019	Winner of the Orange County Engineering Council's Outstanding Service Award
2016	Winner of the ASCE's Outstanding Civil Engineer in the Private Sector Award in the State of California
2016	Winner of the ASCE Los Angeles Section's Outstanding Civil Engineer in the Private Sector Award
2016	Winner of the ASCE Orange County Chapter's Outstanding Civil Engineer in the Private Sector Award
2016	Certificate of Recognition for Dedication to Support the ELTP Program by Los Angeles County MTA/Metro
2016	Winner of the Orange County Engineering Council's Outstanding Engineering Service Award
2015	Orange County Business Journal's 2015 Excellence in Entrepreneurship Award Nominee
2014	Orange County Business Journal's 2014 Excellence in Entrepreneurship Award Nominee
2012	Winner of Cal-EPA/California Air Resources Board's Cool California Climate Leader
2011	Award of Excellence in Service by Los Angeles County MTA/Metro in the County of Los Angeles
2011	Award of Excellence in Service by Los Angeles County MTA/Metro in the County of Los Angeles
2010	Award of Excellence in Service by Los Angeles County MTA/Metro in the County of Los Angeles
2009	Winner of the ASCE's Outstanding Private Sector Civil Engineering Project in Metropolitan Los Angeles
2009	Winner of the Caltrans' 2009 Excellence in Transportation Award in the State of California
2007	Winner of the ASCE's Outstanding Public/Private Sector Civil Engineering Project in Metropolitan Los Angeles
2005	Winner of the APWA's Best Traffic Congestion Mitigation Project of the Year in Southern California
2004	Top Nominee of Transportation Foundation's Highway Management Program in the State of California
2003	Winner of the PTI's Best Transportation Technology Solutions Award in the United States
2002	Winner of the ITS-CA's Best Return on Investment Project Award in the State of California
2000	Award of Excellence in Service by Los Angeles County MTA/Metro in the County of Los Angeles

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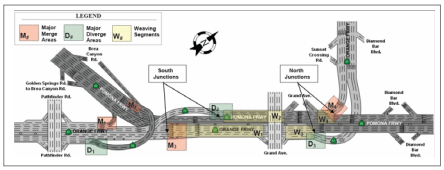
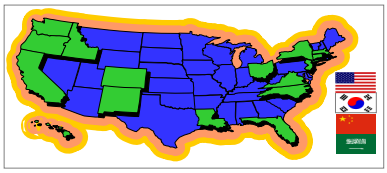
- **Traffic Engineering**
- **Transportation Planning**
- **ITS (Intelligent Transportation Systems)**
- **Civil/Electrical Engineering**
- **Homeland Security**
- **Construction Engineering Management**





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30 Years of Engineering & Planning Excellence