ATTACHMENT 3

Systemic Safety Analysis Report (SSAR)

City of Arroyo Grande

Final Report

REPORT SIGNATURE SHEET

This Systemic Safety Analysis Report has been prepared under the direction of the following Professional Engineer. The Registered Civil Engineer attests to the technical information contained herein and the engineering data upon which recommendations, conclusions, and decisions are based.

Jay D. Walter, PE
Registered Civil Engineer

March 24, 2021

Date

Prepared by Kathryn Savoy Kleinschmidt, Professional Traffic Operations Engineer (PTOE), Certificate # 3871.

Executive Summary

Arroyo Grande was awarded funding from Caltrans for the Systemic Safety Analysis Report Program (SSARP) in 2016 for analysis of the entire roadway system for high-risk roadway characteristics. Furthermore, the City of Arroyo Grande's goal was to identify infrastructure improvement countermeasures that mitigate the City's primary crash type trend which includes rear-ends, sideswipes, pedestrian/bicycle, and broadsides.

Based on the City's SSARP application, this SSAR addresses three (3) Strategic Highway Safety Plan (SHSP) Challenge Areas including:

1. Intersections, Interchanges, and Other Roadway Access
2. Pedestrians
3. Bicycling

Based on our analysis, the following projects (**Exhibit 1**) are recommended for the focused study locations. All have a benefit to cost ratio of 4 or higher and would be competitive for the next Highway Safety Improvement Program (HSIP) Cycle 10 call for projects that is tentatively set for the end of April 2020. In addition, all countermeasures are low cost and could be applied systemically.

Exhibit 1 Recommended HSIP Projects

Pedestrian Improvements at Signalized intersection (S19, S20, S22)				
Locations	Type of collision	Benefit	Cost	B/C
4 following signalized intersections: E GRAND AVE & COURTLAND ST E GRAND AVE & S ELM ST E GRAND AVE & S HALCYON RD E GRAND AVE & PEDESTRIAN SIGNAL (WEST OF ALDER ST)	P&B	$ 1,946,647	$ 476,000	4.09
General Vehicular Signal Improvements (S2, S3, S6)				
Locations	Type of collision	Benefit	Cost	B/C
3 following signalized intersections: E GRAND AVE & COURTLAND ST E GRAND AVE & S ELM ST E GRAND AVE & S HALCYON RD	All	$ 5,539,826	$ 620,000	8.94
Pedestrian Hybrid Beacon (NS19)				
Locations	Type of collision	Benefit	Cost	B/C
2 pedestrian hybrid beacons at the following locations: E GRAND AVE & BELL ST FARROLL AVE & S HALCYON RD	P&B	$ 5,107,961	$ 500,000	10.22
Pedestrian Improvements at Unsignalized Locations and Crosswalks (NS16, NS17, NS18)				
Locations	Type of collision	Benefit	Cost	B/C
2 following unsignalized intersections: E BRANCH ST & SHORT ST W BRNACH ST & BRIDGE ST	P&B	$ 10,409,861	$ 237,500	43.83
Improve Striping and Pavement Markings (R31, R32, R36, Green Conflict markings)				
Locations	Type of collision	Benefit	Cost	B/C
2 following roadway segments: E GRAND AVE FROM COURTLAND ST TO ELM ST E GRAND AVE FROM EAST OF ELM ST TO WEST OF HALCYON RD	All	$ 1,648,506	$ 245,000	6.73

Table of Contents

1. Introduction 1
   - 1.1 Study Locations 2
2. Safety Assessment 2
   - 2.1 Collision Analysis 2
     - 2.1.1 Roadway Segments 5
     - 2.1.2 Intersections 7
   - 2.2 Pedestrian and Bicycle Collisions with Vehicles 8
3. Prioritization 12
   - 3.1 EPDO Crash Methodology 12
   - 3.2 EPDO Ranking Results 12
   - 3.1 Crash Rate Methodology 13
   - 3.2 Crash Rate Ranking 13
   - 3.3 Focused Analysis – Identify Locations 16
4. Safety Data Analysis 16
   - 4.1 Collision Diagnosis 16
   - 4.2 Quantitative Analysis 17
   - 4.3 Qualitative Analysis 20
5. Safety Countermeasures 22
   - 5.1 Roadway Segments – Safety Countermeasures 24
     - 5.1.1 Recommended Roadway Countermeasures 24
   - 5.1 Intersections – Safety Countermeasures 26
6. HSIP Application 28
7. Next Steps – Local Road Safety Plan 29
8. Conclusions 31

Figure Index

Figure 2.1 Citywide Collisions Density Map (2014-2018) 3
Figure 2.2 Fatal and Injury Collision Density Map (2014-2018) 4
Figure 2.3 Roadway Segments – Overall Collision Severity 5

Figure 2.4 Roadway Segments – Overall Collision Type 6
Figure 2.5 Intersections – Overall Collision Severity 7
Figure 2.6 Intersections – Overall Collision Type 8
Figure 2.7 Pedestrian Collisions 10
Figure 2.8 Bicycle Collisions 11
Figure 3.1 Top 10 Ranking Locations – EPDO and Crash Rate 15
Figure 5.1 FHWA Proven Safety Countermeasures 24
Figure 7.1 Traffic Safety E's 30

Table Index

Table 3.1 Comprehensive Costs and EPDO Weights (2018 dollars) 12
Table 4.1 Selected Roadway Locations for Further Analysis 18
Table 4.2 Selected Intersection Locations for Further Analysis 19
Table 5.1 Roadway Segments Safety Countermeasures 25
Table 5.2 Intersection Safety Countermeasures 27
Table 6.1 Recommended HSIP Projects 31
Table 6.2 Recommended Systematic HSIP Projects 32

Appendix Index

Appendix A Collision Maps
Appendix B Traffic Analysis and Collision Analysis
Appendix C Field Reconnaissance
Appendix D HSIP Analyzer Worksheets
Appendix E HSIP Cycle 10 Plans

1. Introduction

The Systemic Safety Analysis Report Program's (SSARP) objective is to perform a collision analysis based on a focused approach in identifying safety issues and develop a possible list of low-cost countermeasures that can be competitive for future Highway Safety Improvement Program (HSIP) funding. Since the focus was citywide, specific study locations were not identified.

The four objectives in performing the systemic safety analysis were as follows:

1. Identify Focus Crash Types and Risk Factors;
2. Screen and Prioritize Candidate Locations;
3. Select Potential Low-Cost Countermeasures; and
4. Prioritize Projects per Benefit-Cost Ratios

This analysis included the evaluation of the past 5 years (2014-2018) of collisions for the study locations in identifying fatal and severe injury collisions (F+SI), high-risk roadway characteristics, and high crash rate locations. In addition, the SSARP application included the expected scope of work and focused challenge areas desired to accomplish this task.

Per the SSARP application, the scope of work was as follows:

- Perform an analysis of the entire roadway system to identify high-risk roadway characteristics as opposed to analyzing high collision area. It was further stated that the City of Arroyo Grande was not experiencing high collision concentrations at specific locations due to having lower volumes on the roadway network.

- Use crash data obtained by Arroyo Grande Police Department and map to identify high risk locations and characteristics.

- Identify infrastructure improvement countermeasures that mitigate the City's primary crash type trends which include rear-ends, sideswipes, pedestrian/bicycle, and broadsides.

In addition, the identified three focus challenge areas were as follows:

1. Intersections, Interchanges, and Other Roadway Access
2. Pedestrians
3. Bicycling

The focused challenge areas were used to further analyze the collisions in evaluating possible systemic low-cost countermeasures.

1.1 Study Locations

The SSAR evaluated the roadway network citywide in identifying roadway segments and intersections for a focused analysis. The roadway segments and intersections are further defined below. Due to it being a citywide analysis, there were too many segments and intersections to list.

The roadway segments between intersections with collisions were evaluated and then ranked. Intersection were defined as 150' on each leg. Even though at some locations the influence area might be more or less, the 150' appeared to be the average length for the majority of intersections.

Collision density maps were first created in identifying the high frequency locations within the city and then further collision maps were made to include the collision severity and type.

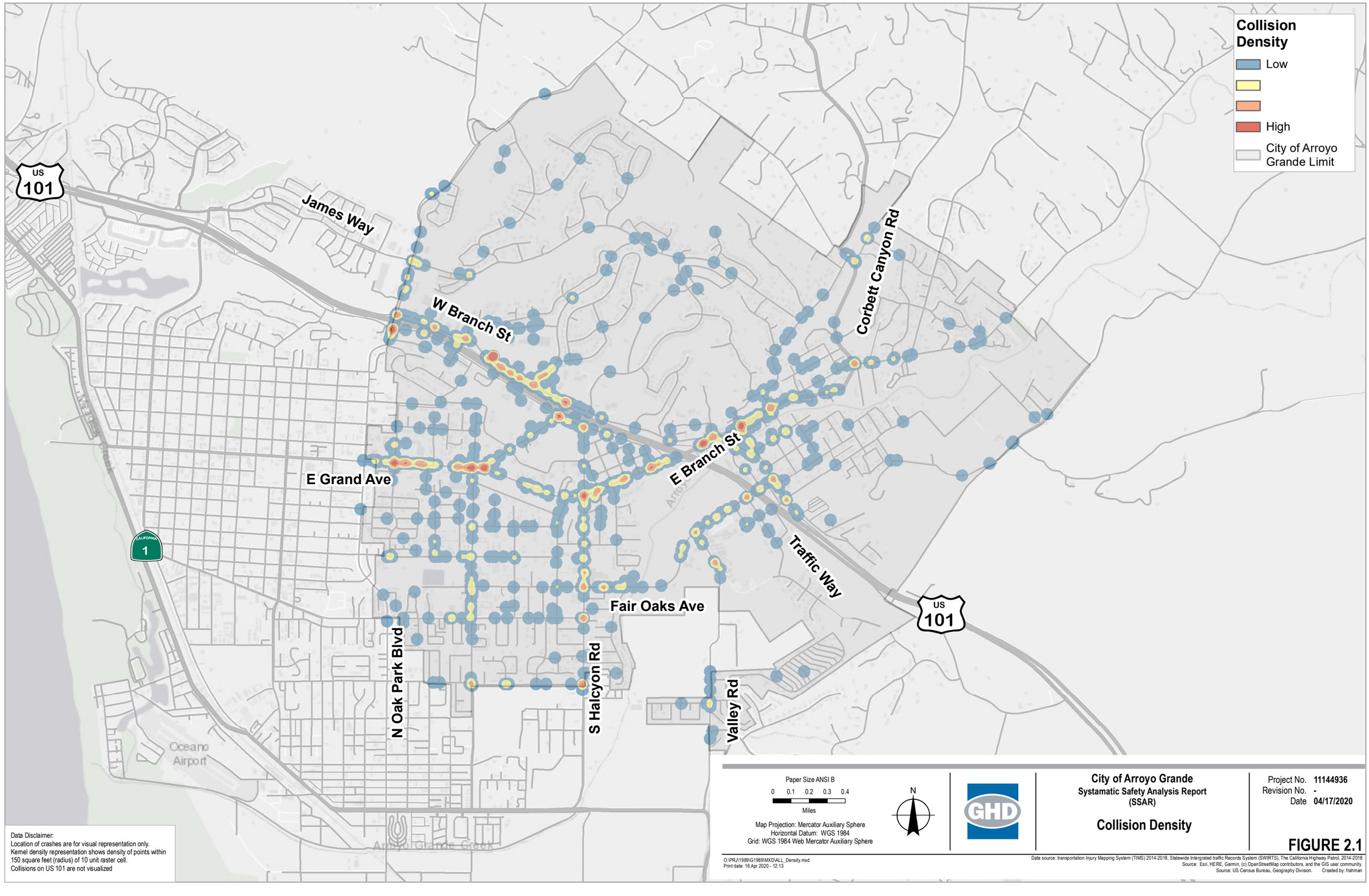
2. Safety Assessment

The past five complete years of collision data (2014-2018) was downloaded from the Statewide Integrated Traffic Records System (SWITRS) database for the study locations. This data was then cross checked with the injury collisions in the Transportation Injury Mapping System (TIMS) and the City of Arroyo Grande's collision database. The collisions were then all cross-check and reconciled in completing the most complete set of collision data. In addition, supplemental reports were examined to see if any collisions were upgraded to a fatality after the initial collision record (per California's *Collision Investigation Manual* a fatal injury is "death as a result of injuries sustained in a collision, or an injury resulting in death within 30 days of a collision"). After completing this process; the collisions were assessed based on high risk, crash frequency, and focused challenge areas.

2.1 Collision Analysis

Collision analysis was performed for all roadways in the City of Arroyo Grande without including the US 101 mainline collisions. In addition, the collisions for the US 101 interchanges were evaluated separately. As presented in **Figure 2.1**, the collision density for the citywide collisions for the past 5 years (2014-2018) without the US 101 interchange collisions were mapped in identifying the high risk segments and intersections. Per the collision density map you start to identify roadway segments and intersections with higher collision frequency along: E. Grand Avenue, E. Branch Street, W. Branch Street, Fair Oaks Avenue, Halcyon Road, and El Camino Real.

In delving into the fatal and injury collisions, another crash density map was created with only the fatal and injury collision. As presented in **Figure 2.2** is the density map for the fatal and injury collisions. There were three (3) fatal collisions. Two fatalities involved pedestrians crossing at a mid-block location (across E. Branch Street at Short Street in 2017 and across Grand Avenue at Bell Street in 2018) and one fatality was a single vehicle collision on El Camino Real (the collision notes cited DUI) in 2018.



Data Disclaimer:
Location of crashes are for visual representation only.
Kernel density representation shows density of points within 150 square feet (radius) of 10 unit raster cell.
Collisions on US 101 are not visualized

Paper Size ANSI B

0 0.1 0.2 0.3 0.4

Miles

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

City of Arroyo Grande
Systematic Safety Analysis Report (SSAR)

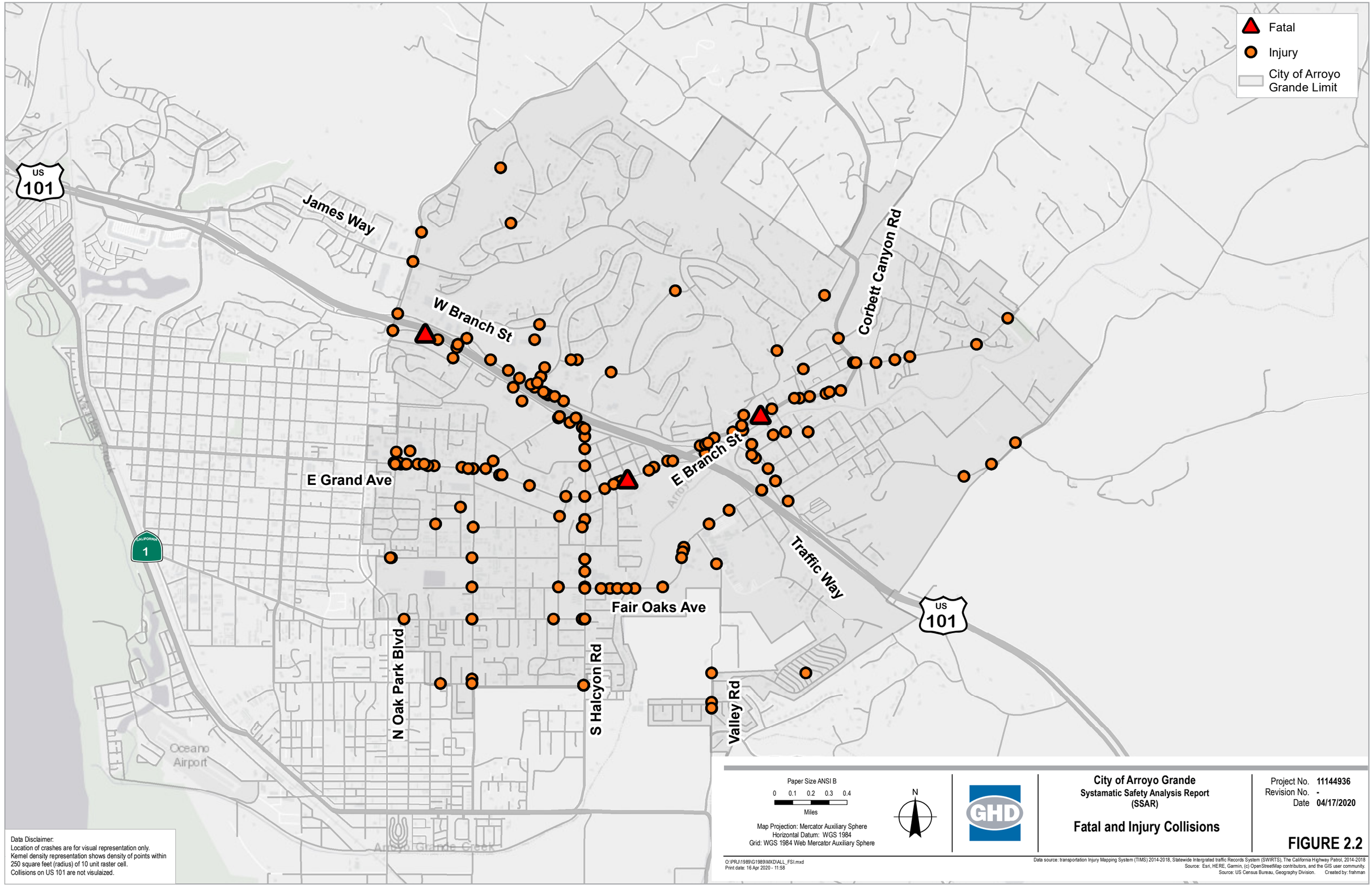
Collision Density

Project No. **11144936**
Revision No. **-**
Date **04/17/2020**

FIGURE 2.1

O:\PRJ\1989\G1989MXD\ALL_Density.mxd
Print date: 16 Apr 2020 - 12:13

Data source: transportation Injury Mapping System (TIMS) 2014-2018, Statewide Intergrated traffic Records System (SWIRTS), The California Highway Patrol, 2014-2018
Source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community.
Source: US Census Bureau, Geography Division. Created by: frahman



Data Disclaimer:
Location of crashes are for visual representation only.
Kernel density representation shows density of points within 250 square feet (radius) of 10 unit raster cell.
Collisions on US 101 are not visulaized.

Paper Size ANSI B
0 0.1 0.2 0.3 0.4
Miles

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

City of Arroyo Grande
Systematic Safety Analysis Report (SSAR)

Fatal and Injury Collisions

Project No. **11144936**
Revision No. **-**
Date **04/17/2020**

FIGURE 2.2

O:\PRJ\1989\G1989\MXD\ALL_FSI.mxd
Print date: 16 Apr 2020 - 11:58

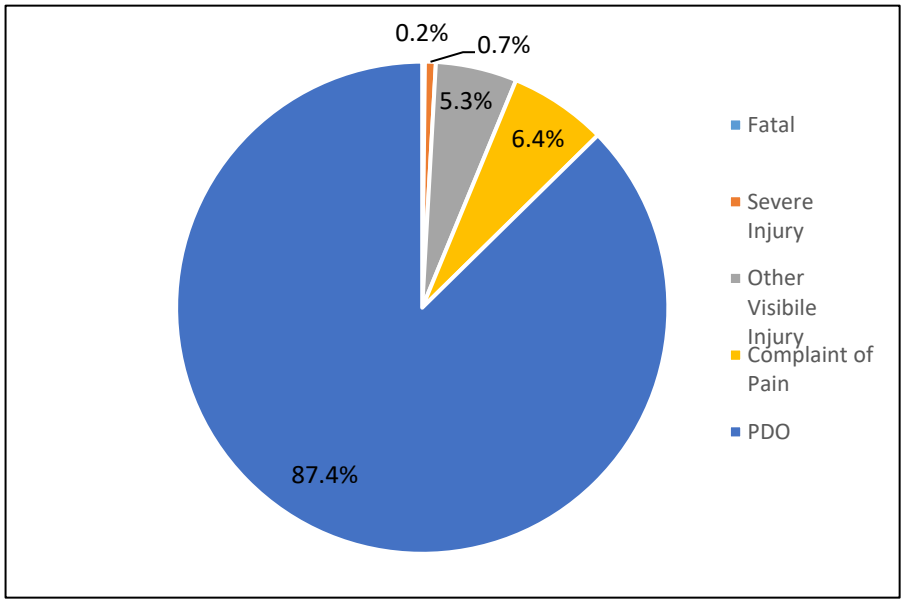
Data source: transportation Injury Mapping System (TIMS) 2014-2018, Statewide Intergrated traffic Records System (SWIRTS), The California Highway Patrol, 2014-2018
Source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community.
Source: US Census Bureau, Geography Division. Created by: frahman

In the further diagnosis of the overall citywide collisions, refined analysis was performed on the roadway segments, intersections, pedestrian collisions, and bicycle collisions. The quantification of these collisions is shown by section below. In addition, further visual representation of the collisions via ArcGIS maps are located in **Appendix A: Collision Maps**.

2.1.1 Roadway Segments

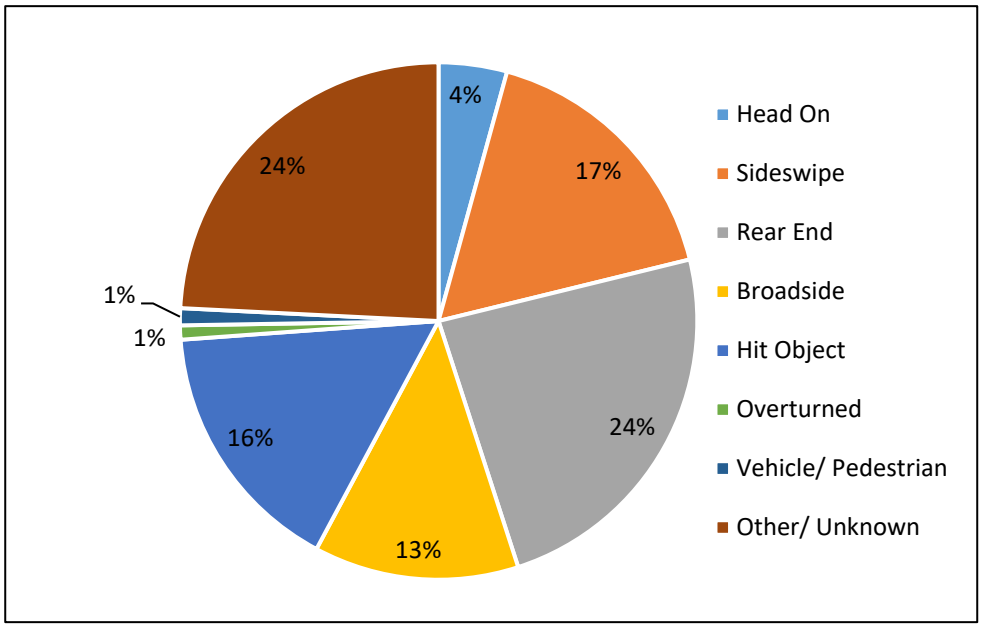
In evaluating the citywide roadway segments, the past 5 years of collision data was evaluated on roadways with the intersection related collisions removed. As presented in **Figure 2.3,** the majority of collisions are property damage only (PDO) at 87.4%. With injury related collisions, comprising of the remaining 12.7%. There was one single vehicle fatal collision and four severe injury (SI) collisions.

Figure 2.3 Roadway Segments – Overall Collision Severity



As presented in **Figure 2.4**, the overall collision types for all roadway segments is shown as a percentage of the total. Rear end and other/unknown collisions were the most common collisions at 24% each, followed by sideswipe collisions at 17%. Rear end collisions are typical when there is speed differential, congestion, and vehicles turning in the through lanes. The other/unknown collisions can be collisions where the type was not recorded or the type of collision didn't fit the categories per the California Highway Patrol reporting manual. Sideswipe collisions can be due to improper lane change, lane departure, or insufficient lane delineation.

Figure 2.4 Roadway Segments – Overall Collision Type



In evaluating the top five (5) roadway segment violation categories they were as follows:

1. Unknown (58%)
2. Unsafe Speed (10%)
3. Improper Turning (8%)
4. Auto Right of Way (7%)
5. Driving Under the Influence (DUI)/ Biking Under the Influence (BUI) (5%)

The majority of "unknown" violation category is due to the City collisions that didn't have overlap with SWITRS. These additional collisions received from the City's Collision Database had limited fields and information and were mostly PDO collisions. The next top roadway violation categories were close in percentage with unsafe speed (10%), improper turning (8%), and auto right of way violations (7%). DUI/BUI violations comprised on 5% of the overall roadway collisions.

2.1.2 Intersections

Figure 2.5 presents the overall collision severity for the intersections, citywide. There were 2 fatalities (pedestrian and vehicle collisions) and 7 severe injury collisions. In evaluating the collisions for the past 5 years, the majority of collisions comprised of PDOs at 84.8% with 15.2% injury collisions.

Figure 2.5 Intersections – Overall Collision Severity

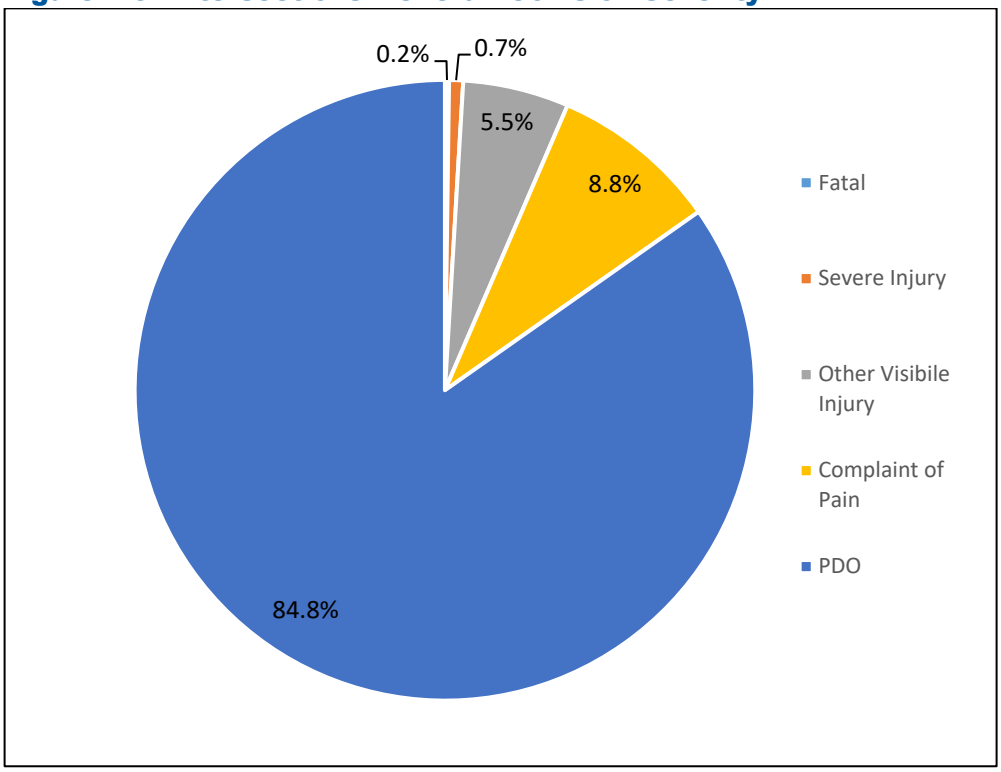
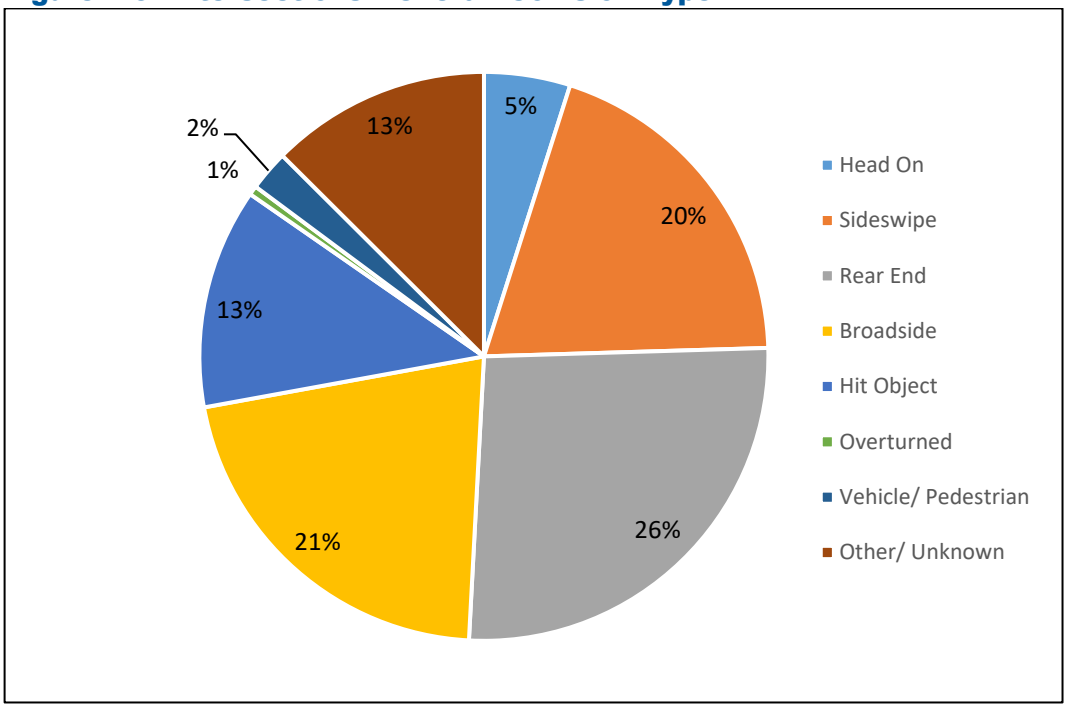


Figure 2.6 displays the citywide collision types for the intersections as a percentage of the total. The top five collision types and overall percentage are as follows:

1. Rear End (26%)
2. Sideswipe (20%)
3. Broadside (21%)
4. Hit Object (13%)
5. Other (13%)

Read end collisions are typically caused with the speed differential and traffic control changes. Sideswipe collisions at an intersection can be due to intersection lane changes or offset lanes through an intersection. Broadside are typically caused by turning vehicles not yielding the right of way and hit object collision can be due to objects within the clear zone.

Figure 2.6 Intersections – Overall Collision Type



In evaluating the top five violation categories for intersection collisions, the following percentages were derived as follows:

1. Unknown (31%)
2. Improper Turning (14%)
3. Auto R/W (14%)
4. Unsafe Speed (13%)
5. DUI/ BUI (6%)

In comparing the roadway segments and intersection violation categories, they both have the same top five categories with similar percentages. For the citywide intersections, unknown was the majority with 31%, followed by improper turning and auto R/W collisions at 14% each, unsafe speed 13%, and DUI/ BUI at 6 %.

2.2 Pedestrian and Bicycle Collisions with Vehicles

Per the SSARP grant, pedestrian and bicycle collisions with vehicles were a focus challenge area. In evaluating these collisions types, the severity of collisions was quantified by roadway segment collisions and intersection relation collisions. As presented in **Tables 2.1 and 2.2,** the pedestrian and bicycle collisions are quantified by severity for roadway segments and intersections, respectively. There were significantly more pedestrian and bicycle collisions at the intersections

than the segments. This most likely due to the increase in pedestrian and bicycle conflict points with vehicles at intersections.

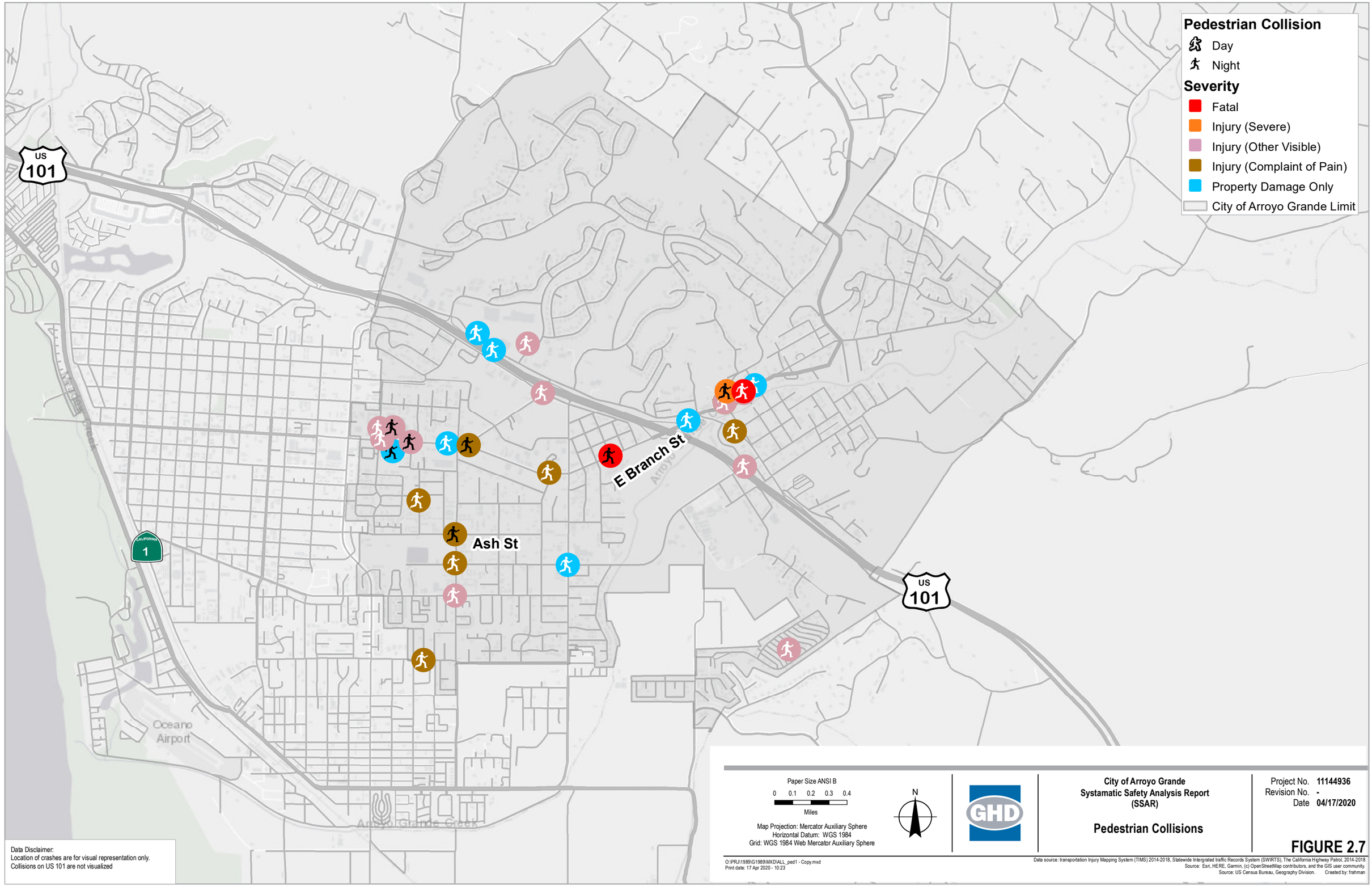
Table 2.1 Pedestrian and Bicycle Collision at Roadway Segments

	Pedestrian Involved	Bicycle Involved
Fatal	0	0
Severe Injury	0	0
Other Visible Injury	2	4
Complaint of Pain	2	2
PDO	1	1
Total Collisions	**5**	**7**

Table 2.2 Pedestrian and Bicycle Collisions at Intersections

	Pedestrian Involved	Bicycle Involved
Fatal	2	0
Severe Injury	1	1
Other Visible Injury	10	11
Complaint of Pain	7	5
PDO	5	4
Total Collisions	**25**	**21**

To provide a visual representation of the location of pedestrian and bicycle collision in the City, figures are presented below. **Figure 2.7 and 2.8** show the pedestrian and bicycles collisions, respectively, with the severity and time of day (day or night).



Data Disclaimer:
Location of crashes are for visual representation only.
Collisions on US 101 are not visualized

Paper Size ANSI B
0 0.1 0.2 0.3 0.4
Miles

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

City of Arroyo Grande
Systematic Safety Analysis Report (SSAR)

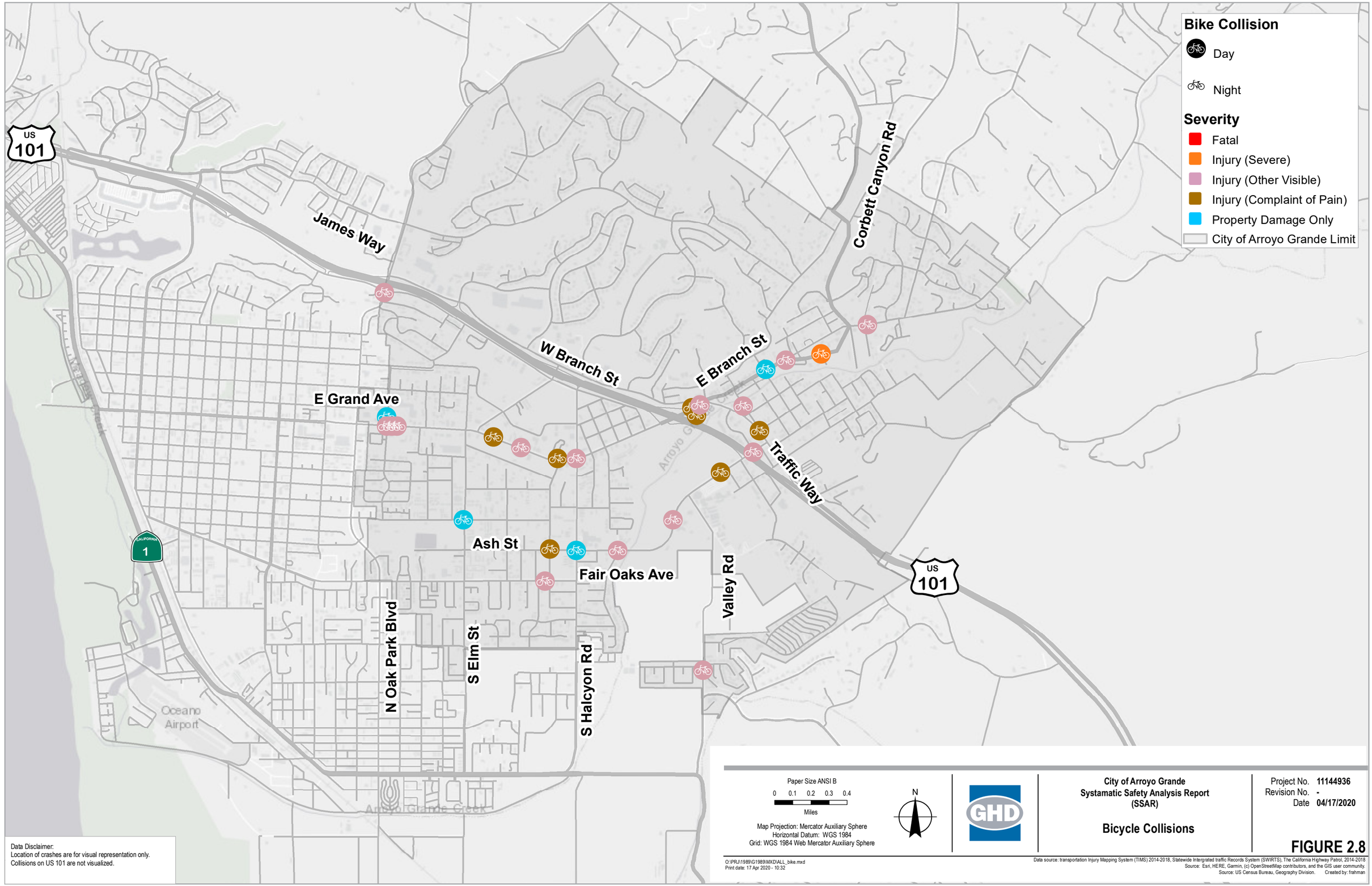
Pedestrian Collisions

Project No. **11144936**
Revision No. **-**
Date **04/17/2020**

FIGURE 2.7

O:\PRJ\1989\G1989\MXD\ALL_ped1 - Copy.mxd
Print date: 17 Apr 2020 - 10:23

Data source: transportation Injury Mapping System (TIMS) 2014-2018, Statewide Intergrated traffic Records System (SWIRTS), The California Highway Patrol, 2014-2018
Source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community.
Source: US Census Bureau, Geography Division. Created by: frahman



Data Disclaimer:
Location of crashes are for visual representation only.
Collisions on US 101 are not visualized.

Paper Size ANSI B
0 0.1 0.2 0.3 0.4
Miles

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

City of Arroyo Grande
Systematic Safety Analysis Report (SSAR)

Bicycle Collisions

Project No. 11144936
Revision No. -
Date 04/17/2020

FIGURE 2.8

O:\PRJ\1989\G1989\MXD\ALL_bike.mxd
Print date: 17 Apr 2020 - 10:32

Data source: transportation Injury Mapping System (TIMS) 2014-2018, Statewide Intergrated traffic Records System (SWIRTS), The California Highway Patrol, 2014-2018
Source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community.
Source: US Census Bureau, Geography Division. Created by: frahman

3. Prioritization

Per the past five years of collision analysis, the overall ranking and prioritization of collision locations was quantified by recommended methodologies in AASHTO's, *Highway Safety Manual 2010 with 2014 Supplement (HSM)*. These methodologies included Equivalent Property Damage Only (EPDO) method and crash rates. Per the ranking methodologies, the top roadway segments and intersections were identified by EPDO and crash rate ranking.

3.1 EPDO Crash Methodology

The Equivalent Property Damage Only (EPDO) average crash ranking methodology was used for this study. The EPDO method assigns weighting factors to collisions by severity to develop a combined frequency and severity score per site. The weighting factors are calculated relative to Property Damage Only (PDO) collision cost. Collision costs include both direct and indirect costs. Direct crash costs include ambulance service, police and fire services, property damage, insurance, and other costs directly related to the crashes. Indirect collision costs account for the value society would place on pain and suffering or loss of life associated with the crash. **Table 3.1** provides a summary of the comprehensive costs and weighting assigned to collisions by severity.

Table 3.1 Comprehensive Costs and EPDO Weights (2018 dollars)

Severity	Comprehensive Costs	EPDO Weight
Fatal (K)	$6,418,400	544
Severe Injury (A)	$345,800	30
Minor Injury (B)	$126,500	11
Non-Visible Injury (C)	$71,900	6
PDO (O)	$11,800	1

Based on Table 7-1, Highway Safety Manual, 2010, Adjusted to 2018 dollars.

In evaluating the citywide locations with collisions, EPDO Ranking was performed for roadway segments and intersections. Section 3.2 presents the top five locations for roadway segments and intersections and corresponding collisions. El Camino Real from Oak Park Boulevard to Brisco Road was the top ranked segment and E. Branch Street at Short Street was the top ranked intersection.

3.2 EPDO Ranking Results

Top 5 Roadway Segment Locations:

1. **El Camino Real – Oak Park Boulevard to Brisco Road (EPDO 594)**
    - 12 total, 1 fatal single vehicle collision and 1-severe injury (SI) collision
2. E. Grand Avenue – Courtland to Elm (EPDO 110)

- 50 total, 6 injury and 44 PDOs (2 pedestrian collisions and 1 bicycle collision)

3. Halcyon – Fair Oaks to Grand Avenue (EPDO 65)
    - 30 total, 6 injury and 24 PDOs
4. Fair Oaks – Halcyon to Valley Road (EPDO 60)
    - 15 total, 7 injury collisions and 8 PDOs, 1 bicycle collision
5. W. Branch – Brisco to Camino Mercado / US 101 ramps (EPDO 57)
    - 27 total, 5 injury collisions and 22 PDOs

Top 5 Intersection Locations:

1. **E. Branch Street at Short Street (EPDO 581)**
    - 8 total, 2 pedestrians collisions (one fatal) and 3 visible injury collisions
2. E. Grand Avenue and Bell Street (EPDO 557)
    - 14 total, one fatal pedestrian collision and 13 PDO
3. E. Grand Avenue and Courtland Street (EPDO 133)
    - 34 total,10 injury collisions (1-SI), 2 pedestrian and 2 bicycle collisions
4. El Camino Real and N. Oak Park Boulevard (EPDO 91)
    - 32 total, 5 injury (1-SI), 1 bicycle collision
5. The Pike and S. Halcyon Road (EPDO 82)
    - 18 total, 6 injury collisions (1-SI), 12 PDO

3.1 Crash Rate Methodology

In further ranking of the citywide locations, crash rates were calculated for the roadway segments and the intersections. In calculating the crash rates, Average Daily Traffic (ADT) data was collected in the field by a subcontractor on the week of November 11, 2019 on a typical weekday, when schools were in session. Further information on traffic counts and crash rate calculations are located in **Appendix B: Traffic Analysis and Collision Analysis.**

Segment crash rates are calculated as the number of crashes that occur at on a given segment during a specified time period, divided by a measure of exposure for that same period. This accounts for the segment length and the Average Daily Traffic (AADT) on the segment normalized to one million miles of travel, commonly referred to as Million Vehicle Miles (MVM) of travel.

Intersection crash rates are calculated by the total crashes at the intersection during a specific time period, divided by a measure of exposure for that same period. Intersections make use of a similar scaling factor, Million Entering Vehicles (MEV), which accounts for the total number of vehicles entering the intersection and is also normalized to one million vehicles.

Per the crash rate ranking, Section 3.2 show the top five locations for roadway segments and intersections. Bridge Street from Traffic Way to E. Branch Street was the ranked top segment and Traffic Way at Allen Street was the top ranked intersection.

3.2 Crash Rate Ranking

Per the crash rate methodology, the top five segments and intersections were ranked.

Top 5 Segment Locations:

1. **Bridge Street – Traffic Way to E. Branch Street**
2. Camino Mercado – W. Branch Street to Rancho Parkway
3. Allen Street – Traffic Way to Pacific Coast Railway Place
4. W. Branch Street – Brisco to E. Branch Street
5. Rancho Parkway – W. Branch to Via Vaquero

Top 5 Intersection Locations:

1. **Traffic Way and Allen Street**
2. Valley Road and AGHS Parking/ Castillo Del Mar
3. W. Branch Street and Brisco Road
4. E. Branch Street and Bridge Street
5. E. Grand Avenue and S. Elm Street

For ease, **Figure 3.1**, is a visual representation of the top ten ranking EPDO and crash rate locations.

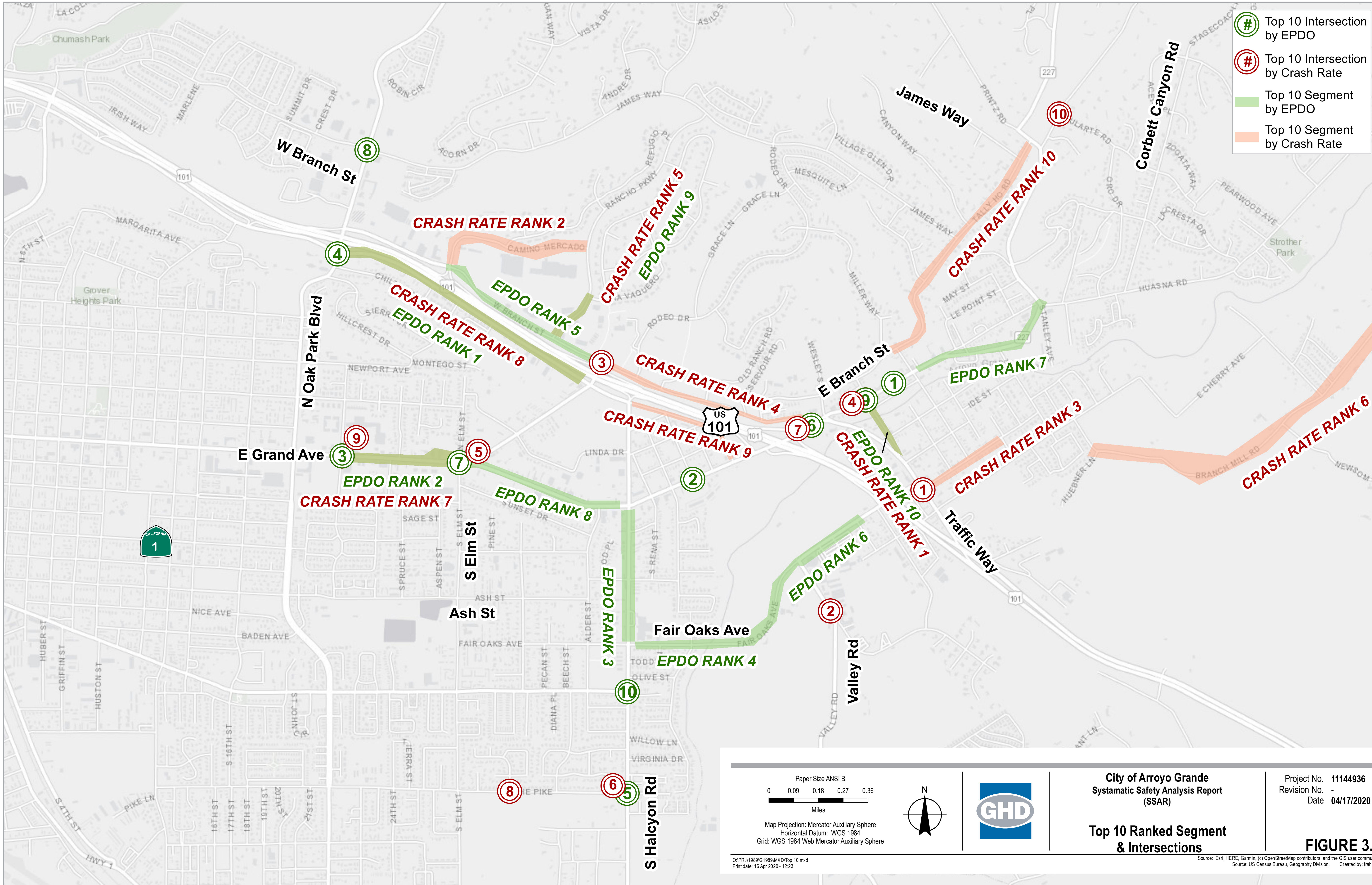

Top 10 Intersection by EPDO
Top 10 Intersection by Crash Rate
Top 10 Segment by EPDO
Top 10 Segment by Crash Rate
W Branch St
James Way
Corbett Canyon Rd
E Branch St
N Oak Park Blvd
E Grand Ave
S Elm St
Ash St
Fair Oaks Ave
Valley Rd
Traffic Way
S Halcyon Rd
CRASH RATE RANK 1
CRASH RATE RANK 2
CRASH RATE RANK 3
CRASH RATE RANK 4
CRASH RATE RANK 5
CRASH RATE RANK 6
CRASH RATE RANK 7
CRASH RATE RANK 8
CRASH RATE RANK 9
CRASH RATE RANK 10
EPDO RANK 1
EPDO RANK 2
EPDO RANK 3
EPDO RANK 4
EPDO RANK 5
EPDO RANK 6
EPDO RANK 7
EPDO RANK 8
EPDO RANK 9
EPDO RANK 10
Paper Size ANSI B
0 0.09 0.18 0.27 0.36
Miles
Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere
N
GHD
City of Arroyo Grande
Systematic Safety Analysis Report
(SSAR)
Top 10 Ranked Segment & Intersections
Project No. 11144936
Revision No. -
Date 04/17/2020

FIGURE 3.1

3.3 Focused Analysis – Identify Locations

After assessing the collision data and through coordination with the City of Arroyo Grande and the Local Road Safety Plan Working Group, the roadways segments and intersections were identified for further analysis due to recent improvements or future improvements. These locations are as follows:

- Traffic Way and Allen Street (**Ranked 1 Crash Rate**) was quantified before the traffic signal at Traffic Way and Fair Oaks was installed in 2019. Further analysis will be conducted in the Local Road Safety Plan.
- Valley Road and Castillo Del Mar (**Ranked 2 Crash Rate)** will have new perpendicular alignment with Valley Road. This improvement will remove the current skewed intersection and requires additional land which is already purchased. Construction tentatively starts in in late spring 2021.
- The Pike and Halcyon Road (**Ranked 5 EPDO, Ranked 6 Crash Rate**) is now an all way stop control (AWSC). It was converted to an AWSC in 2019 and therefore this change is not reflected in the collision analysis. A before and after study will need to be conducted to see if the safety issues were remediated with AWSC.

Bridge Street from Traffic Way to E. Branch Street – **(Ranked 10 EPDO)** does have an improvement project from the bridge but due to the two access points on Traffic Way (one for two-way traffic and one access for the mailboxes) this segment was left in for analysis since the improvement project will not reconfigure the roadways near Traffic Way that are experiencing a trend in sideswipe collisions.

In addition, there is an interchange project planned at US 101 and Brisco Road. Since this project is a few years off from being designed and constructed, the closely spaced City intersections in proximity to the interchange were left in for evaluation of low-cost systemic safety countermeasures.

4. Safety Data Analysis

Safety data analysis was performed to further diagnosis the cause of collisions and any collision trends in selecting safety countermeasure to mitigate those trends. This methodology followed the HSM and Caltrans' *Local Road Safety Manual, Version 1.4, April 2018* and involved roadway assessment and a quantitative analysis.

4.1 Collision Diagnosis

GHD conducted a field reconnaissance of top ranked City intersection and roadway segments in November, December 2019 and January and February 2020. Google Maps was also initially used in quantifying some of the intersection and segment characteristics.

Prior to the field assessment, GHD worked to understand the collision history by reviewing the corridor collision summaries, intersection collision summaries, and all locations where fatalities and severe injuries occurred within the study period. Identifying collision patterns within the data helped our team gain perspective and look for potential deficiencies at each location. Various heat maps

were created and used to locate areas with a high density of specific collision types to further narrow down areas of concern. Furthermore, our team also looked at existing traffic control devices present (signals, signs, flashing beacons, etc.) and potential countermeasures already implemented. Additional information and notes from the field reconnaissance are located in **Appendix B: Traffic Analysis and Collision Analysis.**

4.2 Quantitative Analysis

After the citywide roadway segments and intersections were identified, three locations were screened out due to new traffic control or future improvements. **Tables 4.1 and 4.2** show the selected locations for roadway and intersection locations with a summary of the quantitative analysis performed to include collision severity, collision frequency, EPDO ranking, and crash rate ranking.

Table 4.1 Selected Roadway Locations for Further Analysis

Segment ID		Segment	2014 -2018 Collisions						EPDO	Crash Rate
			Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	Property Damage Only (PDO)	Total Collisions		
Segments Chosen due to High EPDO	15A	EL CAMINO REAL EAST OF OAK PARK TO WEST OF BRISCO	1	1	0	2	8	12	594	1.43
	1B	GRAND COURTLAND TO ELM	0	0	6	0	44	50	110	1.43
	6B	HALCYON NORTH OF FAIR OAKS TO SOUTH OF GRAND	0	0	1	5	24	30	65	1.14
	4B	FAIR OAKS EAST OF HALCYON TO WEST OF VALLEY	0	0	2	5	8	15	60	0.93
	5B	BRANCH EAST OF CAMINO MERCADO TO WEST OF BRISCO	0	0	1	4	22	27	57	1.15
	4C	FAIR OAKS WEST OF VALLEY TO EAST OF CALIFORNIA	0	0	2	4	10	16	56	0.77
	3C	W BRANCH EAST OF MASON TO EAST OF HUSANA/227	0	1	0	1	9	11	45	0.55
	1C	GRAND EAST OF ELM TO WEST OF HALCYON	0	0	1	2	16	19	39	0.66
	10A	RANCHO PKWY NORTH OF BRANCH TO N. OF VIA VAQUERO	0	0	0	2	23	25	35	1.63
	26A	BRIDGE ST NORTH OF TRAFFIC TO SOUTH OF W BRANCH	0	0	2	0	10	12	32	2.92
Segments Chosen due to High Crash Rates	9A	CAMINO MERCADO NO. OF BRANCH TO SO. OF RANCHO PKWY	0	0	0	1	7	8	13	2.53
	31A	ALLEN ST EAST OF TRAFFIC WAY TO WEST OF PACIFIC COAST RAILWAY PLACE	0	0	0	0	3	3	3	2.16
	5C	BRANCH EAST OF BRISCO TO NORTH OF W BRANCH	0	0	0	0	12	12	12	2.07
	32A	BRANCH MILL RD SO. OF HUEBNER LN TO CITY LIMIT	0	0	1	1	3	5	20	1.62
	15C	EL CAMINO REAL EAST OF HALCYON TO NORTH OF GRAND	0	0	0	1	5	6	11	1.42
	23A	TALLY HO RD EAST OF MASON TO WEST OF 227	0	0	1	0	7	8	18	1.29
Segments Chosen due to High Total Crashes	5A	BRANCH EAST OF OAK PARK TO WEST OF CAMINO MERCADO	0	0	0	0	27	27	27	1.09
	14A	BRISCO NORTH OF GRAND TO SOUTH OF EL CAMINO REAL	0	0	1	0	14	15	25	1.15

Table 4.2 Selected Intersection Locations for Further Analysis

Intersection ID		Segment	2014 -2018 Collisions						EPDO	Crash Rate
			Fatal	Severe Injury	Other Visible Injury	Complaint of Pain	Property Damage Only (PDO)	Total Collisions		
Intersections Chosen due to High EPDO	**9**	E BRANCH ST & SHORT ST	1	0	3	0	4	8	581	0.35
	46	E GRAND AVE & BELL ST	1	0	0	0	13	14	557	0.39
	1	E GRAND AVE & COURTLAND ST	0	1	5	4	24	34	133	0.76
	13	EL CAMINO REAL & N OAK PARK BLVD	0	1	2	2	27	32	91	0.56
	6	E GRAND AVE & W BRANCH ST	0	0	3	2	25	30	70	0.79
	2	E GRAND AVE & S ELM ST	0	0	0	2	42	44	54	0.91
	12	JAMES WAY & OAK PARK BLVD	0	1	1	1	5	8	52	0.22
	8	W BRANCH ST & BRIDGE ST	0	0	1	3	22	26	51	0.93
	19	FARROLL AVE & S HALCYON RD	0	0	3	1	9	13	48	0.54
Intersections Chosen due to High Crash Rates	**15**	W BRANCH ST & BRISCO RD	0	0	0	1	24	25	30	0.94
	43	THE PIKE & GARFIELD PL	0	0	0	0	7	7	7	0.78
	67	CORBETT CANYON RD & GULARTE RD	0	0	0	0	5	5	5	0.76
Intersections Chosen due to High Total Crashes	**4**	E GRAND AVE & S HALCYON RD	0	0	1	1	28	30	45	0.54
	27	E GRAND AVE & US 101 SB RAMP	0	0	1	1	21	23	38	0.56
	3	E GRAND AVE & BRISCO RD	0	0	0	1	22	23	28	0.53
	16	EL CAMINO REAL & BRISCO RD	0	0	1	3	18	22	47	0.67

4.3 Qualitative Analysis

During the field assessments, our team made observations along the top five ranking roadway segments and intersections to compile data on the current characteristics. Data was collected regarding the roadway/intersection characteristics, roadside environment, traffic control, and signing and pavement marking. These summarized field notes may be found in **Tables 4.3 and 4.4** for roadway segments and intersections, respectively.

Table 4.3 Field Observations for Roadway Segments

Segment ID		Segment	Frequesnt Collision Type	Qualititve Review
Segments Chosen due to High EPDO	15A	EL CAMINO REAL EAST OF OAK PARK TO WEST OF BRISCO	Frequent Crash Type: Hit Object, Sideswipe. Frequent PCF Violation Category: Improper Turning, Improper Speed	Two way frontage road to US 101 with interchanges at Oak Park and Brisco. Direct driveway access points and horizontal curves that limit sight distance.
	1B	GRAND AVE COURTLAND TO ELM	Frequent Crash Type: Rear Ends, Sideswipe, Broadside Frequent PCF Violation Category: Auto Right of Way Violation, Improper Speed	Bot dot pavement markings on Grand Avenue with limited to no striping. Lanes don't always align across intersection and along segment.
	6B	HALCYON NORTH OF FAIR OAKS TO SOUTH OF GRAND	Frequent Crash Type: Rear Ends, Sideswipe, Hit Object Frequent PCF Violation Category: Improper Speed	Hospital along this segment and signal at Halcyon has split phasing due to the offset lanes across the intersection. Halycon widens out in this section.
	4B	FAIR OAKS EAST OF HALCYON TO WEST OF VALLEY	Frequent Crash Type: Rear Ends, Sideswipe. Frequent PCF Violation Category: Improper Speed	Horizontal curves, bike lanes, and a lane drop for WB traffic. Hospital access, large church, and high school at Valley Road and elementary school at Halcyon.
	5B	BRANCH EAST OF CAMINO MERCADO TO WEST OF BRISCO	Frequent Crash Type: Rear Ends, Broadside Frequent PCF Violation Category: Improper Speed	Vertical curves and limited stopping sight distance to the signal at Brisco. Major shopping centers and access points.
Segments Chosen due to High Overall Crash Rates	9A	CAMINO MERCADO N. OF BRANCH TO S OF RANCHO PKWY	Frequent Crash Type: Hit Object Frequent PCF Violation Category: None Apparent	This is a local collector that serves commerical and residential land uses. The Walmart and Food for Less truck deliveries are per this roadway. Horizontal curves and wide roadway with limited to no striping.
	31A	ALLEN ST E OF TRAFFIC WAY TO W OF PACIFIC COAST RAILWAY PL	Frequent Crash Type: Hit Object, Sideswipe Frequent PCF Violation Category: None Apparent	Roadway in very narrow (approx. 34 feet) with parking allowed on both sides of roadway and no striping.
	5C	BRANCH EAST OF BRISCO TO NORTH OF W BRANCH	Frequent Crash Type: Sideswipe, Rear End, Hit object Frequent PCF Violation Category: Improper Turning	Two lane roadway and bike route (bike lane and sharrows). Horizontal and vertical curves limit sight distance and AWSC at Vernon Street.
	32A	BRANCH MILL RD S. OF HUEBNER LN TO CITY LIMIT	Frequent Crash Type: Overturned, Hit object Frequent PCF Violation Category: None Apparent	Curvy two lane rural roadway along agriculture land uses. Limited shoulder and recovery areas along the roadway.
	15C	EL CAMINO REAL EAST OF HALCYON TO N OF GRAND AVE	Frequent Crash Type: Hit Object, Rear End Frequent PCF Violation Category: Improper Speed	Two lane roadway and bike route with diagonal parking along road, east of Halcyon.
	23A	TALLY HO RD EAST OF MASON TO WEST OF 227	Frequent Crash Type: Hit Object, Rear End Frequent PCF Violation Category: None Apparent	Currently has some speed feedback signs but they aren't showing speeds. AWSC at James Way. Horizontal and vertical curves and bike route.
Segments Chosen due to High Overall Total Crash	5A	BRANCH EAST OF OAK PARK TO WEST OF CAMINO MERCAD	Frequent Crash Type: Rear End, Sideswipe Frequent PCF Violation Category: Unsafe Speed, Improper Turning	A lot of commercical developmnet with driveways and vertical and horizontal curves that limit sight distance.
	14A	BRISCO NORTH OF GRAND TO SOUTH OF EL CAMINO REAL	Frequent Crash Type: Sideswipe, Rear End Frequent PCF Violation Category: Unsafe Speed, Improper Turning	Two lane roadway with parking along roadway. School crosswalks at Linda Drive and El Camino Real.

Table 4.4 Field Observations for Intersections

Intersection ID		Intersection	Frequesnt Collision Type	Qualititve Review
Intersections Chosen due to High EPDO	9	E BRANCH ST & SHORT ST	Frequent Crash Type: Vehicle/ Pedestrian Frequent PCF Violation Category: Pedestrian Right of Way Violation	Offset north and south legs of intersection with Nevada on north leg. Crosswalks on east and south/north legs. Right turn only for NB approach. Crosswalk on the east leg could benefit from being moved, west of the intersection due to less vehicle conflict points.
	46	E GRAND AVE & BELL ST	Frequent Crash Type: Rear Ends, Hit Object, Vehicle/ Pedestrian Frequent PCF Violation Category: Improper Turning	Residential land uses on north side and commerical land uses on south side. Nearest controlled crossing at Halcyon.
	1	E GRAND AVE & COURTLAND ST	Frequent Crash Type: Rear Ends, Broadside, Sideswipe Frequent PCF Violation Category: Traffic Signal & Sign Violation, Unsafe Speed, Auto Right of Way Violation	Permissive left turn for N/S approaches would benefit from a protected only phase. Residential and commercial land uses.
	13	EL CAMINO REAL & N OAK PARK BLVD	Frequent Crash Type: Broadside, Rear Ends, Sideswipe. Frequent PCF Violation Category: Improper Speed, Traffic Signal & Sign	Significant downhill grade on the northbound approach. Also, traffic wanting to access the shopping on Branch Street needs to favor the outside left or have to make a quick lane change on the bridge over US 101. Busy interection with queuing typically on the NB and EB approaches.
	6	E GRAND AVE & W BRANCH ST	Frequent Crash Type: Broadside, Sideswipe Frequent PCF Violation Category: Auto Right of Way Violation	Closely spaced interection with Traffic Way and E. Branch St and US 101 ramps. "Keep Clear" marking on Grand. Due to the majority of traffic headed to Branch or the US 101 on-ramp lane utilization is not balanced (queuing typical in the outside lane during peak hours).
Intersections Chosen due to High Overall Total Crash	4	E GRAND AVE & S HALCYON RD	Frequent Crash Type: Rear End, Sideswipe, Broadside Frequent PCF Violation Category: Improper Speed, Improper Turning	Signalized interesection has split phase for north and south traffic due to the offset alignment of lane through the intersection. Also, alignment through intersection east-west has a bit of a kind. Lane guide marks would be beneficial.
	27	E GRAND AVE & US 101 SB RAMP	Frequent Crash Type: Rear End, Sideswipe, Broadside Frequent PCF Violation Category: Traffic Signal & Sign, Improper Turning	Short ramp length that doesn't allow much deceleration distance. Signalized interection closely spaced to NB on ramp signal. The signals appear to be running on separate controllers or not coordinated.
	3	E GRAND AVE & BRISCO RD	Frequent Crash Type: Broadside, Rear End, Sideswipe Frequent PCF Violation Category: DUI/BUI, Unsafe Speed, Improper Turning, Auto Right of Way Violation	Raised median island that channels the lefts on Grand Avenue. Close proximity to Elm Street creates speed differential for the right turn and left turn movements on Grand. Also, sometimes there is spillback for the EB left turn.
	16	EL CAMINO REAL & BRISCO RD	Frequent Crash Type: Broadside, Rear End, Sideswipe Frequent PCF Violation Category: Unsafe Speed, Auto Right of Way Violation, Improper Turning	School crosswalks on the south and east legs. Delay and queuing present due to the signal timing and phasing with the closely spaced interections along this corridor.

5. Safety Countermeasures

Per Caltrans, Division of Local Assistance, *Systemic Safety Analysis Report Program (SSARP) Guidelines*, February 2016, the following low-cost systemic safety countermeasures were identified for roadway segments and intersections in the City. These countermeasures and their overall crash reduction percentages are as follows:

Roadway Segment Countermeasures:

- Install/Upgrade signs with new fluorescent sheeting (regulatory or warning (R26)
    - 15% crash reduction to all crash types
- Install chevron signs on horizontal curves (R27)
    - 40% crash reduction to all crash types
- Install curve advance warning signs (R28)
    - 25% crash reduction to all crash types
- Install dynamic speed feedback signs (R30)
    - 30% crash reduction to all crash types
- Install delineators, reflectors and other object markers (R31)
    - 15% crash reduction to all crash types
- Install edge lines and centerlines (R32)
    - 25% crash reduction to all crash types
- Install bike lanes (R36)
    - 35% crash reduction to bicycle and pedestrian crash types

Non-Signalized Intersections:

- Install Raised medians/refuge islands (NS16)
    - 45% crash reduction to bicycle and pedestrian crash types
- Install Pedestrian crossing at uncontrolled locations (signs and markings only) (NS17)
    - 25% crash reduction to bicycle and pedestrian crash types
- Install Pedestrian crossing at uncontrolled locations with enhanced safety features (RFFB, curb extensions, etc.) (NS18)
    - 35% crash reduction to bicycle and pedestrian crash types
- Install Pedestrian signal or HAWK (NS19)
    - 55% crash reduction to bicycle and pedestrian crash types

Signalized Intersections:

- Improve signal hardware: lenses, back-plates, mounting, size, and number (S2)
    - 15% crash reduction to all crash types
- Improve signal timing (coordination, phase, red, yellow, or operation) (S3)
    - 15% crash reduction to all crash types
- Provide protected left turn phase (left turn lane already exists) (S6)
    - 30% crash reduction to all crash types
- Install raised pavement markers and striping (through intersections) (S8)
    - 10% crash reduction to all crash types
- Install pedestrian countdown signal heads (S19)
    - 25% crash reduction to bicycle and pedestrian crash types
- Install leading pedestrian interval (S22)
    - 60% crash reduction to bicycle and pedestrian crash types

In addition, Federal Highways Administration (FHWA) has proven safety countermeasures for mitigating collision trends. These countermeasures are presented in **Figure 5.1**.

Figure 5.1 FHWA Proven Safety Countermeasures

5.1 Roadway Segments – Safety Countermeasures

In selecting the appropriate safety countermeasure for the roadway segments, countermeasures that were successful in mitigating the majority of collisions and reduce overall collision severity were recommended for each roadway segment and intersection that identified in Section 4.

5.1.1 Recommended Roadway Countermeasures

As presented in **Table 5.1,** the identified top ranking roadway segments and the recommended safety countermeasure were quantified. This could be a combination of countermeasures.

Table 5.1 Roadway Segments Safety Countermeasures

Segment ID		Segment	Countermeasures
Segments Chosen due to High EPDO	15A	EL CAMINO REAL EAST OF OAK PARK TO WEST OF BRISCO	R30. Dynamic speed feedback signs R26. Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) R27. Install chevron signs on horizontal curves Not Listed. Install green paint for bicycle lane conflict zones.
	1B	GRAND AVE COURTLAND TO ELM	R32. Install edge lines and centerlines R3. Install Delineators, reflectors and other object markers. R36. Install Bike Lanes and install green paint for bicycle lane conflict zones.
	6B	HALCYON NORTH OF FAIR OAKS TO SOUTH OF GRAND	R30. Dynamic speed feedback signs R26. Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) R36. Install Bike Lanes and install green paint for bicycle lane conflict zones.
	4B	FAIR OAKS EAST OF HALCYON TO WEST OF VALLEY	R30. Dynamic speed feedback signs R26. Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) R27. Install chevron signs on horizontal curves
	5B	BRANCH EAST OF CAMINO MERCADO TO WEST OF BRISCO	R30. Dynamic speed feedback signs R26. Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)
	4C	FAIR OAKS WEST OF VALLEY TO EAST OF CALIFORNIA	R30. Dynamic speed feedback signs R26. Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)
	3C	W BRANCH EAST OF MASON TO EAST OF HUSANA/227	R26. Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) R30. Dynamic speed feedback signs R27. Install chevron signs on horizontal curves
	1C	GRAND EAST OF ELM TO WEST OF HALCYON	R32. Install edge lines and centerlines R3. Install Delineators, reflectors and other object markers. R36. Install Bike Lanes and install green paint for bicycle lane conflict zones.
	10A	RANCHO PKWY NORTH OF BRANCH TO NO. OF VIA VAQUERO	Sight distance at driveways and driveway configuration should be evaluated. Install green paint for bicycle lane conflict zones.
	26A	BRIDGE ST NORTH OF TRAFFIC TO SOUTH OF W BRANCH	Bridge Street will have improved design with Bridge Street widening project currently under development. Re-evaluate when complete.
Segments Chosen due to High Overall Crash Rates	9A	CAMINO MERCADO NO. OF BRANCH TO SO. OF RANCHO PKWY	R28. Install curve advanced warning signs R30. Dynamic speed feedback signs
	31A	ALLEN ST EAST OF TRAFFIC WAY TO WEST OF PACIFIC COAST RAILWAY PLACE	Parking should be limited to one side only. Roadway striping would help delineate vehicle travel way.
	5C	BRANCH EAST OF BRISCO TO NORTH OF W BRANCH	R26. Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) Not Listed. Install green paint for bicycle lane conflict zones.
	32A	BRANCH MILL RD SO. OF HUEBNER LN TO CITY LIMIT	Adding shoulder where possible. Install edge and centerline rumble stripes at selective locations.
	15C	EL CAMINO REAL EAST OF HALCYON TO N OF GRAND	R30. Dynamic speed feedback signs R26. Install/Upgrade signs with new fluorescent sheeting (regulatory or warning) R27. Install chevron signs on horizontal curves Not Listed. Install green paint for bicycle lane conflict zones.
	23A	TALLY HO RD EAST OF MASON TO WEST OF 227	R30. Dynamic speed feedback signs R26. Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)
Segments Chosen due to High Overall Total Crash	5A	BRANCH EAST OF OAK PARK TO WEST OF CAMINO MERCADO	R36. Install Bike Lanes and install green paint for bicycle lane conflict zones.
	14A	BRISCO NORTH OF GRAND TO SOUTH OF ECR	R30. Dynamic speed feedback signs R26. Install/Upgrade signs with new fluorescent sheeting (regulatory or warning)

It is recommended that some of these countermeasures, such as striping, be incorporated with pavement rehabilitation projects. Also, even more countermeasures could be added, but with the HSIP analyzer tool, we are limited to only being able to quantify three countermeasures.

5.1 Intersections – Safety Countermeasures

In evaluating the focused intersection locations, low-cost systemic safety countermeasures were recommended in **Table 5.2**. These recommended low-cost countermeasures include traffic signal improvements, bicycle and pedestrian improvements, and striping, pavement markings, and signage improvements. The majority of the identified intersections were signalized and needed additional crossing improvements for pedestrians and bicycles.

Table 5.2 Intersection Safety Countermeasures

Intersection ID		Intersection	Countermeasures
Intersections Chosen due to High EPDO	9	E BRANCH ST & SHORT ST	NS16. Install raised medians/refuge islands NS18. Pedestrian crossing at uncontrolled locations with enchanced safety features (RRFB, curb extensions, etc.)
	46	E GRAND AVE & BELL ST	NS19. Install pedestrian hybrid beacon (HAWK)
	1	E GRAND AVE & COURTLAND ST	S19. Install pedestrian countdown heads S20. Provide pedestrian Crossing S22. Leading pedestrian interval (LPI) S2. Improve signal Hardware: Lenses, back plates mounting, size and number of heads S3. Improve Signal Timing
	13	EL CAMINO REAL & N OAK PARK BLVD	Intersection is in joined jurisdiction; mitigation can not be proposed by city only.
	6	E GRAND AVE & W BRANCH ST	Install luminaire for the crosswalk on the north leg (Branch St leg). Evaluated signage and pavement markings for trap right turn lane (Right Lane Must Turn Right is installed).Consider roundabout with consolidation of closely spaced intersections
	2	E GRAND AVE & S ELM ST	S19. Install pedestrian countdown heads S20. Provide Pedestrian Crossing S22. Leading pedestrian interval (LPI) S2. Improve signal Hardware: Lenses, back plates mounting, size and number of heads S3. Improve Signal Timing S6. Provide protected left turn phasing.
	12	JAMES WAY & OAK PARK BLVD	Joint jurisdiction with Pismo Beach; mitigation can not be proposed by city only.
	8	W BRANCH ST & BRIDGE ST	NS16. Install raised medians/refuge isnlands NS18. Pedestrian crossing at uncontrolled locations with enchanced safety features (RRFB, curb extensions, etc.)
	19	FARROLL AVE & S HALCYON RD	NS19. Install pedestrian hybrid beacon (HAWK)
Intersections Chosen due to High Overall Crash Rates	15	W BRANCH ST & BRISCO RD	S19. Install pedestrian countdown heads S20. Provide Pedestrian Crossing S22. Leading pedestrian interval (LPI) S2. Improve signal Hardware: Lenses, back plates mounting, size and number of heads S3. Improve Signal Timing This intersection will be reconfigured in the future as part of the Brisco Road Interchange Improvement Project
	43	THE PIKE & GARFIELD PL	NS17. Install crossing at uncontrolled locations
	67	CORBETT CANYON RD & GULARTE RD	Sight distance triangle at this intersection should be cleared.
Intersections Chosen due to High Overall Total Crash	4	E GRAND AVE & S HALCYON RD	S19. Install pedestrian countdown heads S20. Provide Pedestrian Crossing S22. Leading pedestrian interval (LPI) S2. Improve signal Hardware: Lenses, back plates mounting, size and number of heads S3. Improve Signal Timing
	27	E GRAND AVE & US 101 SB RAMP	Caltrans jurisdiction; mitigation can not be proposed by city only.
	3	E GRAND AVE & BRISCO RD	Crosswalk should be upgraded to high visibility crosswalks. intersection lighting should be improved on crosswalks.
	16	EL CAMINO REAL & BRISCO RD	S19. Install pedestrian countdown heads S20. Provide Pedestrian Crossing S22. Leading pedestrian interval (LPI) S2. Improve signal Hardware: Lenses, back plates mounting, size and number of heads S3. Improve Signal Timing This intersection will be reconfigured in the future as part of the Brisco Road Interchange Improvement Project

6. HSIP Application

The City of Arroyo Grande submitted a Highway Safety Improvement Program (HSIP) grant application for Cycle 10. The application was for set-aside funding for pedestrian crossing enhancements at the following three locations:

1. Uncontrolled pedestrian crosswalk on the west leg of E. Grand Avenue and Alder Street
2. School crosswalk across Farroll Avenue at S. Halcyon Road
3. School crosswalk on the south leg of S. Halcyon Road at Sandalwood Avenue

Overall, the project descriptions are to generally improve the three existing crosswalks with ADA curb ramps, a Rectangular Rapid Flashing Beacon for the uncontrolled crossing on E. Grand Avenue, curb extensions for the existing crossing on S. Halcyon Road, yield lines, high-visibility crosswalks, and striping and pavement markings.

The preliminary design plans for the HSIP application are in **Appendix E: HSIP Cycle 10 Plans**.

These locations were identified based on SSAR and Local Road Safety Plan (LRSP) that is currently in the public outreach process. Based on the LRSP stakeholder group comprised of City staff, Arroyo Grande Police Department, Five Cities Fire Authority, San Luis Obispo Bike Club, Lucia Mar Unified School District, SLO County, Caltrans, Pismo Beach, and Grover Beach, uncontrolled pedestrian crossings are one of the main safety issues in the City (where fatal and severe injury pedestrian to vehicle collisions were occurring). Therefore, the LRSP working group made it a priority to have a greater focus on uncontrolled crosswalks within the City. The locations in the application were identified based on their deficiencies and use, priority corridors, and collision analysis. The City has also received several messages or testimonies from concerned citizens who use the crossings on a regular basis.

In addition, the two crosswalks on Halcyon Road have been identified for these improvements per the Halcyon Complete Streets Plan, April 2018. This complete street plan had significant outreach but has no current funding so getting some identified improvements implemented in the field will help to bring momentum to the ultimate project.

The award for HSIP Cycle 10 funding should be announced March 31st but was not known when the SSAR was finalized.

7. Next Steps – Local Road Safety Plan

The City of Arroyo Grande is currently conducting a Local Road Safety Plan in building on the SSAR collision analysis and systemic safety countermeasures. A Stakeholder Working group was formed and consists of the following agencies and organizations:

1. *City of Arroyo Grande*
    - *Engineering*
    - *Public Works*
    - *Planning*
    - *Community Development*
    - *Maintenance*
2. *Police Department*
3. *Five Cities Fire Authority*
4. *Lucia Mar Unified School District*
5. *Bike SLO County*
6. *San Luis Obispo Bike Club*
7. *Safe Routes to School Coordinator*
8. *City of Pismo Beach*
9. *City of Grover Beach*
10. *San Luis Obispo County*
11. *Caltrans*

Three stakeholder meetings have been held in guiding the development of the LRSP and we are currently in the public outreach process. A website has been developed in soliciting public feedback and this website has an interactive map where the public can pinpoint their concerns and a survey in gathering City specific safety information.

After the public outreach process, another Stakeholder meeting with be held in April 2021. A discussion of the public comments and recommended countermeasures/safety projects will be the focus of this meeting. After this meeting, the Draft LRSP will be prepared for Stakeholder comments.

A LRSP builds on the data driven process with an agency specific stakeholder group that guides the development of the plan and recommends other ways to improve safety beyond engineering countermeasures to include enforcement, emergency response, education, and emerging technologies. In complimenting the SHSP, the LRSP is focused on identifying countermeasures for the 5 Traffic Safety E's (see **Figure 7.1**).

This collaborative and holistic process also engages the public through outreach, which is key to capturing the near misses or safety concerns before they have documented collision issues. This overall framework provides a proactive systemic approach in improving safety citywide and positions the City for future grant funding with the prioritized safety projects and goals adopted by City Council.

Figure 7.1 Traffic Safety E's

8. Conclusions

GHD has prepared this Systemic Safety Analysis Report (SSAR) for the City of Arroyo Grande. The report consists of detailed historical collision analysis and field observations. These safety issues were then matched to a set of low-cost systemic safety countermeasures and quantified per the HSIP calculator. This calculator quantifies the overall benefit in quantifying the reduction of crashes through Crash Modification Factors (CMF) for the safety countermeasures. In addition, based on recent project costs and Caltrans District 5 unit costs, each project had a preliminary planning cost estimate completed. For HSIP applications, further engineering is needed to include preliminary design and 30% cost estimating will need to be performed. More details into the cost estimate and overall benefit and cost are included in the HSIP analyzer worksheets located in **Appendix D: HSIP Analyzer Worksheet**.

With a systemic approach that makes use of high impact, low-cost countermeasures, GHD submits the following focused list as presented in **Table 6.1**. These projects are intended to be competitive for the next cycle (Cycle 10) in the Highway Safety Improvement Program (HSIP).

Table 8.1 Recommended HSIP Projects

Pedestrian Improvements at Signalized intersection (S19, S20, S22)				
Locations	Type of collision	Benefit	Cost	B/C
4 following signalized intersections: E GRAND AVE & COURTLAND ST E GRAND AVE & S ELM ST E GRAND AVE & S HALCYON RD E GRAND AVE & PEDESTRIAN SIGNAL (WEST OF ALDER ST)	P&B	$ 1,946,647	$ 476,000	4.09
General Vehicular Signal Improvements (S2, S3, S6)				
Locations	Type of collision	Benefit	Cost	B/C
3 following signalized intersections: E GRAND AVE & COURTLAND ST E GRAND AVE & S ELM ST E GRAND AVE & S HALCYON RD	All	$ 5,539,826	$ 620,000	8.94
Pedestrian Hybrid Beacon (NS19)				
Locations	Type of collision	Benefit	Cost	B/C
2 pedestrian hybrid beacons at the following locations: E GRAND AVE & BELL ST FARROLL AVE & S HALCYON RD	P&B	$ 5,107,961	$ 500,000	10.22
Pedestrian Improvements at Unsignalized Locations and Crosswalks (NS16, NS17, NS18)				
Locations	Type of collision	Benefit	Cost	B/C
2 following unsignalized intersections: E BRANCH ST & SHORT ST W BRNACH ST & BRIDGE ST	P&B	$ 10,409,861	$ 237,500	43.83
Improve Striping and Pavement Markings (R31, R32, R36, Green Conflict markings)				
Locations	Type of collision	Benefit	Cost	B/C
2 following roadway segments: E GRAND AVE FROM COURTLAND ST TO ELM ST E GRAND AVE FROM EAST OF ELM ST TO WEST OF HALCYON RD	All	$ 1,648,506	$ 245,000	6.73

In addition, to the focused projects above you can apply the recommended countermeasures systemically to the roadways and intersections with similar risk characteristics and collisions. **Table 6.2** presents the suggested lists of low-cost engineering countermeasures that could be applied systemically throughout the City of Arroyo Grande.

Table 8.2 Recommended Systematic HSIP Projects

Systemic HSIP Projects	Extent
Pedestrian Improvements at Signalized Intersection (S19, S20, S22)	At all signalized intersections throughout the City.
General Vehicular Signal Improvements (S2, S3, S6)	At all signalized intersections throughout the City.
Pedestrian Hybrid Beacon (NS19)	At 4 unsignalized intersections.
Pedestrian Improvements at Unsignalized Locations and Crosswalks (NS16, NS17, NS18)	At unsignalized intersections through the City.
Improve Striping and Pavement Markings (R31, R32, R36, Green Conflict markings)	At 5 roadway segments along East Grand Avenue and West Branch Street. Other locations should be added based on local roadway survey.
Improve Signage & Dynamic Speed Feedback Signs (R26, R30)	A Citywide sign audit will determine locations of needed signage improvement or upgrade. Speed feedback signs should be placed where the observed speed is generally higher than speed limits.
Improve Signage on Curves (R27, R28)	Roadways with Horizontal curves through the City.

8.1 Next Steps

The City of Arroyo Grande is currently conducting a Local Road Safety Plan. This plan is being guided by a Stakeholder Working Group consisting of City staff, Arroyo Grande Police Department, Five Cities Fire Authority, San Luis Obispo Bike Club, Lucia Mar Unified School District, SLO County, Caltrans, Pismo Beach, and Grover Beach. The LRSP is currently in the public outreach process and a Draft LRSP is anticipated to be completed in June 2021.

about GHD

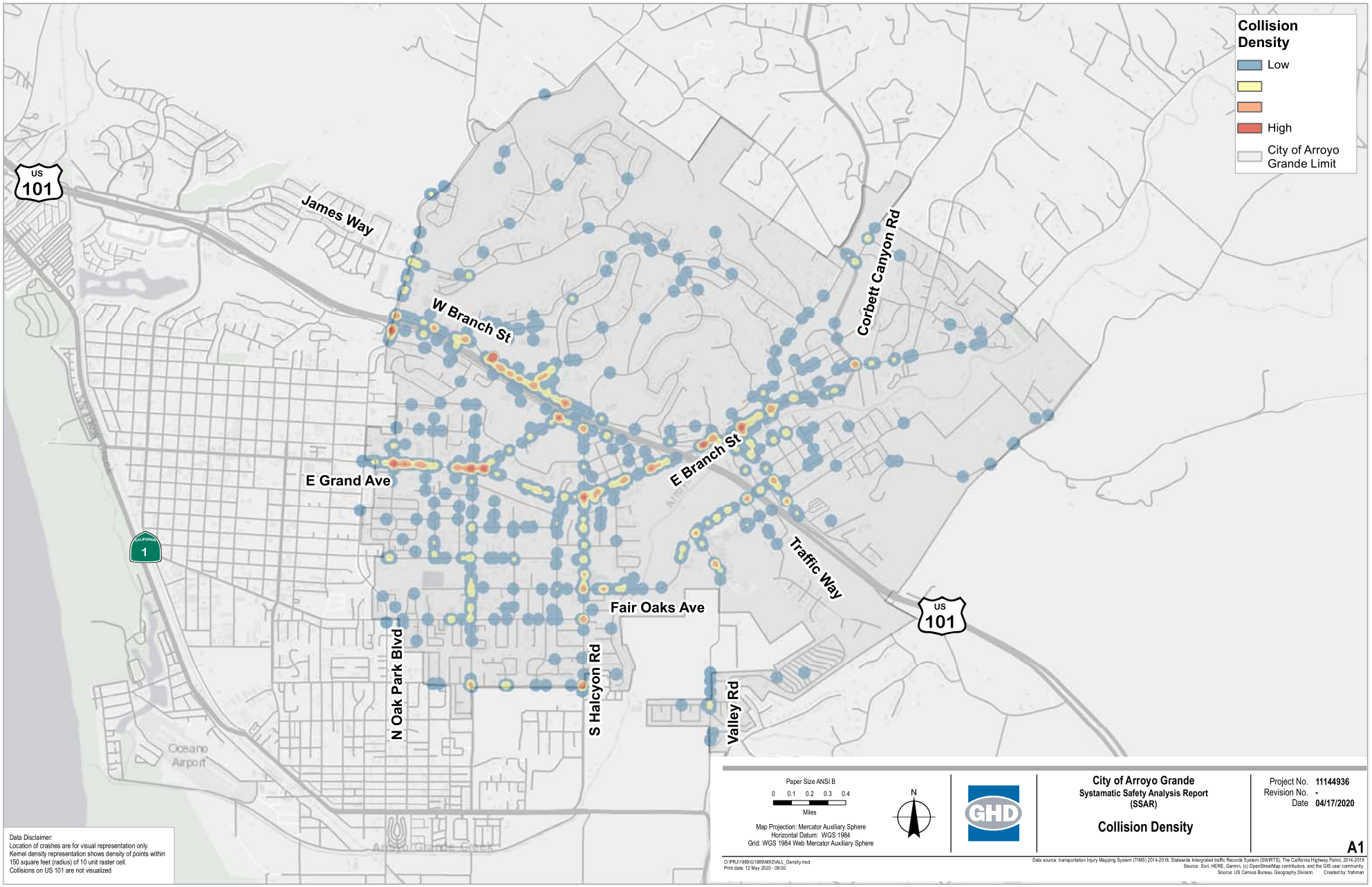
GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

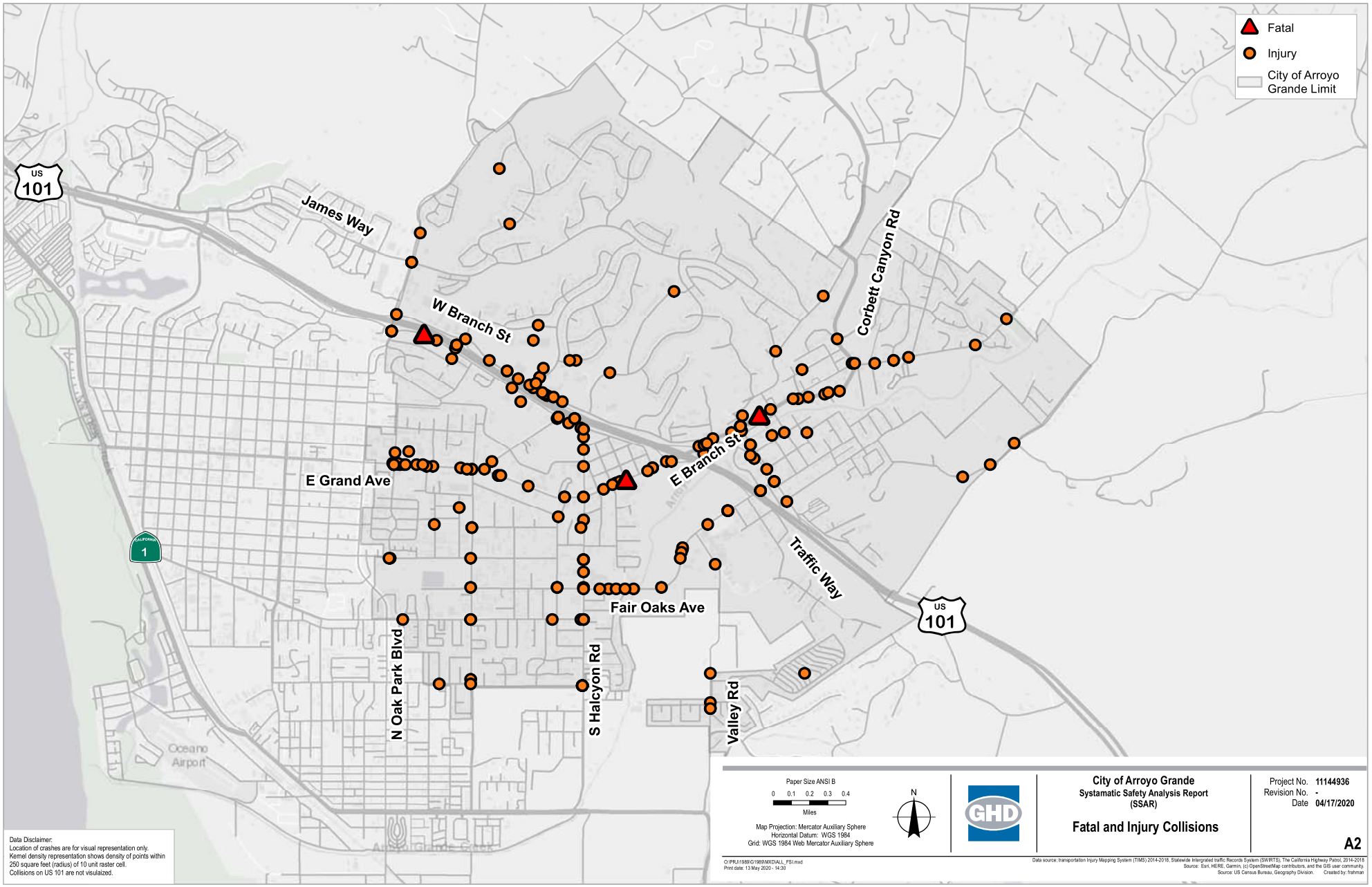
Jay Walter
Jay.Walter@ghd.com
805.858.3141

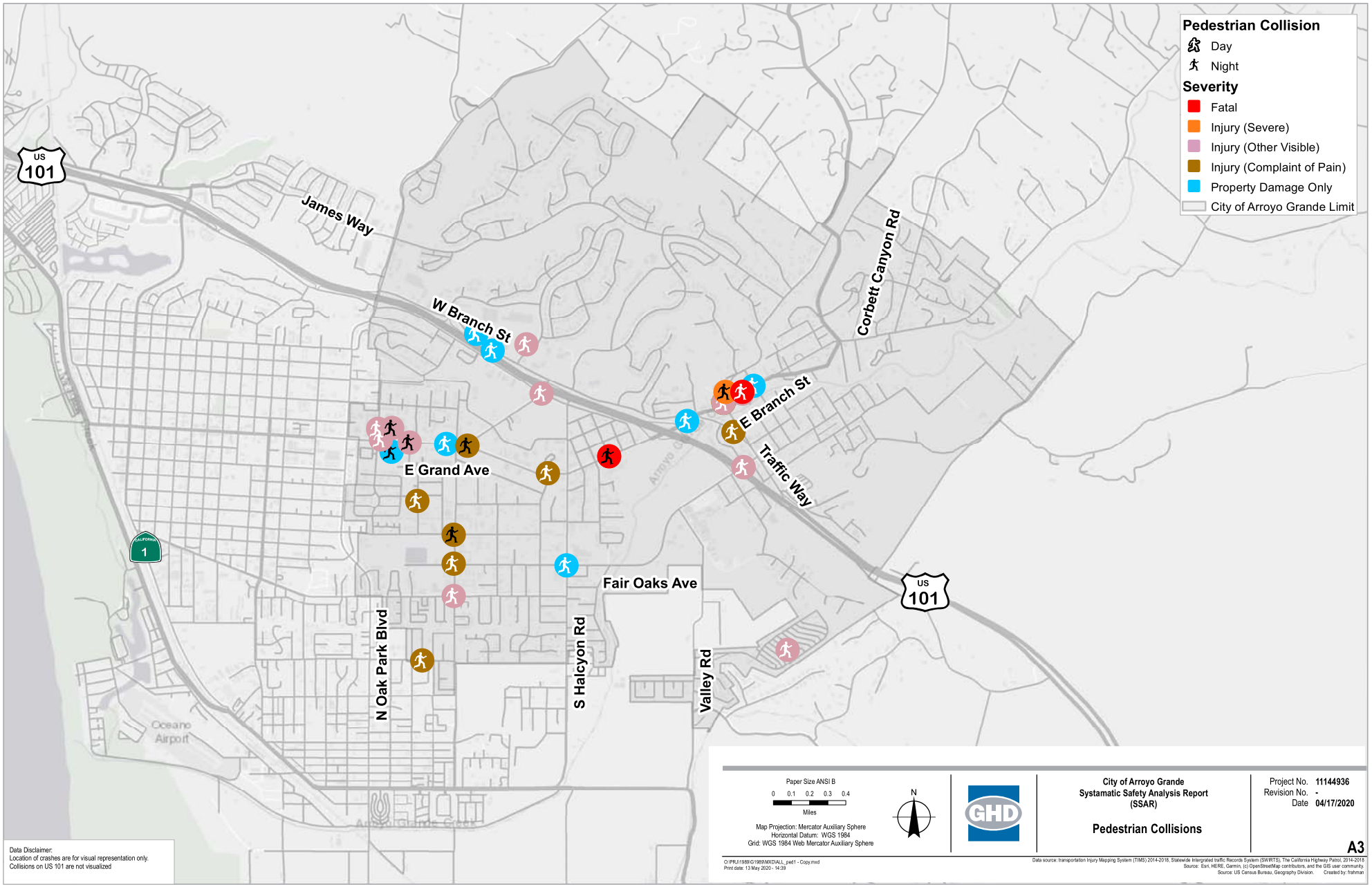
Kathryn Kleinschmidt
Kathryn.Kleinschmidt@ghd.com
805.858.3147

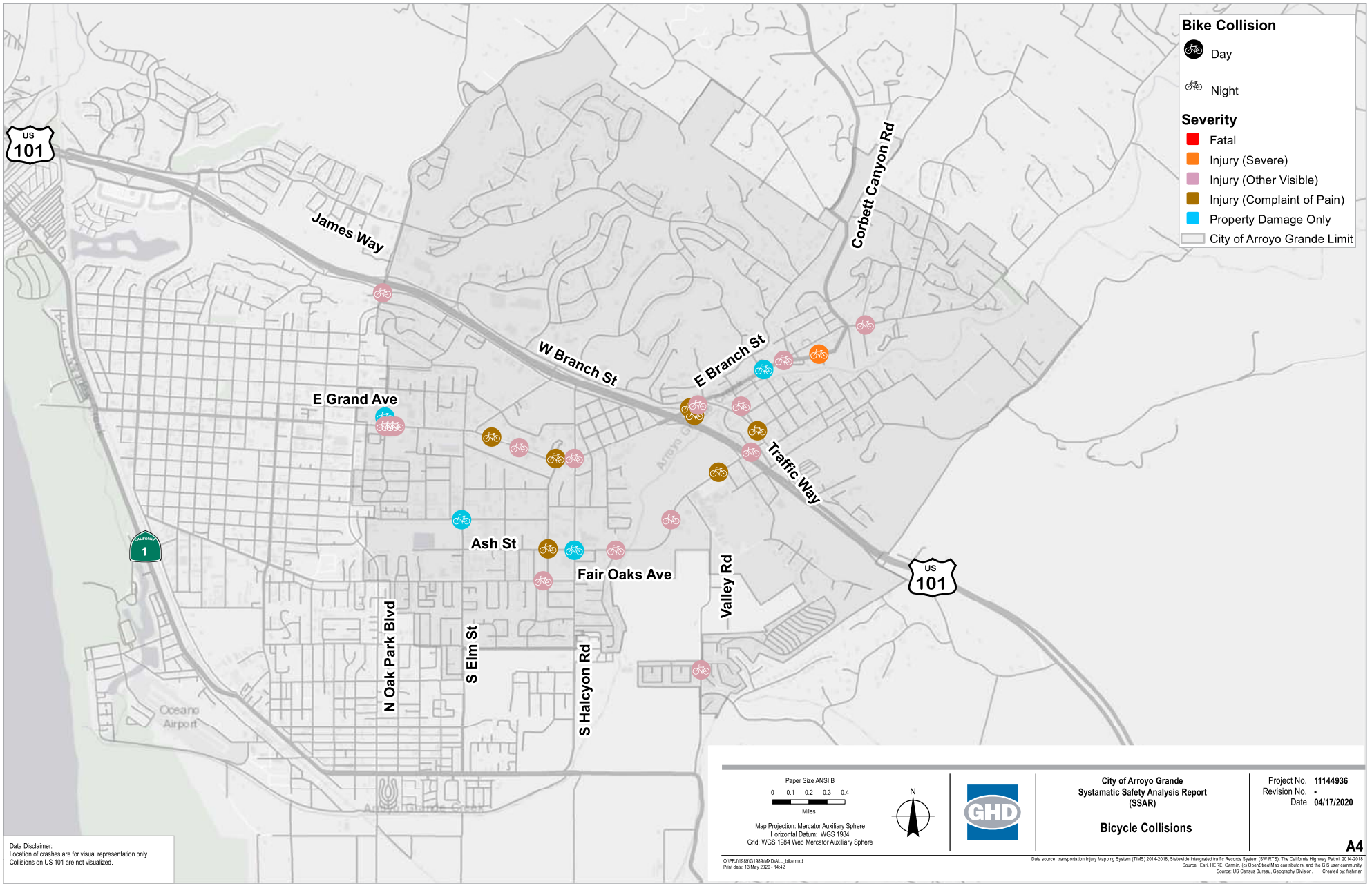
www.ghd.com

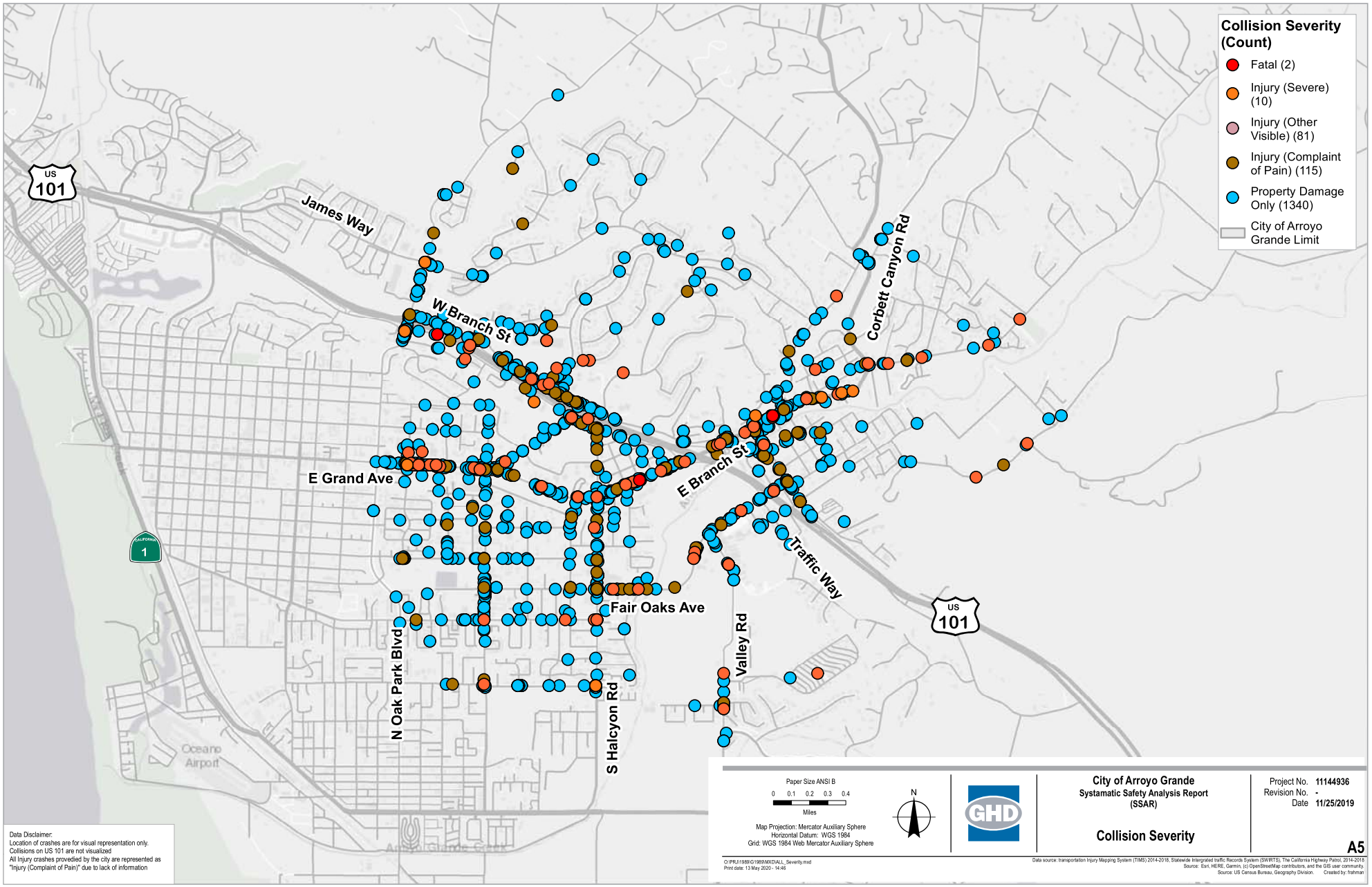
Appendix A – Collision Maps


Collision Density
Low
High
City of Arroyo Grande Limit
US 101
James Way
W Branch St
Corbett Canyon Rd
E Grand Ave
E Branch St
Traffic Way
Fair Oaks Ave
N Oak Park Blvd
S Halcyon Rd
Valley Rd
Oceano Airport
Data Disclaimer:
Location of crashes are for visual representation only.
Kernel density representation shows density of points within 150 square feet (radius) of 10 unit raster cell.
Collisions on US 101 are not visualized
Paper Size ANSI B
0 0.1 0.2 0.3 0.4
Miles
Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere
N
GHD
City of Arroyo Grande
Systematic Safety Analysis Report (SSAR)
Collision Density
Project No. 11144936
Revision No. -
Date 04/17/2020
A1
O:\PR\1989\G1989MXD\ALL_Density.mxd
Print date: 12 May 2020 - 09:00
Data source: transportation Injury Mapping System (TIMS) 2014-2018, Statewide Intergrated traffic Records System (SWIRTS), The California Highway Patrol, 2014-2018
Source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community,
Source: US Census Bureau, Geography Division. Created by: frahman

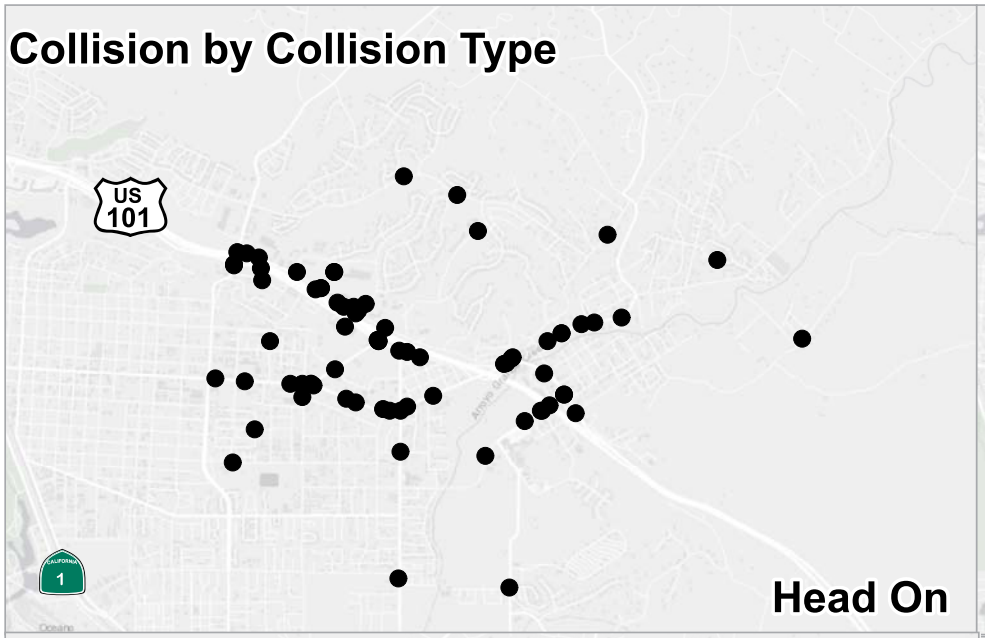

Fatal
Injury
City of Arroyo Grande Limit
US 101
James Way
W Branch St
Corbett Canyon Rd
E Branch St
E Grand Ave
Traffic Way
Fair Oaks Ave
N Oak Park Blvd
S Halcyon Rd
Valley Rd
CALIFORNIA 1
Oceano Airport
Arroyo Grande Creek
Data Disclaimer:
Location of crashes are for visual representation only.
Kernel density representation shows density of points within 250 square feet (radius) of 10 unit raster cell.
Collisions on US 101 are not visualized.
Paper Size ANSI B
0 0.1 0.2 0.3 0.4
Miles
Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere
N
GHD
City of Arroyo Grande
Systematic Safety Analysis Report (SSAR)
Fatal and Injury Collisions
Project No. 11144936
Revision No. -
Date 04/17/2020
A2
O:\PR\11989\GIS\MXD\ALL_FSI.mxd
Print date: 13 May 2020 - 14:30
Data source: transportation Injury Mapping System (TIMS) 2014-2018, Statewide Intergrated traffic Records System (SWIRTS), The California Highway Patrol, 2014-2018
Source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community.
Source: US Census Bureau, Geography Division. Created by: frahman

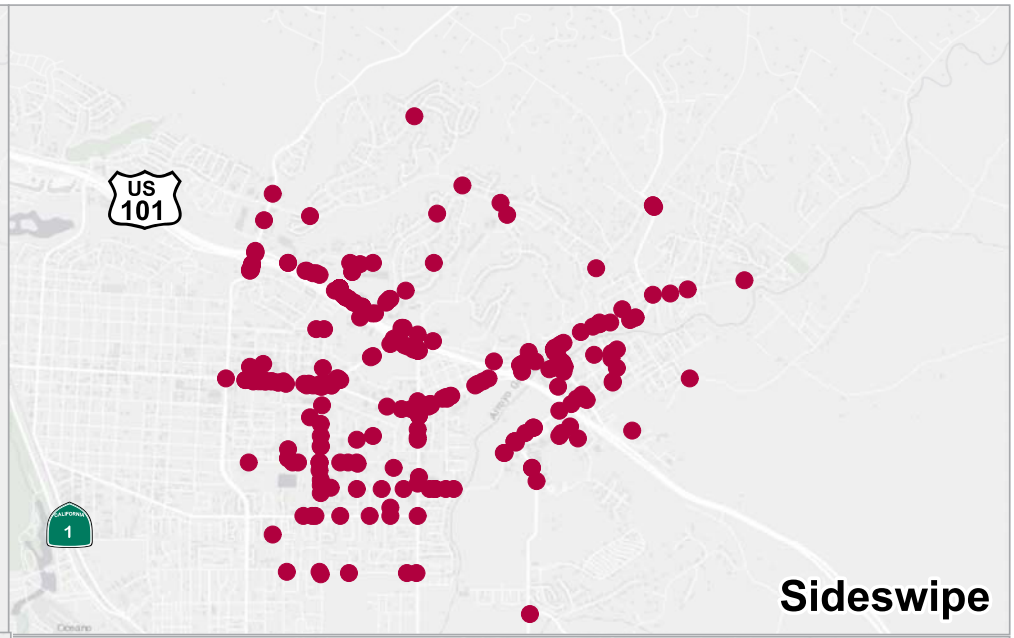

Pedestrian Collision
Day
Night
Severity
Fatal
Injury (Severe)
Injury (Other Visible)
Injury (Complaint of Pain)
Property Damage Only
City of Arroyo Grande Limit
US 101
James Way
W Branch St
E Branch St
Corbett Canyon Rd
Traffic Way
E Grand Ave
Fair Oaks Ave
N Oak Park Blvd
S Halcyon Rd
Valley Rd
CALIFORNIA 1
Oceano Airport
Arroyo Grande Creek
Data Disclaimer:
Location of crashes are for visual representation only.
Collisions on US 101 are not visualized
Paper Size ANSI B
0 0.1 0.2 0.3 0.4
Miles
Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere
N
GHD
City of Arroyo Grande
Systamatic Safety Analysis Report
(SSAR)
Pedestrian Collisions
Project No. 11144936
Revision No. -
Date 04/17/2020
A3
O:\PR\11989\G1989\MXD\ALL_ped1 - Copy.mxd
Print date: 13 May 2020 - 14:39
Data source: transportation Injury Mapping System (TIMS) 2014-2018, Statewide Intergrated traffic Records System (SWIRTS), The California Highway Patrol, 2014-2018
Source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Source: US Census Bureau, Geography Division.
Created by: frahman

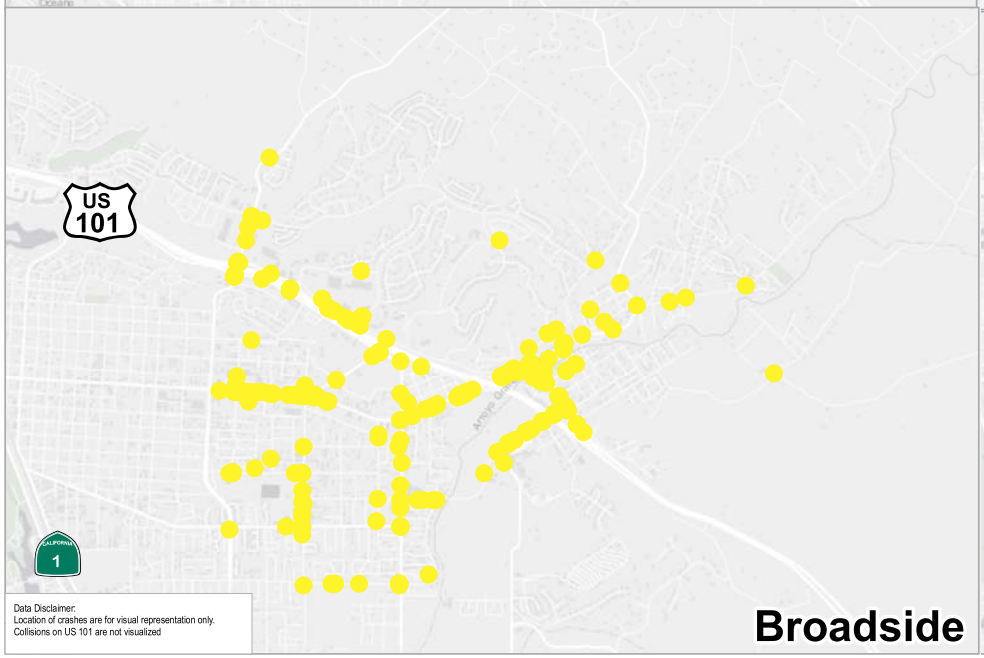

Bike Collision
Day
Night
Severity
Fatal
Injury (Severe)
Injury (Other Visible)
Injury (Complaint of Pain)
Property Damage Only
City of Arroyo Grande Limit
US 101
James Way
W Branch St
E Branch St
Corbett Canyon Rd
E Grand Ave
Traffic Way
Ash St
Fair Oaks Ave
Valley Rd
N Oak Park Blvd
S Elm St
S Halcyon Rd
CALIFORNIA 1
Oceano Airport
Arroyo Grande Creek
Paper Size ANSI B
0 0.1 0.2 0.3 0.4
Miles
Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere
N
GHD
City of Arroyo Grande
Systamatic Safety Analysis Report
(SSAR)
Bicycle Collisions
Project No. 11144936
Revision No. -
Date 04/17/2020
A4
O:\PR\11989\GIS\MXD\ALL_bike.mxd
Print date: 13 May 2020 - 14:42
Data source: transportation Injury Mapping System (TIMS) 2014-2018, Statewide Intergrated traffic Records System (SWIRTS), The California Highway Patrol, 2014-2018
Source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community,
Source: US Census Bureau, Geography Division.
Created by: frahman
Data Disclaimer:
Location of crashes are for visual representation only.
Collisions on US 101 are not visualized.

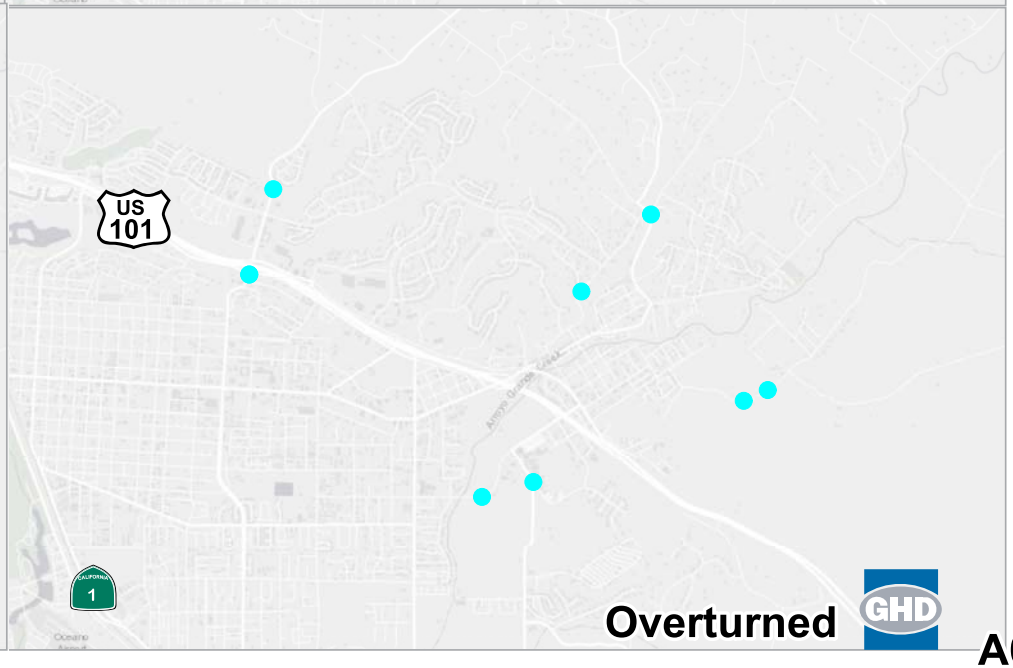

Collision Severity (Count)
Fatal (2)
Injury (Severe) (10)
Injury (Other Visible) (81)
Injury (Complaint of Pain) (115)
Property Damage Only (1340)
City of Arroyo Grande Limit
US 101
James Way
W Branch St
Corbett Canyon Rd
E Grand Ave
E Branch St
Traffic Way
Fair Oaks Ave
Valley Rd
N Oak Park Blvd
S Halcyon Rd
CALIFORNIA 1
Oceano Airport
Arroyo Grande Creek
Data Disclaimer:
Location of crashes are for visual representation only.
Collisions on US 101 are not visualized
All Injury crashes provedied by the city are represented as "Injury (Complaint of Pain)" due to lack of information
Paper Size ANSI B
0 0.1 0.2 0.3 0.4
Miles
Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere
N
GHD
City of Arroyo Grande
Systamatic Safety Analysis Report (SSAR)
Collision Severity
Project No. 11144936
Revision No. -
Date 11/25/2019
A5
O:\PR\11989\GIS\MXD\ALL_Severity.mxd
Print date: 13 May 2020 - 14:46
Data source: transportation Injury Mapping System (TIMS) 2014-2018, Statewide Intergrated traffic Records System (SWRTS), The California Highway Patrol, 2014-2018
Source: Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community,
Source: US Census Bureau, Geography Division. Created by: frahman

Collision by Collision Type



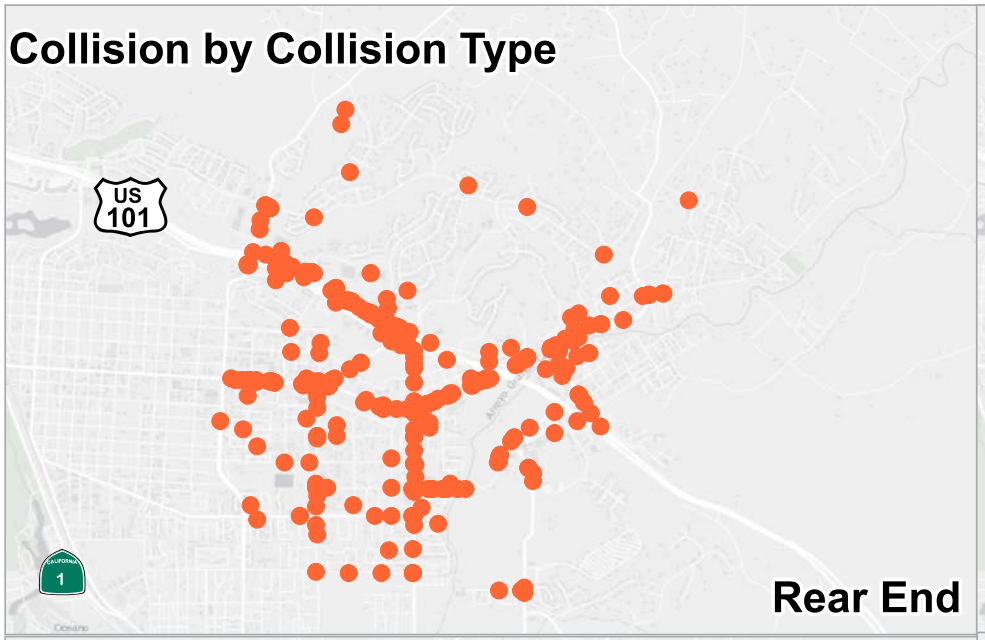




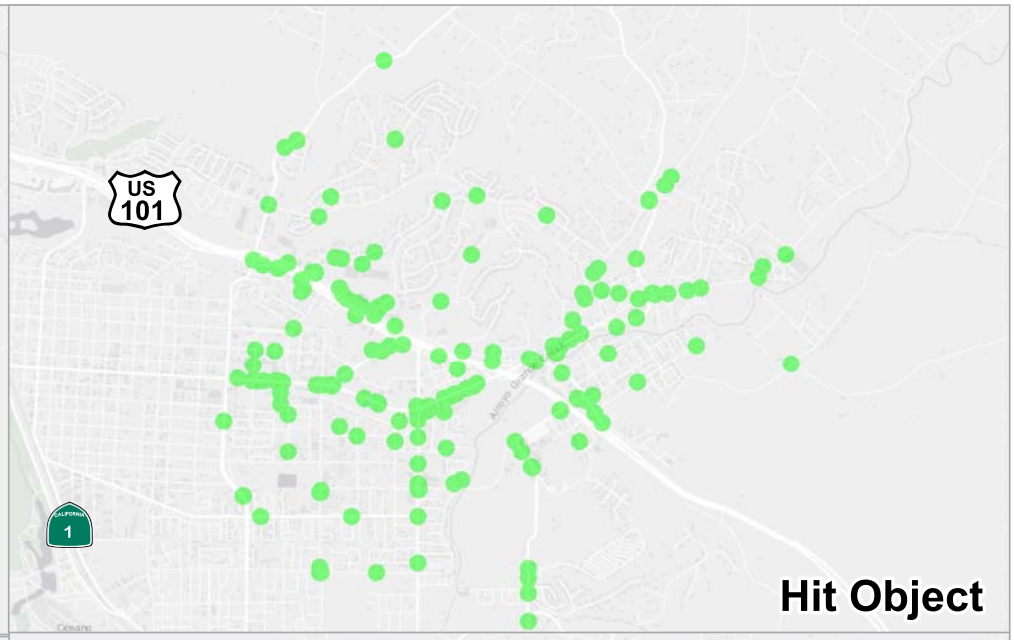


A6

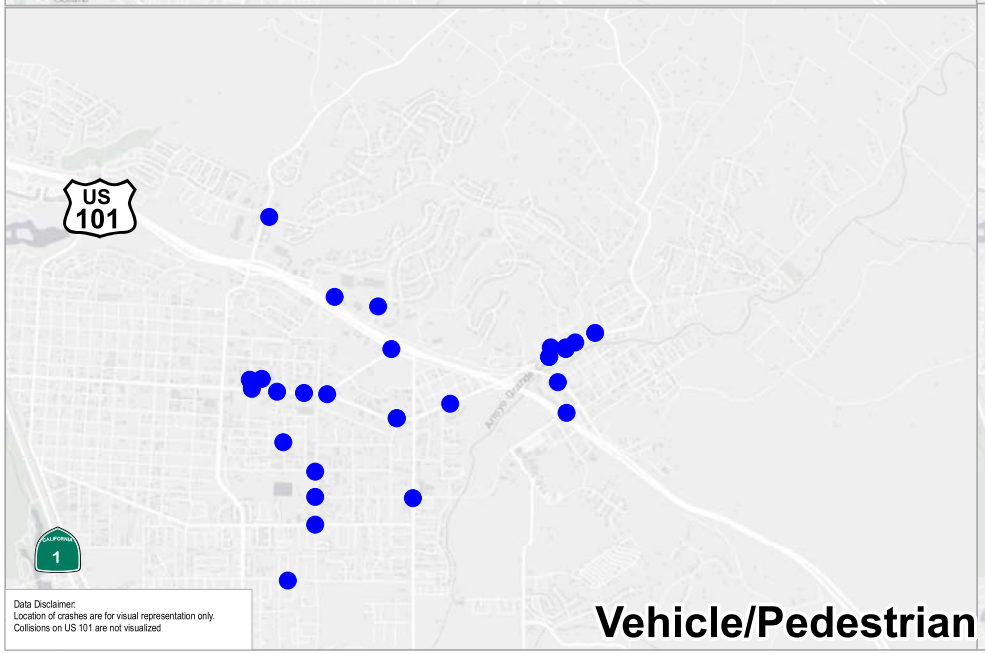
Collision by Collision Type



Rear End

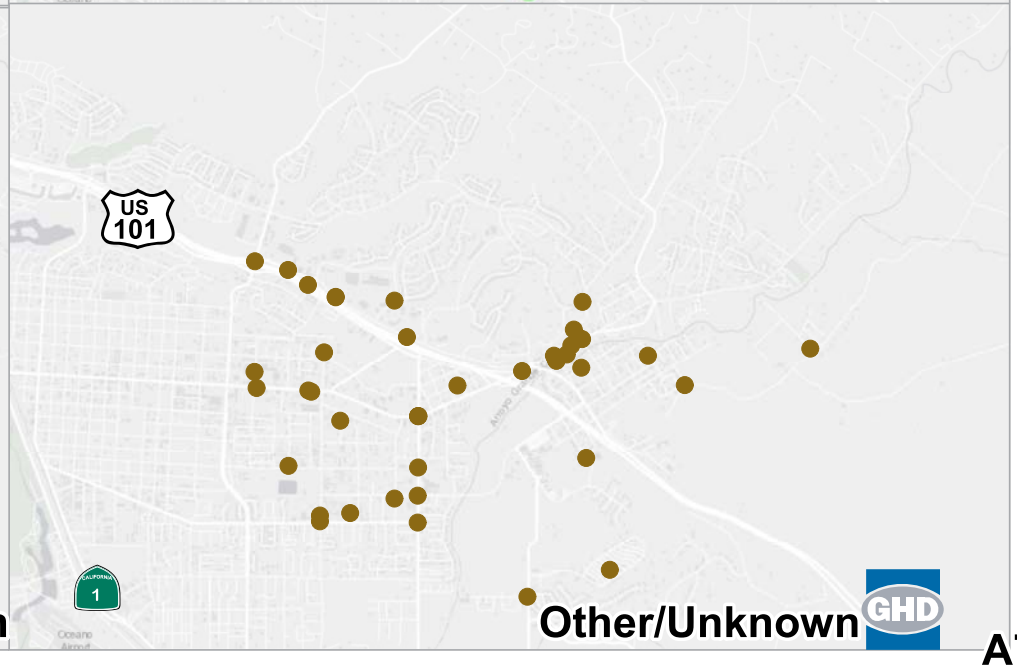


Hit Object



Data Disclaimer:
Location of crashes are for visual representation only.
Collisions on US 101 are not visualized

Vehicle/Pedestrian



Other/Unknown

GHD

A7

Appendix B – Traffic Analysis and Collision Analysis

Intersection ID	Ranked Intersection by EPDO	EPDO
9	E BRANCH ST & SHORT ST	581
46	E GRAND AVE & BELL ST	557
1	E GRAND AVE & COURTLAND ST	133
13	EL CAMINO REAL & N OAK PARK BLVD	91
20	THE PIKE & S HALCYON RD	82
6	E GRAND AVE & W BRANCH ST	70
2	E GRAND AVE & S ELM ST	54
12	JAMES WAY & OAK PARK BLVD	52
8	W BRNACH ST & BRIDGE ST	51
19	FARROLL AVE & S HALCYON RD	48
16	EL CAMINO REAL & BRISCO RD	47
4	E GRAND AVE & S HALCYON RD	45
14	W BRANCH ST & RANCHO PKWY	43
5	E GRAND AVE & EL CAMINO REAL	39
17	EL CAMINO REAL & N HALCYON RD	39
27	E GRAND AVE & US 101 SB RAMP	38
29	W BRANCH ST / US 101 NB RAMP & N OAK PARK BLVD	36
58	FAIR OAKS AVE & STATION WAY	36
40	E GRAND AVE & JUNIPER ST	32
15	W BRANCH ST & BRISCO RD	30
63	FAIR OAKS AVE & AGHS EAST ENTRANCE	30
28	W BRANCH ST & CAMINO MERCADO / US 101 NB RAMPS	29
31	N OAK PARK BLVD & E GRAND AVE	29
3	E GRAND AVE & BRISCO RD	28
11	E BRANCH ST & HUSANA RD	27
64	VALLEY RD & AGHS STAFF PARKING / BACK ROAD	27
7	W BRANCH ST & TRAFFIC WAY	26
42	THE PIKE & S ELM ST	26
69	E GRAND AVE & ALDER ST	26
37	FARROLL AVE & S ELM ST	25
65	FAIR OAKS AVE & TODD LN	25
74	W BRANCH ST & TOWN CENTER DR	24
18	FAIR OAKS AVE & S HALCYON RD	23
22	FAIR OAKS AVE & TRAFFIC WAY	22
45	E GRAND AVE N ALPINE ST	22
10	E BRANCH ST & S MASON ST	19
49	TRAFFIC WAY & NELSON ST	18
62	FAIR OAKS AVE & AGHS MIDDLE ENTRANCE	18
44	E GRAND AVE & RENA ST	17
66	S ELM ST & MAPLE ST	17
23	FAIR OAKS AVE & US 101 SB OFF RAMP & ORCHARD ST	16
35	ASH ST & COURTLAND ST	16
36	FAIR OAKSAVE & S ELM ST	15
59	CHERRY AVE & TRAFFIC WAY	15
54	HUSANA RD & CLARENCE AVE	14
55	HUSANA RD & ORO DR	13
56	HUSANA RD & STAGECOACH RD	12
24	FAIR OAKS AVE & VALLEY RD	11
41	E GRAND AVE & FAIR VIEW DR	11
52	NELSON ST & S MASON ST	10
21	LEANNA DR & VALLEY RD	9
61	FAIR OAKS AVE & AGHS WEST ENTRANCE	8
43	THE PIKE & GARFIELD PL	7
50	TRAFFIC WAY & POOLE ST	7
53	CORBETT CANYON RD & SR 227 / PRINTZ RD	5
67	CORBETT CANYON RD & GULARTE RD	5
38	DODSON WAY & HALCYON RD	4
51	TRAFFIC WAY & ALLEN ST	4
70	JAMES WAY & MEADOW WAY	4
25	TRAFFIC WAY & US 101 NB RAMP	3
26	E GRAND AVE & US 101 NB RAMP	3
57	PRINTZ RD & TALLY HO RD	3
68	MASON & LE POINT ST	3
71	OAK PARK BLVD & MEADOWLARK DR	3
72	BRISCO & LINDA DR	3
30	BRISCO RD & US 101 NB RAMPS	2
32	W BRANCH ST & RODEO DR	2
39	ASH ST & WALNUT ST	2
47	EL CAMINO REAL & BELL ST	2
60	CHERRY AVE & CALIFORNIA ST	2
33	JAMES WAY & RODEO DR	1
34	JAMES WAY & TALLY HO RD	1
48	W BRANCH ST & VERNON ST	1
73	FAIR OAKS AVE & CALIFORNIA ST	1

Intersection ID	Ranked Intersection by Overall Crash Rates	Overall Crash Rates
51	TRAFFIC WAY & ALLEN ST	1.48
64	VALLEY RD & AGHS STAFF PARKING / BACK ROAD	1.22
15	W BRANCH ST & BRISCO RD	0.94
8	W BRNACH ST & BRIDGE ST	0.93
2	E GRAND AVE & S ELM ST	0.91
20	THE PIKE & S HALCYON RD	0.83
6	E GRAND AVE & W BRANCH ST	0.79
43	THE PIKE & GARFIELD PL	0.78
1	E GRAND AVE & COURTLAND ST	0.76
67	CORBETT CANYON RD & GULARTE RD	0.76
16	EL CAMINO REAL & BRISCO RD	0.67
28	W BRANCH ST & CAMINO MERCADO / US 101 NB RAMPS	0.66
14	W BRANCH ST & RANCHO PKWY	0.65
17	EL CAMINO REAL & N HALCYON RD	0.65
65	FAIR OAKS AVE & TODD LN	0.63
13	EL CAMINO REAL & N OAK PARK BLVD	0.56
27	E GRAND AVE & US 101 SB RAMP	0.56
23	FAIR OAKS AVE & US 101 SB OFF RAMP & ORCHARD ST	0.56
52	NELSON ST & S MASON ST	0.55
11	E BRANCH ST & HUSANA RD	0.54
7	W BRANCH ST & TRAFFIC WAY	0.54
19	FARROLL AVE & S HALCYON RD	0.54
4	E GRAND AVE & S HALCYON RD	0.54
35	ASH ST & COURTLAND ST	0.53
3	E GRAND AVE & BRISCO RD	0.53
5	E GRAND AVE & EL CAMINO REAL	0.52
59	CHERRY AVE & TRAFFIC WAY	0.51
47	EL CAMINO REAL & BELL ST	0.47
74	W BRANCH ST & TOWN CENTER DR	0.44
10	E BRANCH ST & S MASON ST	0.43
49	TRAFFIC WAY & NELSON ST	0.41
42	THE PIKE & S ELM ST	0.39
62	FAIR OAKS AVE & AGHS MIDDLE ENTRANCE	0.39
22	FAIR OAKS AVE & TRAFFIC WAY	0.39
46	E GRAND AVE & BELL ST	0.39
24	FAIR OAKS AVE & VALLEY RD	0.39
18	FAIR OAKS AVE & S HALCYON RD	0.37
66	S ELM ST & MAPLE ST	0.37
53	CORBETT CANYON RD & SR 227 / PRINTZ RD	0.37
36	FAIR OAKSAVE & S ELM ST	0.36
29	W BRANCH ST / US 101 NB RAMP & N OAK PARK BLVD	0.36
70	JAMES WAY & MEADOW WAY	0.36
9	E BRANCH ST & SHORT ST	0.35
40	E GRAND AVE & JUNIPER ST	0.34
44	E GRAND AVE & RENA ST	0.33
21	LEANNA DR & VALLEY RD	0.29
58	FAIR OAKS AVE & STATION WAY	0.29
54	HUSANA RD & CLARENCE AVE	0.27
71	OAK PARK BLVD & MEADOWLARK DR	0.26
68	MASON & LE POINT ST	0.26
57	PRINTZ RD & TALLY HO RD	0.25
63	FAIR OAKS AVE & AGHS EAST ENTRANCE	0.23
12	JAMES WAY & OAK PARK BLVD	0.22
72	BRISCO & LINDA DR	0.21
69	E GRAND AVE & ALDER ST	0.21
37	FARROLL AVE & S ELM ST	0.20
55	HUSANA RD & ORO DR	0.20
45	E GRAND AVE N ALPINE ST	0.19
25	TRAFFIC WAY & US 101 NB RAMP	0.19
39	ASH ST & WALNUT ST	0.18
32	W BRANCH ST & RODEO DR	0.18
48	W BRANCH ST & VERNON ST	0.17
41	E GRAND AVE & FAIR VIEW DR	0.17
61	FAIR OAKS AVE & AGHS WEST ENTRANCE	0.14
38	DODSON WAY & HALCYON RD	0.14
56	HUSANA RD & STAGECOACH RD	0.13
33	JAMES WAY & RODEO DR	0.12
34	JAMES WAY & TALLY HO RD	0.11
50	TRAFFIC WAY & POOLE ST	0.10
30	BRISCO RD & US 101 NB RAMPS	0.07
26	E GRAND AVE & US 101 NB RAMP	0.07
31	N OAK PARK BLVD & E GRAND AVE	0.07
73	FAIR OAKS AVE & CALIFORNIA ST	0.04
60	CHERRY AVE & CALIFORNIA ST	-

Intersection ID	Ranked intersection by Total Crashes	Toal Crashes
2	E GRAND AVE & S ELM ST	44
1	E GRAND AVE & COURTLAND ST	34
13	EL CAMINO REAL & N OAK PARK BLVD	32
6	E GRAND AVE & W BRANCH ST	30
4	E GRAND AVE & S HALCYON RD	30
8	W BRNACH ST & BRIDGE ST	26
15	W BRANCH ST & BRISCO RD	25
27	E GRAND AVE & US 101 SB RAMP	23
3	E GRAND AVE & BRISCO RD	23
16	EL CAMINO REAL & BRISCO RD	22
7	W BRANCH ST & TRAFFIC WAY	21
29	W BRANCH ST / US 101 NB RAMP & N OAK PARK BLVD	21
28	W BRANCH ST & CAMINO MERCADO / US 101 NB RAMPS	19
17	EL CAMINO REAL & N HALCYON RD	19
5	E GRAND AVE & EL CAMINO REAL	19
20	THE PIKE & S HALCYON RD	18
14	W BRANCH ST & RANCHO PKWY	18
64	VALLEY RD & AGHS STAFF PARKING / BACK ROAD	17
23	FAIR OAKS AVE & US 101 SB OFF RAMP & ORCHARD ST	16
10	E BRANCH ST & S MASON ST	14
46	E GRAND AVE & BELL ST	14
19	FARROLL AVE & S HALCYON RD	13
18	FAIR OAKS AVE & S HALCYON RD	13
11	E BRANCH ST & HUSANA RD	12
22	FAIR OAKS AVE & TRAFFIC WAY	12
40	E GRAND AVE & JUNIPER ST	12
44	E GRAND AVE & RENA ST	12
42	THE PIKE & S ELM ST	11
24	FAIR OAKS AVE & VALLEY RD	11
65	FAIR OAKS AVE & TODD LN	10
59	CHERRY AVE & TRAFFIC WAY	10
36	FAIR OAKSAVE & S ELM ST	10
74	W BRANCH ST & TOWN CENTER DR	9
49	TRAFFIC WAY & NELSON ST	8
62	FAIR OAKS AVE & AGHS MIDDLE ENTRANCE	8
9	E BRANCH ST & SHORT ST	8
12	JAMES WAY & OAK PARK BLVD	8
43	THE PIKE & GARFIELD PL	7
66	S ELM ST & MAPLE ST	7
45	E GRAND AVE N ALPINE ST	7
35	ASH ST & COURTLAND ST	6
58	FAIR OAKS AVE & STATION WAY	6
69	E GRAND AVE & ALDER ST	6
41	E GRAND AVE & FAIR VIEW DR	6
67	CORBETT CANYON RD & GULARTE RD	5
52	NELSON ST & S MASON ST	5
53	CORBETT CANYON RD & SR 227 / PRINTZ RD	5
63	FAIR OAKS AVE & AGHS EAST ENTRANCE	5
37	FARROLL AVE & S ELM ST	5
51	TRAFFIC WAY & ALLEN ST	4
70	JAMES WAY & MEADOW WAY	4
21	LEANNA DR & VALLEY RD	4
54	HUSANA RD & CLARENCE AVE	4
38	DODSON WAY & HALCYON RD	4
31	N OAK PARK BLVD & E GRAND AVE	4
71	OAK PARK BLVD & MEADOWLARK DR	3
68	MASON & LE POINT ST	3
57	PRINTZ RD & TALLY HO RD	3
72	BRISCO & LINDA DR	3
55	HUSANA RD & ORO DR	3
25	TRAFFIC WAY & US 101 NB RAMP	3
61	FAIR OAKS AVE & AGHS WEST ENTRANCE	3
26	E GRAND AVE & US 101 NB RAMP	3
60	CHERRY AVE & CALIFORNIA ST	2
47	EL CAMINO REAL & BELL ST	2
39	ASH ST & WALNUT ST	2
32	W BRANCH ST & RODEO DR	2
56	HUSANA RD & STAGECOACH RD	2
50	TRAFFIC WAY & POOLE ST	2
30	BRISCO RD & US 101 NB RAMPS	2
48	W BRANCH ST & VERNON ST	1
33	JAMES WAY & RODEO DR	1
34	JAMES WAY & TALLY HO RD	1
73	FAIR OAKS AVE & CALIFORNIA ST	1

Collisions at Selected Intersection

Intersection #	Name	Severity					Type										Year												Total
		Fatal	Injury (Severe)	Injury (Other Visible)	Injury (Complaint of Pain)	Property Damage Only	Head-on	Sideswipe	Rear End	Broadside	Hit Object	Overturned	Vehicle/ Pedestrian	Other/Not Listed	Pedestrian	Bicycle*	2014	2015	2016	2017	2018	EPDO	24-HOUR ENTERING VOLUME	Fatal + Injury	Overall Crash Rate	Fatal Crash Rate	Fatal + Injury Crash rate	
1	E GRAND AVE & COURTLAND ST		1	5	4	24		6	10	12	2		2	2	2	2	11	5	9	5	4	133	24,387	10	0.764	-	0.225	34
2	E GRAND AVE & S ELM ST				2	42	4	9	20	6	3			2			7	12	8	8	9	54	26,394	2	0.913	-	0.042	44
3	E GRAND AVE & BRISCO RD				1	22	1	3	5	7	3		1	3	1		8	3	4	5	3	28	23,960	1	0.526	-	0.023	23
4	E GRAND AVE & S HALCYON RD			1	1	28	1	7	8	4	2			8		1	9	7	5	6	3	45	30,603	2	0.537	-	0.036	30
5	E GRAND AVE & EL CAMINO REAL			1	2	16		2	5	8	2			2			7	3	6	2	1	39	19,883	3	0.524	-	0.083	19
6	E GRAND AVE & W BRANCH ST			3	2	25	2	4	2	20				2	1	2	10	7	3	6	4	70	20,709	5	0.794	-	0.132	30
7	W BRANCH ST & TRAFFIC WAY				1	20	2	2	8	5	1			3			3		5	6	7	26	21,343	1	0.539	-	0.026	21
8	W BRNACH ST & BRIDGE ST			1	3	22		9	6		2		2	7	3		1	8	5	4	8	51	15,249	4	0.934	-	0.144	26
9	E BRANCH ST & SHORT ST	1		3		4	1		1		1		2	3	2		1	1	3	1	2	581	12,602	4	0.348	0.043	0.174	8
10	E BRANCH ST & S MASON ST				1	13	2	1	6	1	1		1	2	1		3	2	3	2	4	19	17,799	1	0.431	-	0.031	14
11	E BRANCH ST & HUSANA RD			1	1	10		1	3		7			1			2	2	1	1	6	27	12,172	2	0.540	-	0.090	12
12	JAMES WAY & OAK PARK BLVD		1	1	1	5			3	3	1			1			2		4	2		52	20,040	3	0.219	-	0.082	8
13	EL CAMINO REAL & N OAK PARK BLVD		1	2	2	27	2	7	7	8	1	2		5		1	8	3	9	6	6	91	31,197	5	0.562	-	0.088	32
14	W BRANCH ST & RANCHO PKWY			2	1	15	1	1	5	2	3			6			5	3	4	2	4	43	15,096	3	0.653	-	0.109	18
15	W BRANCH ST & BRISCO RD				1	24	1	6	13	1				4			7	6	3	6	3	30	14,590	1	0.939	-	0.038	25
16	EL CAMINO REAL & BRISCO RD			1	3	18	4	6	7	3			1	1	1		3	2	3	7	7	47	17,901	4	0.673	-	0.122	22
17	EL CAMINO REAL & N HALCYON RD			1	2	16	1	11	3	1	3			0			2	4	4	1	8	39	16,038	3	0.649	-	0.102	19
18	FAIR OAKS AVE & S HALCYON RD				2	11		1	6	2	2		1	1	1	1	5	4	1	1	2	23	19,018	2	0.375	-	0.058	13
19	FARROLL AVE & S HALCYON RD			3	1	9		1	2	8	1			1			2	3	5	1	2	48	13,213	4	0.539	-	0.166	13
20	THE PIKE & S HALCYON RD		1	2	3	12	1	1	5	9				2			4	2	2	6	4	82	11,952	6	0.825	-	0.275	18
21	LEANNA DR & VALLEY RD				1	3	1		2					1			1		2		1	9	7,619	1	0.288	-	-	4
22	FAIR OAKS AVE & TRAFFIC WAY				2	10	2	2	3	4				1			5		2	2	3	22	16,827	2	0.391	-	0.065	12
23	FAIR OAKS AVE & US 101 SB OFF RAMP & ORCHARD ST					16	2	2	1	6	3			2			3	5	4	2	2	16	15,787	0	0.555	-	-	16
24	FAIR OAKS AVE & VALLEY RD					11		4	3	2	1			1				3	2	1	5	11	15,563	0	0.387	-	-	11
25	TRAFFIC WAY & US 101 NB RAMP					3			1		1			1			1	1			1	3	8,675	0	0.189	-	-	3
26	E GRAND AVE & US 101 NB RAMP					3		1	1		1			0			1	2				3	24,252	0	0.068	-	-	3
27	E GRAND AVE & US 101 SB RAMP			1	1	21		5	7	5	2		1	3	1	1	2	9	3	3	6	38	22,479	2	0.561	-	0.049	23
28	W BRANCH ST & CAMINO MERCADO / US 101 NB RAMPS				2	17	1	3	6	1	8			0			6	2	3	4	4	29	15,761	2	0.661	-	0.070	19
29	W BRANCH ST / US 101 NB RAMP & N OAK PARK BLVD			1	1	19	1	3	3	9	1			4			7	5	3	1	5	36	31,872	2	0.361	-	0.034	21
30	BRISCO RD & US 101 NB RAMPS					2			1		1			0				1			1	2	15,055	0	0.073	-	-	2
31	N OAK PARK BLVD & E GRAND AVE			2	1	1		1	1	2				0				2	1		1	29	32,613	3	0.067	-	-	4
32	W BRANCH ST & RODEO DR					2								2			1			1		2	6,173	0	0.178	-	-	2
33	JAMES WAY & RODEO DR					1		1						0						1		1	4,667	0	0.117	-	-	1
34	JAMES WAY & TALLY HO RD					1			1					0				1				1	4,821	0	0.114	-	-	1
35	ASH ST & COURTLAND ST				2	4	1	1		4				0			2		2	2		16	6,202	2	0.530	-	0.177	6
36	FAIR OAKSAVE & S ELM ST				1	9		2	3	2	2		1	0	1		1	2	5	2		15	15,120	1	0.362	-	0.036	10
37	FARROLL AVE & S ELM ST			2		3		1		2			1	1	1		1	1		1	2	25	13,534	2	0.202	-	0.081	5
38	DODSON WAY & HALCYON RD					4	1		1	1				1			1			2	1	4	15,352	0	0.143	-	-	4
39	ASH ST & WALNUT ST					2		2						0			1				1	2	6,017	0	0.182	-	-	2
40	E GRAND AVE & JUNIPER ST			2		10		3	3	1	4		1	0	1		2	2	2	5	1	32	19,216	2	0.342	-	0.057	12
41	E GRAND AVE & FAIR VIEW DR				1	5		1		4				1			1		3	2		11	19,216	1	0.171	-	0.029	6
42	THE PIKE & S ELM ST			1	1	9		2	1	1	5			2			3	2	4	1	1	26	15,348	2	0.393	-	0.071	11
43	THE PIKE & GARFIELD PL					7		1	1	3				2			2			3	2	7	4,901	0	0.783	-	-	7
44	E GRAND AVE & RENA ST				1	11		4	4	1	1			2			2	1	2	5	2	17	19,714	1	0.334	-	0.028	12
45	E GRAND AVE N ALPINE ST			1	1	5		3	2	1	1			0			2	1	3		1	22	19,714	2	0.195	-	0.056	7
46	E GRAND AVE & BELL ST	1				13	1	1	5	2	3		1	1	1		1	3	3	4	3	557	19,714	1	0.389	0.028	0.028	14
47	EL CAMINO REAL & BELL ST					2				1	1			0					1		1	2	2,312	0	0.474	-	0.000	2
48	W BRANCH ST & VERNON ST					1		1						0							1	1	3,175	0	0.173	-	0.000	1
49	TRAFFIC WAY & NELSON ST				2	6	1	1	1	1	1		1	2	1		2	1	3		2	18	10,681	2	0.410	-	0.103	8
50	TRAFFIC WAY & POOLE ST				1	1				2				0		1		1		1		7	10,681	1	0.103	-	0.051	2
51	TRAFFIC WAY & ALLEN ST					4		1	1	1				1			1	1		1	1	4	1,483	0	1.478	-	-	4
52	NELSON ST & S MASON ST				1	4		1	2	2				0			2	1			2	10	4,970	1	0.551	-	0.110	5
53	CORBETT CANYON RD & SR 227 / PRINTZ RD					5		3				1		1			3			2		5	7,462	0	0.367	-	-	5
54	HUSANA RD & CLARENCE AVE			1		3		1	2		1			0		1	1			1	2	14	8,187	1	0.268	-	0.067	4
55	HUSANA RD & ORO DR				2	1		1		1	1			0			1			1	1	13	8,187	2	0.201	-	0.134	3
56	HUSANA RD & STAGECOACH RD			1		1				1	1			0				1		1		12	8,187	1	0.134	-	0.067	2
57	PRINTZ RD & TALLY HO RD					3					2			1					2		1	3	6,703	0	0.245	-	-	3
58	FAIR OAKS AVE & STATION WAY			3		3	1	1		3			1	0	2	1		2	2	2		36	11,447	3	0.287	-	0.144	6
59	CHERRY AVE & TRAFFIC WAY				1	9	1		2	3	2			2			5	1	1	2	1	15	10,780	1	0.508	-	0.051	10
60	CHERRY AVE & CALIFORNIA ST					2		2						0				1		1		2	No Volume Data	0	-	-	-	2
61	FAIR OAKS AVE & AGHS WEST ENTRANCE				1	2		1		2				0				2	1			8	11,354	1	0.145	-	0.048	3
62	FAIR OAKS AVE & AGHS MIDDLE ENTRANCE			1		7		4	1	1				2			2	1	4	1		18	11,187	1	0.392	-	-	8
63	FAIR OAKS AVE & AGHS EAST ENTRANCE			1	3	1	1			4				0		1		1	2	2		30	11,822	4	0.232	-	0.185	5
64	VALLEY RD & AGHS STAFF PARKING / BACK ROAD			1		16		3	6		3	1		4			1	5	5	4	2	27	7,619	1	1.223	-	0.072	17
65	FAIR OAKS AVE & TODD LN			1	1	8		3	5	2				0			3	2	2	1	2	25	8,724	2	0.628	-	0.126	10
66	S ELM ST & MAPLE ST				2	5		2	4	1				0			1	1	2	3		17	10,252	2	0.374	-	0.107	7
67	CORBETT CANYON RD & GULARTE RD					5					4			1			1		1	2	1	5	3,605	0	0.760	-	-	5
68	MASON & LE POINT ST					3				1	1			1				1	1	1		3	6,363	0	0.258	-	-	3
69	E GRAND AVE & ALDER ST			1	2	3	1	1	1				2	1	1	1	2			2	2	26	15,707	3	0.209	-	0.105	6
70	JAMES WAY & MEADOW WAY					4			1		3			0			1			2	1	4	6,114	0	0.358	-	-	4
71	OAK PARK BLVD & MEADOWLARK DR					3				1	2			0			1		1	1		3	6,277	0	0.262	-	-	3
72	BRISCO & LINDA DR					3	1		1	1				0			2	1				3	7,674	0	0.214	-	-	3
73	FAIR OAKS AVE & CALIFORNIA ST					1				1									1			1	12,644	0	0.043	-	-	1
74	W BRANCH ST & TOWN CENTER DR				3	6	1	1	5	1	1						2	1	1	2	3	24	11,264	3	0.438	-	-	9
Total		2	4	47	68	667	40	148	207	181	92	4	19	97	21	13	177	144	161	153	153	-	-	-	-	-	-	788

* Data provide by the City of Arroyo Grande do not identify bicycle related collisions

Segment ID	Ranked Segment by EPDO	From	To	EPDO
15A	EL CAMINO REAL EAST OF OAK PARK TO WEST OF BRISCO	EAST OF OAK PARK	WEST OF BRISCO	594
1B	GRAND COURTLAND TO ELM	EAST OF COURTLAND	EAST OF S ELM	110
6B	HALCYON NORTH OF FAIR OAKS TO SOUTH OF GRAND	NORTH OF FAIR OAKS	SOUTH OF GRAND	65
4B	FAIR OAKS EAST OF HALCYON TO WEST OF VALLEY	EAST OF HALCYON	WEST OF VALLEY	60
5B	BRANCH WEST OF CAMINO MERCADO TO WEST OF BRISCO	WEST OF CAMINO MERCADO	WEST OF BRISCO	57
4C	FAIR OAKS WEST OF VALLEY TO EAST OF CALIFORNIA	WEST OF VALLEY	EAST OF CALIFORNIA	56
3C	W BRANCH EAST OF MASON TO EAST OF HUSANA/227	EAST OF MASON ST	EAST OF HUSANA/227	45
1C	GRAND EAST OF ELM TO WEST OF HALCYON	EAST OF ELM	WEST OF HALCYON	39
10A	RANCHO PKWY NORTH OF BRANCH TO NO. OF VIA VAQUERO	NORTH OF BRANCH	NORHT OF VIA VAQUERO	35
26A	BRIDGE ST NORTH OF TRAFFIC TO SOUTH OF W BRANCH	NORTH OF TRAFFIC WAY	SOUTH OF W BRANCH	32
5A	BRANCH EAST OF OAK PARK TO WEST OF CAMINO MERCADO	EAST OF OAK PARK	WEST OF CAMINO MERCADO	27
14A	BRISCO NORTH OF GRAND TO SOUTH OF ECR	NORTH OF GRAND	SOUTH OF EL CAMINO REAL	25
2A	GRAND WEST OF HALCYON TO EAST OF EL CAMINO REAL	WEST OF HALCYON	EAST OF EL CAMINO REAL	22
3D	HUSANA EAST OF 227 TO CITY LIMIT	EAST OF 227	CITY LIMITS	22
32A	BRANCH MILL RD SO. OF HUEBNER LN TO CITY LIMIT	SOUTH OF HUEBNER LN	CITY LIMIT	20
2B	GRAND/BRANCH EAST OF ECR TO EAST OF W BRANCH	EAST OF EL CAMINO REAL	EAST OF W BRANCH	18
23A	TALLY HO RD EAST OF MASON TO WEST OF 227	EAST OF MASON	WEST OF 227	18
7B	OAK PARK SOUTH OF BRANCH TO CITY LIMIT	NORTH OF BRANCH	CITY LIMIT	15
9A	CAMINO MERCADO NO. OF BRANCH TO SO. OF RANCHO PKWY	NORTH OF BRANCH	SOUTH OF RANCHO PKWY	13
12A	SPRUCE ASH TO POPLAR	ASH	SOUTH OF POPLAR	13
24A	LE POINTE RD FROM CROWN TER TO 227	CROWN TER	SOUTH OF 227	13
3A	W BRANCH EAST OF W BRANCH TO WEST OF BRIDGE	EAST OF W BRANCH ST	WEST OF BRIDGE ST	12
5C	BRANCH WEST OF BRISCO TO NORTH OF W BRANCH	WEST OF BRISCO	NORTH OF W BRANCH	12
15C	EL CAMINO REAL EAST OF HALCYON TO SOUTH OF GRAND	EAST OF HALCYON	SOUTH OF GRAND	11
11B	ELM SOUTH OF FARROLL TO NORTH OF ASH	SOUTH OF FARROLL	NORTH OF ASH	10
15B	EL CAMINO REAL EAST OF BRISCO TO WEST OF HALCYON	EAST OF BRISCO	WEST OF HALCYON	10
18A	ASH WEST OF COURTLAND TO WEST OF ELM	WEST OF COURTLAND	WEST OF ELM	10
6C	HALCYON NORTH OF GRAND NORTH OF ECR TO	NORTH OF GRAND	NORTH OF ECR	9
8A	JAMES WAY EAST OF OAK PARK WEST OF TALLY HO	EAST OF OAK PARK	WEST OF TALLY HO	9
3B	W BRANCH WEST OF BRIDGE TO EAST OF MASON	WEST OF BRIDGE ST	EAST OF MASON ST	8
17A	FARROLL EAST OF OAK PARK TO WEST OF HALCYON	EAST OF OAK PARK	WEST OF ELM	7
18B	ASH EAST OF ELM TO EAST OF ALDER	EAST OF ELM	WEST OF ALDER	6
1A	GRAND OAK PARK TO EAST OF COURTLAND	OAK PARK	EAST OF COURTLAND	5
11C	ELM NORTH OF ASH TO SOUTH OF GRAND	NORTH OF ASH	SOUTH OF GRAND	5
13A	COURTLAND NORTH OF GRAND TO NORHT OF BRIGHTON	NORTH OF GRAND	NORTH OF BRIGHTON	5
21A	ALDER ST NORTH OF ASH TO SOUTH OF GRAND	NORTH OF ASH	SOUTH OF GRAND	4
27C	TRAFFCI WAY NORTH OF POOLE TO SOUTH OF BRANCH	NORTH OF POOLE	SOUTH OF BRANCH	4
28A	STATION NORTH OF FAIR OAKS SOTUH OF TRAFFIC	NORTH OF FAIR OAKS	SOUTH OF TRAFFIC	4
29A	OLOHAN ALLY EAST OF TRAFFIC WAY EAST OF MASON ST	EAST OF TRAFFIC WAY	EAST OF MASON ST	4
4A	FAIR OAKS EAST OF ELM TO EAST OF HALCYON	EAST OF ELM	EAST OF HALCYON	3
16B	THE PIKE EAST OF ELM TO WEST OF HALCYON	EAST OF ELM	WEST OF HALCYON	3
20A	VALLEY RD SOUTH OF CASTILLO DEL MAR	CITY LIMIT	SOUTH OF CASTILLO DEL MAR	3
25A	CROWN HILL FROM NORTH OF BRANCH TO 227	NORTH OF BRANCH	SOUTH OF 227	3
31A	ALLEN ST EAST OF TRAFFIC WAY TO WEST OF PCR PL	EAST OF TRAFFIC WAY	WEST OF PACIFIC COAST RAILWAY PLACE	3
11A	ELM SOUTH OF PIKE TO SOUTH OF FARROLL	SOUTH OF PIKE	SOUTH OF FARROLL	2
20B	VALLEY RD CASTRILLO SOUTH OF DEL MAR TO FAIR OAKS	NORTH OF CASTILLO DEL MAR	SOTH OF FAIR OAKS AVE	2
22A	RENA ST NORTH OF DODSON TO SOUTH OF GRAND	NORTH OF DODSON	SOUTH OF GRAND	2
27A	TRAFFIC WAY NORTH OF RAMP TO SOUTH OF FAIR OAKS	NORHT OF 101 RAMP	SOUTH OF FAIR OAKS	2
27B	TRAFFIC WAY SOUTH OF FAIR OAKS TO NORTH OF POOLE	SOUTH OF FAIR OAKS	NORTH OF POOLE	2
30A	NELSON ST EAST OF TRAFFIC WAY TO WEST OF MASON ST	EAST OF TRAFFIC WAY	EAST OF MASON ST	2
33A	ORCHARD SO. OF CASTILLO DEL MAR TO SO. OF CHERRY	SOUTH OF CASTILLO DEL MAR	SOUTH OF CHERRY AVER	2
34A	WHITELEY ST	EXTENT	EXTENT	2
11D	ELM NORTH OF GRAND TO LIMIT	NORTH OF GRAND	TERMINUS	1
17B	FARROLL EAST OF ELM TO WEST OF HALCYON	EAST OF ELM	WEST OF HALCYON	1
19A	MAPLE EAST OF ELM TO WEST OF ALDER	EAST OF ELM	WEST OF ALDER	1
4D	FAIR OAKS EAST OF CALIFORNIA TO WEST OF TRAFFIC	EAST OF CALIFORNIA	WEST OF TRAFFIC WAY	0
6A	HALCYON SOUTH OF PIKE TO SOUTH OF FAIR OAKS	SOUTH OF PIKE	SOUTH OF FAIR OAKS	0
7A	OAK PARK SOUTH OF CHITTON NORTH OF BRANCH	SOUTH OF CHITTON	NORTH OF BRANCH	0
14B	BRISCO SOUTH OF ECR TO NORTH OF NB RAMPS	SOUTH OF ECR	NORTH OF NB RAMPS	0
16A	PIKE CITH LIMIT TO WEST OF ELM	CITY LIMIT (DEL SOL ST)	WEST OF ELM	0

Segment ID	Ranked Segment by Overall Crash Rate	From	To	Overall Crash Rate
26A	BRIDGE ST NORTH OF TRAFFIC TO SOUTH OF W BRANCH	NORTH OF TRAFFIC WAY	SOUTH OF W BRANCH	2.92
9A	CAMINO MERCADO NO. OF BRANCH TO SO. OF RANCHO PKWY	NORTH OF BRANCH	SOUTH OF RANCHO PKWY	2.53
31A	ALLEN ST EAST OF TRAFFIC WAY TO WEST OF PCR PL	EAST OF TRAFFIC WAY	WEST OF PACIFIC COAST RAILWAY PLACE	2.16
5C	BRANCH WEST OF BRISCO TO NORTH OF W BRANCH	WEST OF BRISCO	NORTH OF W BRANCH	2.07
10A	RANCHO PKWY NORTH OF BRANCH TO NO. OF VIA VAQUERO	NORTH OF BRANCH	NORHT OF VIA VAQUERO	1.63
32A	BRANCH MILL RD SO. OF HUEBNER LN TO CITY LIMIT	SOUTH OF HUEBNER LN	CITY LIMIT	1.62
1B	GRAND COURTLAND TO ELM	EAST OF COURTLAND	EAST OF S ELM	1.43
15A	EL CAMINO REAL EAST OF OAK PARK TO WEST OF BRISCO	EAST OF OAK PARK	WEST OF BRISCO	1.43
15C	EL CAMINO REAL EAST OF HALCYON TO SOUTH OF GRAND	EAST OF HALCYON	SOUTH OF GRAND	1.42
23A	TALLY HO RD EAST OF MASON TO WEST OF 227	EAST OF MASON	WEST OF 227	1.29
5B	BRANCH WEST OF CAMINO MERCADO TO WEST OF BRISCO	WEST OF CAMINO MERCADO	WEST OF BRISCO	1.15
14A	BRISCO NORTH OF GRAND TO SOUTH OF ECR	NORTH OF GRAND	SOUTH OF EL CAMINO REAL	1.15
6B	HALCYON NORTH OF FAIR OAKS TO SOUTH OF GRAND	NORTH OF FAIR OAKS	SOUTH OF GRAND	1.14
5A	BRANCH EAST OF OAK PARK TO WEST OF CAMINO MERCADO	EAST OF OAK PARK	WEST OF CAMINO MERCADO	1.09
4B	FAIR OAKS EAST OF HALCYON TO WEST OF VALLEY	EAST OF HALCYON	WEST OF VALLEY	0.93
8A	JAMES WAY EAST OF OAK PARK WEST OF TALLY HO	EAST OF OAK PARK	WEST OF TALLY HO	0.83
17A	FARROLL EAST OF OAK PARK TO WEST OF HALCYON	EAST OF OAK PARK	WEST OF ELM	0.79
18B	ASH EAST OF ELM TO EAST OF ALDER	EAST OF ELM	WEST OF ALDER	0.78
4C	FAIR OAKS WEST OF VALLEY TO EAST OF CALIFORNIA	WEST OF VALLEY	EAST OF CALIFORNIA	0.77
1C	GRAND EAST OF ELM TO WEST OF HALCYON	EAST OF ELM	WEST OF HALCYON	0.66
18A	ASH WEST OF COURTLAND TO WEST OF ELM	WEST OF COURTLAND	WEST OF ELM	0.65
3C	W BRANCH EAST OF MASON TO EAST OF HUSANA/227	EAST OF MASON ST	EAST OF HUSANA/227	0.55
11B	ELM SOUTH OF FARROLL TO NORTH OF ASH	SOUTH OF FARROLL	NORTH OF ASH	0.53
13A	COURTLAND NORTH OF GRAND TO NORHT OF BRIGHTON	NORTH OF GRAND	NORTH OF BRIGHTON	0.49
4A	FAIR OAKS EAST OF ELM TO EAST OF HALCYON	EAST OF ELM	EAST OF HALCYON	0.41
30A	NELSON ST EAST OF TRAFFIC WAY TO WEST OF MASON ST	EAST OF TRAFFIC WAY	EAST OF MASON ST	0.34
16B	THE PIKE EAST OF ELM TO WEST OF HALCYON	EAST OF ELM	WEST OF HALCYON	0.34
7B	OAK PARK SOUTH OF BRANCH TO CITY LIMIT	NORTH OF BRANCH	CITY LIMIT	0.33
3B	W BRANCH WEST OF BRIDGE TO EAST OF MASON	WEST OF BRIDGE ST	EAST OF MASON ST	0.32
11C	ELM NORTH OF ASH TO SOUTH OF GRAND	NORTH OF ASH	SOUTH OF GRAND	0.27
33A	ORCHARD SO. OF CASTILLO DEL MAR TO SO. OF CHERRY	SOUTH OF CASTILLO DEL MAR	SOUTH OF CHERRY AVER	0.26
11D	ELM NORTH OF GRAND TO LIMIT	NORTH OF GRAND	TERMINUS	0.26
15B	EL CAMINO REAL EAST OF BRISCO TO WEST OF HALCYON	EAST OF BRISCO	WEST OF HALCYON	0.23
2B	GRAND/BRANCH EAST OF ECR TO EAST OF W BRANCH	EAST OF EL CAMINO REAL	EAST OF W BRANCH	0.22
2A	GRAND WEST OF HALCYON TO EAST OF EL CAMINO REAL	WEST OF HALCYON	EAST OF EL CAMINO REAL	0.22
20A	VALLEY RD SOUTH OF CASTILLO DEL MAR	CITY LIMIT	SOUTH OF CASTILLO DEL MAR	0.22
6C	HALCYON NORTH OF GRAND NORTH OF ECR TO	NORTH OF GRAND	NORTH OF ECR	0.21
27C	TRAFFCI WAY NORTH OF POOLE TO SOUTH OF BRANCH	NORTH OF POOLE	SOUTH OF BRANCH	0.20
17B	FARROLL EAST OF ELM TO WEST OF HALCYON	EAST OF ELM	WEST OF HALCYON	0.19
20B	VALLEY RD CASTRILLO SOUTH OF DEL MAR TO FAIR OAKS	NORTH OF CASTILLO DEL MAR	SOTH OF FAIR OAKS AVE	0.14
1A	GRAND OAK PARK TO EAST OF COURTLAND	OAK PARK	EAST OF COURTLAND	0.14
3D	HUSANA EAST OF 227 TO CITY LIMIT	EAST OF 227	CITY LIMITS	0.13
27A	TRAFFIC WAY NORTH OF RAMP TO SOUTH OF FAIR OAKS	NORHT OF 101 RAMP	SOUTH OF FAIR OAKS	0.13
11A	ELM SOUTH OF PIKE TO SOUTH OF FARROLL	SOUTH OF PIKE	SOUTH OF FARROLL	0.11
27B	TRAFFIC WAY SOUTH OF FAIR OAKS TO NORTH OF POOLE	SOUTH OF FAIR OAKS	NORTH OF POOLE	0.09
3A	W BRANCH EAST OF W BRANCH TO WEST OF BRIDGE	EAST OF W BRANCH ST	WEST OF BRIDGE ST	0.08
4D	FAIR OAKS EAST OF CALIFORNIA TO WEST OF TRAFFIC	EAST OF CALIFORNIA	WEST OF TRAFFIC WAY	0.00
6A	HALCYON SOUTH OF PIKE TO SOUTH OF FAIR OAKS	SOUTH OF PIKE	SOUTH OF FAIR OAKS	0.00
7A	OAK PARK SOUTH OF CHITTON NORTH OF BRANCH	SOUTH OF CHITTON	NORTH OF BRANCH	0.00
14B	BRISCO SOUTH OF ECR TO NORTH OF NB RAMPS	SOUTH OF ECR	NORTH OF NB RAMPS	0.00
16A	PIKE CITH LIMIT TO WEST OF ELM	CITY LIMIT (DEL SOL ST)	WEST OF ELM	0.00
12A	SPRUCE ASH TO POPLAR	ASH	SOUTH OF POPLAR	-
24A	LE POINTE RD FROM CROWN TER TO 227	CROWN TER	SOUTH OF 227	-
21A	ALDER ST NORTH OF ASH TO SOUTH OF GRAND	NORTH OF ASH	SOUTH OF GRAND	-
28A	STATION NORTH OF FAIR OAKS SOTUH OF TRAFFIC	NORTH OF FAIR OAKS	SOUTH OF TRAFFIC	-
29A	OLOHAN ALLY EAST OF TRAFFIC WAY EAST OF MASON ST	EAST OF TRAFFIC WAY	EAST OF MASON ST	-
25A	CROWN HILL FROM NORTH OF BRANCH TO 227	NORTH OF BRANCH	SOUTH OF 227	-
22A	RENA ST NORTH OF DODSON TO SOUTH OF GRAND	NORTH OF DODSON	SOUTH OF GRAND	-
34A	WHITELEY ST	EXTENT	EXTENT	-
19A	MAPLE EAST OF ELM TO WEST OF ALDER	EAST OF ELM	WEST OF ALDER	-

Segment ID	Ranked Segment by Total Crashes	From	To	Overall Crashes
1B	GRAND COURTLAND TO ELM	EAST OF COURTLAND	EAST OF S ELM	50
6B	HALCYON NORTH OF FAIR OAKS TO SOUTH OF GRAND	NORTH OF FAIR OAKS	SOUTH OF GRAND	30
5B	BRANCH WEST OF CAMINO MERCADO TO WEST OF BRISCO	WEST OF CAMINO MERCADO	WEST OF BRISCO	27
5A	BRANCH EAST OF OAK PARK TO WEST OF CAMINO MERCADO	EAST OF OAK PARK	WEST OF CAMINO MERCADO	27
10A	RANCHO PKWY NORTH OF BRANCH TO NO. OF VIA VAQUERO	NORTH OF BRANCH	NORHT OF VIA VAQUERO	25
1C	GRAND EAST OF ELM TO WEST OF HALCYON	EAST OF ELM	WEST OF HALCYON	19
4C	FAIR OAKS WEST OF VALLEY TO EAST OF CALIFORNIA	WEST OF VALLEY	EAST OF CALIFORNIA	16
14A	BRISCO NORTH OF GRAND TO SOUTH OF ECR	NORTH OF GRAND	SOUTH OF EL CAMINO REAL	15
4B	FAIR OAKS EAST OF HALCYON TO WEST OF VALLEY	EAST OF HALCYON	WEST OF VALLEY	15
26A	BRIDGE ST NORTH OF TRAFFIC TO SOUTH OF W BRANCH	NORTH OF TRAFFIC WAY	SOUTH OF W BRANCH	12
5C	BRANCH WEST OF BRISCO TO NORTH OF W BRANCH	WEST OF BRISCO	NORTH OF W BRANCH	12
15A	EL CAMINO REAL EAST OF OAK PARK TO WEST OF BRISCO	EAST OF OAK PARK	WEST OF BRISCO	12
3C	W BRANCH EAST OF MASON TO EAST OF HUSANA/227	EAST OF MASON ST	EAST OF HUSANA/227	11
11B	ELM SOUTH OF FARROLL TO NORTH OF ASH	SOUTH OF FARROLL	NORTH OF ASH	10
7B	OAK PARK SOUTH OF BRANCH TO CITY LIMIT	NORTH OF BRANCH	CITY LIMIT	10
8A	JAMES WAY EAST OF OAK PARK WEST OF TALLY HO	EAST OF OAK PARK	WEST OF TALLY HO	9
12A	SPRUCE ASH TO POPLAR	ASH	SOUTH OF POPLAR	8
9A	CAMINO MERCADO NO. OF BRANCH TO SO. OF RANCHO PKWY	NORTH OF BRANCH	SOUTH OF RANCHO PKWY	8
23A	TALLY HO RD EAST OF MASON TO WEST OF 227	EAST OF MASON	WEST OF 227	8
3B	W BRANCH WEST OF BRIDGE TO EAST OF MASON	WEST OF BRIDGE ST	EAST OF MASON ST	8
2B	GRAND/BRANCH EAST OF ECR TO EAST OF W BRANCH	EAST OF EL CAMINO REAL	EAST OF W BRANCH	8
17A	FARROLL EAST OF OAK PARK TO WEST OF HALCYON	EAST OF OAK PARK	WEST OF ELM	7
2A	GRAND WEST OF HALCYON TO EAST OF EL CAMINO REAL	WEST OF HALCYON	EAST OF EL CAMINO REAL	7
15C	EL CAMINO REAL EAST OF HALCYON TO SOUTH OF GRAND	EAST OF HALCYON	SOUTH OF GRAND	6
18B	ASH EAST OF ELM TO EAST OF ALDER	EAST OF ELM	WEST OF ALDER	6
32A	BRANCH MILL RD SO. OF HUEBNER LN TO CITY LIMIT	SOUTH OF HUEBNER LN	CITY LIMIT	5
18A	ASH WEST OF COURTLAND TO WEST OF ELM	WEST OF COURTLAND	WEST OF ELM	5
13A	COURTLAND NORTH OF GRAND TO NORHT OF BRIGHTON	NORTH OF GRAND	NORTH OF BRIGHTON	5
11C	ELM NORTH OF ASH TO SOUTH OF GRAND	NORTH OF ASH	SOUTH OF GRAND	5
15B	EL CAMINO REAL EAST OF BRISCO TO WEST OF HALCYON	EAST OF BRISCO	WEST OF HALCYON	5
1A	GRAND OAK PARK TO EAST OF COURTLAND	OAK PARK	EAST OF COURTLAND	5
21A	ALDER ST NORTH OF ASH TO SOUTH OF GRAND	NORTH OF ASH	SOUTH OF GRAND	4
28A	STATION NORTH OF FAIR OAKS SOTUH OF TRAFFIC	NORTH OF FAIR OAKS	SOUTH OF TRAFFIC	4
29A	OLOHAN ALLY EAST OF TRAFFIC WAY EAST OF MASON ST	EAST OF TRAFFIC WAY	EAST OF MASON ST	4
6C	HALCYON NORTH OF GRAND NORTH OF ECR TO	NORTH OF GRAND	NORTH OF ECR	4
27C	TRAFFCI WAY NORTH OF POOLE TO SOUTH OF BRANCH	NORTH OF POOLE	SOUTH OF BRANCH	4
24A	LE POINTE RD FROM CROWN TER TO 227	CROWN TER	SOUTH OF 227	3
25A	CROWN HILL FROM NORTH OF BRANCH TO 227	NORTH OF BRANCH	SOUTH OF 227	3
31A	ALLEN ST EAST OF TRAFFIC WAY TO WEST OF PCR PL	EAST OF TRAFFIC WAY	WEST OF PACIFIC COAST RAILWAY PLACE	3
4A	FAIR OAKS EAST OF ELM TO EAST OF HALCYON	EAST OF ELM	EAST OF HALCYON	3
16B	THE PIKE EAST OF ELM TO WEST OF HALCYON	EAST OF ELM	WEST OF HALCYON	3
20A	VALLEY RD SOUTH OF CASTILLO DEL MAR	CITY LIMIT	SOUTH OF CASTILLO DEL MAR	3
22A	RENA ST NORTH OF DODSON TO SOUTH OF GRAND	NORTH OF DODSON	SOUTH OF GRAND	2
34A	WHITELEY ST	EXTENT	EXTENT	2
30A	NELSON ST EAST OF TRAFFIC WAY TO WEST OF MASON ST	EAST OF TRAFFIC WAY	EAST OF MASON ST	2
33A	ORCHARD SO. OF CASTILLO DEL MAR TO SO. OF CHERRY	SOUTH OF CASTILLO DEL MAR	SOUTH OF CHERRY AVER	2
20B	VALLEY RD CASTRILLO SOUTH OF DEL MAR TO FAIR OAKS	NORTH OF CASTILLO DEL MAR	SOTH OF FAIR OAKS AVE	2
3D	HUSANA EAST OF 227 TO CITY LIMIT	EAST OF 227	CITY LIMITS	2
27A	TRAFFIC WAY NORTH OF RAMP TO SOUTH OF FAIR OAKS	NORHT OF 101 RAMP	SOUTH OF FAIR OAKS	2
11A	ELM SOUTH OF PIKE TO SOUTH OF FARROLL	SOUTH OF PIKE	SOUTH OF FARROLL	2
27B	TRAFFIC WAY SOUTH OF FAIR OAKS TO NORTH OF POOLE	SOUTH OF FAIR OAKS	NORTH OF POOLE	2
3A	W BRANCH EAST OF W BRANCH TO WEST OF BRIDGE	EAST OF W BRANCH ST	WEST OF BRIDGE ST	2
19A	MAPLE EAST OF ELM TO WEST OF ALDER	EAST OF ELM	WEST OF ALDER	1
11D	ELM NORTH OF GRAND TO LIMIT	NORTH OF GRAND	TERMINUS	1
17B	FARROLL EAST OF ELM TO WEST OF HALCYON	EAST OF ELM	WEST OF HALCYON	1
4D	FAIR OAKS EAST OF CALIFORNIA TO WEST OF TRAFFIC	EAST OF CALIFORNIA	WEST OF TRAFFIC WAY	0
6A	HALCYON SOUTH OF PIKE TO SOUTH OF FAIR OAKS	SOUTH OF PIKE	SOUTH OF FAIR OAKS	0
7A	OAK PARK SOUTH OF CHITTON NORTH OF BRANCH	SOUTH OF CHITTON	NORTH OF BRANCH	0
14B	BRISCO SOUTH OF ECR TO NORTH OF NB RAMPS	SOUTH OF ECR	NORTH OF NB RAMPS	0
16A	PIKE CITH LIMIT TO WEST OF ELM	CITY LIMIT (DEL SOL ST)	WEST OF ELM	0

Collisions at Segments (no Intersections)

Intersection #	Name	From	To	Severity					Type										Year												Total
				Fatal	Injury (Severe)	Injury (Other Visible)	Injury (Complaint of Pain)	Property Damage Only	Head-on	Sideswipe	Rear End	Broadside	Hit Object	Overturned	Vehicle/ Pedestrian	Other/Not Listed	Pedestrian	Bicycle*	2014	2015	2016	2017	2018	EPDO	24-HOUR ENTERING VOLUME	Fatal + Injury	Overall Crash Rate	Fatal Crash Rate	Fatal + Injury Crash rate	
1A	GRAND OAK PARK TO EAST OF COURTLAND	OAK PARK	EAST OF COURTLAND	0	0	0	0	5	1	0	2	1	1	0	0	2	0	0	0	2	1	0	2	5	19,216	0	0.143	-	-	5
1B	GRAND COURTLAND TO ELM	EAST OF COURTLAND	EAST OF S ELM	0	0	6	0	44	2	9	15	8	4	0	2	16	2	1	7	12	9	4	18	110	19,216	6	1.426	-	0.171	50
1C	GRAND EAST OF ELM TO WEST OF HALCYON	EAST OF ELM	WEST OF HALCYON	0	0	1	2	16	1	0	6	2	2	0	0	12	0	2	7	3	3	4	2	39	15,707	3	0.663	-	0.105	19
2A	GRAND WEST OF HALCYON TO EAST OF EL CAMINO REAL	WEST OF HALCYON	EAST OF EL CAMINO REAL	0	0	1	1	5	1	1	0	2	1	0	0	18	0	0	1	1	1	1	3	22	17,402	2	0.220	-	0.063	7
2B	GRAND/BRANCH EAST OF ECR TO EAST OF W BRANCH	EAST OF EL CAMINO REAL	EAST OF W BRANCH	0	0	1	0	7	0	1	2	2	0	0	0	9	0	0	0	3	3	2	0	18	19,646	1	0.223	-	0.028	8
3A	W BRANCH EAST OF W BRANCH TO WEST OF BRIDGE	EAST OF W BRANCH ST	WEST OF BRIDGE ST	0	0	1	0	1	0	0	0	2	0	0	0	3	0	0	1	0	1	0	0	12	13,699	1	0.080	-	0.040	2
3B	W BRANCH WEST OF BRIDGE TO EAST OF MASON	WEST OF BRIDGE ST	EAST OF MASON ST	0	0	0	0	8	0	1	3	0	2	0	0	16	0	0	0	4	0	0	4	8	13,699	0	0.320	-	-	8
3C	W BRANCH EAST OF MASON TO EAST OF HUSANA/227	EAST OF MASON ST	EAST OF HUSANA/227	0	1	0	1	9	1	3	4	0	1	0	0	3	0	0	2	3	2	2	2	45	10,980	2	0.549	-	0.100	11
3D	HUSANA EAST OF 227 TO CITY LIMIT	EAST OF 227	CITY LIMITS	0	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	1	22	8,187	2	0.134	-	0.134	2
4A	FAIR OAKS EAST OF ELM TO EAST OF HALCYON	EAST OF ELM	EAST OF HALCYON	0	0	0	0	3	0	2	1	0	0	0	0	2	0	0	2	0	1	0	0	3	4,046	0	0.406	-	0.000	3
4B	FAIR OAKS EAST OF HALCYON TO WEST OF VALLEY	EAST OF HALCYON	WEST OF VALLEY	0	0	2	5	8	1	4	7	1	0	1	0	1	0	1	4	3	3	3	2	60	8,805	7	0.933	-	0.436	15
4C	FAIR OAKS WEST OF VALLEY TO EAST OF CALIFORNIA	WEST OF VALLEY	EAST OF CALIFORNIA	0	0	2	4	10	1	5	1	7	0	0	0	3	0	1	2	4	7	3	0	56	11,348	6	0.773	-	0.290	16
4D	FAIR OAKS EAST OF CALIFORNIA TO WEST OF TRAFFIC	EAST OF CALIFORNIA	WEST OF TRAFFIC WAY	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	13,091	0	0.000	-	-	0
5A	BRANCH EAST OF OAK PARK TO WEST OF CAMINO MERCADO	EAST OF OAK PARK	WEST OF CAMINO MERCADO	0	0	0	0	27	2	6	9	1	1	0	0	8	0	0	9	4	4	5	5	27	13,536	0	1.093	-	-	27
5B	BRANCH WEST OF CAMINO MERCADO TO WEST OF BRISCO	WEST OF CAMINO MERCADO	WEST OF BRISCO	0	0	1	4	22	2	1	12	4	2	0	0	12	0	0	3	5	3	8	8	57	12,810	5	1.155	-	0.214	27
5C	BRANCH WEST OF BRISCO TO NORTH OF W BRANCH	WEST OF BRISCO	NORTH OF W BRANCH	0	0	0	0	12	0	4	2	0	1	0	0	9	0	0	3	4	2	2	1	12	3,175	0	2.071	-	-	12
6A	HALCYON SOUTH OF PIKE TO SOUTH OF FAIR OAKS	SOUTH OF PIKE	SOUTH OF FAIR OAKS	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	13,643	0	0.000	-	-	0
6B	HALCYON NORTH OF FAIR OAKS TO SOUTH OF GRAND	NORTH OF FAIR OAKS	SOUTH OF GRAND	0	0	1	5	24	0	5	8	3	5	0	0	10	0	0	9	6	5	5	5	65	14,363	6	1.144	-	0.229	30
6C	HALCYON NORTH OF GRAND NORTH OF ECR TO	NORTH OF GRAND	NORTH OF ECR	0	0	0	1	3	0	1	2	0	0	0	0	1	0	0	2	1	1	0	0	9	10,625	1	0.206	-	0.052	4
7A	OAK PARK SOUTH OF CHITTON NORTH OF BRANCH	SOUTH OF CHITTON	NORTH OF BRANCH	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	16,065	0	0.000	-	-	0
7B	OAK PARK SOUTH OF BRANCH TO CITY LIMIT	NORTH OF BRANCH	CITY LIMIT	0	0	0	1	9	0	1	1	2	0	1	0	5	0	0	4	3	2	1	0	15	16,645	1	0.329	-	0.033	10
8A	JAMES WAY EAST OF OAK PARK WEST OF TALLY HO	EAST OF OAK PARK	WEST OF TALLY HO	0	0	0	0	9	2	1	2	1	1	0	1	1	0	0	0	2	3	1	3	9	6,114	0	0.807	-	-	9
9A	CAMINO MERCADO NO. OF BRANCH TO SO. OF RANCHO PKWY	NORTH OF BRANCH	SOUTH OF RANCHO PKWY	0	0	0	1	7	0	1	0	1	3	0	0	3	0	0	3	2	1	2	0	13	1,736	1	2.525	-	0.316	8
10A	RANCHO PKWY NORTH OF BRANCH TO NO. OF VIA VAQUERO	NORTH OF BRANCH	NORHT OF VIA VAQUERO	0	0	0	2	23	1	4	1	5	3	0	0	12	0	0	3	7	6	4	5	35	8,391	2	1.633	-	0.131	25
11A	ELM SOUTH OF PIKE TO SOUTH OF FARROLL	SOUTH OF PIKE	SOUTH OF FARROLL	0	0	0	0	2	0	0	1	1	0	0	0	2	0	0	0	2	0	0	0	2	10,252	0	0.107	-	-	2
11B	ELM SOUTH OF FARROLL TO NORTH OF ASH	SOUTH OF FARROLL	NORTH OF ASH	0	0	0	0	10	0	3	1	5	0	0	0	2	0	0	0	3	1	4	2	10	10,252	0	0.534	-	-	10
11C	ELM NORTH OF ASH TO SOUTH OF GRAND	NORTH OF ASH	SOUTH OF GRAND	0	0	0	0	5	0	3	1	0	0	0	0	1	0	0	0	1	2	2	0	5	10,252	0	0.267	-	-	5
11D	ELM NORTH OF GRAND TO LIMIT	NORTH OF GRAND	TERMINUS	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	2,145	0	0.255	-	-	1
12A	SPRUCE ASH TO POPLAR	ASH	SOUTH OF POPLAR	0	0	0	1	7	0	3	0	1	1	0	1	3	1	0	1	2	1	2	2	13	-	1	-	-	-	8
13A	COURTLAND NORTH OF GRAND TO NORHT OF BRIGHTON	NORTH OF GRAND	NORTH OF BRIGHTON	0	0	0	0	5	0	0	0	2	1	0	0	2	0	1	0	0	3	0	2	5	5,596	0	0.490	-	-	5
14A	BRISCO NORTH OF GRAND TO SOUTH OF ECR	NORTH OF GRAND	SOUTH OF EL CAMINO REAL	0	0	1	0	14	0	5	4	1	4	0	0	1	0	0	2	3	1	1	8	25	7,135	1	1.152	-	0.077	15
14B	BRISCO SOUTH OF ECR TO NORTH OF NB RAMPS	SOUTH OF ECR	NORTH OF NB RAMPS	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	13,990	0	0.000	-	-	0
15A	EL CAMINO REAL EAST OF OAK PARK TO WEST OF BRISCO	EAST OF OAK PARK	WEST OF BRISCO	1	1	0	2	8	2	1	3	1	5	0	0	0	0	0	1	3	1	2	5	594	4,613	4	1.425	0.119	0.475	12
15B	EL CAMINO REAL EAST OF BRISCO TO WEST OF HALCYON	EAST OF BRISCO	WEST OF HALCYON	0	0	0	1	4	0	2	1	0	1	0	0	1	0	0	3	0	1	1	0	10	11,962	1	0.229	-	0.046	5
15C	EL CAMINO REAL EAST OF HALCYON TO SOUTH OF GRAND	EAST OF HALCYON	SOUTH OF GRAND	0	0	0	1	5	1	0	2	0	2	0	0	2	0	0	3	1	1	1	0	11	2,312	1	1.422	-	0.237	6
16A	PIKE CITH LIMIT TO WEST OF ELM	CITY LIMIT (DEL SOL ST)	WEST OF ELM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,901	0	0.000	-	0.000	0
16B	THE PIKE EAST OF ELM TO WEST OF HALCYON	EAST OF ELM	WEST OF HALCYON	0	0	0	0	3	0	1	1	1	0	0	0	2	0	0	1	0	0	0	2	3	4,901	0	0.335	-	-	3
17A	FARROLL EAST OF OAK PARK TO WEST OF HALCYON	EAST OF OAK PARK	WEST OF ELM	0	0	0	0	7	0	1	3	1	0	0	0	3	0	0	1	2	3	1	0	7	4,849	0	0.791	-	-	7
17B	FARROLL EAST OF ELM TO WEST OF HALCYON	EAST OF ELM	WEST OF HALCYON	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	1	2,915	0	0.188	-	-	1
18A	ASH WEST OF COURTLAND TO WEST OF ELM	WEST OF COURTLAND	WEST OF ELM	0	0	0	1	4	0	1	1	1	0	0	1	1	1	0	2	1	0	1	1	10	4,210	1	0.651	-	0.130	5
18B	ASH EAST OF ELM TO EAST OF ALDER	EAST OF ELM	WEST OF ALDER	0	0	0	0	6	0	2	1	0	0	0	0	3	0	0	1	1	1	1	2	6	4,210	0	0.781	-	-	6
19A	MAPLE EAST OF ELM TO WEST OF ALDER	EAST OF ELM	WEST OF ALDER	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	1	-	0	-	-	-	1
20A	VALLEY RD SOUTH OF CASTILLO DEL MAR	CITY LIMIT	SOUTH OF CASTILLO DEL MAR	0	0	0	0	3	0	0	0	0	2	0	0	2	0	0	1	0	0	0	2	3	7,619	0	0.216	-	-	3
20B	VALLEY RD CASTRILLO SOUTH OF DEL MAR TO FAIR OAKS	NORTH OF CASTILLO DEL MAR	SOTH OF FAIR OAKS AVE	0	0	0	0	2	0	0	0	1	1	0	0	4	0	0	0	1	1	0	0	2	7,619	0	0.144	-	-	2
21A	ALDER ST NORTH OF ASH TO SOUTH OF GRAND	NORTH OF ASH	SOUTH OF GRAND	0	0	0	0	4	0	0	0	0	2	0	0	3	0	0	0	1	1	0	2	4	-	0	-	-	-	4
22A	RENA ST NORTH OF DODSON TO SOUTH OF GRAND	NORTH OF DODSON	SOUTH OF GRAND	0	0	0	0	2	0	0	1	0	0	0	0	1	0	0	0	2	0	0	0	2	-	0	-	-	-	2
23A	TALLY HO RD EAST OF MASON TO WEST OF 227	EAST OF MASON	WEST OF 227	0	0	1	0	7	1	1	1	0	4	0	0	2	0	0	3	0	1	2	2	18	3,407	1	1.287	-	0.161	8
24A	LE POINTE RD FROM CROWN TER TO 227	CROWN TER	SOUTH OF 227	0	0	1	0	2	0	0	1	1	1	0	0	0	0	0	1	0	1	1	0	13	-	1	-	-	-	3
25A	CROWN HILL FROM NORTH OF BRANCH TO 227	NORTH OF BRANCH	SOUTH OF 227	0	0	0	0	3	0	1	1	1	0	0	0	0	0	0	0	2	0	0	1	3	-	0	-	-	-	3
26A	BRIDGE ST NORTH OF TRAFFIC TO SOUTH OF W BRANCH	NORTH OF TRAFFIC WAY	SOUTH OF W BRANCH	0	0	2	0	10	0	5	2	2	0	0	0	5	0	1	3	2	1	1	5	32	2,250	2	2.922	-	0.487	12
27A	TRAFFIC WAY NORTH OF RAMP TO SOUTH OF FAIR OAKS	NORHT OF 101 RAMP	SOUTH OF FAIR OAKS	0	0	0	0	2	0	0	0	1	1	0	0	4	0	0	0	1	1	0	0	2	8,487	0	0.129	-	-	2
27B	TRAFFIC WAY SOUTH OF FAIR OAKS TO NORTH OF POOLE	SOUTH OF FAIR OAKS	NORTH OF POOLE	0	0	0	0	2	1	0	1	0	0	0	0	1	0	0	1	0	0	1	0	2	12,640	0	0.087	-	-	2
27C	TRAFFCI WAY NORTH OF POOLE TO SOUTH OF BRANCH	NORTH OF POOLE	SOUTH OF BRANCH	0	0	0	0	4	0	0	0	1	2	0	0	2	0	0	0	0	1	0	3	4	10,768	0	0.204	-	-	4
28A	STATION NORTH OF FAIR OAKS SOTUH OF TRAFFIC	NORTH OF FAIR OAKS	SOUTH OF TRAFFIC	0	0	0	0	4	0	1	1	0	0	0	0	2	0	0	1	1	1	0	1	4	-	0	-	-	-	4
29A	OLOHAN ALLY EAST OF TRAFFIC WAY EAST OF MASON ST	EAST OF TRAFFIC WAY	EAST OF MASON ST	0	0	0	0	4	0	0	2	1	0	0	0	1	0	0	1	1	1	0	1	4	-	0	-	-	-	4
30A	NELSON ST EAST OF TRAFFIC WAY TO WEST OF MASON ST	EAST OF TRAFFIC WAY	EAST OF MASON ST	0	0	0	0	2	0	0	1	0	0	0	0	1	0	0	0	0	2	0	0	2	3,238	0	0.338	-	-	2
31A	ALLEN ST EAST OF TRAFFIC WAY TO WEST OF PCR PL	EAST OF TRAFFIC WAY	WEST OF PACIFIC COAST RAILWAY PLACE	0	0	0	0	3	0	1	0	0	1	0	0	2	0	0	0	0	0	1	2	3	761	0	2.161	-	-	3
32A	BRANCH MILL RD SO. OF HUEBNER LN TO CITY LIMIT	SOUTH OF HUEBNER LN	CITY LIMIT	0	0	1	1	3	0	1	0	0	1	2	0	1	0	0	3	0	0	1	1	20	1,691	2	1.620	-	0.648	5
33A	ORCHARD SO. OF CASTILLO DEL MAR TO SO. OF CHERRY	SOUTH OF CASTILLO DEL MAR	SOUTH OF CHERRY AVER	0	0	0	0	2	0	1	0	0	1	0	0	1	0	0	0	0	1	0	1	2	4,173	0	0.263	-	-	2
34A	WHITELEY ST	EXTENT	EXTENT	0	0	0	0	2	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	2	-	0	-	-	-	2
Total				1	2	24	34	396	20	85	108	65	60	4	5	221	4	7	91	101	87	71	107	-	-	-	-	-	-	457

Appendix C – Field Reconnaissance

Intersection of Valley Road and Castillo Del Mar/AG High School

The Village, Pedestrian Crosswalk at W. Branch Street and Short Street

School Crosswalk at S. Halcyon Road and Sandalwood Avenue

Intersection Traffic Way and Fair Oaks Avenue

Intersection of Traffic Way and W. Branch Street

Appendix D – HSIP Analyzer Worksheets

HSIP ANALYZER

Cost Estimate, Crash Data and Benefit Cost Ratio (BCR) Calculation for Highway Safety Improvement Program (HSIP) Application

Important: Review and follow the step-by-step instructions in "Manual for HSIP Analyzer". Completing the HSIP Analyzer without referencing to the manual may result in an application with fatal flaws that will be disqualified from the ranking and selection process.

All yellow highlighted fields must be filled in. The gray fields are calculated and read-only. This is a dynamic form (later steps vary depending on the data entered in earlier steps). If any error messages in red appear, fix the errors prior to proceeding to the next steps.

1. Application ID, Project Location and Project Description (copy from the HSIP Application Form):

Application ID: **05-ArroyoGrande-01Calc**

Save this file using the Application ID plus "Calc" as the file name (e.g. "07-Los Angeles-01Calc.pdf").

Project Location: (limited to 250 characters)

E GRAND AVE & COURTLAND ST
E GRAND AVE & S ELM ST
E GRAND AVE & S HALCYON RD
E GRAND AVE & PEDESTRIAL SIGNAL (WEST OF ALDER ST)

Project Description: (limited to 250 characters)

Pedestrian related improvements at signalized intersection including leading pedestrian phasing and pedestrian countdown heads.

2. Application Category (Check one):

Application Categories that require a Benefit Cost Ratio (BCR):

- ☒ Common BCR Application
- ☐ Set-aside for High Friction Surface Treatment

Application Categories that do NOT require a Benefit Cost Ratio (BCR):

- ☐ Set-aside for Guardrail Upgrades
- ☐ Set-aside for Horizontal Curve Signing
- ☐ Set-aside for Pedestrian Crossing Enhancements
- ☐ Set-aside for Tribes

Dual consideration?

☐ If an Application Category that does not require a BCR is selected above, check this box to indicate your desire that this application will be considered as a Common BCR Application as well in case it does not get selected for funding under the set-aside category. If this box is checked, a benefit cost analysis is required so the project will have a BCR.

A safety benefit cost analysis is required for this application. This tool will guide through cost estimate, safety benefit evaluation and Benefit Cost Ratio (BCR) calculation.

Section I. Construction Cost Estimate and Cost Breakdown

The purpose of this section is to:

- Provide detailed engineer's estimate (for construction items only). The costs for other phases (PE, ROW, and CE) will be included in Section II.
- Test if countermeasures (CMs) (up to 3) are eligible for being used in the project benefit calculation. For a CM to be used in the project benefit calculation, the construction cost of the CM must be at least 15% of the project's total construction cost, unless an exception is requested. And
- Determine the project's maximum Federal Reimbursement Ratio (FRR).

I.1 Select up to 3 countermeasures (CMs) to be tested in the Engineer's Estimate:

Number of CMs to be used in this project: 3

CM No. 1:	S22: Modify signal phasing to implement a Leading Pedestrian Interval (LPI)
CM No. 2:	S19: Install pedestrian countdown signal heads
CM No. 3:	S20: Install pedestrian crossing (S.I.)

I.2 Detailed Engineer's Estimate for Construction Items:

Cost breakdown by CMs. For each item, enter a cost percentage for each of the CMs and "Other Safety-Related" (OS) components. (e.g. enter 10 for 10%). The cost % for "Non-Safety-Related" (NS) components is calculated.

	No.	Item Description	Unit	Quantity	Unit Cost	Total	% for CM#1 (S22)	% for CM#2 (S19)	% for CM#3 (S20)	% for OS*	% for NS**
+ -	1	Pedestrian Countdown Signal Head	Intx	4	$10000.00	40,000	0%	100%	0%	0%	0
+ -	2	Modifying Signal Phasing	Intx	4	$40000.00	140,000	90%	10%	0%	0%	0
+ -	3	Reflective Cross walks	ea	13	$5000.00	65,000	0%	0%	100%	0%	0
					Weighted Average (%)		51%	22%	27%		
					Total ($)	$245,000					

* % for OS: Cost % for Other Safety-Related components;
** % for NS: Cost % for Non Safety-Related components.

Contingencies, as % of the above "Total" of the construction items: 50 % $122,500
(e.g. enter 10 for 10%)

Total Construction Cost (Con Items & Contingencies): $367,500
(Rounded up to the nearest hundreds)

I.3 Summary

3 CM(s) are eligible to be used in the project benefit calculation.

Countermeasure ID	Federal Funding Eligibility (FFE)	Cost %	Eligible to be used in benefit calculation?	Request exception to the 15% rule*
S22	100%	51.43%	Yes (>=15% cost)	☐
S19	100%	22.04%	Yes (>=15% cost)	☐
S20	100%	26.53%	Yes (>=15% cost)	☐

*By requesting an exception to the 15% rule, the CM with less than 15% of the construction cost will then be eligible to be used in the benefit calculation. if an exception is requested for any CM(s) above, please provide the reason (low cost treatment with significant safety benefits, etc.):

Project's Maximum Federal Reimbursement Ratio = 100.0%

The project's Maximum Federal Reimbursement Ratio is calculated as the least of the FFEs of the above countermeasures, minus the percentage of the non-safety related costs in excess of 10%. **This is the maximum value allowed to be entered in "HSIP/Total (%)" column in Section II (Project Cost Estimate).**

Section II. Project Cost Estimate

All project costs, **for all phases and by all funding sources**, must be accounted for on this form.

i. "**Total Cost**": Round all costs up to the nearest hundred dollars.

ii. "**HSIP/Total (%)**": The maximum allowed is the project's Federal Reimbursement Ratio (FRR) as determined in Section I. Click the button to assign the maximum to all, OR enter if not the maximum.

iii. "**HSIP Funds**" and "**Local/Other Funds**" are calculated.

Pay attention to the interactive warning/error messages below the table. The messages, if any, must be fixed, or exceptions should be justified in Question No. 5 in Section II of the HSIP Application Form.

Project's maximum Federal Reimbursement Ratio (FRR) (from Section I, rounded up to integer): 100 %

To set all "HSIP/Total (%)" in the below table to the above maximum FRR, click "Set": Set

Description	Total Cost	HISP/Total (%)	HSIP Funds	Local/Other Funds
Preliminary Engineering (PE) Phase				
Environmental	$0	%	$0	$0
PS&E	$0	%	$0	$0
Subtotal - PE	**$0**	%	**$0**	**$0**
Right of Way (ROW) Phase				
Right of Way Engineering	$0	%	$0	$0
Appraisals, Acquisitions & Utilities	$0	%	$0	$0
Subtotal - Right of Way (ROW)	**$0**	%	**$0**	**$0**
Construction (CON) Phase				
Construction Engineering (CE)	$50,000	100 %	$50,000	$0
Construction Items	$367,500 (Read only - from Section I)	100 %	$367,500	$0
Subtotal - Construction	**$417,500**	**100** %	**$417,500**	**$0**
PROJECT TOTAL	$417,500	100 %	$417,500	$0

☒ Agency does NOT request **HSIP** funds for PE Phase (automatically checked if PE - HSIP funds is $0).

Interactive Warning/Error Messages:

If there are any messages in the below box, please fix OR explain justification for exceptions in Question No 5, Section II in the HSIP Application.

Section III. Project Location Groups, Countermeasures and Crash Data

The benefit of an HSIP safety project is achieved by reducing potential future crashes due to the application of the safety countermeasures (CMs). In this section, you will need to provide information regarding the project's safety CMs and historical crash data at the project sites. The data will be used to estimate the project benefit in Section IV.

1. Divide the project locations into groups.

It is quite often that an HSIP project has multiple locations. Theoretically the benefit for every single location may be calculated separately and then sum them up. However, that may be time consuming or almost impossible when there are a lot of locations. It is more efficient that the project locations with exactly the same safety countermeasures are combined into a group. The benefits of the locations in the same group can then be calculated at once.

When only one group is needed:

If your project consists of only one location or multiple locations that have similar features, address similar safety issues and utilize the same countermeasure(s). The crash data of all the locations can be combined and only one group is needed.

When multiple groups are needed:

If your project include multiple locations that have various safety issues and the proposed safety improvements (countermeasures) are not exactly the same for all the locations. The locations must be divided into different groups. The project benefits are then calculated multiple times, once for each location group. The project total benefit is the sum of the benefits from the different groups.

It should be noted that within a group, all locations should be of the same type: Signalized Intersection (S), Non-Signalized Intersection (NS), or Roadway (R).

If necessary, you may explain the location grouping for your project in details in Question No. 3 (Crash Data Evaluation), Section II in the HSIP Application Form.

2. After the number of location groups is entered, one subform will be populated for each location group. For each location group:

1) First, select the applicable CMs. *Note: If a Roundabout CM (S18 or NS4A or NS4B) is selected, additional information is required.*

For each group, only the CMs of the same type as the group location type can be used. For example, if a group consists of 5 signalized intersections, only "Signalized Intersection" CMs may be used for this group.

2) Based on the selected CMs, crash data tables of the required types are displayed for data entry.

Different CMs will reduce crashes of different types during the life of the safety improvements. Depending on the selected CMs for the group, you will be required to fill in one or more crash data tables, for any combination of the five crash types (datasets): "All" , "Night" , Ped & Bike", "Emergency Vehicle", and "Animal" (Each of the later four datasets is a sub-dataset of the "All" dataset.)

For more information regarding grouping project locations and examples, please refer to the Manual for HSIP Analyzer.

III.1 List of Project Locations and Location Groups

List all locations/sites included in this project by groups. The locations entered in Table III.1 below will be automatically populated in the crash data tables in III.2.

Based on the criteria described on the last page, the locations/sites need to be divided into 3 groups.

Table III.1 List of Project Locations by Groups

Highlighted fields must be filled in. For each group:
1) Must select a Location Type;
2) Initially each group has one location line. Click "+"/"-" to add a new line/delete an existing line;
3) Enter location description for each line. The same descriptions will be auto-populated in III.2.

*Note: If your project has a large number of locations, please aggregate some locations into one description, e.g. 10 stop controlled intersections, 5 horizontal curves, etc., as long as they have similar features and the safety improvements to be implemented are the same.

	No.	No. in Group	Location Description (Intersection Name or Road Limit or General Description)	
GROUP 1			Select Location Type:	S (Signalized Intersections)
+ -	1	G1-1	E Grand Ave/ Courtland, E Grand Ave/S Elm	
GROUP 2			Select Location Type:	S (Signalized Intersections)
+ -	2	G2-1	E Grand Ave/ Halcyon	
GROUP 3			Select Location Type:	S (Signalized Intersections)
+ -	3	G3-1	Grand Ave/ Signalized Pedestrian Crossing West of Alder	

III.2: Countermeasures and Crash Data

(Repeats for each location group)

Countermeasures and Crash Data -Location Group No. 1 of 3

Hide Group Details

Step 1: Select countermeasure(s) to be applied to this location group

This group's location type: S (Signalized Intersections)

Please check the CMs for this location group. All the CMs that have passed the test in Section I AND match the location type of this group are listed below.

	No.	Countermeasure (CM) Name	CM Type*	Crash Reduction Factor (CRF)	Expected Life (Years)	Crash Type	Federal Funding Eligibility
☒	1	S22: Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	S	0.6	10	Ped & Bike	100%
☒	2	S19: Install pedestrian countdown signal heads	S	0.25	20	Ped & Bike	100%
☒	3	S20: Install pedestrian crossing (S. I.)	S	0.25	20	Ped & Bike	100%
	*CM Type: S-Signalized Intersection; NS-Non-Signalized Intersection; R-Roadway.						

Step 2: Provide crash data.

2.1 Crash Data Period: must be between 3 and 5 years.

from (MM/DD/YYYY): 01/01/2014 To (MM/DD/YYYY): 12/31/2018 Crash Data Period (years) = 5

2.2 Fill out the crash data table(s) for the crash type(s) as required by the selected countermeasure(s) in Step 1.

Based on the countermeasures selected in Step 1 , the crash data types to be provided are:

(1) Ped & Bike

Crash Data Table for Crash Type: Pedestrians and Bicyclists Involved (P&B)

No.	Location (from Table III.1)	Fatal (P&B)	Severe Injury (P&B)	Other Visible Injury (P&B)	Complaint of Pain (P&B)	PDO (P&B)	Total
1	E Grand Ave/ Courtland, E Grand Ave/S Elm	0	0	6	0	2	8
	Total	0	0	6	0	2	8

III.2: Countermeasures and Crash Data

(Repeats for each location group)

Countermeasures and Crash Data -Location Group No. 2 of 3

Hide Group Details

Step 1: Select countermeasure(s) to be applied to this location group

This group's location type: S (Signalized Intersections)

Please check the CMs for this location group. All the CMs that have passed the test in Section I AND match the location type of this group are listed below.

	No.	Countermeasure (CM) Name	CM Type*	Crash Reduction Factor (CRF)	Expected Life (Years)	Crash Type	Federal Funding Eligibility
☒	1	S22: Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	S	0.6	10	Ped & Bike	100%
☒	2	S19: Install pedestrian countdown signal heads	S	0.25	20	Ped & Bike	100%
☒	3	S20: Install pedestrian crossing (S. I.)	S	0.25	20	Ped & Bike	100%
	*CM Type: S-Signalized Intersection; NS-Non-Signalized Intersection; R-Roadway.						

Step 2: Provide crash data.

2.1 Crash Data Period: must be between 3 and 5 years.

from (MM/DD/YYYY): 01/01/2014 To (MM/DD/YYYY): 12/31/2018 Crash Data Period (years) = 5

2.2 Fill out the crash data table(s) for the crash type(s) as required by the selected countermeasure(s) in Step 1.

Based on the countermeasures selected in Step 1 , the crash data types to be provided are:

(1) Ped & Bike

Crash Data Table for Crash Type: Pedestrians and Bicyclists Involved (P&B)

No.	Location (from Table III.1)	Fatal (P&B)	Severe Injury (P&B)	Other Visible Injury (P&B)	Complaint of Pain (P&B)	PDO (P&B)	Total
1	E Grand Ave/ Halcyon	0	0	1	0	1	2
	Total	0	0	1	0	1	2

III.2: Countermeasures and Crash Data

(Repeats for each location group)

Countermeasures and Crash Data -Location Group No. 3 of 3

Hide Group Details

Step 1: Select countermeasure(s) to be applied to this location group

This group's location type: S (Signalized Intersections)

Please check the CMs for this location group. All the CMs that have passed the test in Section I AND match the location type of this group are listed below.

	No.	Countermeasure (CM) Name	CM Type*	Crash Reduction Factor (CRF)	Expected Life (Years)	Crash Type	Federal Funding Eligibility
☐	1	S22: Modify signal phasing to implement a Leading Pedestrian Interval (LPI)	S	0.6	10	Ped & Bike	100%
☒	2	S19: Install pedestrian countdown signal heads	S	0.25	20	Ped & Bike	100%
☒	3	S20: Install pedestrian crossing (S. I.)	S	0.25	20	Ped & Bike	100%
	*CM Type: S-Signalized Intersection; NS-Non-Signalized Intersection; R-Roadway.						

Step 2: Provide crash data.

2.1 Crash Data Period: must be between 3 and 5 years.

from (MM/DD/YYYY): 01/01/2014 To (MM/DD/YYYY): 12/31/2018 Crash Data Period (years) = 5

2.2 Fill out the crash data table(s) for the crash type(s) as required by the selected countermeasure(s) in Step 1.

Based on the countermeasures selected in Step 1 , the crash data types to be provided are:

(1) Ped & Bike

Crash Data Table for Crash Type: Pedestrians and Bicyclists Involved (P&B)

No.	Location (from Table III.1)	Fatal (P&B)	Severe Injury (P&B)	Other Visible Injury (P&B)	Complaint of Pain (P&B)	PDO (P&B)	Total
1	Grand Ave/ Signalized Pedestrian Crossing West of Alder	0	0	1	0	0	1
	Total	0	0	1	0	0	1

Section IV. Calculation and Results

Click the "Calculate" button to calculate. The script will first check if there are any errors or inconsistencies in the countermeasure selections and crash data. If errors are detected and displayed below, the errors must be fixed first before you click the "Calculate" button again. If no errors are displayed, the calculation results are provided in this section. Please refer to the Manual for HSIP Analyzer for details regarding possible errors.

Calculate

Project Summary Information:

Project Total Cost: 417500
3 countermeasures are eligible in benefit calculation. (S22 S19 S20)
Project location(s) are divided into 3 group(s) for calculating the benefits.

IV.1 Benefit Summary by location groups

Group No.	Group Info/Data*	Benefit from CM #1	Benefit from CM #2	Benefit from CM #3	Total Benefit of the group
1	Location type: S (Signalized Intersections) Number of location(s): 1 Number of selected countermeasure(s): 3 (S22 S19 S20) Crash Data Information: Crash data period (years): 5 Number of crashes(F/SI/OVI/I-CP/PDO)*: Ped & Bike: 0,0,6,0,2	$661,653	$618,077	$618,077	$1,897,807
2	Location type: S (Signalized Intersections) Number of location(s): 1 Number of selected countermeasure(s): 3 (S22 S19 S20) Crash Data Information: Crash data period (years): 5 Number of crashes(F/SI/OVI/I-CP/PDO)*: Ped & Bike: 0,0,1,0,1	$116,927	$109,226	$109,226	$335,379
3	Location type: S (Signalized Intersections) Number of location(s): 1 Number of selected countermeasure(s): 2 (S19 S20) Crash Data Information: Crash data period (years): 5 Number of crashes(F/SI/OVI/I-CP/PDO)*: Ped & Bike: 0,0,1,0,0	$0	$110,688	$110,688	$221,376
Sum		**$778,580**	**$837,991**	**$837,991**	**$2,454,562**

*Number of crashes: five crash numbers are for Fatal (F), Severe Injury (SI), Other Visible Injury (OVI), Injury - Complaint of Pain (I-CP), and Property Damage Only (PDO), respectively.

IV.2. Project Benefit and BCR Summary

No.	Countermeasure Name	Benefit	Cost	Resulting B/C
1	S22	$778,580	$214,714	**3.6**
2	S19	$837,991	$92,020	**9.1**
3	S20	$837,991	$110,765	**7.6**
	Entire Project	**$2,454,562**	**$417,500**	**5.9**

Data to be transferred to the HSIP Application Form

This section is generated automatically once the data entry and calculation have been completed. Transfer the data on this page to Section III of the HSIP Application Form.

Safety Countermeasure Information

Number of countermeasures: 3
S22: Modify signal phasing to implement a Leading Pedestrian Interval (LPI)
S19: Install pedestrian countdown signal heads
S20: Install pedestrian crossing (S.I.)

Cost, FRR, Benefit and BCR:

Total Project Cost:	$417,500
HSIP Funds Requested:	$417,500
Max. Federal Reimbursement Ratio (FRR):	100%
Total Expected Benefit:	$2,454,562
Benefit Cost Ratio:	5.88

HSIP ANALYZER

Cost Estimate, Crash Data and Benefit Cost Ratio (BCR) Calculation for Highway Safety Improvement Program (HSIP) Application

Important: Review and follow the step-by-step instructions in "Manual for HSIP Analyzer". Completing the HSIP Analyzer without referencing to the manual may result in an application with fatal flaws that will be disqualified from the ranking and selection process.

All yellow highlighted fields must be filled in. The gray fields are calculated and read-only. This is a dynamic form (later steps vary depending on the data entered in earlier steps). If any error messages in red appear, fix the errors prior to proceeding to the next steps.

1. Application ID, Project Location and Project Description (copy from the HSIP Application Form):

Application ID: **05-ArroyoGrande-02Calc**

Save this file using the Application ID plus "Calc" as the file name (e.g. "07-Los Angeles-01Calc.pdf").

Project Location: (limited to 250 characters)

E GRAND AVE & COURTLAND ST
E GRAND AVE & S ELM ST
E GRAND AVE & S HALCYON RD

Project Description: (limited to 250 characters)

Signalized intersection improvements including improving signal timing, improving signal hardwares (lenses, reflective back plates, mounting, sizes and numbers), and providing left turn phase.

2. Application Category (Check one):

Application Categories that require a Benefit Cost Ratio (BCR):

- ☒ Common BCR Application
- ☐ Set-aside for High Friction Surface Treatment

Application Categories that do NOT require a Benefit Cost Ratio (BCR):

- ☐ Set-aside for Guardrail Upgrades
- ☐ Set-aside for Horizontal Curve Signing
- ☐ Set-aside for Pedestrian Crossing Enhancements
- ☐ Set-aside for Tribes

☐ **Dual consideration?**
If an Application Category that does not require a BCR is selected above, check this box to indicate your desire that this application will be considered as a Common BCR Application as well in case it does not get selected for funding under the set-aside category. If this box is checked, a benefit cost analysis is required so the project will have a BCR.

A safety benefit cost analysis is required for this application. This tool will guide through cost estimate, safety benefit evaluation and Benefit Cost Ratio (BCR) calculation.

Section I. Construction Cost Estimate and Cost Breakdown

The purpose of this section is to:

- Provide detailed engineer's estimate (for construction items only). The costs for other phases (PE, ROW, and CE) will be included in Section II.
- Test if countermeasures (CMs) (up to 3) are eligible for being used in the project benefit calculation. For a CM to be used in the project benefit calculation, the construction cost of the CM must be at least 15% of the project's total construction cost, unless an exception is requested. And
- Determine the project's maximum Federal Reimbursement Ratio (FRR).

I.1 Select up to 3 countermeasures (CMs) to be tested in the Engineer's Estimate:

Number of CMs to be used in this project: 3

CM No. 1:	S2: Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number
CM No. 2:	S3: Improve signal timing (coordination, phases, red, yellow, or operation)
CM No. 3:	S6: Provide protected left turn phase (left turn lane already exists)

I.2 Detailed Engineer's Estimate for Construction Items:

Cost breakdown by CMs. For each item, enter a cost percentage for each of the CMs and "Other Safety-Related" (OS) components. (e.g. enter 10 for 10%). The cost % for "Non-Safety-Related" (NS) components is calculated.

	No.	Item Description	Unit	Quantity	Unit Cost	Total	% for CM#1 (S2)	% for CM#2 (S3)	% for CM#3 (S6)	% for OS*	% for NS**
+ -	1	Signal Modification	ea	3	$40000.00	120,000	%	100%	%	%	0
+ -	2	Adding Left turn phasing	Ea	2	100,000	200,000	%	%	100%	%	0
+ -	3	Reflective back plate signal head upgrades	Ea	3	$20000.00	60,000	100%	%	%	%	0
					Weighted Average (%)		16%	32%	53%		
					Total ($)	$380,000					

* % for OS: Cost % for Other Safety-Related components;
** % for NS: Cost % for Non Safety-Related components.

Contingencies, as % of the above "Total" of the construction items: 50 % $190,000
(e.g. enter 10 for 10%)

Total Construction Cost (Con Items & Contingencies): $570,000
(Rounded up to the nearest hundreds)

I.3 Summary

3 CM(s) are eligible to be used in the project benefit calculation.

Countermeasure ID	Federal Funding Eligibility (FFE)	Cost %	Eligible to be used in benefit calculation?	Request exception to the 15% rule*
S2	100%	15.79%	Yes (>=15% cost)	☐
S3	50%	31.58%	Yes (>=15% cost)	☐
S6	100%	52.63%	Yes (>=15% cost)	☐

*By requesting an exception to the 15% rule, the CM with less than 15% of the construction cost will then be eligible to be used in the benefit calculation. if an exception is requested for any CM(s) above, please provide the reason (low cost treatment with significant safety benefits, etc.):

Project's Maximum Federal Reimbursement Ratio = 50.0%

The project's Maximum Federal Reimbursement Ratio is calculated as the least of the FFEs of the above countermeasures, minus the percentage of the non-safety related costs in excess of 10%. **This is the maximum value allowed to be entered in "HSIP/Total (%)" column in Section II (Project Cost Estimate).**

Section II. Project Cost Estimate

All project costs, **for all phases and by all funding sources**, must be accounted for on this form.

i. "**Total Cost**": Round all costs up to the nearest hundred dollars.

ii. "**HSIP/Total (%)**": The maximum allowed is the project's Federal Reimbursement Ratio (FRR) as determined in Section I. Click the button to assign the maximum to all, OR enter if not the maximum.

iii. "**HSIP Funds**" and "**Local/Other Funds**" are calculated.

Pay attention to the interactive warning/error messages below the table. The messages, if any, must be fixed, or exceptions should be justified in Question No. 5 in Section II of the HSIP Application Form.

Project's maximum Federal Reimbursement Ratio (FRR) (from Section I, rounded up to integer): 50 %

To set all "HSIP/Total (%)" in the below table to the above maximum FRR, click "Set": Set

Description	Total Cost	HISP/Total (%)	HSIP Funds	Local/Other Funds
Preliminary Engineering (PE) Phase				
Environmental	$0	50 %	$0	$0
PS&E	$0	50 %	$0	$0
Subtotal - PE	**$0**	%	**$0**	**$0**
Right of Way (ROW) Phase				
Right of Way Engineering	$0	50 %	$0	$0
Appraisals, Acquisitions & Utilities	$0	50 %	$0	$0
Subtotal - Right of Way (ROW)	**$0**	%	**$0**	**$0**
Construction (CON) Phase				
Construction Engineering (CE)	$50,000	50 %	$25,000	$25,000
Construction Items	$570,000 (Read only - from Section I)	50 %	$285,000	$285,000
Subtotal - Construction	**$620,000**	**50** %	**$310,000**	**$310,000**
PROJECT TOTAL	$620,000	50 %	$310,000	$310,000

☒ Agency does NOT request **HSIP** funds for PE Phase (automatically checked if PE - HSIP funds is $0).

Interactive Warning/Error Messages:

If there are any messages in the below box, please fix OR explain justification for exceptions in Question No 5, Section II in the HSIP Application.

Section III. Project Location Groups, Countermeasures and Crash Data

The benefit of an HSIP safety project is achieved by reducing potential future crashes due to the application of the safety countermeasures (CMs). In this section, you will need to provide information regarding the project's safety CMs and historical crash data at the project sites. The data will be used to estimate the project benefit in Section IV.

1. Divide the project locations into groups.

It is quite often that an HSIP project has multiple locations. Theoretically the benefit for every single location may be calculated separately and then sum them up. However, that may be time consuming or almost impossible when there are a lot of locations. It is more efficient that the project locations with exactly the same safety countermeasures are combined into a group. The benefits of the locations in the same group can then be calculated at once.

When only one group is needed:

If your project consists of only one location or multiple locations that have similar features, address similar safety issues and utilize the same countermeasure(s). The crash data of all the locations can be combined and only one group is needed.

When multiple groups are needed:

If your project include multiple locations that have various safety issues and the proposed safety improvements (countermeasures) are not exactly the same for all the locations. The locations must be divided into different groups. The project benefits are then calculated multiple times, once for each location group. The project total benefit is the sum of the benefits from the different groups.

It should be noted that within a group, all locations should be of the same type: Signalized Intersection (S), Non-Signalized Intersection (NS), or Roadway (R).

If necessary, you may explain the location grouping for your project in details in Question No. 3 (Crash Data Evaluation), Section II in the HSIP Application Form.

2. After the number of location groups is entered, one subform will be populated for each location group. For each location group:

1) First, select the applicable CMs. *Note: If a Roundabout CM (S18 or NS4A or NS4B) is selected, additional information is required.*

For each group, only the CMs of the same type as the group location type can be used. For example, if a group consists of 5 signalized intersections, only "Signalized Intersection" CMs may be used for this group.

2) Based on the selected CMs, crash data tables of the required types are displayed for data entry.

Different CMs will reduce crashes of different types during the life of the safety improvements. Depending on the selected CMs for the group, you will be required to fill in one or more crash data tables, for any combination of the five crash types (datasets): "All" , "Night" , Ped & Bike", "Emergency Vehicle", and "Animal" (Each of the later four datasets is a sub-dataset of the "All" dataset.)

For more information regarding grouping project locations and examples, please refer to the Manual for HSIP Analyzer.

III.1 List of Project Locations and Location Groups

List all locations/sites included in this project by groups. The locations entered in Table III.1 below will be automatically populated in the crash data tables in III.2.

Based on the criteria described on the last page, the locations/sites need to be divided into 2 groups.

Table III.1 List of Project Locations by Groups

Highlighted fields must be filled in. For each group:
1) Must select a Location Type;
2) Initially each group has one location line. Click "+"/"-" to add a new line/delete an existing line;
3) Enter location description for each line. The same descriptions will be auto-populated in III.2.

*Note: If your project has a large number of locations, please aggregate some locations into one description, e.g. 10 stop controlled intersections, 5 horizontal curves, etc., as long as they have similar features and the safety improvements to be implemented are the same.

	No.	No. in Group	Location Description (Intersection Name or Road Limit or General Description)	
GROUP 1			Select Location Type:	S (Signalized Intersections)
+ -	1	G1-1	E Grand Ave & Courtland St, Grand Ave and Elm St	
GROUP 2			Select Location Type:	S (Signalized Intersections)
+ -	2	G2-1	E Grand Ave and Halcyon Rd	

III.2: Countermeasures and Crash Data

(Repeats for each location group)

Countermeasures and Crash Data -Location Group No. 1 of 2

Hide Group Details

Step 1: Select countermeasure(s) to be applied to this location group

This group's location type: S (Signalized Intersections)

Please check the CMs for this location group. All the CMs that have passed the test in Section I AND match the location type of this group are listed below.

	No.	Countermeasure (CM) Name	CM Type*	Crash Reduction Factor (CRF)	Expected Life (Years)	Crash Type	Federal Funding Eligibility
☒	1	S2: Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number	S	0.15	10	All	100%
☒	2	S3: Improve signal timing (coordination, phases, red, yellow, or operation)	S	0.15	10	All	50%
☒	3	S6: Provide protected left turn phase (left turn lane already exists)	S	0.3	20	All	100%
	*CM Type: S-Signalized Intersection; NS-Non-Signalized Intersection; R-Roadway.						

Step 2: Provide crash data.

2.1 Crash Data Period: must be between 3 and 5 years.

from (MM/DD/YYYY): 01/01/2014 To (MM/DD/YYYY): 12/31/2018 Crash Data Period (years) = 5

2.2 Fill out the crash data table(s) for the crash type(s) as required by the selected countermeasure(s) in Step 1.

Based on the countermeasures selected in Step 1 , the crash data types to be provided are:

(1) All

Crash Data Table for Crash Type: ALL

No.	Location (from Table III.1)	Fatal (ALL)	Severe Injury (ALL)	Other Visible Injury (ALL)	Complaint of Pain (ALL)	PDO (ALL)	Total
1	E Grand Ave & Courtland St, Grand Ave and Elm St	0	1	5	6	66	78
	Total	0	1	5	6	66	78

III.2: Countermeasures and Crash Data

(Repeats for each location group)

Countermeasures and Crash Data -Location Group No. 2 of 2

Hide Group Details

Step 1: Select countermeasure(s) to be applied to this location group

This group's location type: S (Signalized Intersections)

Please check the CMs for this location group. All the CMs that have passed the test in Section I AND match the location type of this group are listed below.

	No.	Countermeasure (CM) Name	CM Type*	Crash Reduction Factor (CRF)	Expected Life (Years)	Crash Type	Federal Funding Eligibility
☒	1	S2: Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number	S	0.15	10	All	100%
☒	2	S3: Improve signal timing (coordination, phases, red, yellow, or operation)	S	0.15	10	All	50%
☐	3	S6: Provide protected left turn phase (left turn lane already exists)	S	0.3	20	All	100%
	*CM Type: S-Signalized Intersection; NS-Non-Signalized Intersection; R-Roadway.						

Step 2: Provide crash data.

2.1 Crash Data Period: must be between 3 and 5 years.

from (MM/DD/YYYY): 01/01/2014 To (MM/DD/YYYY): 12/31/2018 Crash Data Period (years) = 5

2.2 Fill out the crash data table(s) for the crash type(s) as required by the selected countermeasure(s) in Step 1.

Based on the countermeasures selected in Step 1 , the crash data types to be provided are:

(1) All

Crash Data Table for Crash Type: ALL

No.	Location (from Table III.1)	Fatal (ALL)	Severe Injury (ALL)	Other Visible Injury (ALL)	Complaint of Pain (ALL)	PDO (ALL)	Total
1	E Grand Ave and Halcyon Rd	0	0	1	1	28	30
	Total	0	0	1	1	28	30

Section IV. Calculation and Results

Click the "Calculate" button to calculate. The script will first check if there are any errors or inconsistencies in the countermeasure selections and crash data. If errors are detected and displayed below, the errors must be fixed first before you click the "Calculate" button again. If no errors are displayed, the calculation results are provided in this section. Please refer to the Manual for HSIP Analyzer for details regarding possible errors.

Calculate

Project Summary Information:

Project Total Cost: 620000
3 countermeasures are eligible in benefit calculation. (S2 S3 S6)
Project location(s) are divided into 2 group(s) for calculating the benefits.

IV.1 Benefit Summary by location groups

Group No.	Group Info/Data*	Benefit from CM #1	Benefit from CM #2	Benefit from CM #3	Total Benefit of the group
1	Location type: S (Signalized Intersections) Number of location(s): 1 Number of selected countermeasure(s): 3 (S2 S3 S6) Crash Data Information: Crash data period (years): 5 Number of crashes(F/SI/OVI/I-CP/PDO)*: All: 0,1,5,6,66	$816,180	$816,180	$3,613,980	$5,246,340
2	Location type: S (Signalized Intersections) Number of location(s): 1 Number of selected countermeasure(s): 2 (S2 S3) Crash Data Information: Crash data period (years): 5 Number of crashes(F/SI/OVI/I-CP/PDO)*: All: 0,0,1,1,28	$146,743	$146,743	$0	$293,486
Sum		**$962,923**	**$962,923**	**$3,613,980**	**$5,539,826**

*Number of crashes: five crash numbers are for Fatal (F), Severe Injury (SI), Other Visible Injury (OVI), Injury - Complaint of Pain (I-CP), and Property Damage Only (PDO), respectively.

IV.2. Project Benefit and BCR Summary

No.	Countermeasure Name	Benefit	Cost	Resulting B/C
1	S2	$962,923	$97,895	**9.8**
2	S3	$962,923	$195,789	**4.9**
3	S6	$3,613,980	$326,316	**11.1**
	Entire Project	**$5,539,826**	**$620,000**	**8.9**

Data to be transferred to the HSIP Application Form

This section is generated automatically once the data entry and calculation have been completed. Transfer the data on this page to Section III of the HSIP Application Form.

Safety Countermeasure Information

Number of countermeasures: 3

S2: Improve signal hardware: lenses, back-plates with retroreflective borders, mounting, size, and number

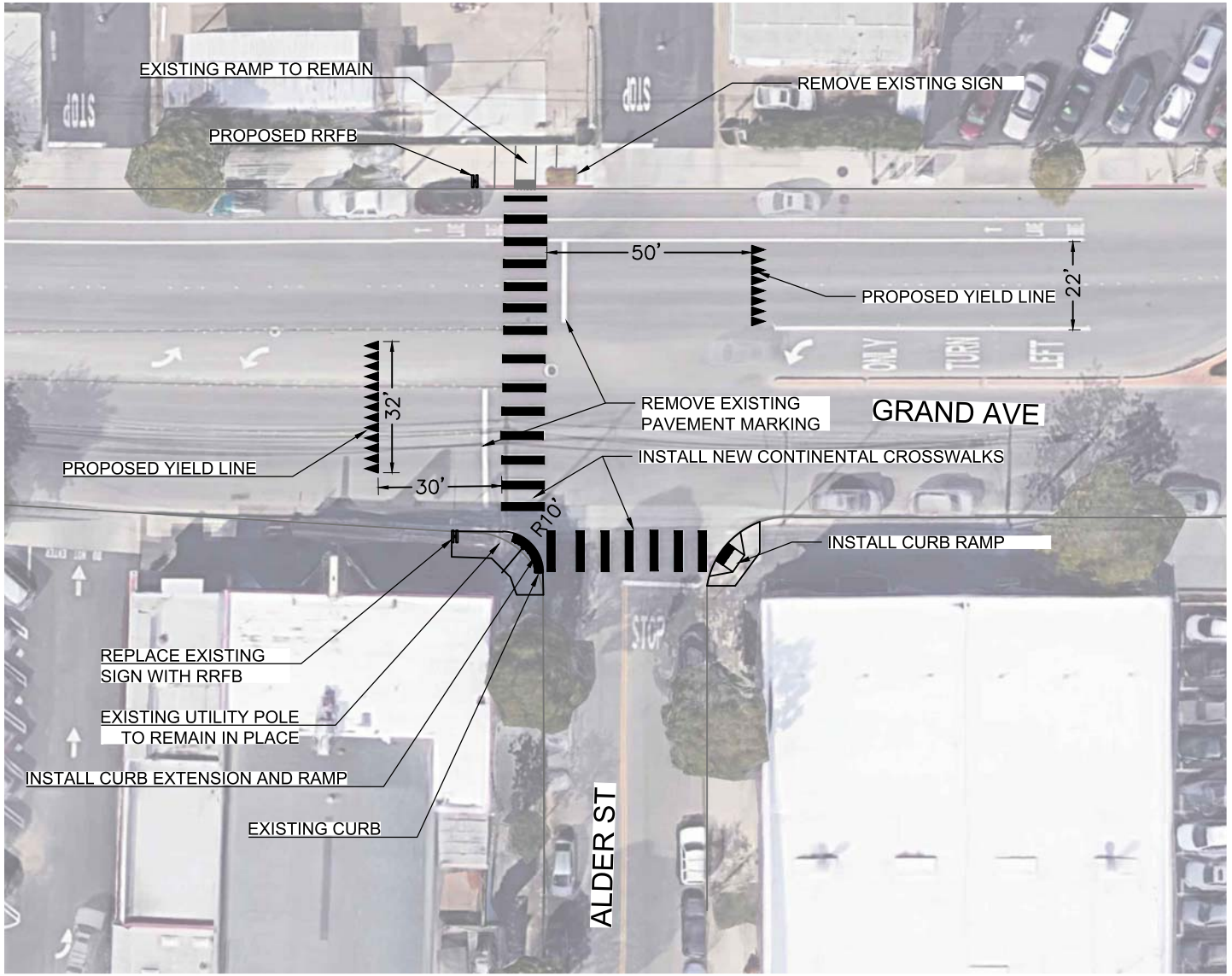
S3: Improve signal timing (coordination, phases, red, yellow, or operation)

S6: Provide protected left turn phase (left turn lane already exists)

Cost, FRR, Benefit and BCR:

Total Project Cost:	$620,000
HSIP Funds Requested:	$310,000
Max. Federal Reimbursement Ratio (FRR):	50%
Total Expected Benefit:	$5,539,826
Benefit Cost Ratio:	8.94

Appendix E – HSIP Cycle 10 Plans



GRAND AVENUE
City Right of Way = 102 ft
Road Width = 82 ft
Classification = Principal Arterial

40 0 40
1 inch = 40 ft.

N

GHD

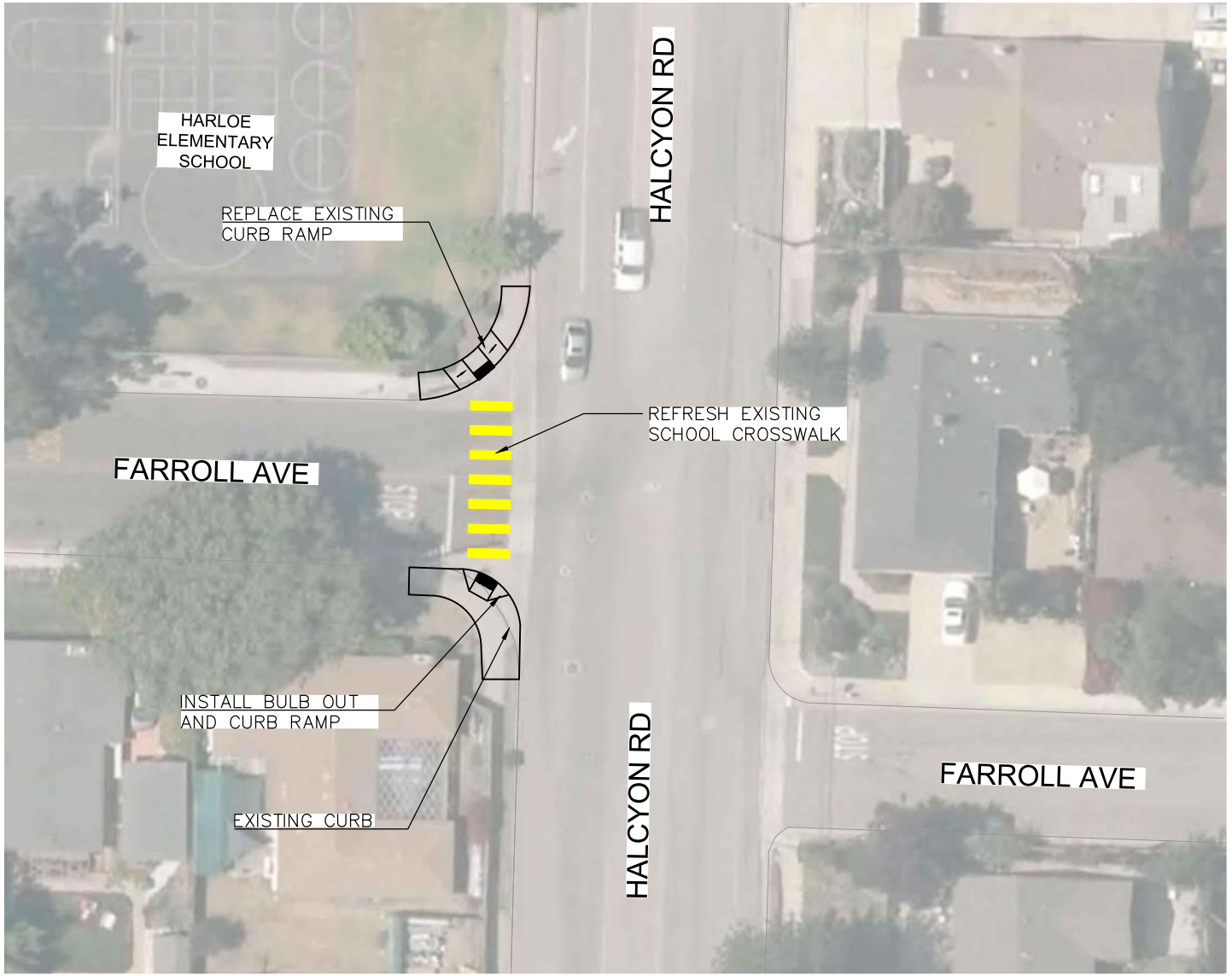
CITY OF ARROYO GRANDE
Pedestrian Crossing Enhancement Project
HSIP Application

LOCATION 1: E GRAND AVE AT ALDER ST

FIGURE 3.1

Filename: O:\PRJ\1989\AutoCAD\Pedestrian Crossing Enhancements.dwg Plot Date: 23 October 2020 - 10:11 AM

Source: GHD



HALCYON ROAD
City Right of Way = 76 ft
Road Width = 64 ft
Classification = Major Collector

40 0 40
1 inch = 40 ft.

N

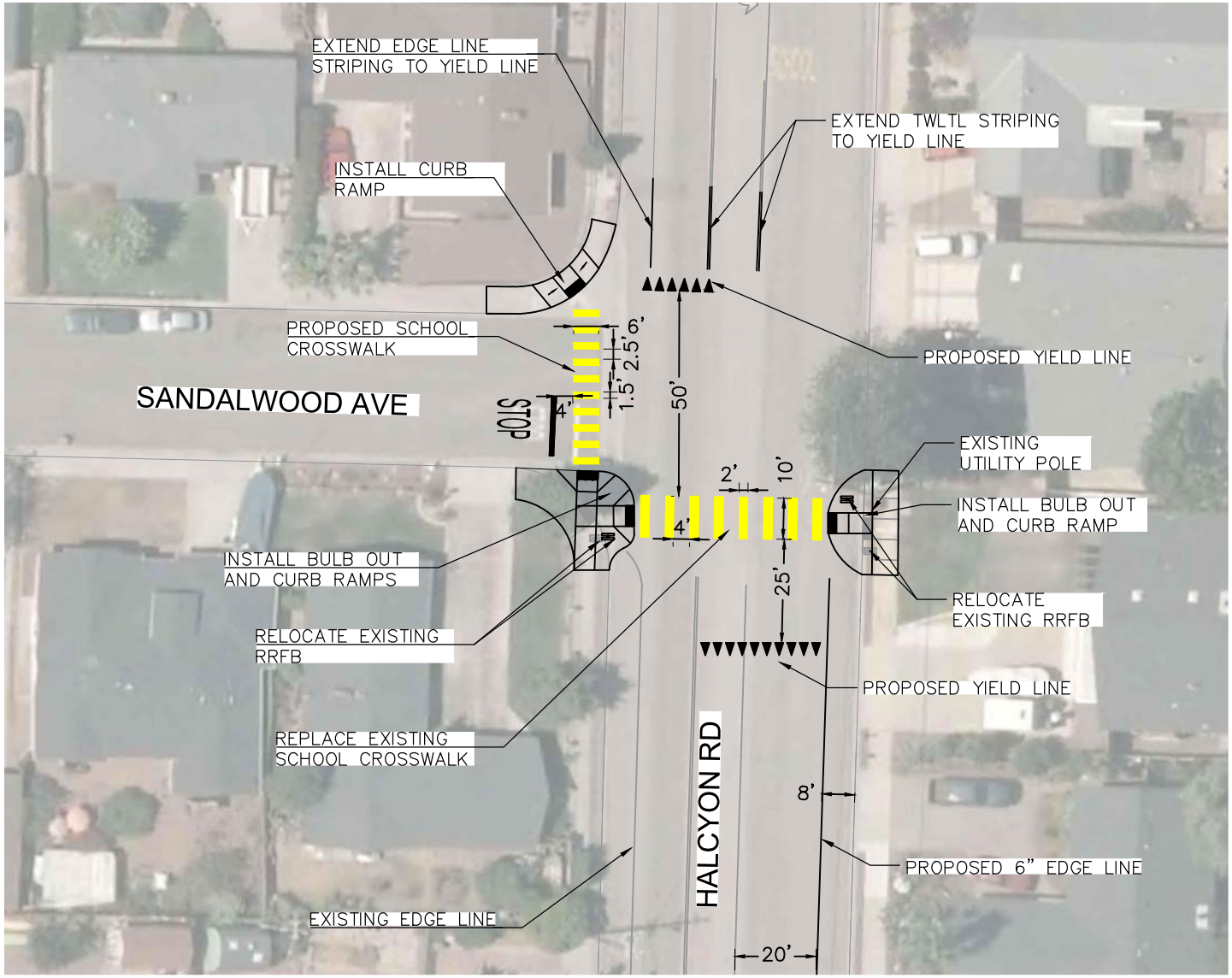
CITY OF ARROYO GRANDE
Pedestrian Crossing Enhancement Project
HSIP Application

LOCATION 2: S HALCYON RD AT FARROLL AVE

FIGURE 3.2

Filename: O:\PRJ\1989\AutoCAD\Pedestrian Crossing Enhancements.dwg Plot Date: 23 October 2020 - 8:49 AM

Source: GHD



HALCYON ROAD
City Right of Way = 76 ft
Road Width = 64 ft
Classification = Major Collector

40 0 40
1 inch = 40 ft.

N

GHD

CITY OF ARROYO GRANDE
Pedestrian Crossing Enhancement Project
HSIP Application

LOCATION 3: S HALCYON RD AT SANDALWOOD AVE

FIGURE 3.3

Filename: O:\PRJ\1989\AutoCAD\Pedestrian Crossing Enhancements.dwg Plot Date: 23 October 2020 - 8:47 AM

Source: GHD