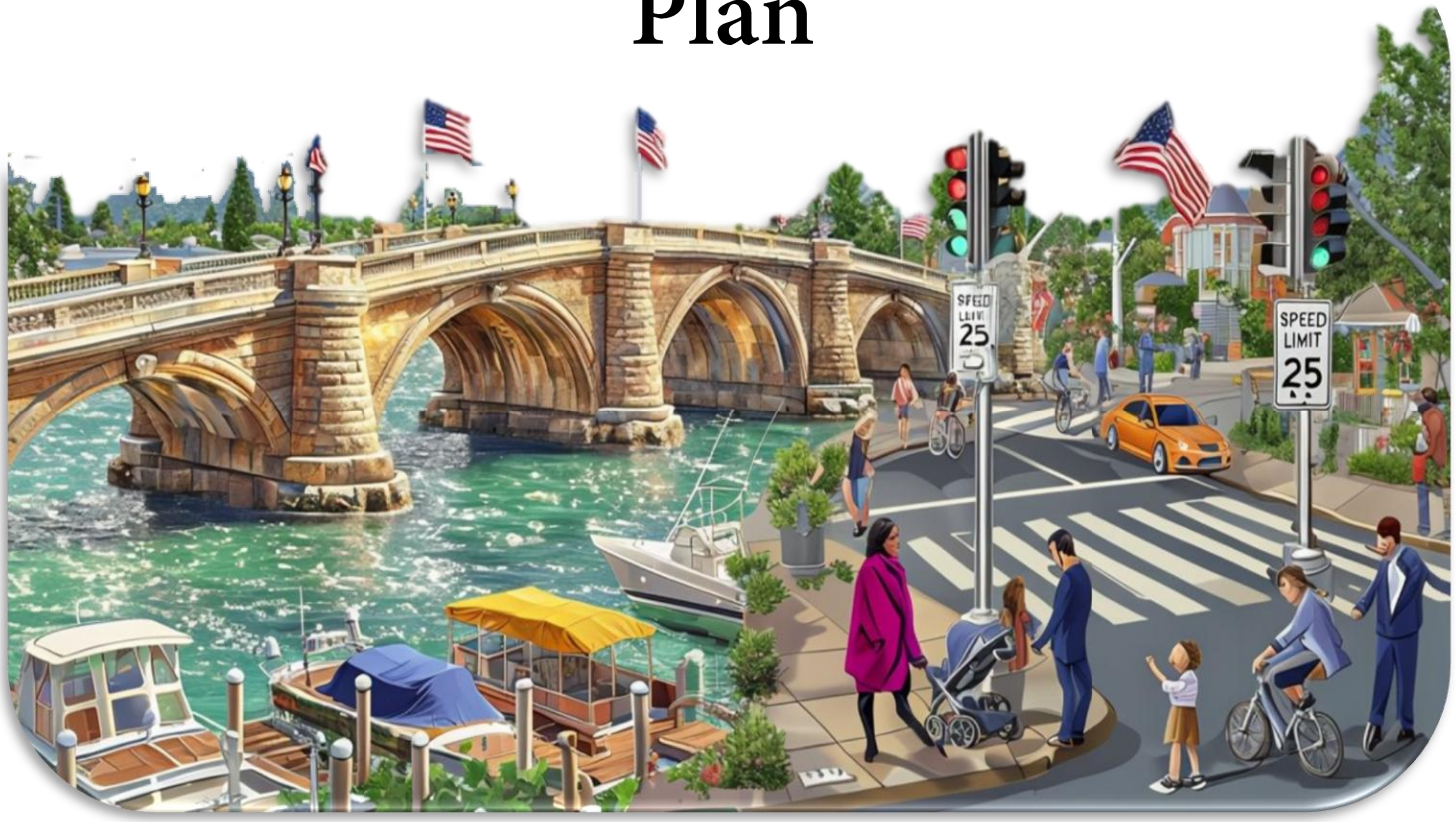
Lake Havasu MPO
METROPOLITAN PLANNING ORGANIZATION

Lake Havasu Metropolitan Planning Organization

Strategic Transportation Safety Plan



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Acknowledgments

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Acronyms

ACIS – Arizona Crash Information System

ADOT – Arizona Department of Transportation

BIL – Bipartisan Infrastructure Bill

CMAQ - Congestion Mitigation and Air Quality Improvement

CMF – Crash Modification Factor

CYMPO – Central Yavapai Metropolitan Planning Organization

DOT – Department of Transportation

DPS – Department of Public Safety

ETC - Equitable Transportation Community

FARS - Fatality Analysis Reporting System

FHWA – Federal Highway Administration

FTA - Federal Transit Administration

HRRR - High Risk Rural Road

HSIP – Highway Safety Improvement Program

MPO - Metropolitan Planning Organization

NACOG – Northern Arizona Council of Governments

NHTSA - National Highway Traffic Safety Administration

RTSP – Regional Transportation Safety Plan

SHSP – Strategic Highway Safety Plan

SS4A – Safe Streets and Roads for All

STB - State Transportation Board

T2 - Technology Transfer

TIP - Transportation Improvement Program

VMT – Vehicle Miles Traveled

Executive Summary

LHMPO led the development of a Strategic Transportation Safety Plan (STSP) in partnership with Lake Havasu City, Mohave County, and the Arizona Department of Transportation (ADOT). A planning committee consisting of staff members from these agencies provided oversight for the STSP's development; all will jointly lead its implementation and monitoring.

This STSP establishes a framework for reducing fatal and serious injury crashes on public roads in the LHMPO region by identifying crash trends, emphasis areas, performance measures, high-risk crash locations, funding resources, and potential projects.

Vision: "*Toward Zero Deaths by establishing a safe and inclusive transportation system for all users.*"

Goal: "Achieve a 5% annual reduction in serious injury and fatal crashes until reaching zero fatalities or serious injuries within the LHMPO region."

A crash analysis was performed for the LHMPO region based on the most recent five years of available crash data: January 1, 2018, to December 31, 2022. Over this period, 2,913 reported crashes, with 26 fatalities and 1,244 injuries occurred in the LHMPO region. The following highlight the crash trend and crash characteristics:

- Intersection crashes account for the highest number of fatal plus serious injury crashes at 38%
- Nighttime crashes represent the second highest number of fatal plus serious injury crashes at 35%
- Unrestrained (not wearing seat belt) crashes represent the third highest number of fatal plus serious injury crashes at 35%
- Of the 49 pedestrian-involved crashes, 4% resulted in fatalities, while 19% were reported as suspected serious injuries
- Of the 38 bicycle-involved crashes, no crashes resulted in fatalities, while 29% were reported as suspected serious injuries
- "Speed Too Fast For Conditions" and "Failed To Yield Right Of Way" were the top crash violations in the region

The most common manners of collision in all crashes were rear end (26%), angle (24%), and single vehicle (18%).

Emphasis areas represent the crash types and factors in the region associated with a high frequency of fatal and serious injury crashes. Directing safety initiatives toward these specific areas helps to achieve the STSP vision. The following emphasis areas were identified for the LHMPO region:



- **Behavior Related:** *Speeding, Impaired Driving, Unrestrained (Not Wearing Seat Belt), and Distracted Driving*



- **Intersection**



- **Lane Departure**



- **Nighttime**



- **Motorcycle**

Priority intersections and segments were identified by conducting a network screening of crash data for the region. Crash frequency and severity were key factors in identifying priority intersections and road segments within the region.

The Safe System Approach (SSA) was utilized in developing strategies to improve transportation safety in the region. SSA is based on the principles that the human body is vulnerable, humans make mistakes, and it is unacceptable that these mistakes result in death and injury. The SSA employs strategies that revolve around the fundamental elements of Safe Roads, Safe Speeds, Safe Road Users, Safe Vehicles, and Post-Crash Care.

Using input from stakeholders, the public, crash data analysis, network screening, and individual agency input, potential safety projects within the region were identified. The projects are intended to improve safety in the region and further the region's safety goals.

Introduction

Regional Overview

Lake Havasu Metropolitan Planning Organization (LHMPO) is covers approximately 100 square miles with a population of 59,257. LHMPO area boundary encompasses all areas within the Lake Havasu City limits, the Mohave County area north of the City limits known as Desert Hills, Havasu Gardens, Crystal Beach and the Mohave County area south of the City known as Horizon Six. LHMPO is governed by an executive board and technical advisory committee that are composed of elected officials and technical staff, respectively, from member entities.

Plan Development

A Strategic Transportation Safety Plan (STSP) was developed in 2017 by LHMPO in collaboration with the other agencies within the LHMPO region. The purpose of the STSP was to address safety from a holistic, regional perspective to reduce the risk of death and serious injury to all transportation users. To continue efforts to reduce fatal and serious injury crashes in the western Arizona region, LHMPO managed the development of this update to the 2017 STSP. From 2018-2022, 26 people have died, and over 1,244 people have been injured in traffic crashes within the LHMPO region, highlighting the critical need for this region to update its STSP.

A planning committee consisting of staff members from LHMPO, Lake Havasu City, Mohave County, and ADOT provided oversight for the development of the STSP and will lead the implementation and monitoring of the STSP.

LHMPO STSP Safety Committee

For the implementation of this STSP, a Safety Committee has been established that consists of personnel from LHMPO member agencies. The members of the Safety Committee shall include the following representatives:

LHMPO, Senior Transportation Planner

ADOT, Assistant District Engineer

Mohave County, Public Works Director/ Engineering Manager

Lake Havasu City, Director of Public Works

Safe Streets and Roads for All Action Plans

This STSP meets all of the requirements for a Safe Streets and Roads for All (SS4A) Safety Action Plan for LHMPO. The SS4A Safety Action Plan allows for any agency within LHMPO to pursue program funds for projects through the Bipartisan Infrastructure Law's SS4A discretionary program with $5 billion in appropriated funds over 5 years, 2022-2026. The plan typically consists of 8 essential components: leadership commitment and goal setting, planning structure, safety analysis, engagement and collaboration, equity considerations, policy and process changes, strategy and project selections, and progress transparency. The location of each of these components in this plan are referenced in the table below.

Table 1: SS4A Action Plan 8 Essential Components

Number	Essential Component	Page Number
1	*Leadership Commitment and Goal Setting*	24
2	*Planning Structure*	6
3	*Safety Analysis*	15
4	*Engagement and Collaboration*	8
5	*Equity Considerations*	13
6	*Policy and Process Changes*	44
7	*Strategy and Project Selections*	31 & 48
8	*Progress and Transparency*	43

Promoting a Culture of Safety

To meet the "Toward Zero Deaths" goal, a culture of safety is needed, from the regional level to the agency level, to the individual road user. Establishing a culture of safety requires the collaboration among and responsibility of all who develop, prioritize, fund, plan, use and enforce the transportation system. Key attributes of a successful culture of safety include:

- Prioritize people, starting with the most vulnerable users of the system, with equity and sustainability
- Focus on messaging, education and public outreach at all phases of planning, design, construction, maintenance, and enforcement
- Adopt a Safe System Approach
- Develop interagency initiatives that reach from top to bottom by incorporating safety principles into policies within an organization

Community Engagement

Introduction

Community engagement is a cornerstone in the development of a comprehensive transportation safety plan. Community engagement and outreach initiatives are pivotal in fostering collaboration between local residents, stakeholders, and transportation authorities to address safety concerns effectively. Through open dialogue, active participation, and a shared understanding of community needs, a transportation safety plan can be tailored to reflect the unique challenges and priorities of the area. Community members and other interested stakeholders were invited to complete safety surveys in person at community events, organization/committee meetings, or online. The surveys were open for approximately six months and closed on October 31, 2024.

Technical Advisory Committee Meetings

Several Technical Advisory Committee (TAC) stakeholder meetings were held with the LHMPO TAC in July 2023, November 2023, January 2024, March 2024, and November 2024. These TAC meetings aimed to facilitate collaboration and gather insights and feedback from regional stakeholders regarding the STSP. Key topics discussed in the meetings were as follows:

- Public Outreach and Involvement: Online surveys were shown and discussed to gather broader community input.
- Vision and Goals: The vision and goals of the STSP were discussed, focusing on reducing traffic-related fatalities and serious injuries.
- Crash Data Analysis: Detailed crash data analysis was presented, highlighting high-risk areas and trends.
- Recommended Emphasis Areas: Following the crash analysis, recommended emphasis areas were shared with stakeholders for their input.
- Network Screening: The discussion on network screening included a list of top-priority intersections and segments needing safety improvements.
- Highway Safety Improvement Program (HSIP) Application Opportunities: Opportunities for Highway Safety Improvement Program (HSIP) applications were discussed to secure funding for safety projects.

A summary of the topics presented to stakeholders can be found in **Appendix I.**

Public Event

A public meeting was held at Lake Havasu City Council on July 9, 2024. The purpose of the public meeting was to gather insights and feedback from community members and stakeholders about their safety concerns and experiences on local roads. These meetings aimed to foster collaboration and ensure that the community's perspectives and concerns were considered in developing the safety plan.



July 2024 Lake Havasu City Council, Lake Havasu City AZ

Regional Transportation Safety Plan Surveys

The primary means of soliciting comments on the experiences of the community through driving, bicycling, and pedestrian transportation came in the form of a survey designed by the project team. The survey consisted of 12 questions and considered feelings around safety, observations of drivers, bicyclists, and pedestrians, as well as ideas to contribute to the study team on making changes to roadways or enhancing safety messages and education. At the end of the survey, participants were asked to identify areas of concern on an interactive map exercise (Social Pinpoint), allowing responders to mark locations with safety needs. A summary of the survey and its results can be found in **Appendix II**.

Summary Of Findings

Respondents from the LHMPO region primarily identified as motorists (93%), of whom 32% feel unsafe on the roads. The respondents who reported feeling the least safe were bicyclists, elderly and/or disabled persons, motorcyclists, and pedestrians, respectively. Overall, respondents feel the following words best describe drivers' behaviors in the region: hurried, inattentive, distracted, and frustrated. **Figure 1** represents the top five safety concerns observed by respondents.

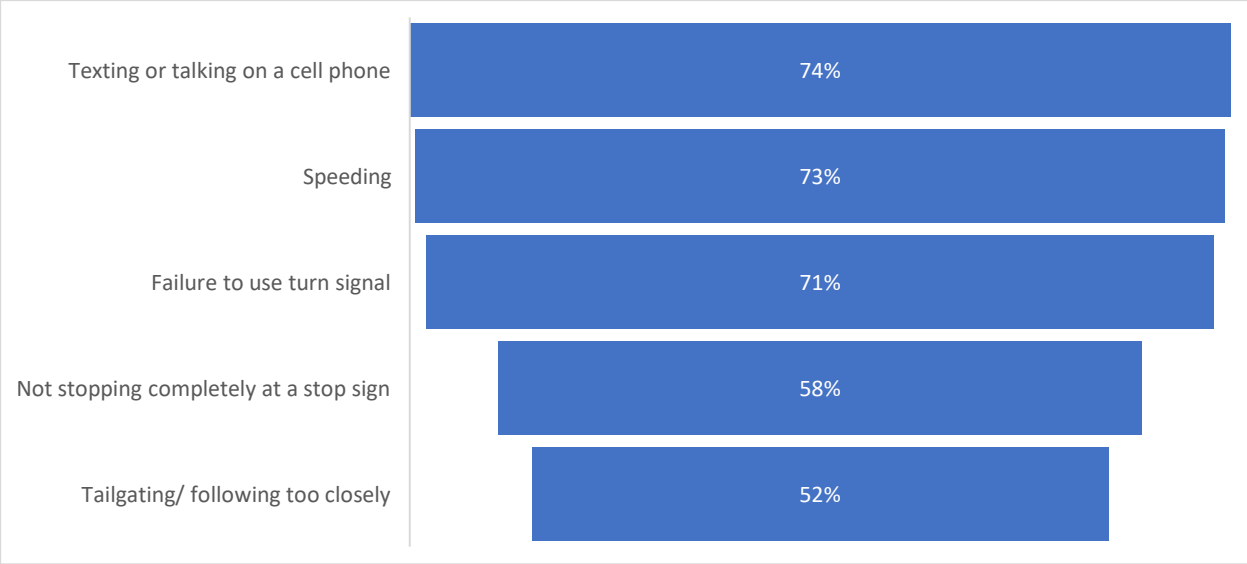


Figure 1: Top Five Safety Concerns by Respondents

Respondents feel that speed, distracted driving, and cellphone use habits are the primary causes of crashes. They feel public agencies should provide more police enforcement and driver education. Respondents also believe that traffic signal improvements could enhance travel safety.

During the online mapping exercise portion of the survey, participants were asked to place comments on the map to show locations of concern for drivers, bicyclists, and pedestrians. Respondents identifying as bicyclists highlighted the lack of bike lanes and driver attention to cyclists and pedestrians as primary concerns, citing these issues as significant safety hazards for biking and walking.

Respondents who identified as drivers had the following primary concerns: installing traffic signals, optimizing traffic signals on the SR 95 corridor, and traffic congestion.

Locations where respondents requested the most safety improvements are in and around the following areas:

- SR 95
- Acoma Blvd
- Kingman

Safe System Approach

The LHMPO STSP adopts the Safe System Approach[1] which is based on the principles that the human body is vulnerable, humans make mistakes, and it is unacceptable that these mistakes result in death and injury. It is critical to design and operate the roadway system to keep impact energy on the human body at tolerable levels. Shared responsibility by all stakeholders is key, making it important that the stakeholders are collaborative and engaged partners when developing and implementing the LHMPO STSP.



Source: FHWA.

Figure 2: Safe System Approach (Source: FHWA)

The FHWA has recognized the Safe System Approach as a method for eliminating traffic fatalities and serious injuries for all roadway users. The Safe System Approach moves beyond the traditional approach of reacting strictly based on crash history by proactively identifying risk factors associated with severe crash types and implementing safety countermeasures systemically based on those factors. This STSP includes the systemic implementation of strategies. All parts of the transportation system need to be strengthened to build redundancy to accommodate failures of the system. Examples of redundancy include the installation of curve warning signs to alert motorists of conditions in which a slower speed is necessary, combined with speed feedback signs and education and enforcement campaigns that help avoid behaviors that may result in crashes.

This STSP uses the five elements of the Safe System Approach as the framework for integrating emphasis areas and strategies. These elements encompass the 4Es of safety (Engineering, Education, Enforcement, and Emergency Response) and accommodate human error:

Safe Roads: The roadway is the platform in which users move across the system. Safe roads incorporate engineering-related strategies during planning, design, construction, maintenance, and operations to prevent crashes and manage impacts to keep kinetic energy at tolerable levels should a crash occur.

Safe Road Users: This represents all users of all modes of travel. Their capabilities are influenced by factors such as age, level of impairment, and other behaviors. System owners and other stakeholders can use strategies such as signing, enforcement, and education campaigns to address these limitations and encourage behavior change.

Safe Speeds: As speeds increase, the risk of death and serious injury dramatically increases. This is especially true for pedestrians (See **Figure 3**), where the risk of death doubles for a pedestrian when speeds increase from 32 mph to 42 mph and triples at 50 mph. Safe speeds increase the likelihood of an individual surviving a crash. Appropriate speed limits and signing, as well as radar speed feedback signs, help reduce the speed of users. These can be reinforced with enforcement and education campaigns.

[1] FHWA, Office of Safety, Safe System Approach flyer, SA-20-015, https://safety.fhwa.dot.gov/zerodeaths/docs/FHWA_SafeSystem_Brochure_V9_508_200717.pdf

Safe Vehicles: Safe vehicles incorporate new technology and other features to prevent crashes from occurring and, if they do, reduce the severity of a crash.

Post-Crash Care: Post-crash care is critical when a crash occurs, and a person is injured. This includes first responders being able to quickly locate and respond to the crash and stabilize and transport the individual. This also includes accurate and complete data collection and sharing of the data to facilitate improved decision-making and investments specific to safety.

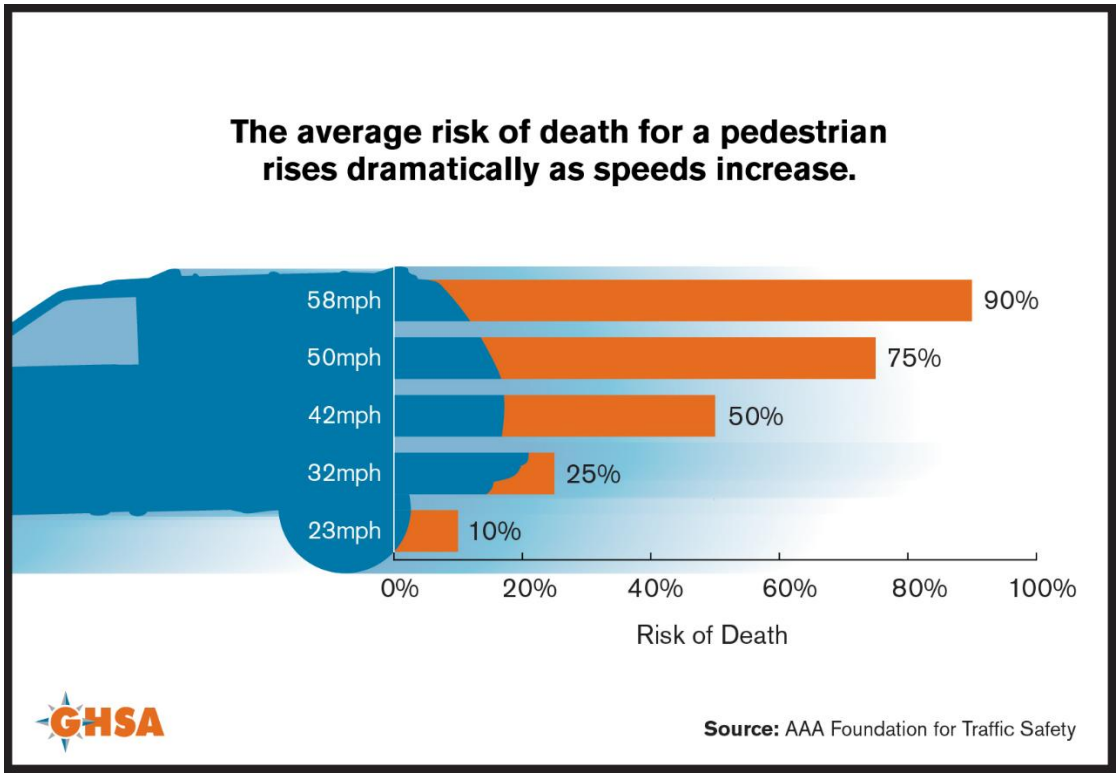


Figure 3 Risk of Death for a Pedestrian at Speed

Ultimately, the Safe System Approach prioritizes safety and shifts transportation investments. LHMPO and its stakeholders can reduce traffic fatalities and serious injuries on its roadways through their combined efforts and application of the Safe System Approach during the development and implementation of the STSP.

Equity Analysis

Equity is a fundamental consideration of the Safe System Approach, particularly given that pedestrian and bicyclist fatality rates on a per-capita basis vary by race,[2] income, age, and gender to varying degrees in varying places.[3] These outcomes better prioritize project development and underscore the need to explicitly examine correlations between sociodemographic and risk factors related to roadway infrastructure and operations. Furthermore, an equity analysis ideally encompasses more than just safety analysis, given the known limitations of crash data (e.g., underreporting or near misses) and the lack of systemic exposure estimates to contextualize risk.

It is important to note that vulnerable populations such as the very young, elderly, and those facing economic challenges are often disproportionately affected by transportation disparities. This demographic is less likely to have access to personal vehicles, relying heavily on alternative modes of transportation like walking, cycling, or public transit. As a result, they face increased vulnerability to road accidents and may encounter greater risks due to limited mobility options. Addressing these disparities is crucial in ensuring equitable and safe mobility for all members of the community.

USDOT's Equitable Transportation Community (ETC) Explorer[4] and BUILD Persistent Poverty[5] tools were used to identify priority equity areas in the study regions. **Table 2** provides the total number and the percentage of fatal or suspected serious injury crashes that occurred in disadvantaged areas in the LHMPO region. As the table demonstrates, nearly a third of all reported fatal or suspected serious injury crashes occurred in disadvantaged areas in the LHMPO region (37.4%).

Table 2: Proportion of Fatal or Suspected Serious Injury Crashes in Disadvantaged Areas

Regional Jurisdiction	Number of Fatal or Suspected Serious Injury Crashes in Region	Number of Fatal or Suspected Serious Injury Crashes in Disadvantaged Areas in Region	% of Fatal or Suspected Serious Injury Crashes in Disadvantaged Areas in Region
LHMPO	147	55	37.4%

Figure 4 illustrates the disadvantaged areas in relation to the priority locations identified prior at the census tract level for LHMPO. Special attention is given to selecting projects that are within disadvantaged areas in the following project selection section. **Table 3** summarizes the total number of priority projects within a disadvantaged area for the LHMPO region.

[2] Federal Highway Administration. "Integrating Equity into the Safe System Approach" Presentation. Accessed Apr. 17, 2023: https://highways.dot.gov/safety/zero-deaths/integrating-equity-safe-system-approach-presentation.
[3] Vision Zero Network. N.d. *Equity Strategies for Practitioners.* Accessed April 17, 2023: https://visionzeronetwork.org/wp-content/uploads/2017/05/VisionZero_Equity.pdf
[4] https://www.transportation.gov/priorities/equity/justice40/etc-explorer
[5] https://www.transportation.gov/BUILDgrants/location-designations

Table 3: Summary of Overlap Between Regional Priority Projects and Disadvantaged Areas

Regional Jurisdiction	Number of Priority Intersection Projects in a Disadvantaged Area	Number of Priority Segment Projects in a Disadvantaged Area	Total Number of Priority Projects in a Disadvantaged Area
LHMPO	18	17	35

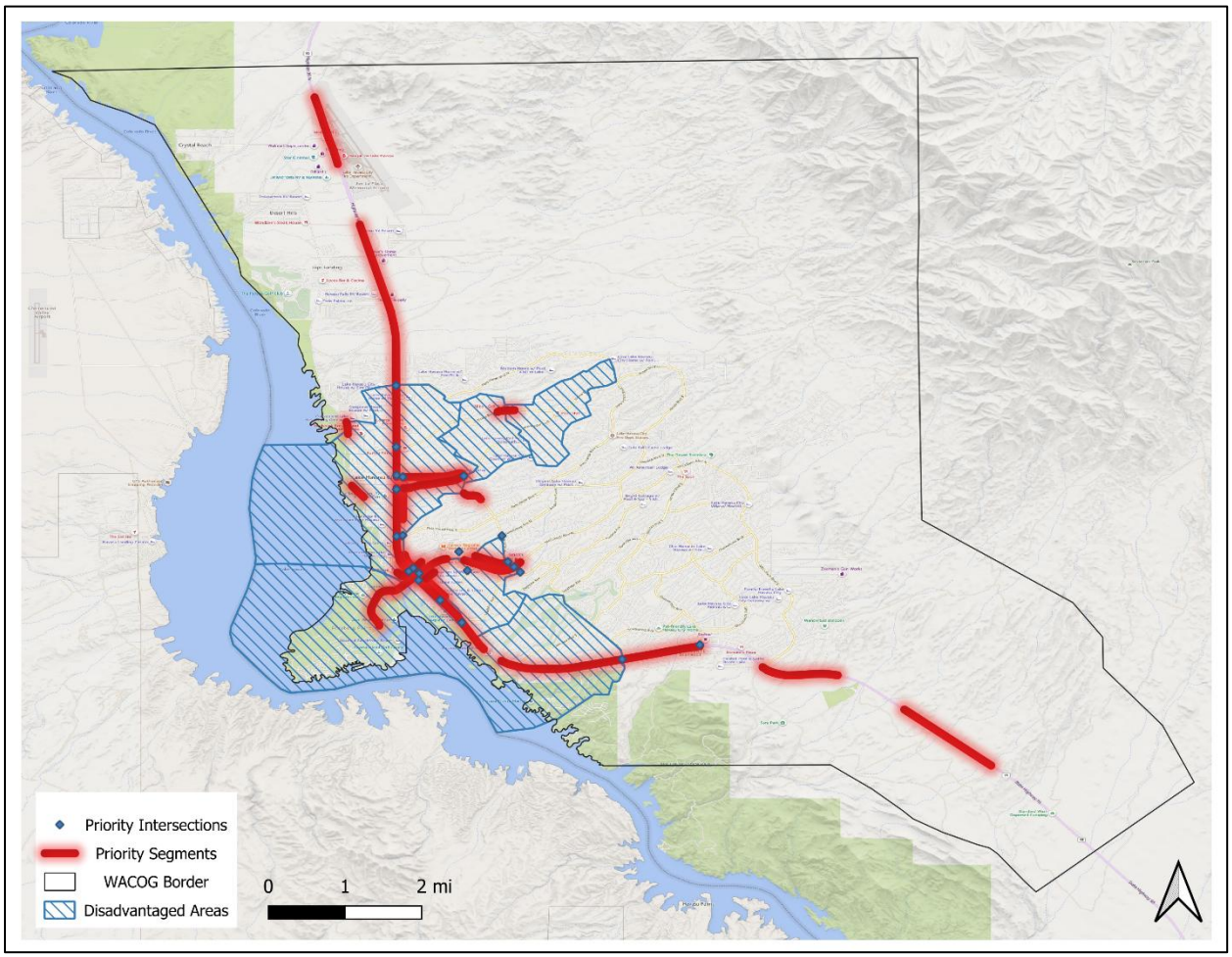


Figure 4: LHMPO Region Equity Analysis Map

Regional Safety Performance

Arizona Department of Transportation's (ADOT) Crash Information System (ACIS) was used to retrieve the crash data. ACIS is a comprehensive database system that collects, manages, and maintains traffic crash information within the state of Arizona. The most recent 5 years of crash data (2018-2022) were analyzed to determine existing crash performance, identify regional emphasis areas, and establish performance metrics to track future progress. A technical memorandum detailing the broad regional safety performance effort can be found in **Appendix III.**

Crash Trends

Figure 5 illustrates the distribution of crashes by severity for the LHMPO region from 2018 to 2022. A total of 2,913 crashes occurred during this five-year period, and fatal and serious injury crashes accounted for approximately 6 percent of the total crashes, while no injury crashes accounted for approximately 67 percent of the total crashes.

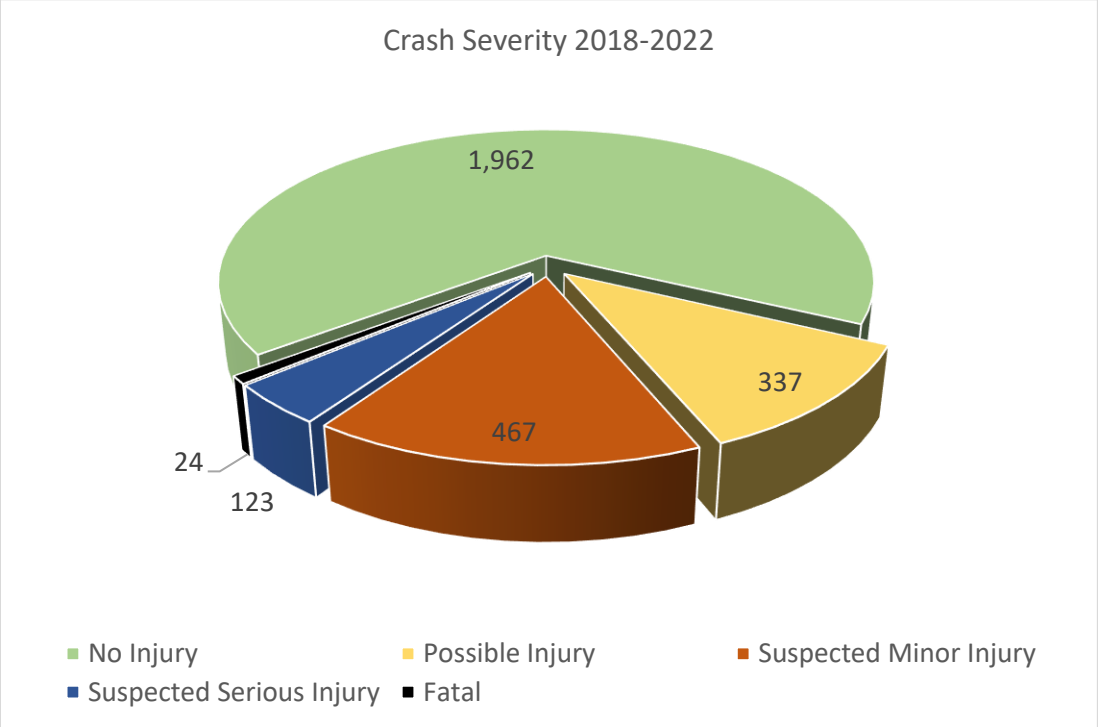


Figure 5: LHMPO Crashes by Severity

Figure 6 shows the annual crash frequency from 2018 to 2022. The trend indicates a generally flat frequency of crashes over the five years, with a significant decrease in 2020 that can be mainly attributed to the reduced traffic volumes associated with the pandemic. Note that while statewide crashes showed a 1.1% reduction in total crashes from 2021 to 2022 (121,345 crashes and 119,991 crashes, respectively), Lake Havasu MPO experienced a 4.5% reduction during that same time period. That is nearly a four times greater reduction in total crashes than the statewide decrease.

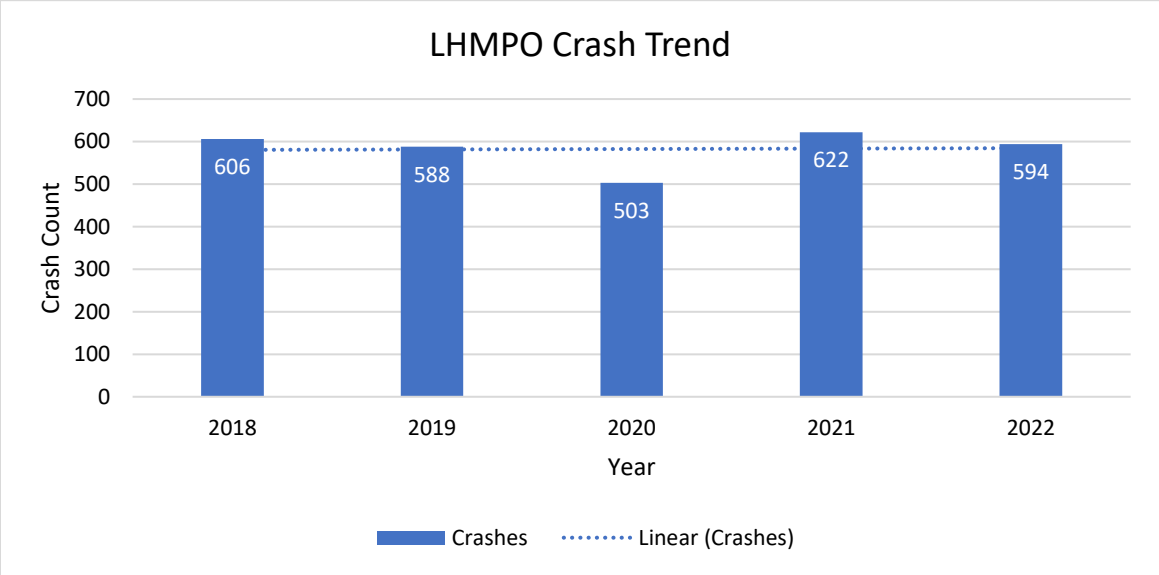


Figure 6: LHMPO Annual Crash Trend

Crash Characteristics

Figure 7 shows the distribution of crashes by manner. "Rear End" crashes are the most prevalent, accounting for nearly 26% of all incidents among the various crash manners. This is followed by “Angle” and “Single Vehicle” crash manner at approximately 24% and 18% of all crashes, respectively.

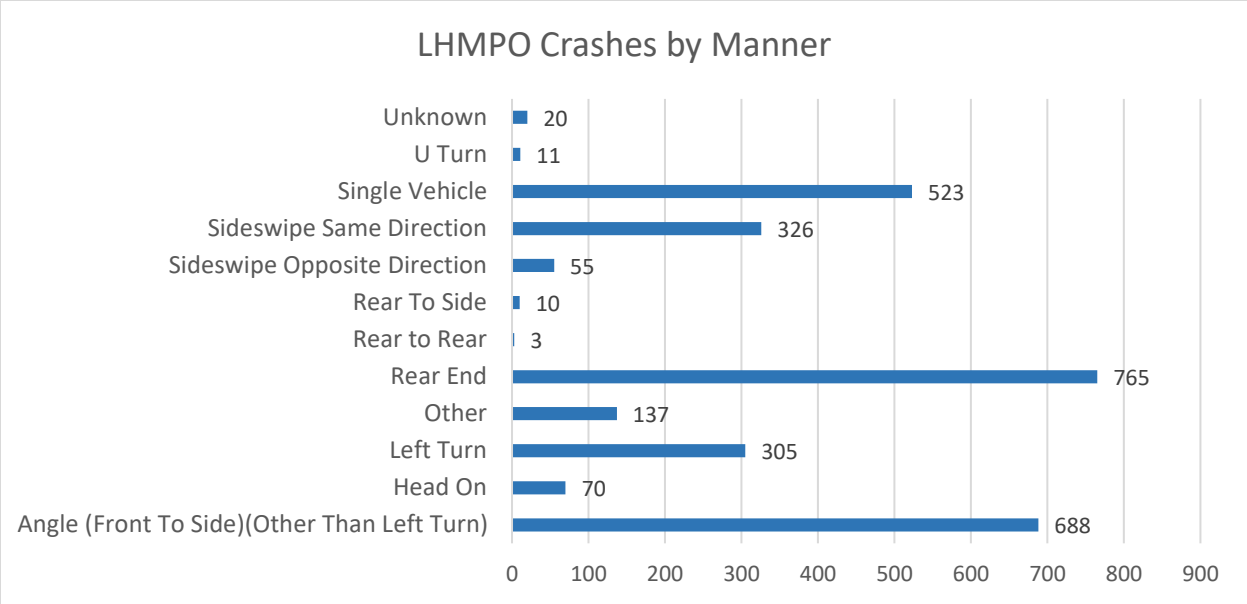


Figure 7: LHMPO Crashes by Manner

Figure 8 This displays the distribution of crashes by light condition. The "Daylight" condition has the highest number of crashes, with a total of 2,177. This is followed by the "Dark not Lighted" and "Dark Lighted" conditions, with 379 and 221 crashes, respectively.

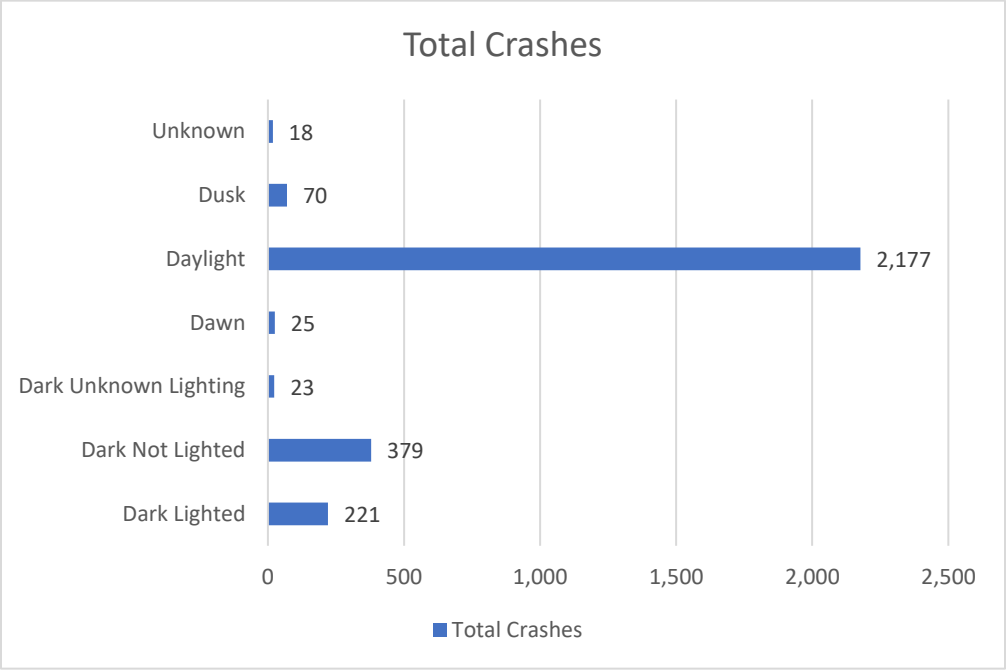


Figure 8: LHMPO Crashes by Light Condition

Figure 9 represents the percentage of suspected serious injury and fatal crashes by light conditions. "Daylight" crashes are the most prevalent, accounting for nearly 55% of all crashes. This is followed by “Dark not Lighted” condition at approximately 31% of all crashes.

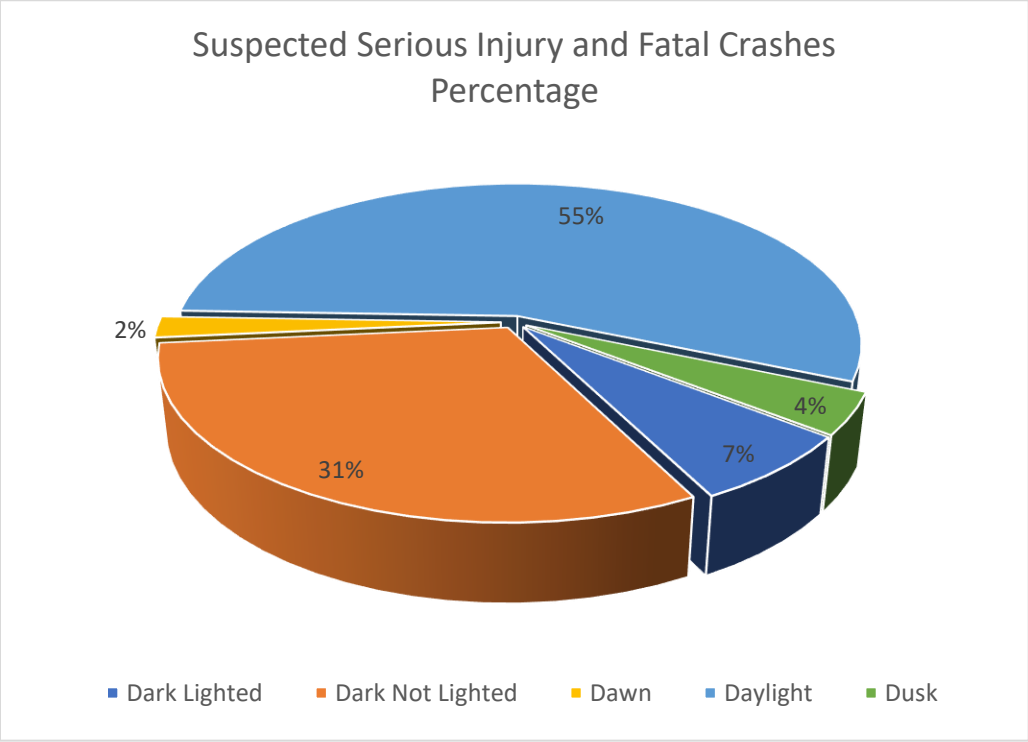


Figure 9: Suspected Serious Injury & Fatal Cashes Percentage

Table 4 shows crash violations by severity. “Speed Too Fast For Conditions” and “Failed To Yield Right Of Way” are the top crash violations.

Table 4: LHMPO Crash Violation by Severity

Violation	No Injury	Possible Injury	Suspected Minor Injury	Suspected Serious Injury	Fatal	Grand Total	% of MPO Crashes
Speed Too Fast For Conditions	507	135	141	38	8	829	28%
Failed To Yield Right Of Way	366	58	110	22	2	558	19%
No Improper Action	176	16	49	12	2	255	9%
Unknown	153	13	22	5	3	196	7%
Other	148	18	19	8		193	7%
Made Improper Turn	135	15	16	3		169	6%
Failed To Keep In Proper Lane	121	8	22	11	1	163	6%
Unsafe Lane Change	133	11	7			151	5%
Disregarded Traffic Signal	56	23	30	5	1	115	4%
Followed Too Closely	75	11	11			97	3%
Ran Stop Sign	40	14	12	4	1	71	2%
Exceeded Lawful Speed	22	5	14	6	2	49	2%
Drove Left Of Center Line	11	6	5	5	3	30	1%

Note: Only crash violation categories that represent more than one percent of the region's crashes are included in this table.

The crash data were evaluated to determine the factors that contributed to the highest percentage of fatalities and serious injuries. The top contributing crash characteristics are shown in **Figure 10.** Intersection crashes account for the highest number of fatal plus serious injury crashes at 38%, with Nighttime and Unrestrained/Unknown ranking below at 35% and 35%, respectively. These crash characteristics helped identify the emphasis areas as described in the next section.

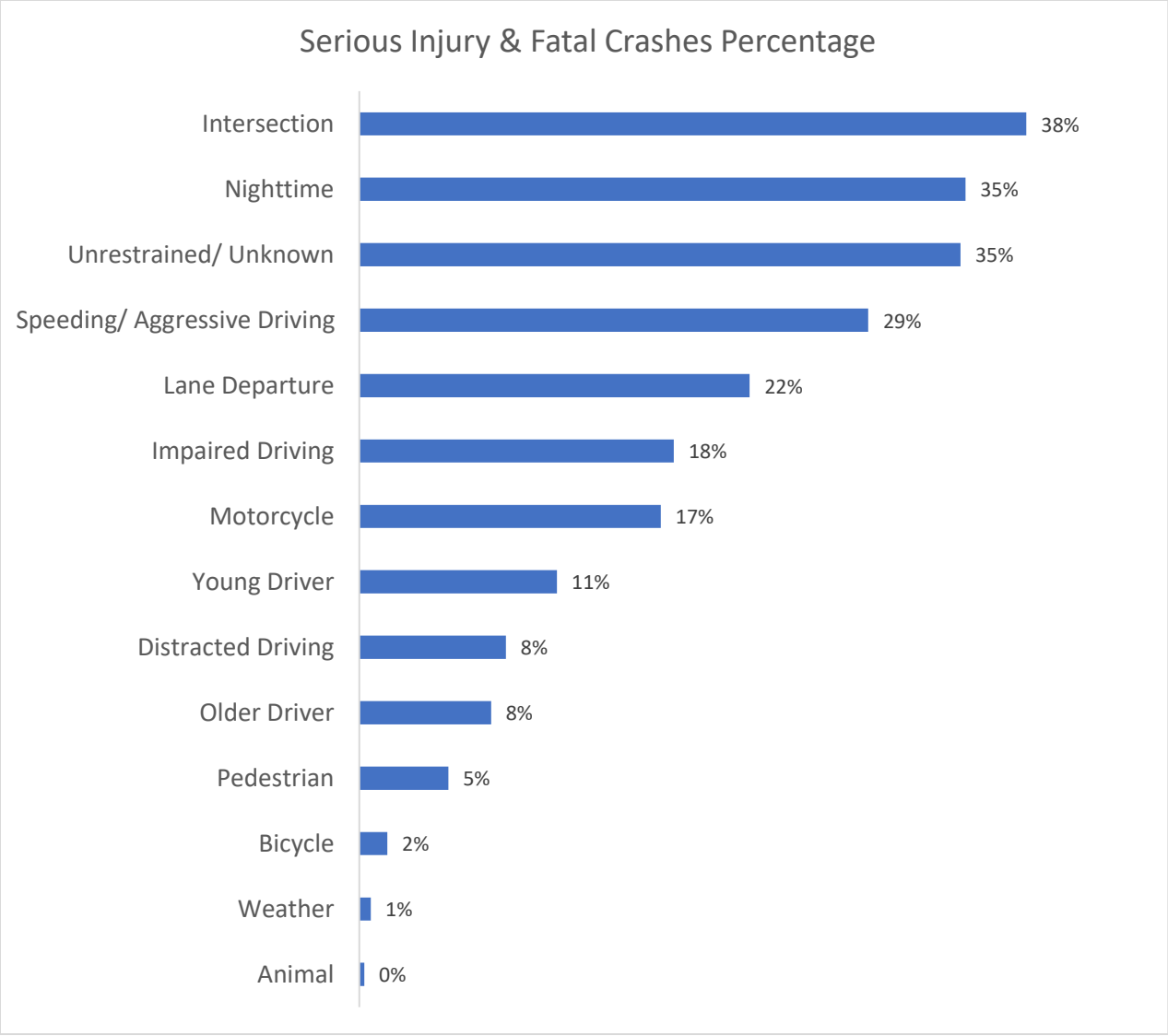


Figure 10: LHMPO Fatal and Serious Injury Characteristics

Pedestrian Safety Performance

Figure 11 shows the distribution of pedestrian crashes by injury severity. Over the span of 2018 to 2022, there were a total of 49 pedestrian-involved crashes. Of these, 4% resulted in fatalities, while 19% were classified as suspected serious injuries.

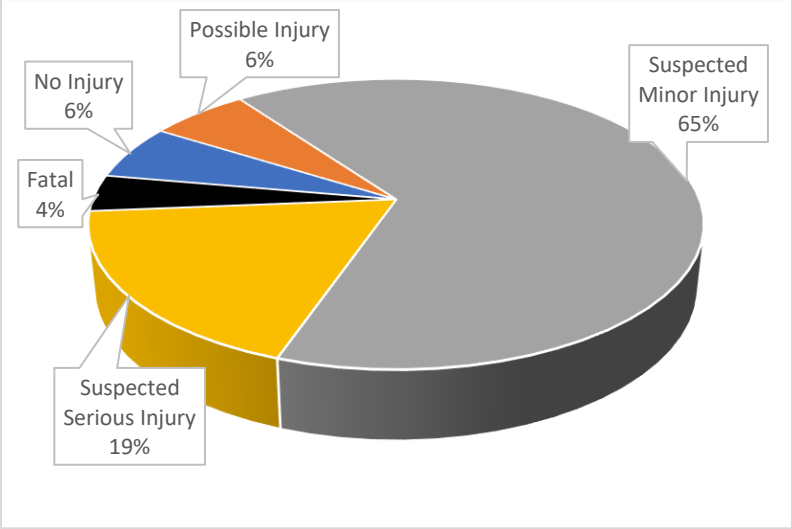


Figure 11: LHMPO Pedestrian Crashes by Severity

Bicyclist Safety Performance

Figure 12 shows the distribution of bicycle crashes by injury severity. From 2018 to 2022, there were 38 bicycle-involved crashes, with 0% resulting in fatalities, while 29% were classified as suspected serious injuries.

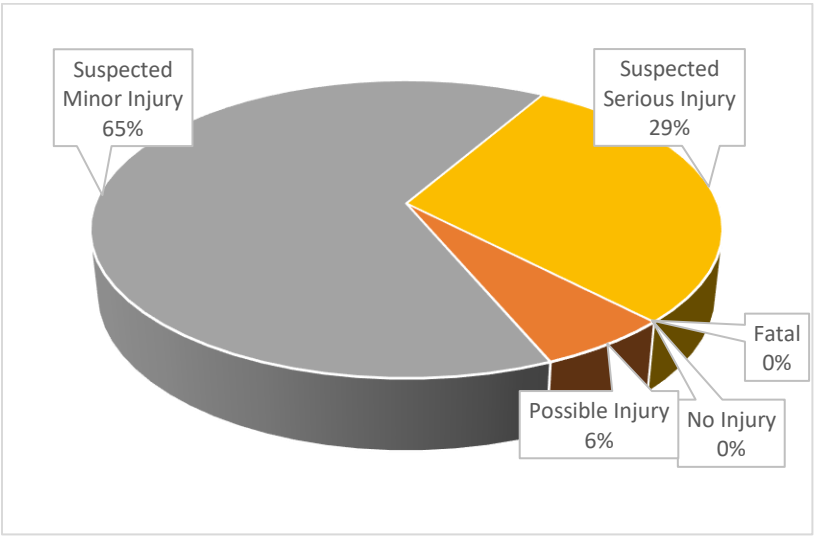


Figure 12: LHMPO Bicyclist Crashes by Severity

Crash Data Analysis by Jurisdiction

A crash data analysis was completed for each jurisdiction. Aspects such as five-year crash count, crash severity, and crash manner are shown in **Table 5** to **Table 7** below.

Table 5: Crashes by Jurisdiction

Agency	2018	2019	2020	2021	2022	Grand Total
Lake Havasu City	590	568	485	600	570	2,813
Mohave County	16	20	18	22	24	100
Grand Total	**606**	**588**	**503**	**622**	**594**	**2,913**

Table 6: Crash Severity by Jurisdiction

Agency	No Injury	Possible Injury	Suspected Minor Injury	Suspected Serious Injury	Fatal	Grand Total
Lake Havasu City	1,896	331	446	117	23	2,813
Mohave County	66	6	21	6	1	100
Grand Total	**1,962**	**337**	**467**	**123**	**24**	**2,913**

Table 7: Crash Manner by Jurisdiction

Agency	Angle (Front To Side)(Other Than Left Turn)	Head On	Left Turn	Other	Rear End	Rear to Rear	Rear To Side	Sideswipe Opposite Direction	Sideswipe Same Direction	Single Vehicle	U Turn	Unknown	Grand Total
Lake Havasu City	682	68	296	130	736	3	8	51	318	491	11	19	2,813
Mohave County	6	2	9	7	29		2	4	8	32		1	100
Grand Total	**688**	**70**	**305**	**137**	**765**	**3**	**10**	**55**	**326**	**523**	**11**	**20**	**2,913**

Figure 13 highlights key differences in crash frequency and severity per 100,000 population between Lake Havasu City and the State. As shown in the **Figure 13**, Lake Havasu City experienced an annual crash rate of 980 per 100,000 residents, significantly lower than the statewide average of 1,678. However, the rate of serious injury crashes per 100,000 population is identical for both the city and the state at 41. Notably, Lake Havasu City has a lower fatal crash rate of 8 per 100,000 population, compared to the statewide average of 14. These findings indicate that while overall crash occurrences are lower in Lake Havasu City, the proportion of serious injury crashes aligns with the state, emphasizing the need for continued safety improvements to further reduce crash severity.

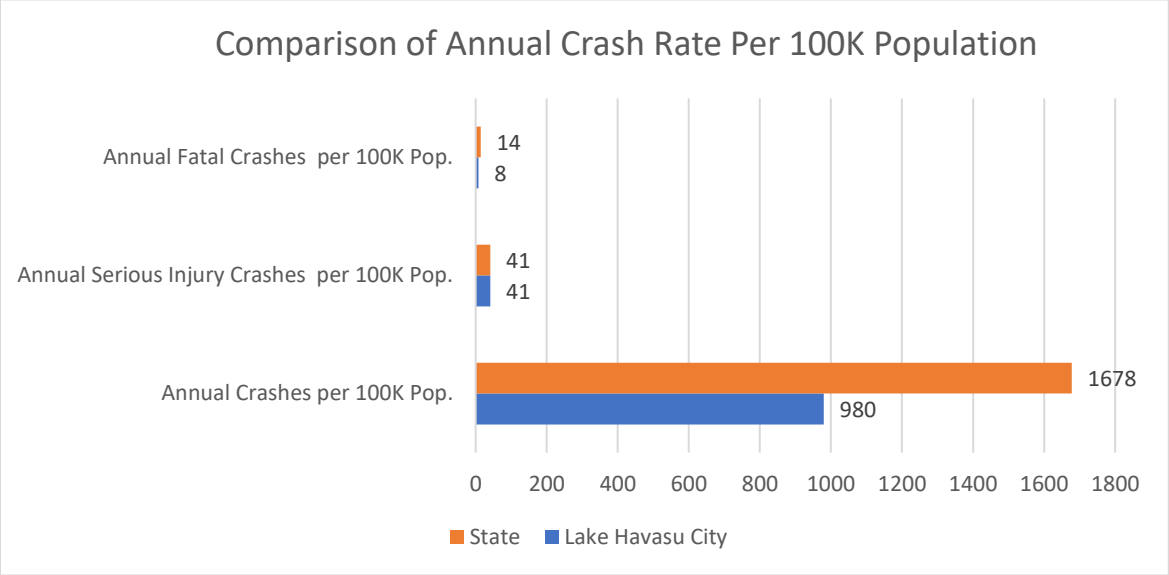


Figure 13: Comparison of Annual Crash Rates per 100K Population – Lake Havasu City vs. Statewide

Vision and Emphasis Areas

Vision & Goal

The STSP aligns with the FHWA Vision of "Toward zero deaths and serious injuries on the Nation's roadways" along with the 2024 Arizona Strategic Highway Safety Plan (SHSP) Vision, "Creating shared responsibility so everyone arrives safely home."

Vision: "*Toward Zero Deaths by establishing a safe and inclusive transportation system for all users.*"

Goal: "Achieve a 5% annual reduction in serious injury and fatal crashes until reaching zero fatalities or serious injuries within the LHMPO region."

The zero deaths goal acknowledges that even one death on our transportation system is unacceptable and focuses on safe mobility for all road users. This idea was first adopted in Sweden in 1997 as "Vision Zero" and has since spread worldwide. The U.S. Department of Transportation National Roadway Safety Strategy (NRSS) outlines the Department's comprehensive approach to significantly reducing serious injuries and deaths on our Nation's highways, roads, and streets. This is the first step in working toward an ambitious long-term goal of reaching zero roadway fatalities. Safety is U.S. DOT's top priority, and the NRSS represents a department-wide approach to working with stakeholders across the country, including COGs and MPOs, to achieve this goal.

Emphasis Areas

Emphasis areas represent the crash types and factors associated with high frequencies of fatal and serious injury crashes. Directing safety initiatives towards these specific areas helps to achieve the STSP vision. **Table 8** presents the number of crashes, fatal crashes, and suspected serious injury crashes for each safety factor, and compares these figures to the statewide data. Highlighted cells are areas of concern where the region is higher than the state for that factor or crash severity.

Table 8: LHMPO Emphasis Areas

Focus Area	Crashes	% of Crashes	% of State Crashes	Serious Injury	% of Crashes	% of State Crashes	Fatal	% of Crashes	% of State Crashes
Unrestrained/ Unknown	507	**17.4**	16.1	44	**35.8**	29.2	13	**54.2**	45.3
Motorcycle	117	**4.0**	1.6	30	**24.4**	14.8	7	**29.2**	13.3
Intersection	1,476	**50.7**	47.5	52	42.3	49.2	7	29.2	43.6
Lane Departure	662	**22.7**	16.4	41	**33.3**	28.6	9	**37.5**	31.3
Pedestrian	45	**1.5**	1.4	9	7.3	11.7	2	8.3	23.3
Bicycle	34	**1.2**	0.9	10	**8.1**	4.7	0	0.0	3.5
Nighttime	623	21.4	25.6	48	**39.0**	35.2	9	37.5	47.9
Speeding/ Aggressive Driving	884	30.3	33.1	44	**35.8**	29.4	10	**41.7**	26.7
Impaired Driving	373	**12.8**	8.5	35	**28.5**	19.1	4	16.7	35.6
Young Driver	964	33.1	37.2	12	9.8	30.6	3	12.5	23.8
Older Driver	1,167	**40.1**	17.2	11	8.9	18.6	2	8.3	20.0
Weather	76	2.6	5.6	5	4.1	5.6	0	0.0	4.8
Animal	19	0.7	1.6	1	**0.8**	0.4	0	0.0	0.3
Distracted Driving	367	**12.6**	8.1	14	**11.4**	7.2	0	0.0	19.3

Source: ADOT crash data from 2018 to 2022
Note: Cells highlighted in dark blue have a higher percentage than State

Based on crash data analysis results and stakeholder input, below are the emphasis areas for the LHMPO region:



- **Behavior Related:** *Speeding, Impaired Driving, Unrestrained (Not Wearing Seat Belt), and Distracted Driving*



- **Intersection**



- **Lane Departure**



- **Nighttime**



- **Motorcycle**

Note that the emphasis areas shown are not in priority order.

Network Screening and Areas of Opportunity

Priority intersections and segments were identified by conducting a network screening of crash data for the region. Crash frequency and severity were key factors in identifying the region's priority intersections and road segments. The prioritization scoring methodology, detailed in **Appendix III,** was used to rank these sites. This approach, known as the priority index method, emphasizes locations with high frequencies of severe crash outcomes, identifying areas that warrant further investigation and the application of appropriate safety countermeasures. These locations are often the most competitive for grant funding programs that address fatal and severe injury crashes, including but not limited to the Safe Streets and Roads for All (SS4A) grant program, ADOT Highway Safety Improvement Program (HSIP), the USDOT Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) grant program, and the USDOT Better Utilizing Investments to Leverage Developmen (BUILD) grant program.

Priority Location Scores

Priority intersections and segments were identified through a review of annualized/normalized crash severity scores from the network screening results. Priority locations were developed from the highest-scoring locations in the region. The highest ranking locations in the region were designated as priority locations. Intersections with fewer than 10,000 entering ADT and fewer than 10 crashes over the five-year study period were excluded from the priority list, as these are primarily local intersections with low traffic volumes and are not critical for inclusion in the top safety priority list. Similarly, roadway segments with five or fewer crashes over the five-year study period were excluded from the segment priority list. The list of priority intersections and segments are provided in **Table 9** and **Table 10,** respectively.

Table 9. Priority Intersections by Crash Severity Score

Rank	Intersection Name	Crash Frequency Rank	Crash Rate Rank	Severity Index Rank	Priority Index
1	Kiowa Blvd & SR-95	1	10	32	43
2	SR-95 & Swanson Ave	4	14	25	43
3	Acoma Blvd North & SR-95	8	22	15	45
4	Acoma Blvd South & SR-95	11	15	21	47
5	Acoma Blvd & Lake Havasu Ave	9	5	34	48
6	Palo Verde Blvd North & SR-95	6	19	24	49
7	Oro Grande Blvd & SR-95	18	21	12	51
8	Lake Havasu Ave & McCulloch Blvd	2	7	43	52
9	Acoma Blvd & Mesquite Ave	12	6	35	53
10	Lake Havasu Ave & Mesquite Ave	3	13	39	55
11	Palo Verde Blvd South & SR-95	6	12	37	55
12	Mesquite Ave & Riviera Blvd	15	20	20	55
13	Mesquite Ave & SR-95	5	23	30	58
14	Acoma Blvd & McCulloch Blvd	14	25	27	66
15	London Bridge Rd & SR-95	20	38	10	68
16	Acoma Blvd & Swanson Ave	17	44	10	71
17	Industrial Blvd & SR-95	10	31	31	72
18	Mulberry Ave & SR-95	7	34	33	74
19	Smoketree Ave & SR-95	14	48	13	75
20	Acoma Blvd & Palo Verde Blvd	16	40	26	82

Crash Frequency *is the number of crashes occurred at each intersection during the analysis period.*
Intersection Crash Rate *is a measure of crash frequency normalized by traffic exposure at an intersection, expressed as crashes per 100,000 entering vehicles. It is calculated using the total number of crashes, the average daily traffic (ADT), and the entering ADT to account for variations in traffic flow. See* ***Appendix III*** *for more details including calculated crash rate and frequency for each intersection.*
Severity Index *is a weighted measure of crash severity that accounts for the distribution of crashes by their level of injury or damage. It is calculated by summing the number of crashes at each severity level, multiplied by their respective severity weights, and dividing by the total number of crashes.*

Table 10: Priority Roadway Segments by Crash Severity Score

Rank	Roadway Segment	Crash Frequency Rank	Severity Index Rank	Priority Index
1	SR-95 *From M186 to M187*	3	15	18
2	SR-95 *From M176 to M177*	17	6	23
3	SR 95 *From M184 to Topaz Dr alignment M183*	1	25	26
4	SR-95 *From M180 to M181*	8	22	30
5	SR-95 *From M187 to M188*	9	21	30
6	Lake Havasu Ave *From Corona Dr Alignment to Sea Angler Dr Alignment*	13	18	31
7	SR-95 *From M189 to M90*	13	18	31
8	SR-95 *From Kiowa Ave to College Dr Alignment*	15	16	31
9	McCulloch Blvd *From Agave Bay To 550' West of Smoketree Ave*	17	14	31
10	Lake Havasu Ave *From Willow Ave to McCulloch Blvd*	2	30	32

*Note: The top 500 roadway segments identified by this prioritization process are included in **Appendix III**.*
***Crash Frequency** is the number of crashes at each segment during the analysis period.*
***Segment Crash Rate** is a measure of crash occurrence normalized by traffic exposure, typically expressed as crashes per 100,000 vehicle miles traveled (VMT). It is calculated using traffic volume (Average Daily Traffic - ADT) and segment length to account for exposure differences across locations. VMT data was utilized in the network screening analysis to identify priority segments and intersections where volume data was available. See Appendix III for more details including calculated crash segment crash rate and frequency for each segment.*

Priority intersections and segments are visualized in **Figure 14** and **Figure 15**. Additional details can be found in **Appendix III**.

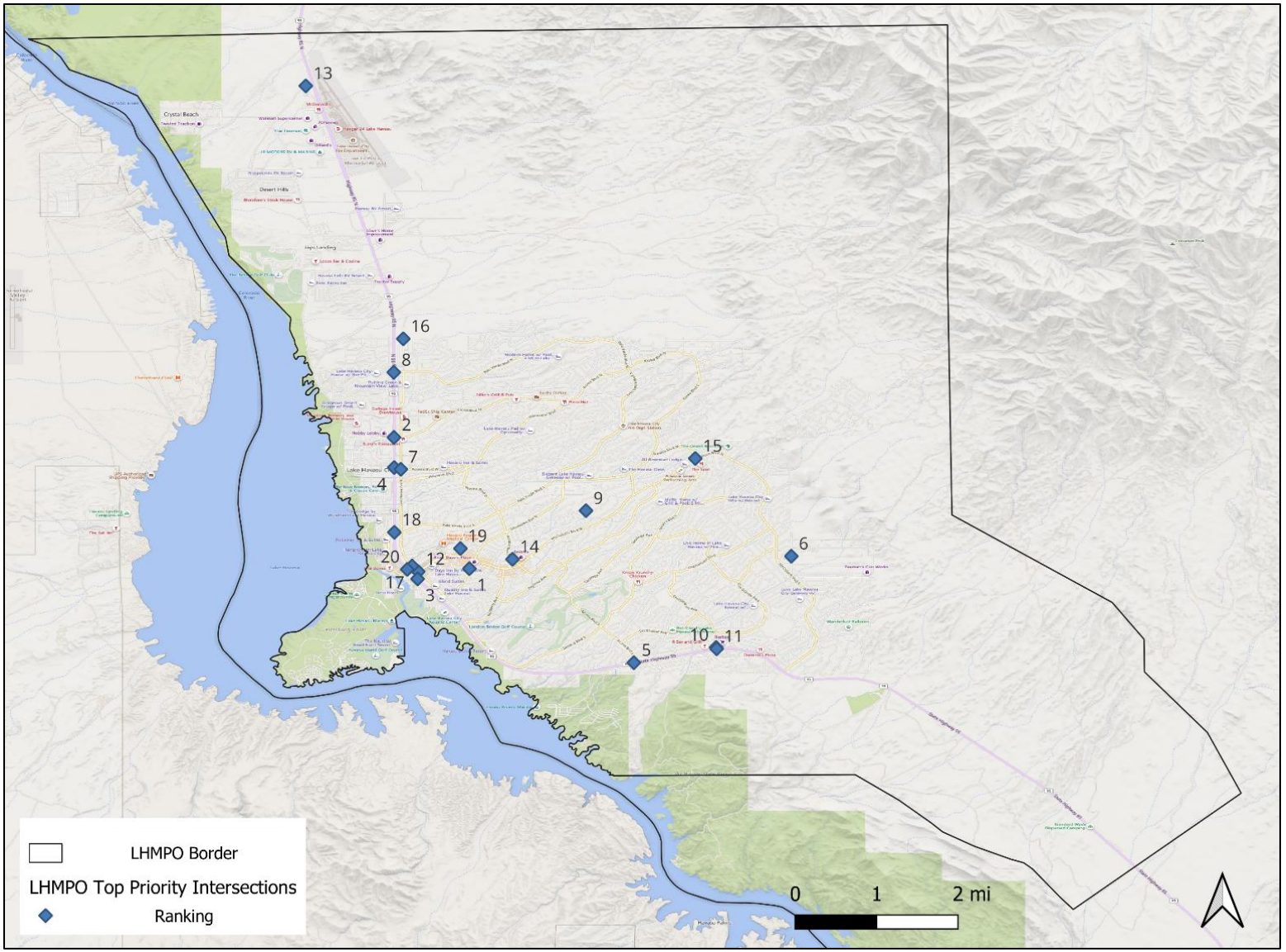


Figure 14: LHMPO Top 20 Priority Intersections

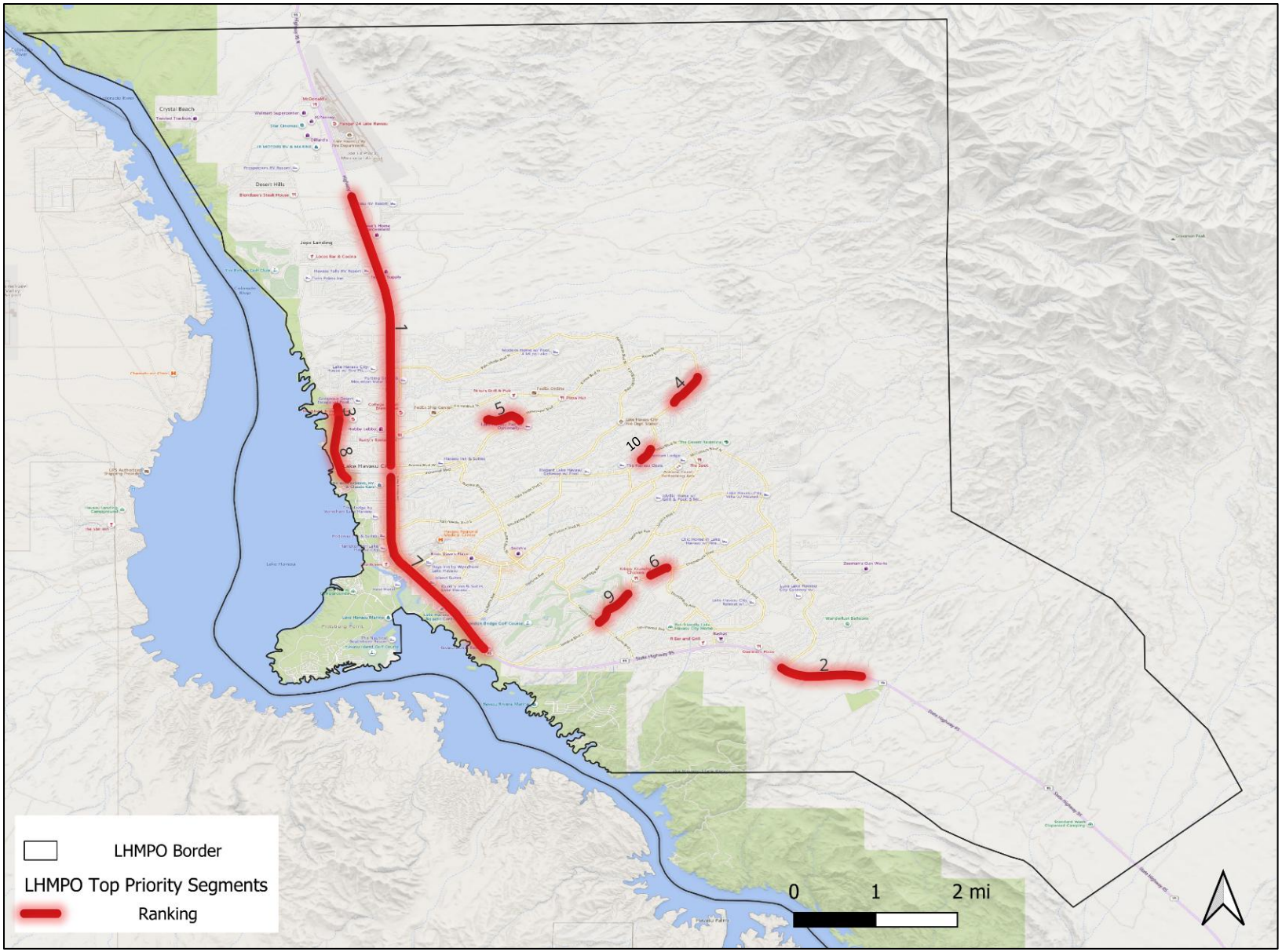


Figure 15: LHMPO Top 10 Priority Segments

Safety Strategies

LHMPO and its stakeholders evaluated the results of the data analysis and the safety concerns and priorities of the region, and using the Safe System Approach as the framework, established the strategies represented in the STSP. Each Safe System element (Safe Roads, Safe Speeds, Safe Road Users, Safe Vehicles, and Post-crash Care) represented in the following strategy lists acts as the pillar for which implementation occurs. Each of these elements identifies emphasis areas and strategies which, when implemented with leadership and stakeholder support and input, will help achieve the RTSP's safety goals.

LHMPO used multiple resources in developing appropriate safety strategies, including:

- FHWA's Proven Safety Countermeasures[6]
- National Highway Traffic Safety Administration's (NHTSA) "Countermeasures that Work" [7]
- FHWA's Crash Modification Factors Clearinghouse[8]

The effectiveness of an engineering-related action item is measured by a crash modification factor (CMF) and its associated crash reduction factor (CRF) from the FHWA Crash Modification Factors Clearinghouse. NHTSA's publication Countermeasures That Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices[9] contains star ratings for behavior (education and enforcement) related countermeasures that are used most regularly by State Highway Safety Offices and have the most evidence of effectiveness.

A CMF is an estimate of the change in crashes expected after the implementation of a countermeasure. For example, an intersection experiences 100 angle crashes per year. If you apply a countermeasure that has a CMF of 0.80 for angle crashes, then you can expect 80 angle crashes per year following the implementation of the countermeasure (100 x 0.80 = 80). A CRF is the inverse of a CMF and is typically expressed as a percentage.

(Source: FHWA CMF Clearinghouse)

Behavior Countermeasure Star Ratings

★★★★ or ★★★★★ Effective

★★★ Promising, and Likely To Be Effective

☆☆ Effectiveness Still Undetermined

☆ Limited or No High-Quality Evaluation Evidence

(Source: NHTSA Countermeasures That Work)

[6] FHWA, Office of Safety, Proven Safety Countermeasures, https://safety.fhwa.dot.gov/provencountermeasures/
[7] https://www.nhtsa.gov/sites/nhtsa.gov/files/2021-09/15100_Countermeasures10th_080621_v5_tag.pdf
[8] http://www.cmfclearinghouse.org/
[9] https://www.nhtsa.gov/sites/nhtsa.gov/files/2021-09/15100_Countermeasures10th_080621_v5_tag.pdf

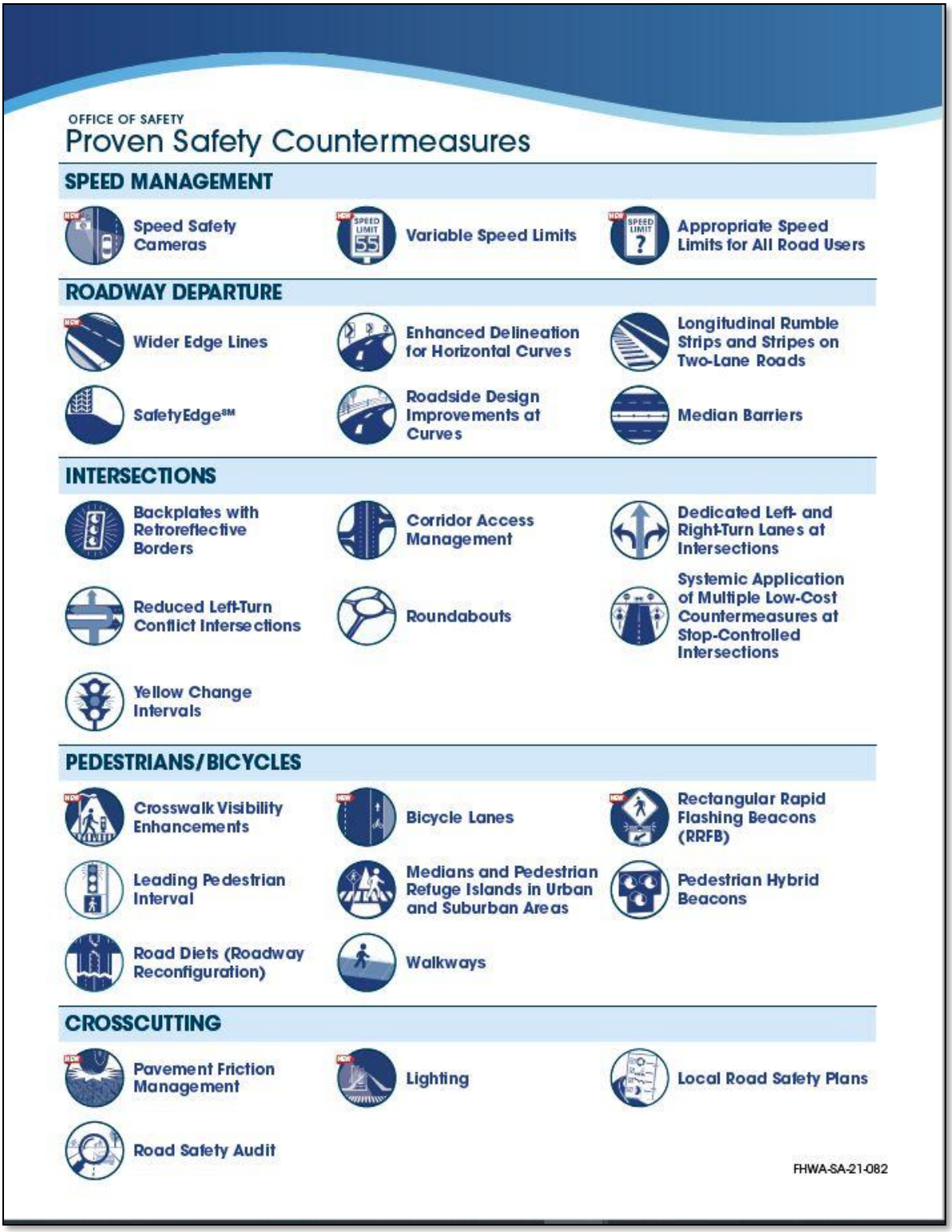


Figure 16: FHWA proven safety countermeasures (Source: FHWA)

The following are strategies that the stakeholders deemed as providing a significant opportunity to reduce traffic related fatalities and serious injuries in the region. Each emphasis area includes the 4E categories, safety strategies, the Safe System Approach elements associated with each strategy, and the effectiveness star rating from the NHTSA, and associated CRF range.

1. Lane Departure

Education

- Launch public awareness campaigns to educate drivers about the risks of lane departure and the importance of staying within their lanes, especially in curves and during inclement weather. (*Safe Road Users | 3 star)*
- Include lane departure prevention and safe driving practices in driver education and training programs. (*Safe Road Users | 1-2 star*)

Engineering

- Identify and prioritize high-crash (fatalities and serious injuries) and high-risk segments for lane-departure crashes to be addressed through infrastructure improvements. (*Safe Roads | 3 star*)
- Install centerline and edge-line rumble strips, especially on two-lane roads. (*Safe Roads | 12-37% reduction in lane departure crashes*)
- Wider pavement markings (6 inches instead of the standard 4 inches) improve visibility and driver awareness, reducing the likelihood of unintentional lane departures. (*Safe Roads | 38% reduction in lane departure crashes*)
- Enhance pavement markings to improve lane detection by vehicle sensors and cameras. (*Safe Roads)*
- Enhanced Delineation for Horizontal Curves: chevrons, post-mounted delineators, oversized signs, brighter/wider markings, enhanced guardrail delineation, post-mounted retroreflective sheeting, pavement markings through horizontal curves and tangent approaches (“Curve Ahead,” “Slow”) or dynamic speed-actuated feedback warning signs, and LED raised pavement markers. (*Safe Roads and Safe Speeds | 6-22% reduction in road departure crashes*)
- Utilize high-friction surface treatments. (*Safe Roads | 5-17% reduction in road departure crashes*)
- Where feasible, install a combination of shoulder rumble strips with additional shoulder widening, or where feasible, pave existing shoulders, widen existing paved shoulders, or establish gravel/stabilized “usable” shoulder extension at 1V:20H slope or flatter, particularly where paved shoulder width is less than 8 feet. (*Safe Roads | 11-51% reduction in road departure crashes*)
- Remove/relocate objects within the recovery area along the side of the road in high-risk locations. (*Safe Roads | 8-44% reduction in road departure crashes*)
- Apply paving technologies to negate vertical drop-offs and facilitate driver ability to maintain vehicle control under instances of lane departure, such as Safety Edge. (*Safe Roads and Safe Vehicles | 21% reduction in road departure crashes*)

- Conduct slope flattening, repair, restoration, and maintenance to reduce the likelihood of rollover on > 33% slopes, or recovery on > 25% slopes. (*Safe Roads and Safe Vehicles | 4% reduction in road departure crashes*)
- Improve shoulders by dispersing aggregate along the road edge to provide a more stable recovery area beyond the edge of pavement. Millings or aggregate are dispersed at 1V:6H or flatter. (*Safe Roads | 8-44% reduction in road departure crashes*)
- Median Barriers (*Safe Roads | 97% reduction in road departure crashes*)

2. Behavior Related: Speeding

Education

- Run public awareness campaigns to educate drivers about the dangers of speeding and aggressive driving by using emotional appeals, statistics, and real-life stories to convey the message. (*Safe Road Users and Safe Speeds | 3 star*)
- Mandate defensive driving courses and education programs for drivers cited for speeding or aggressive driving. (*Safe Road Users and Safe Speeds | 3 star*)
- Reward and incentive programs to encourage safe driving behaviors, such as obeying speed limits and avoiding aggressive driving. (*Safe Road Users | 3 star*)

Engineering

- Install decreased speed limit sign. (*Safe Roads | 9-21% reduction in crashes*)
- Dynamic speed feedback sign that has data collection features (speed, volume). (*Safe Roads and Safe Speeds | 5% reduction in crashes*)
- Traffic Calming Measures: Installing speed humps, rumble strips, chicanes, and raised crosswalks. (*Safe Roads and Safe Speeds | varies reduction in crashes*)
- Identify locations with a high frequency of speed-related crashes for targeted enforcement (GIS heat maps can be generated for law enforcement). (*Safe Roads | 3 star*)
- Install traffic calming to reduce speeds (e.g. speed humps, road diets, curb bulb-outs). Road diets reduce the number of lanes and lane widths. Curb bulb-outs narrow the street width at intersections. (*Safe Roads | 29% reduction in crashes*)
- Improving sightlines, adding clear and visible signage, and optimizing lane widths. (*Safe Roads | 20-41% reduction in crashes*)

Enforcement

- Targeted enforcement in school zones and locations with speeding-related crashes. (*Safe Road Users and Safe Roads | 2 star*)
- Installing automated speed cameras that automatically issue citations to drivers who violate traffic laws, including speeding. (*Safe Speeds and Safe Roads | 5 star*)

- High-Visibility Enforcement: Police officers use highly visible patrol cars and uniforms to increase their presence on the road, discouraging aggressive behaviors. (Safe *Speeds, Safe Roads, and Safe Road Users | 2 star)*
- Regulate policies for car manufacturing to use advancements in vehicle technology, such as adaptive cruise control and lane-keeping assistance. (*Safe Speeds, Safe Roads, and Safe Road Users | 2 star*)

Emergency Response

- Traffic Incident Management: Efficient management of traffic incidents can prevent. secondary crashes caused by aggressive driving around accident scenes. Quick clearance of the road can reduce congestion and frustration. (Post-Crash Care)

3. Behavior Related: Impaired Drivers

Education

- Improve public awareness of and access to alternate forms of transportation (e.g. transit, taxicabs, ride share) (Safe Road Users | *3 star*)
- Inform the public of the dangers of impaired driving and establish positive social norms that make driving while impaired unacceptable (Safe Road Users | *3 star*)
- Inform and encourage the public to use designated drivers and establish a positive social norm related to their use (Safe Road Users | 2 star)

Enforcement

- Conduct high-visibility impaired-driving enforcement initiatives (Safe Road Users | *4-5 star*)
- Work with the court system to promote policies and practices that result in the imposition of stricter driving laws and penalties for impaired driving convictions (Safe Road Users |*3-5 star*)
- Conduct high-visibility, saturated impairment enforcement campaigns (Safe Road Users | *4 star*)
- Increase the enforcement of drug-impaired driving by law enforcement (Safe Road Users | 3 star)

4. Behavior Related: Distracted Driving

Education

- Run public awareness campaigns to educate drivers about the dangers of distracted driving. (Safe Road Users | *1 star*)
- Utilize D3 Arizona campaign materials and public service announcements D3Arizona.org (Safe Road Users | *1 star*)
- Schools and community organizations collaborate with agencies to integrate distracted driving education into curricula and outreach programs targeting young drivers and emphasizing safe driving habits. (Safe Road Users | *1 star*)
- Encourage hands-free technology, such as Bluetooth devices, for phone calls and navigation can reduce manual distractions. (Safe Road Users | *1 star*)
- Peer-to-Peer Influence; Programs encourage young drivers to influence their peers positively by speaking out against distracted driving and setting good examples. (Safe Road Users | *1 star*)
- Insurance Incentives: Collaborating with insurance companies to offer discounts to policyholders who use tracking devices that monitor safe driving behaviors, including avoiding distractions. (Safe Road Users | *1 star*)

Engineering

- Collecting and analyzing data on distracted driving incidents to identify trends, high-risk areas, and demographics prone to distraction. (Safe Roads)
- Installing center line and edge line rumble strips. (Safe Roads | *8-39% reduction in crashes*)

Enforcement

- Regulating policies for vehicle manufacturers to design and promote in-car technology that minimizes distractions, such as voice-activated controls and heads-up displays. (Safe Vehicles)
- Actively enforce distracted driving laws and issue citations to offenders. (Safe Road Users | *4 star*)
- Corporate Policies: Agencies work with companies to establish distracted driving policies for their employees who drive as part of their job. (Safe Road Users | *1 star*)

5. Behavior Related: Unrestrained (Not Wearing Seat Belt)

Education

- Run public awareness campaigns emphasizing the importance of seat belt use and child safety seats. (*Safe Road Users, Safe Vehicles | 4-5 star*)
- Work with schools to integrate seat belt safety education into curricula and conduct seat belt usage surveys among students. (*Safe Road Users, Safe Vehicles | 3 star*)
- Education media campaigns: using television, radio, social media, and other outlets to disseminate messages about the importance of safety device use. (*Safe Road Users, Safe Vehicles | 4-5 star*)
- Incentives and rewards: offering incentives or rewards to encourage seat belt use, such as discounts on insurance premiums for drivers with a history of safe practices. (*Safe Road Users, Safe Vehicles, Safe Speeds | 4 star*)
- Conduct surveys to assess seat belt usage rates to help agencies track progress and identify areas that need improvement. (*Safe Roads, Safe Vehicles, Safe Road Users*)

Engineering

- Partner with local organizations and car dealerships to provide safety device checks and installations. (*Safe Vehicles| 3 star*)

Enforcement

- Advocate for stricter seat belt laws and penalties for non-compliance can serve as a deterrent to unrestrained driving. (*Safe Road Users*)

6. Intersections

Education

- Build upon and distribute educational materials related to intersection safety. *(Safe Road Users | 1 star)*
- Build upon existing "best practices" guides for high-risk intersections. *(Safe Roads 1-4 star)*
- Partner with local professional societies to hold an annual workshop to educate roadway designers on safety tools available to assess and improve substantive safety. *(Safe Road Users | 1 star)*
- Educate policymakers on the benefits of engineering strategies to increase the use of those strategies. *(Safe Roads | 1 star)*

Engineering

- Consider adopting Intersection Control Evaluation (ICE) policies and procedures to evaluate and select the geometry and control for an intersection. *(Safe Roads)*

- Identify individuals or groups of intersections with fatal and serious injury crash patterns that can be addressed through infrastructure upgrades or improvements. *(Safe Roads)*
- Evaluate left-turn phasing practices and policies. *(Safe Roads)*
- Review and update corridor traffic signal timing and coordination on a regular schedule (every three to five years minimum). *(Safe Roads)*
- Improve traffic signal timing and coordination between jurisdictional signal systems to improve operations and reduce driver frustration. *(Safe Roads)*
- Implement systemic improvements based on identifying characteristics of high-risk intersections. *(Safe Roads)*
- Enhance the existing network screening methodology for intersections and segments. *(Safe Roads)*
- Reduced Left-Turn Conflict Intersections *(Safe Roads | 30-54% reduction in crashes)*
    - Reduced left-turn conflict intersections are geometric designs that alter how left-turn movements occur to simplify decisions and minimize the potential for related crashes. Two highly effective designs that rely on U-turns to complete certain left-turn movements are known as the restricted crossing U-turn (RCUT) and the median U-turn (MUT).
- Systemic Application of Multiple Low-Cost Countermeasures at Stop-Controlled Intersections *(Safe Roads | 10-15% reduction in crashes)*
    - This systemic approach to intersection safety involves deploying a group of multiple low-cost countermeasures, such as enhanced signing and pavement markings, at many stop-controlled intersections within a jurisdiction. It is designed to increase driver awareness and recognition of the intersections and potential conflicts.
- Left and Right Turn Lanes at Two-Way Stop-Controlled Intersections *(Safe Roads | 14-48% reduction in crashes)*
- Appropriate Yellow Change Intervals *(Safe Roads | 8-14% reduction in crashes)*
- Roundabouts *(Safe Roads | 78-82% reduction in crashes)*
- Corridor Access Management *(Safe Roads | 5-31% reduction in crashes)*
    - Access management refers to the design, application, and control of entry and exit points along a roadway. This includes intersections with other roads and driveways that serve adjacent properties.
- Improve left-turn lane offset to create a positive offset *(Safe Roads | 38% reduction in crashes)*
- Protected-only left-turn phasing *(Safe Roads | 51-77% reduction in crashes)*
- Flashing yellow arrow *(Safe Roads | 19% reduction in crashes)*
- Turn lane channelization *(Safe Roads | 33% reduction in crashes)*
- Clear sight triangles *(Safe Roads | 48% reduction in crashes)*
- Improve visibility of signals *(Safe Roads | 29% reduction in crashes)*
- One signal head per lane *(Safe Roads | 46% reduction in crashes)*
- Larger (12”) signal heads *(Safe Roads | 42% reduction in crashes)*
- Reflective border for signal backplates *(Safe Roads | 15% reduction in crashes)*
- Conduct RSAs during the design phase *(Safe Roads)*

<u>Enforcement</u>

- Install red-signal enforcement lights to assist enforcement of red-light runners. *(Safe Road Users | 2 star)*
- Encourage and expand the data-driven speed and red-light running enforcement, including the use of technology to assist enforcement. *(Safe Road Users)*
- Conduct targeted enforcement of high crash-risk intersections. *(Safe Road Users | 2 star)*
- Utilize automated enforcement at high crash risk intersections where appropriate *(Safe Roads and Safe Road Users | 2-45% reduction in crashes)*

Emergency Response

- Evaluate Emergency Vehicle Preemption system implementation practices. *(Post Crash Care)*
- Expand deployment of Emergency Vehicle Preemption systems. *(Post Crash Care)*

7. Nighttime

Education

- Promote the use of high-visibility clothing for pedestrians and cyclists can make them more visible to drivers at night. *(Safe Road Users)*
- Run public awareness campaigns about the dangers of drowsy driving, which is more common at night. *(Safe Road Users)*
- Promote the use of vehicles with adaptive headlights that adjust their intensity and direction based on vehicle speed and steering angle. *(Safe Road Users)*

Engineering

- Maintain and upgrade street lighting to ensure well-lit roadways, intersections, and pedestrian crosswalks. *(Safe Roads)*
- Use Reflective Signage and Markings for road signs, lane markings, and pedestrian crosswalks to enhance visibility at night. *(Safe Roads)*
- Provide roadside assistance services, especially in areas with limited services, ensuring that motorists who encounter problems at night can receive help quickly. *(Post Crash Care)*
- Install emergency call boxes along highways and remote roads, allowing motorists to call for assistance in case of emergencies. *(Post Crash Care)*
- Design roadways that enhance nighttime safety, such as improved sightlines, well-placed signage, and delineation of curves and intersections. *(Safe Roads)*
- Implement Animal Detection Systems that detect the presence of wildlife on the road and warn drivers of potential hazards at night. *(Safe Roads)*

Enforcement

- Enhanced Police Presence during nighttime hours can discourage speeding and reckless driving. *(Safe Road Users | 2 star)*

8. Motorcycle

Education

- Run public awareness campaigns to educate both motorcyclists and other road users about the importance of sharing the road safely, respecting motorcyclists' space, and being aware of blind spots. (*Safe Road Users | 1-2 star*)

- Educate riders about the importance of wearing helmets that meet safety standards and encourage compliance with helmet laws. (*Safe Road Users | 1 Star*)
- Education media campaigns: using television, radio, social media, and other outlets to disseminate messages about common crash factors such as speeding, alcohol and drug impairment, and distractions, emphasizing the importance of risk awareness and responsible riding behavior. (*Safe Road Users, Safe Vehicles | 1 Star*)
- Community engagement: Partner with motorcycle clubs, rider associations, and community organizations to conduct safety seminars, workshops, and events focused on motorcycle safety awareness and education. (*Safe Roads, Safe Vehicles, Safe Road Users*)

Engineering

- Identify and prioritize high-crash (fatalities and serious injuries) and high-risk segments for motorcycle crashes to be addressed through infrastructure improvements. (*Safe Roads*)
- Maintain road surfaces to minimize hazards such as potholes, loose gravel, and uneven pavement, which can pose significant risks to motorcyclists. (*Safe Roads*)
- Install motorcycle-friendly guardrail designs that minimize the risk of rider entanglement and reduce the severity of impacts in the event of a crash. Use crash cushions and energy-absorbing barriers to provide additional protection for riders. (*Safe Roads)*
- Utilize high-friction surface treatments and durable road markings to improve traction and visibility. (*Safe Roads | 32.8% reduction in crashes*)
- Ensure clear and consistent lane markings, symbols, and lane width standards to help motorcyclists navigate safely and maintain proper lane positioning. (*Safe Roads | 22% reduction in crashes)*
- Implement curve warning signs, reflective delineators, and pavement markings to alert motorcyclists to upcoming curves and reduce the likelihood of run-off-road crashes. (*Safe Roads | 34.8% reduction in crashes)*
- Install barriers and median separators to prevent head-on collisions and minimize the risk of cross-median crashes. (*Safe Roads and Safe Vehicles | 81.1% reduction in crashes*)

The Future: Automated and Connected Vehicles

Automated vehicle (AV) and connected vehicle (CV) technologies are set to revolutionize travel and traffic safety. The National Cooperative Highway Research Program (NCHRP) Research Report 845 Advancing Automated and Connected Vehicles: Policy and Planning Strategies for State and Local Transportation Agencies is an excellent resource for agencies that want to participate in how these technologies will be deployed and how they will impact their facilities and operations. The following are key policy and planning strategies that NCHRP 845 recommends that transportation agencies consider:

1. Enact legislation to legalize AV testing.
2. Enact legislation to stimulate AV or CV testing.
3. Modify driver training standards and curricula.
4. Increase public awareness of benefits and risks.

5. Subsidize shared automated vehicle (SAV) use.
6. Implement transit benefits for SAVs.
7. Implement a parking cash-out strategy.
8. Implement location-efficient mortgages.
9. Implement land use policies and parking requirements.
10. Apply road use pricing.
11. Implement a no-fault insurance approach.
12. Require motorists to carry more insurance.
13. Subsidize CVs.
14. Invest in CV infrastructure.
15. Grant AVs and CVs priority access to dedicated lanes.
16. Grant signal priority to CVs.
17. Grant parking access to AVs and CVs.
18. Implement new contractual mechanisms with private-sector providers.

The integration of AV and CV technologies is rapidly evolving, with near-term applications already taking shape at the local level. One key advancement is vehicle-to-infrastructure (V2I) technology, which enables real-time communication between vehicles and roadside infrastructure to enhance safety.

A notable example is Mohave County's recently awarded $1 million Advanced Technology Grant from the U.S. Department of Transportation. By late 2025, this project will install STOP sign gap assist technology at three intersections along London Bridge Road. This system will provide in-vehicle warnings to drivers, helping them make safer decisions at STOP-controlled intersections.

Beyond STOP sign gap assist, other V2I applications are gaining momentum, such as:

- **Curve Speed Warning Systems**, which alert drivers if they approach a curve at excessive speeds.
- **Traffic Signal Display Warnings**, which provide in-vehicle notifications of upcoming signal changes, reducing red-light running and improving intersection safety.
- **Pedestrian and Cyclist Detection**, where sensors communicate with vehicles to prevent crashes involving vulnerable road users.

These emerging V2I applications demonstrate how connected technology is already shaping roadway safety at the regional level, making roads smarter and more responsive. Rather than focusing solely on long-term AV strategies that depend on state-level implementation, near-term V2I deployments offer immediate safety benefits and should be explored for wider adoption.

Implementation Plan

Participants

LHMPO has the primary leadership role and acts as the primary contact for the STSP. Based upon strategies formulated in this plan, local agencies, ADOT, and law enforcement will participate in executing the implementation plan.

Incorporating Safety into Project Development Process

Safety is often viewed as an "extra" or "add-on" or even a nuisance to incorporate into a project, when in fact, safety elements should be mainstreamed and explicitly considered on every project. Traffic safety programs, projects, and policies included in an agency's Long-Range Transportation Plan, Comprehensive Plan, and/or Master Plan have a higher likelihood of being implemented. The following should be considered for inclusion in an agency's policies, future Capital Improvement Plans (CIP), and updates to plans to ensure safety is an explicit consideration in projects:

1. Include systemic safety improvements in projects. Many of the FHWA Proven Safety Countermeasures are appropriate for systemic implementation (https://safety.fhwa.dot.gov/provencountermeasures/)


Safety Edge


Reflective Border Backplates


Enhanced Curve Delineation


Rumble Strips


Sidewalks


Lighting


Shoulder Improvement

2. Develop evaluation criteria to consider safety in project programming or consider making the following adjustments:
   - Strengthen evaluation criteria for proposed projects in regional Transportation Improvement and Maintenance Programs (TIMP) to include safety elements.
   - Give higher priority to projects that address RTSP Emphasis Areas
   - Give higher priority to locations experiencing fatal and serious injury crashes
   - Give higher priority to projects incorporating multiple safety countermeasures

Some examples of incorporating safety into project programming include:

- The Sun Corridor Metropolitan Planning Organization (SCMPO) Regional Transportation Plan (RTP) 2040 includes safety in its Project Scoring and Prioritization Criteria. The RTP project scoring criteria assigns up to 20 points (out of 100) to a project that improves safety by implementing an FHWA proven safety countermeasure or a recommendation from the SCMPO STSP.
- The Western Arizona Council of Governments (WACOG) Project Application form includes safety criteria in project development and prioritization. ***Table 11*** and ***Table 12*** show the safety and bicycle and pedestrian project scoring criteria used by WACOG.

Table 11: *WACOG Project Prioritization Safety Scoring*

SAFETY SCORING CRITERIA				25 Points Available
Check all that apply				
Safety Countermeasures	Yes ☐	No ☐	Project incorporates one or more of the FHWA or WACOG STSP (Safety Plan) safety countermeasures AND/OR addresses a specific location with identified safety deficiencies	Points Available Yes = 20, No = 10
	Yes ☐	No ☐	Does roadway exhibit a five (5)-year historic fatal and total crash rate above the State average?	Points Available Yes = 5, No = 2.5
Safety Total:				

Table 12: WACOG Project Prioritization Bicycle and Pedestrian Scoring

BICYCLE, PEDESTRIAN, AND TRANSIT MOBILITY				15 Points Available
Improves bus, bicycle, or pedestrian operations, safety, convenience and comfort, e.g., bike lanes, bus stops, ADA ramps & sidewalks, etc. Check all that apply				
Bicycle, Pedestrian & Transit	Yes ☐	No ☐	Project provides tangible improvement to, bicycle, or pedestrian facilities, safety, mobility, or convenience.	Points Available Yes =7.5, No = 2.5
	Yes ☐	No ☐	Project provides tangible improvement to Bus facilities, safety, mobility or convenience	Points Available Yes = 7.5, No = 2.5
Bike, PED & Transit Total:				

- ADOT's Planning-to-Programming (P2P) process incorporates safety into its scoring for Modernization projects by assigning values to the expected reduction in crashes as a result of the project and if the project has been identified in the state's Strategic Highway Safety Plan.
- The Northwest Arkansas MPO uses a 20-point system to prioritize its Surface Transportation Program projects. Safety accounts for three points maximum and is based on the 3-year average crash rate. If the crash rate in the project area is higher than the statewide average for similar facilities, the project receives three points. If the crash rate is near the statewide average, the project receives two points. Projects with a crash rate below the statewide average are awarded one point.
- The Androscoggin Transportation Resource Center, an MPO in Maine, includes a safety component in the TIP prioritization process for all projects. The MPO's prioritization process awards points to transportation projects that correct a safety problem at an identified high-crash location. The safety score is based on the state's list of high-crash locations for the preceding 3-year period. However, a project can also receive a partial safety score if it has an identifiable crash pattern that can be corrected, even if it is not on a high-crash location link/node. The intent is to award points to projects that address safety problems, regardless of whether they contain a high-crash location.

Progress and Transparency

After developing a Transportation Safety Plan, progress toward meeting the Plan's goals must be measured over time. This progress needs to be transparent to residents and other relevant stakeholders. At a minimum, this must include annual public and accessible reporting on progress toward reducing roadway fatalities and serious injuries, as well as public posting of the Safety Plan online.

FHWA requires state DOTs and MPOs to report annually on the following five safety performance measures:

1. Number of Fatalities
2. Rate of Fatalities per 100 million vehicle miles traveled (VMT)
3. Number of Serious Injuries
4. Rate of Serious Injuries per 100 million VMT
5. Number of Non-motorized Fatalities and Serious Injuries

States and MPOs must also establish annual targets for these five performance measures. COGs and local agencies are not required to establish safety performance measures or targets, but it is recommended. To meet SS4A requirements, LHMPO must report annually on progress toward reducing roadway fatalities and serious injuries. This annual report will be posted on the Strategic Transportation Safety Plan page of LHMPO's website and will be accessible to the public and stakeholders. An example of annual reporting can be found on the Maricopa Association of Government's (MAG) Crash Trends webpage at: https://azmag.gov/Programs/Transportation/Road-Safety-and-Technology/Crash-Trends/Crash-Trends-in-the-MAG-Region

Below is one of the MAG webpage graphics:

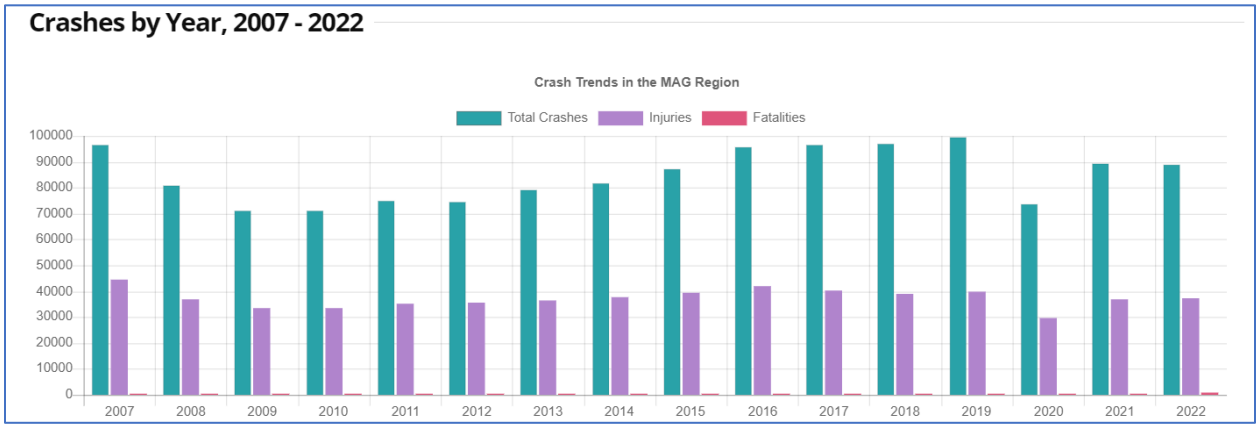


Figure 17: Crash Trends in the MAG Region (Example)

LHMPO will conduct an annual crash performance review. During this review, LHMPO will ultimately report its annual safety performance using the previously mentioned five safety performance measures. An assessment may then be made as to whether or not the region is meeting its safety performance targets.

Process and Policy Changes

FHWA requires safety plans to assess current policies, plans, guidelines, and/or standards to identify opportunities to improve how processes prioritize transportation safety. The safety plan should include implementation examples through the adoption of revised or new policies, guidelines, and/or standards, as appropriate.

Process Changes

LHMPO and its local agencies are encouraged to establish a safety project-specific prioritization strategy. NACOG's scoring criteria for its annual Regional Priority Projects List are a good example of a process that prioritizes safety, as they include a safety category worth 10% of the overall project score. The safety category requires a description of how the project improves the safety of the transportation system, ideally through implementing an FHWA-proven safety countermeasure or an STSP recommendation. The Scoring Criteria Chart and category description are provided in the exhibits below.

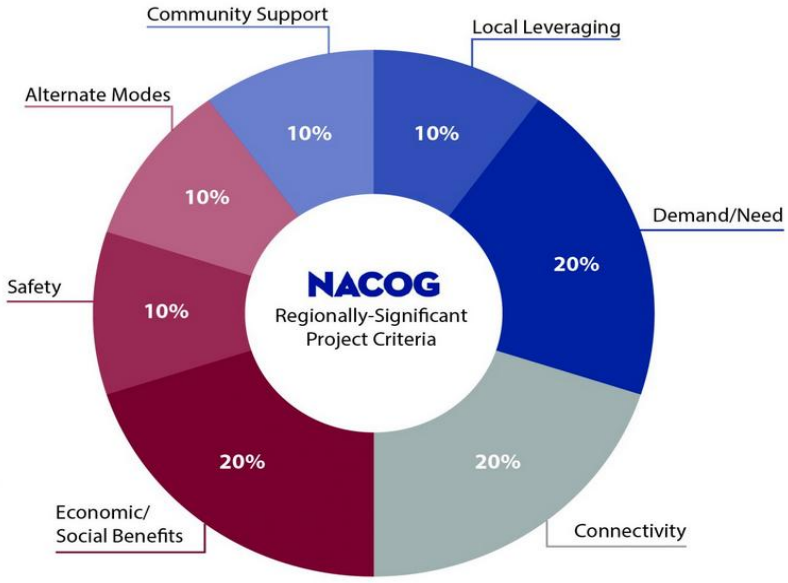


Figure 18: NACOG's Regional Priority Projects List Scoring Criteria (Example)

Table 13: NACOG's Regional Priority Projects List Safety Scoring Criteria (Example)

Category	Description	Potential Specific Scoring Criteria
Safety	Please describe how the project or plan improves the safety of the transportation system. If applicable, describe how the project implements one of the FHWA Proven Safety Countermeasures or recommendations from the NACOG Regional Transportation Safety Plan. Example data includes: Number of incidents, number of injuries, number of fatalities.	1) Project or plan addresses a specific location with identified safety deficiencies. (Yes or No) 2) Project or plan implements safety countermeasures to enhance safety for system users. (Yes or No)

Policy, Program, and Plan Recommendations

LHMPO and its local agencies should consider implementing a variety of policies, programs, and plans to help guide and formalize enhancements to transportation safety within local plans and regulations. Safety is sometimes seen as an enhancement to a project; by institutionalizing safety into policies and programs, it becomes normalized rather than a unique add-on feature.

Vision Zero

The **zero deaths** vision acknowledges that even one death on our transportation system is unacceptable and focuses on safe mobility for **all road users**.



Consider the adoption of a "Vision Zero" type initiative to target fatal crashes. Vision Zero is a strategy to eliminate all traffic fatalities and severe injuries while increasing safe, healthy, and equitable mobility for all. First implemented in Sweden in the 1990s, Vision Zero has proved successful across Europe and is gaining momentum in the United States. The City of Tempe has recently adopted a Vision Zero policy:

(https://www.tempe.gov/government/engineering-and-transportation/transportation/vision-zero).

A core principle of the vision is that "Life and health can never be exchanged for other benefits within the society". A presentation and comparison between rural and urban agency vision zero policies is found in **Appendix IV.**

Complete Streets

Complete Streets policies formalize a community's intent to plan, design, and maintain streets so they are safe for all users of all ages and abilities. Policies direct transportation planners and engineers to consistently design and construct the right-of-way to accommodate all anticipated users, including pedestrians, bicyclists, public transportation users, motorists, and freight vehicles. Complete Streets can be achieved through a variety of policies, ordinances, and resolutions, rewrites of design manuals, inclusion in comprehensive plans, internal memos from directors of transportation agencies, policies adopted by city and county councils, and executive orders from elected officials, such as Mayors or Governors. All policies should include the 10 elements of a Complete Streets policy (https://smartgrowthamerica.org/resources/elements-complete-streets-policy/).



A presentation and comparison between rural and urban agencies' complete streets policies are found in **Appendix IV.**

Active Transportation Plans

Active Transportation Plans address pedestrian and bicyclist issues, but they also help improve safety for all road users. The City of Phoenix's Active Transportation Plan (April 2023) includes safety-related recommendations to create a safer environment for pedestrians, cyclists, and other non-motorized users by implementing infrastructure upgrades and adopting Vision Zero principles. The plan offers several priority safety actions that serve as strong examples, such as:

- Re-establish a communitywide Safe Routes to School (SRTS) program
- Adopt a Complete Streets policy
- Implement traffic calming measures in high-risk areas, such as speed humps, narrowed lanes, and raised crosswalks.
- Intersection Improvements include installing curb extensions, high-visibility crosswalks, and pedestrian refuge islands.
- Enhanced Lighting and Signage

Road Safety Assessments

A Road Safety Assessment (RSA) is a formal safety performance examination of an existing or future road or intersection by an independent, multidisciplinary team. It reports on potential road safety issues and identifies opportunities for improvements in safety for all road users. ADOT conducts RSAs for local agencies as a free service through its Traffic Safety division; the RSA application can be accessed at https://azdot.gov/sites/default/files/2023-06/rsa-application.pdf.

LHMPO should consider conducting RSAs during:

- Project design

- Evaluation of high-priority locations, especially those identified in the LHMPO Strategic Transportation Safety Plan and Regional Transportation Plan (RTP).

Fatal Crash Team

Establish a fatal crash investigation team of engineering, planning, law enforcement, and risk management to meet quarterly to analyze fatal crashes in the region. The City of Casa Grande is a good example of conducting multidiscipline evaluations of fatal crashes. Another example is Pinal County, which conducts evaluations of fatal crashes with the County Sheriff's Office, County Risk Management, and County Traffic Engineering.

Safety Projects

Using input from stakeholders, the public survey, crash data analysis, network screening, and individual agency input, projects within the LHMPO region were identified. The projects are intended to improve safety and further the region's safety goals. Using the safety performance and areas of opportunity identified, a short list of high crash hotspots for each agency was developed. These, along with lists of public comments and agency priority locations, informed the final selection of project locations.

Upon identifying locations for improvements, each location's crash history was reviewed to inform which safety emphasis area and associated strategy should be utilized to mitigate the potential for future crashes or safety concerns at the location. After selecting improvements and strategies for each location, each respective agency was provided an opportunity to provide input on the selected improvements. This provided local support for the projects and increased the likelihood of project implementation in the future.

Individual projects for each agency are outlined in **Table 14**. The project's location, selection method(s), and recommended scope provide a foundation for each agency to pursue the projects as desired. Further details, such as the project's coordinates and a high-level cost estimate in 2024 dollars, are provided in **Appendix V.** Also included are individual improvements and their high-level unit cost. This is included to provide flexibility to the listed projects where an agency could add or remove items from the project's scope as desired.

Systemic projects typically provide a better opportunity for an agency to address larger and multi-location safety issues on their road network. By combining a similarly scoped project into a larger systemic project, not only are more areas of concern addressed, but typically, a higher project benefit-to-cost ratio can be achieved to better the chances of securing funding for the project. Therefore, a list of systemic projects stemming from the list of individual projects was developed for the region's agencies, found in **Table 15**.

The implementation of the projects found in **Table 14** and **Table 15** are recommended to be prioritized in the order of those with the selection method Top Crash Intersection/Segment, Agency Comment, then Public Comment.

Table 14: LHMPO Project Selections

LHMPO Project Selections							
Location	**Roadway Ownership**	**Intersection/ Segment**	**Project Type**	**Selection Method**	**Scope**	**Estimated Cost**	**Timeframe**
Lake Havasu City	ADOT	Kiowa Blvd & SR-95	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$17,000	Short
Lake Havasu City	Lake Havasu City	Lake Havasu Ave & McCulloch Blvd	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$17,000	Short
Lake Havasu City	Lake Havasu City	Lake Havasu Ave & Mesquite Ave	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$17,000	Short
Lake Havasu City	ADOT	SR-95 & Swanson Ave	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$17,000	Short
Lake Havasu City	ADOT	Mesquite Ave & SR-95	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$17,000	Short
Lake Havasu City	ADOT	Palo Verde Blvd North & SR-95	Intersection	Top Crash Intersections, Social Pinpoint	Install retroreflective signal backplates	$17,000	Short
Lake Havasu City	ADOT	Palo Verde Blvd South & SR-95	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$17,000	Short
Lake Havasu City	ADOT	Mulberry Ave & SR-95	Intersection	Top Crash Intersections, Social Pinpoint	Install retroreflective signal backplates and refresh pavement markings	$44,000	Short

LHMPO Project Selections							
Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Estimated Cost	Timeframe
Lake Havasu City	ADOT	Acoma Blvd North & SR-95	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$17,000	Short
Lake Havasu City	Lake Havasu City	Acoma Blvd & Lake Havasu Ave	Intersection	Top Crash Intersections	Install traffic signal if warranted	$1,078,000	Medium
Lake Havasu City	ADOT	Industrial Blvd & SR-95	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$17,000	Short
Lake Havasu City	ADOT	Acoma Blvd South & SR-95	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$17,000	Short
Lake Havasu City	Lake Havasu City	Acoma Blvd & Mesquite Ave	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$17,000	Short
Lake Havasu City	Lake Havasu City	Smoketree Ave & Swanson Ave	Intersection	Top Crash Intersections	Install traffic signal if warranted	$1,078,000	Medium
Lake Havasu City	Lake Havasu City	Maricopa Ave & Oro Grande Blvd	Intersection	Top Crash Intersections	Install traffic signal if warranted	$1,078,000	Medium
Lake Havasu City	Lake Havasu City	Lake Havasu Ave & Palo Verde Blvd South	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$17,000	Short
Lake Havasu City	ADOT	Smoketree Ave & SR-95	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$17,000	Short

LHMPO Project Selections							
Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Estimated Cost	Timeframe
Lake Havasu City	Lake Havasu City	Acoma Blvd & McCulloch Blvd	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$17,000	Short
Lake Havasu City	Lake Havasu City	Mesquite Ave & Riviera Blvd	Intersection	Top Crash Intersections, Social Pinpoint	Install traffic signal if warranted and refresh pavement markings	$1,113,000	Medium
Lake Havasu City	Lake Havasu City	Acoma Blvd & Smoketree Ave	Intersection	Top Crash Intersections, Social Pinpoint	Install traffic signal if warranted	$1,078,000	Medium
Lake Havasu City	Lake Havasu City	Acoma Blvd & Swanson Ave	Intersection	Social Pinpoint	Install traffic signal if warranted	$1,078,000	Medium
Lake Havasu City	Lake Havasu City	Havasupai Boulevard & Acoma Blvd	Intersection	Social Pinpoint	Install traffic signal if warranted	$1,078,000	Medium
Lake Havasu City	Lake Havasu City	Lake Havasu Ave: Willow Ave To S Smoketree Ave	Segment	Top Crash Segments	Install speed feedback signs and narrow travel lanes	$108,000	Short
Lake Havasu City	ADOT	SR-95: M184 To M188	Segment	Top Crash Segments	Install speed feedback signs, optimize traffic signal timing along the segment*, install overhead signal ahead warning signs with flashing beacons, and narrow travel lanes	$137,000	Medium

LHMPO Project Selections							
Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Estimated Cost	Timeframe
Lake Havasu City	ADOT	SR-95: M175 To Lost Surveyor Rd	Segment	Top Crash Segments	Install shoulder rumble strips, speed feedback signs, and narrow travel lanes	$137,000	Medium
Lake Havasu City	Lake Havasu City	McCulloch Blvd: Isla Circle Dr To Civic Center Ln	Segment	Top Crash Segments	Install speed feedback signs and narrow travel lanes	$108,000	Short
Lake Havasu City	Lake Havasu City	N Lake Havasu Ave: Industrial Blvd To Sabino Dr	Segment	Top Crash Segments	Install speed feedback signs and narrow travel lanes	$75,000	Short
Lake Havasu City	ADOT	SR-95: London Bridge Rd (M190) To M189	Segment	Top Crash Segments	Install retroreflective backplates at signalized intersections, speed feedback signs, and narrow travel lanes	$124,000	Short
Lake Havasu City	Lake Havasu City	Mesquite Ave: SR-95 To Del Rio Ln	Segment	Top Crash Segments	Install speed feedback signs	$42,000	Short
Lake Havasu City	Lake Havasu City	McCulloch Blvd: Agave Bay To 550' West of Smoketree Ave	Segment	Top Crash Segments	Refresh pavement markings and install speed feedback signs	$108,000	Short
Lake Havasu City	ADOT	SR 95: McCulloch Blvd S To M176	Segment	Top Crash Segments	Install speed feedback signs and narrow travel lanes	$108,000	Short
Lake Havasu City	Lake Havasu City	Kiowa Blvd: 650' East of Avalon Ave To 570' West of Avalon Ave	Segment	Top Crash Segments	Narrow travel lanes and add buffers to bike lanes	$33,000	Short

LHMPO Project Selections							
Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Estimated Cost	Timeframe
Lake Havasu City	Lake Havasu City	Mesquite Ave: Smoketree Ave To Acoma Blvd	Segment	Top Crash Segments	Narrow travel lanes and install speed feedback signs	$108,000	Short
Lake Havasu City	Lake Havasu City	London Bridge Rd: Paseo del Sol Ave To Marlboro Dr	Segment	Top Crash Segments	Install raised medians	$1,546,000	Long
Lake Havasu City	Lake Havasu City	Acoma Blvd: Lake Havasu Ave To Havasupai Blvd	Segment	Top Crash Segments	Refresh pavement markings, install raised medians, and narrow travel lanes	$6,900,000	Long
Lake Havasu City	Lake Havasu City	Acoma Blvd: Polaris Dr To Rainbow Ave	Segment	Top Crash Segments	Install speed feedback signs and narrow travel lanes	$108,000	Short
Lake Havasu City	Lake Havasu City	Industrial Blvd: Lake Havasu Ave To Acoma Blvd	Segment	Top Crash Segments	Install raised medians and improve the pavement surface	$9,440,000	Long
Lake Havasu City	Lake Havasu City	McCulloch Blvd: Isle Cir Dr To 1200' North of McCulloch Blvd	Segment	Top Crash Segments	Install speed feedback signs and narrow travel lanes	$108,000	Short
Lake Havasu City	Lake Havasu City	London Bridge Rd: 400' North of Industrial Blvd To 200' South of Boat Launch Rd	Segment	Top Crash Segments	Install speed feedback sign and refresh pavement markings	$58,000	Short
Lake Havasu City	Lake Havasu City	London Bridge Rd: Kirk Dr To 440' South of Vista del Lago Loop	Segment	Top Crash Segments	Install intersection lighting and chevron curve warning signs	$205,000	Medium

LHMPO Project Selections							
Location	**Roadway Ownership**	**Intersection/ Segment**	**Project Type**	**Selection Method**	**Scope**	**Estimated Cost**	**Timeframe**
Lake Havasu City	Lake Havasu City	Swanson Ave: Lake Havasu Ave To 470' South of Capri Blvd	Segment	Top Crash Segments	Install raised medians	$1,546,000	Long
Lake Havasu City	ADOT	SR-95 From Pena Ln (M180.5) To Oro Grande Blvd	Segment	Top Crash Segments	Install retroreflective backplates at signalized intersections, speed feedback signs, overhead signal ahead warning signs with flashing beacons, narrow travel lanes, and optimize traffic signal timing along the segment*	$154,000	Medium
Mohave County	ADOT	SR-95: Industrial Blvd To M180	Segment	Top Crash Segments, Social Pinpoint	Install speed feedback signs, optimize traffic signal timing along the segment*, install overhead signal ahead warning signs with flashing beacons, and narrow travel lanes	$137,000	Medium

** The cost for this item is not included as it is considered an operational enhancement rather than a construction activity.*

Table 15: LHMPO Systemic Project Selections

LHMPO Systemic Projects							
Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Estimated Cost	Timeframe
Lake Havasu City	ADOT	Kiowa Blvd & SR-95; Lake Havasu Ave & McCulloch Blvd; Lake Havasu Ave & Mesquite Ave; SR-95 & Swanson Ave; Mesquite Ave & SR-95; Palo Verde Blvd North & SR-95; Palo Verde Blvd South & SR-95; Mulberry Ave & SR-95; Acoma Blvd North & SR-95; Industrial Blvd & SR-95; Industrial Blvd & SR-95; Acoma Blvd South & SR-95; Acoma Blvd & Mesquite Ave; Lake Havasu Ave & Palo Verde Blvd South; Smoketree Ave & SR-95; Acoma Blvd & McCulloch Blvd	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$264,000	Short
Lake Havasu City	Lake Havasu City	Acoma Blvd & Lake Havasu Ave; Smoketree Ave & Swanson Ave; Maricopa Ave & Oro Grande Blvd; Mesquite Ave & Riviera Blvd; Acoma Blvd & Smoketree Ave; Acoma Blvd & Swanson Ave; Havasupai Boulevard & Acoma Blvd	Intersection	Top Crash Intersections, Social Pinpoint	Install traffic signal if warranted	$7,544,000	Medium
Lake Havasu City	Lake Havasu City	Mesquite Ave & Riviera Blvd; McCulloch Blvd: Agave Bay To 550' West of Smoketree Ave; Acoma Blvd: Lake Havasu Ave To Havasupai Blvd; London Bridge Rd: 400' North of Industrial Blvd To 200' South of Boat Launch Rd	Intersection, Segment	Top Crash Intersections, Social Pinpoint, Top Crash Segments	Refresh pavement markings	$184,000	Short

LHMPO Systemic Projects							
Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Estimated Cost	Timeframe
Lake Havasu City	Lake Havasu City	Lake Havasu Ave: Willow Ave To S Smoketree Ave; SR-95: M184 To M188; SR-95: Industrial Blvd To M180; SR-95: M175 To Lost Surveyor Rd; McCulloch Blvd: Isla Circle Dr To Civic Center Ln; N Lake Havasu Ave: Industrial Blvd To Sabino Dr; SR-95: London Bridge Rd (M190) To M189; Mesquite Ave: SR-95 To Del Rio Ln; McCulloch Blvd: Agave Bay To 550' West of Smoketree Ave; SR 95: McCulloch Blvd S To M176; Mesquite Ave: Smoketree Ave To Acoma Blvd; Acoma Blvd: Polaris Dr To Rainbow Ave; McCulloch Blvd: Isle Cir Dr To 1200' North of McCulloch Blvd; London Bridge Rd: 400' North of Industrial Blvd To 200' South of Boat Launch Rd; SR-95 From Pena Ln (M180.5) To Oro Grande Blvd	Segment	Top Crash Segments	Install speed feedback signs	$624,000	Short

LHMPO Systemic Projects							
Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Estimated Cost	Timeframe
Lake Havasu City	Lake Havasu City	Lake Havasu Ave: Willow Ave To S Smoketree Ave; SR-95: M184 To M188; SR-95: Industrial Blvd To M180; SR-95: M175 To Lost Surveyor Rd; SR-95: London Bridge Rd (M190) To M189; SR 95: McCulloch Blvd S To M176; Kiowa Blvd: 650' East of Avalon Ave To 570' West of Avalon Ave; Mesquite Ave: Smoketree Ave To Acoma Blvd; Acoma Blvd: Lake Havasu Ave To Havasupai Blvd; Acoma Blvd: Polaris Dr To Rainbow Ave; McCulloch Blvd: Isle Cir Dr To 1200' North of McCulloch Blvd; SR-95 From Pena Ln (M180.5) To Oro Grande Blvd	Segment	Top Crash Segments	Narrow travel lanes	$66,000	Short
Lake Havasu City	ADOT	SR-95: M184 To M188; SR-95: Industrial Blvd To M180; SR-95 From Pena Ln (M180.5) To Oro Grande Blvd	Segment	Top Crash Segments, Social Pinpoint	Install overhead signal ahead warning signs with flashing beacons	$90,000	Medium
Lake Havasu City	ADOT	SR-95: M184 To M188; SR-95: Industrial Blvd To M180; SR-95 From Pena Ln (M180.5) To Oro Grande Blvd	Segment	Top Crash Segments	Optimize traffic signal timing along the segment*	-	Short
Lake Havasu City	Lake Havasu City	London Bridge Rd: Paseo del Sol Ave To Marlboro Dr; Industrial Blvd: Lake Havasu Ave To Acoma Blvd; Swanson Ave: Lake Havasu Ave To 470' South of Capri Blvd	Segment	Top Crash Segments	Install raised medians	$9,926,000	Long

LHMPO Systemic Projects							
Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Estimated Cost	Timeframe
Lake Havasu City	ADOT/Lake Havasu City	Intersections of SR 95 and Kiowa Blvd, SR 95 and Swanson Ave, SR 95 and Mesquite Ave, SR 95 and Palo Verde Blvd N, SR 95 and Palo Verde Blvd S, SR 95/Lake Havasu Ave and Mulberry Ave, SR 95 and Acoma Blvd N, SR 95 and Acoma Blvd S, SR 95 and Industrial Blvd, SR 95 and Smoketree Ave, SR 95 and McCulloch Blvd South, SR 95 and Oro Grande Blvd, SR 95 and Havasu Riviera Pkwy, SR 95 and London Bridge Rd, SR 95 and Centre Loop, SR 95 and The Shops Blvd, SR 95 and Airport Centre Blvd, SR 95 and Retail Centre Blvd, SR 95 and Chenoweth Dr, SR 95 and Lake Dr, Lake Havasu Ave and McCulloch Blvd, Lake Havasu Ave and Mesquite Ave, Lake Havasu Ave and Palo Verde Blvd S, Acoma Blvd and Mesquite Ave, Acoma Blvd and McCulloch Blvd, Lake Havasu Ave and S Smoketree Ave, Lake Havasu Ave and Swanson Ave, Lake Havasu Ave and Industrial Blvd, McCulloch Blvd and Riviera Blvd, McCulloch Blvd and Capri Blvd, McCulloch Blvd and Smoketree Ave, and Palo Verde Blvd S and Kiowa Blvd S	Intersection	Agency Comment	Install retroreflective signal backplates	$522,000	Short

Funding Sources

Funding is critical to implement the safety strategies and action items in this STSP and may come from a variety of sources: Federal, State, local, and the private sector. These include standard funding program mechanisms and grants as well as new initiative grants. Some sources of funding include the following:

- Local Agency Funding. Local agencies have various funding sources that can be used to improve and maintain streets and roads and perform other safety activities. Considering the STSP strategies during the allocation of funding, especially for maintenance activities or other street and road improvement projects, can support the implementation of the STSP.

- Arizona Department of Transportation (ADOT) Railroad-Highway Grade Crossing Program administers approximately $2,300,000 annually to improve safety at public railroad crossings. A diagnostic review team consisting of representatives from ADOT, the Arizona Corporation Commission, the Federal Highway Administration (FHWA), the Railroad, and the Road Sponsor (State, City, County, or Tribe) evaluates railroad crossings and develops a list of potential projects.

- ADOT Transportation Alternatives Program (TAP) provides funding to Greater Arizona through a competitive grant program and a distribution formula that allocates funding to communities based on population. The TAP provides funding for a variety of generally smaller-scale transportation projects such as pedestrian and bicycle facilities; construction of turnouts, overlooks, and viewing areas; community improvements such as historic preservation and vegetation management; environmental mitigation related to stormwater and habitat connectivity; recreational trails; safe routes to school projects; and vulnerable road user safety assessments.

- The High Risk Rural Road (HRRR) funding set aside was eliminated in 2012 by the Moving Ahead for Progress in the 21st Century Act (MAP-21) Federal legislation. That set-aside has been replaced with a Special Rule that requires states with an increase in fatality rates on rural roads to obligate 200% of the state's 2009 HRRR funding amount, which was $1,800,000 in Arizona, meaning $3,600,000 of Highway Safety Improvement Program (HSIP) funds would be required to be used on HRRRs. The use of HRRR-related HSIP funding would become an option for Pinal County if Arizona was found to have an increase in fatalities on rural roads over the most recent two years.

- AZ State Match Advantage for Rural Transportation (SMART) Fund. The AZ SMART Fund was established by the Arizona Legislature in 2022 to assist eligible cities, towns, counties, and the Arizona Department of Transportation (ADOT) in competing for Federal discretionary surface transportation grants. The Fund is administered by ADOT, and all awards must be approved by the State Transportation Board (STB).

- Highway Safety Improvement Program (HSIP). The HSIP provides Federal funds for projects that aim to reduce traffic fatalities and serious injuries on public roads, including tribal lands and roads owned by non-state entities. ADOT manages Arizona's HSIP funds, which are approximately $40 million annually. HSIP funds are distributed via a competitive process, ranking applications based on benefit/cost analysis. The next call for Arizona HSIP project applications is expected in early 2026.

- Safe Streets and Roads for All (SS4A). The Bipartisan Infrastructure Law (BIL) establishes the new SS4A discretionary program, which will provide $5-6 billion in grants from 2022 to 2026. Funding supports regional, local, and Tribal initiatives to prevent deaths and serious injuries on roads and streets. This program offers two types of grants: a Planning and Demonstration Grant and an Implementation Grant.
  - Planning and Demonstration Grants are used to develop, complete, or supplement a comprehensive safety action plan, as well as carry out demonstration activities that are outlined in an Action Plan.
  - Implementation Grants are used to implement strategies or projects that are consistent with an existing Action Plan and may also bundle funding requests for supplemental planning and demonstration activities that are outlined in an Action Plan.

- Federal Section 164 Impaired Driving Repeat Offender Safety Program Funding. ADOT uses its allocated Federal Section 164 program funds to maintain and expand impaired driving enforcement activities statewide.

- Congestion Mitigation and Air Quality Improvement (CMAQ) Program. These Federal funds are made available to State and local governments for transportation projects and programs to help meet the requirements of the Clean Air Act.

- Strengthening Mobility and Revolutionizing Transportation (SMART) Grants Program. The SMART program was established to provide Federal grants to eligible public sector agencies to conduct demonstration projects focused on advanced smart community technologies and systems in order to improve transportation efficiency and safety.

- Federal Lands Access Program (FLAP). This program, administered through FHWA, provides funding for a wide range of transportation projects that provide access to, are adjacent to, or are located within Federal lands

- Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) Program. The PROTECT grant program provides funding through the BIL for projects that ensure transportation resilience. Examples of these types of projects include community evacuation plans or implementation projects and natural disaster planning or implementation efforts.

- Better Utilizing Investments to Leverage Developmen (BUILD) Grant. The BUILD grant awards funding through the BIL for transportation and infrastructure projects. This program replaces the previous Better Utilizing Investments to Leverage Development (BUILD) and Transportation Investment Generating Economic Recovery (TIGER) grant programs. This funding program allows for multi-jurisdictional projects, which often have a difficult time obtaining funding, to be funded with Federal dollars. Approximately half of the overall BUILD grant funding monies must be awarded to rural communities.

- MPDG Program. The MPDG opportunity contains three grant programs: the National Infrastructure Project Assistance grants program (Mega), the Nationally Significant Multimodal Freight and Highway Projects grants program (INFRA), and the Rural Surface Transportation Grant program (Rural).

- Rural Grant. The Rural Surface Transportation Grant Program provides funding for projects that aim to improve transportation infrastructure in rural areas. The aim of the program is to increase connectivity, improve safety, improve quality of life, and generate regional economic growth in rural communities.

- MEGA: The Mega Program supports large, complex projects that are difficult to fund by other means and likely to generate national or regional economic, mobility, or safety benefits. The Mega grant program funding will be made available under the MPDG combined Notice of Funding Opportunity (NOFO).

- INFRA Grant. The INFRA grant program awards funding under the MPDG combined NOFO for projects that improve safety, accessibility, efficiency, and reliability of the movement of freight and people in rural and urban areas. The aim of the program is to reduce congestion, reduce supply chain bottlenecks, and generate economic benefits.
    - Tribal Transportation Program (TTP) Safety Funds. Each year two percent of the available TTP funds are set aside to address safety issues within tribal communities. Funding is available to Tribal entities in four categories, including safety planning, engineering improvements, enforcement/EMS, and education. These funds can be used for:
    - Development and update of transportation safety plans
    - Crash data assessment, improvement, and analysis
    - Infrastructure improvements

- Governor's Office Of Highway Safety. The Governor's Office of Highway Safety (GOHS) administers National Highway Traffic Safety Administration (NHTSA) funding through grant applications. Typical projects include law enforcement activities such as targeted DUI checkpoints and improvements to crash data collection. Local agencies have utilized GOHS funding to purchase portable speed feedback trailers to rotate placement on streets experiencing speed-related crashes. GOHS funds have also been used in educational efforts, for example, to conduct mock crash demonstrations at high schools during prom season. Annual funding available through GOHS is approximately $8,000,000 in Arizona.

- Highway User Revenue Fund (HURF). The State of Arizona taxes motor fuels and collects a variety of fees and charges relating to the registration and operation of motor vehicles on the public highways of the State. These revenues are deposited in the Arizona HURF and are then distributed to the cities, towns and counties and to the State Highway Fund. These taxes represent a primary source of revenues available to the State for highway construction, improvements, and other related expenses.

Project Timelines

Key funding source application tentative dates are:

- ADOT HSIP: January-April 2026
- SS4A Grants: April-August 2025
- GOHS Grants: January-March 2025

Safety projects should be programmed and completed as soon as possible, and generally within a one to five year period, depending on the complexity of the project.

Grants Applications

Projects for safety improvements that intend to address safety issues in the region often start with a well-crafted grant funding application. Whether the grant is federal, state, or local in nature, the basic information requirements of most grants can be the same. The STSP provides some of these information requirements to agency(s) so that a grant application can be completed. The primary information provided for a project in the STSP is the project scope, high-level cost estimate, benefits strategy/CMF, and region-wide support.

Project scopes in the STSP are available for individual projects or systemic projects for some agencies in the project selection section. The scope of each of these could be used in their entirety or in addition to further scope identified by the agency. Projects that are not identified in the STSP could also be based on one or multiple of the STSP's emphasis areas or strategies and could be matched with high crash locations in the agency as they are shown in the Regional Safety Performance section of the STSP.

High-level project cost estimates for individual projects, systemic projects, or individual improvement unit costs identified in the STSP are available. For projects that were not selected from the identified project lists, the improvement unit costs could be used to aid in constructing a project cost estimate. These cost estimates can be leveraged in the grant development process to expedite the application preparation time.

Benefits of projects that are either scoped in the STSP or use the identified safety strategies can be quantified in support of a benefit-cost analysis. Each project listed in the STSP uses strategies and CMFs identified for those strategies to provide a quantifiable value of societal benefit in crash reduction. The CMFs of multiple improvements can be combined using the combined crash modification factor formula to leverage their benefits. The CMFs should be applied only to crashes that occurred at the improvement location(s) and during the prospective grant's years of interest.

.

Appendix

I. Stakeholder Input Summary

II. Public Engagement Summary

III. Network Screening Technical Memorandum

IV. Complete Streets and Vision Zero

V. Recommended Projects

Appendix I: Stakeholder Input Summary

Regional Strategic Transportation Safety Plan Update

LHMPO Technical Advisory Committee
July 25, 2023





WACOG Western Arizona Council of Governments

Lake Havasu MPO
METROPOLITAN PLANNING ORGANIZATION

Greenlight Traffic Engineering

Project Management Team

- Roland Hulse, WACOG
- Justin Hembree, LHMPO
- Mike Blankenship, Greenlight TE

Consultant Team:

- Greenlight Traffic Engineering
- United Civil Group
- GCI (The Barnhart Company)

Oversight:

- Technical Advisory Committee
- Additional input from other stakeholders

Background

26 people died and 1,244 people were injured over the past 5 years in traffic crashes in the LHMPO region

Plans will include Lake Havasu MPO and WACOG regions

Objectives

- Update 2017 Strategic Transportation Safety Plan consistent with state STSP
- Update crash data analysis and screening tools
- Position the region to compete for ADOT's HSIP funds and for SS4A, PROTECT, INFRA, and RAISE federal funds

Save Lives!



Objectives

Incorporate elements required to apply for Safe Streets & Roads for All Implementation Grants, including:

- Vision Zero
- Equity Considerations



Work Plan

1. Project Management and Coordination

- Manage consultant team
- Coordinate with:
  - LHMPO and WACOG member agencies
  - TAC
  - Other stakeholders

2. LEP Four Factor Analysis

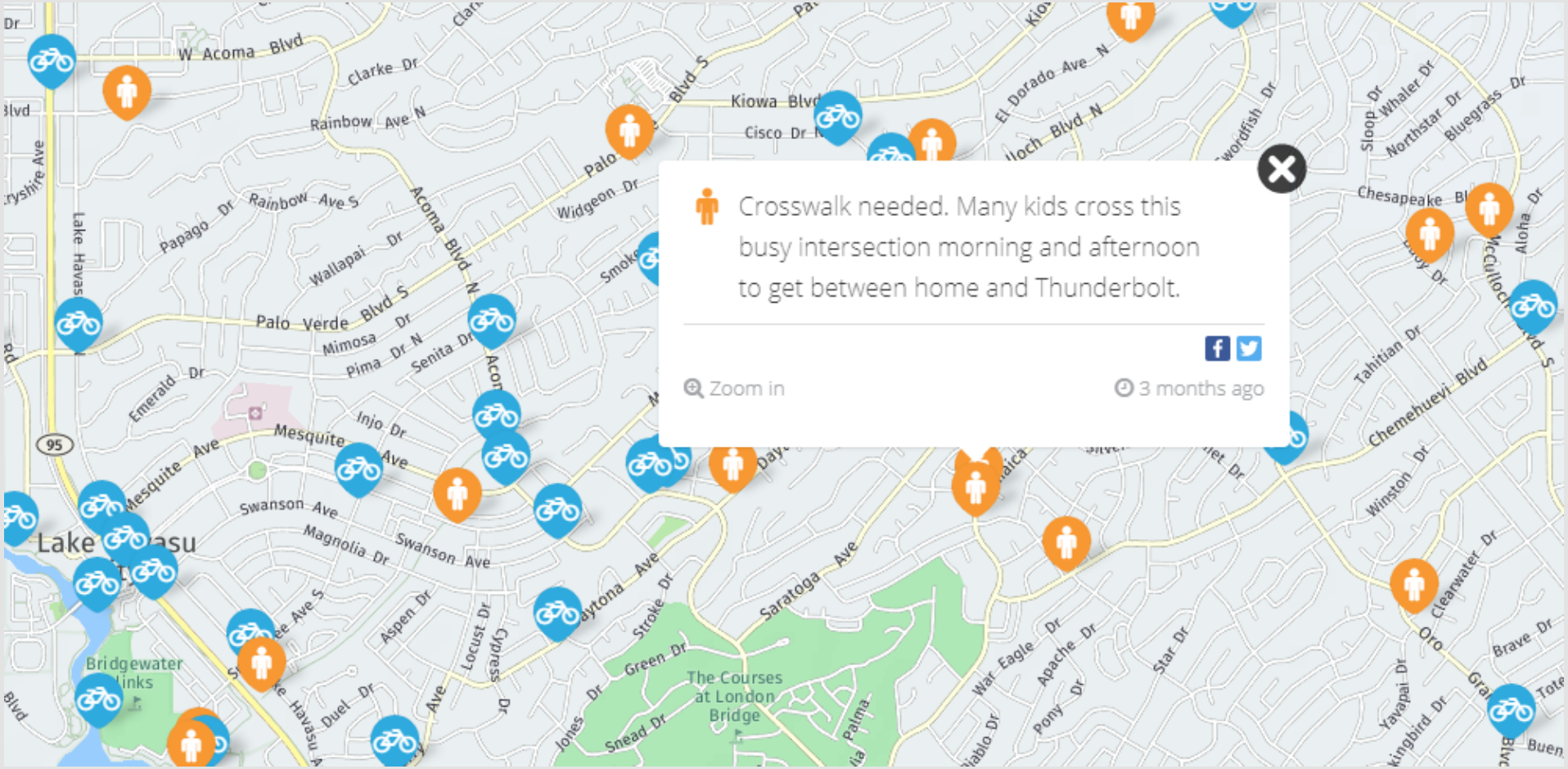
Conduct a Limited English Proficiency (LEP) Four Factor Analysis

- Determine the need for translation services
- Most recently available census data will be utilized

3. Public Outreach and Involvement

- Conduct online survey to solicit input on safety concerns
- Conduct public meeting(s)
- Make presentations summarizing key findings at:
  - LHMPO & WACOG Transportation Advisory Committee Meetings
  - LHMPO & WACOG Executive Board Meeting

Social Pinpoint Example



4. Identify and Analyze Safety Resources

Review and document all relevant federal, state, local, and regional funding resources and eligibility criteria for road safety planning and implementation

5. Reevaluate Regional Vision and Goals

Collaborate with stakeholders to update the following 2017 Vision and Goal:

- **Vision: Toward Zero Deaths by Reducing Crashes for a Safer Lake Havasu Region**
- **Goal: Reduce the number of fatalities and serious injuries in the Lake Havasu region by 3 to 7 percent during the next 5 years**



6. Network Screening and Analysis Tools Updates

- Analyze the most recent 5 years (2018-2022) of crash data from the ADOT ACIS crash database and recent 2023 data
- Present findings using various visualization formats, including GIS mapping and spreadsheet-based tools

6. Network Screening and Analysis Tools Updates

Update crash data analysis tools that were developed for the 2017 STSP:

- Crash Data Dashboard
- Intersection Ranking Tool
- Road Segment Sliding Window Tool

Intersection	ADT	Crash Frequency	Crash Rate	Severity Index	PI Rank
SR 95 & Kiowa Blvd	26481	103	1.07	1.89	1
SR 95 & Acoma Blvd South	19898	76	1.05	1.97	2
SR 95 & Mesquite Ave / London Bridge Rd	20909	126	1.65	1.58	3
Lake Havasu Ave & McCulloch Blvd	23312	101	1.19	1.62	4
Lake Havasu Ave & Mesquite Ave	23980	129	1.47	1.47	4
SR 95 & Palo Verde Blvd North	21345	69	0.89	1.98	6
Acoma Blvd & McCulloch Blvd	22514	99	1.20	1.46	7
Acoma Blvd & Palo Verde Blvd South	21198	74	0.96	1.71	8
SR 95 & Mulberry Ave	21308	66	0.85	1.85	8
SR 95 & Palo Verde Blvd South	24834	76	0.84	1.72	8
SR 95 & Oro Grande Blvd	19349	72	1.02	1.66	11
SR 95 & Swanson Ave	23410	71	0.83	1.82	12
McCulloch Blvd & Smoketree Ave	18530	66	0.98	1.60	13
Lake Havasu Ave & Swanson Ave	18042	73	1.11	1.36	14
SR 95 & Smoketree Ave	21530	60	0.76	1.83	14
SR 95 & Industrial Blvd	27822	44	0.43	1.90	16
McCulloch Blvd & Riviera Blvd	12649	20	0.43	2.11	17
Lake Havasu Ave & Mulberry Ave	9583	28	0.80	1.49	18
SR 95 & Acoma Blvd West	23390	48	0.56	1.59	18
SR 95 & London Bridge Rd	18937	7	0.10	3.06	20

7. Emphasis Areas, Goals, and Performance Measures

Update Emphasis Areas from Previous Plans:

LHMPO 2017 Plan:
- Impaired Driving
- Pedestrians
- Older Drivers
- Bicyclists

WACOG 2018 Plan:
- Lane Departure
- Occupant Protection
- Speeding
- Impaired Driving
- Older Driver
- Distracted Driving
- Heavy Vehicle



8. Prioritization of Safety Needs

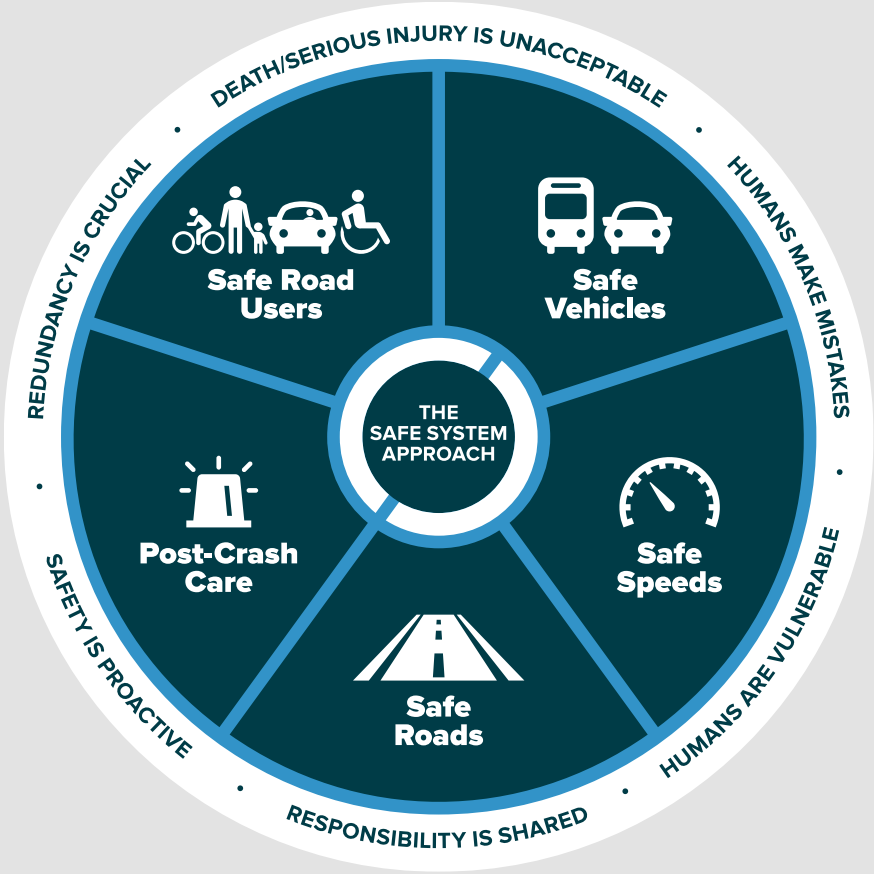
- Identify high crash risk intersections and segments
- Develop safety strategies for emphasis areas





8. Prioritization of Safety Needs

Incorporate Safe System approach into safety strategies



9. Performance Measure Analysis and Progress Tracking Reports

Evaluate the region in comparison to the state's safety performance targets. Current targets are:

- Number of Fatalities +2.0%
- Rate of Fatalities +2.0%
- Number of Serious Injuries -7.0%
- Rate of Serious Injuries -8.0%
- Number of Non-Motorized Fatalities & Serious Injuries -1.0%

10. Update Implementation Plan

Develop a usable implementation plan that:

- Identifies large-scale steps to address carrying out the STSP
- Develops an evaluation strategy
- Identifies roles and responsibilities of stakeholders
- Develops schedule for implementation of safety strategies

11. Draft and Final Plan

- Develop a draft Safety Plan summarizing findings from Tasks 1-10
- Distribute to the TAC for their review and comments
- Incorporate TAC's comments into a final Safety Plan

12. Crash Data Analysis Tools and Training

- Annual updates through fiscal year 2027 for the Crash Data Analysis and Tools
- Conduct annual data workshops with the TAC and key stakeholders

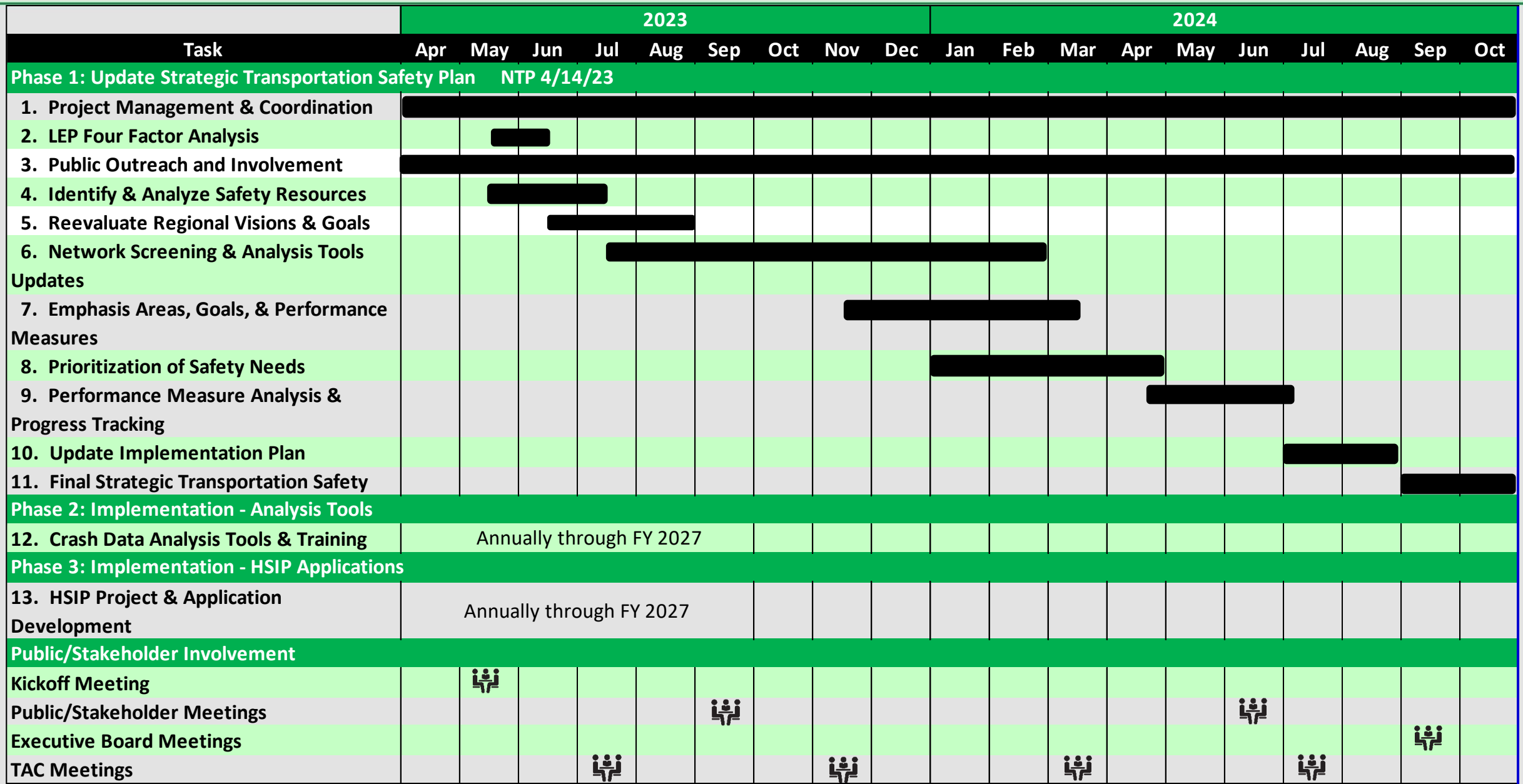
13. HSIP Project and Application Development

- Develop Highway Safety Improvement Program (HSIP) applications for funding safety projects FY23 to FY27

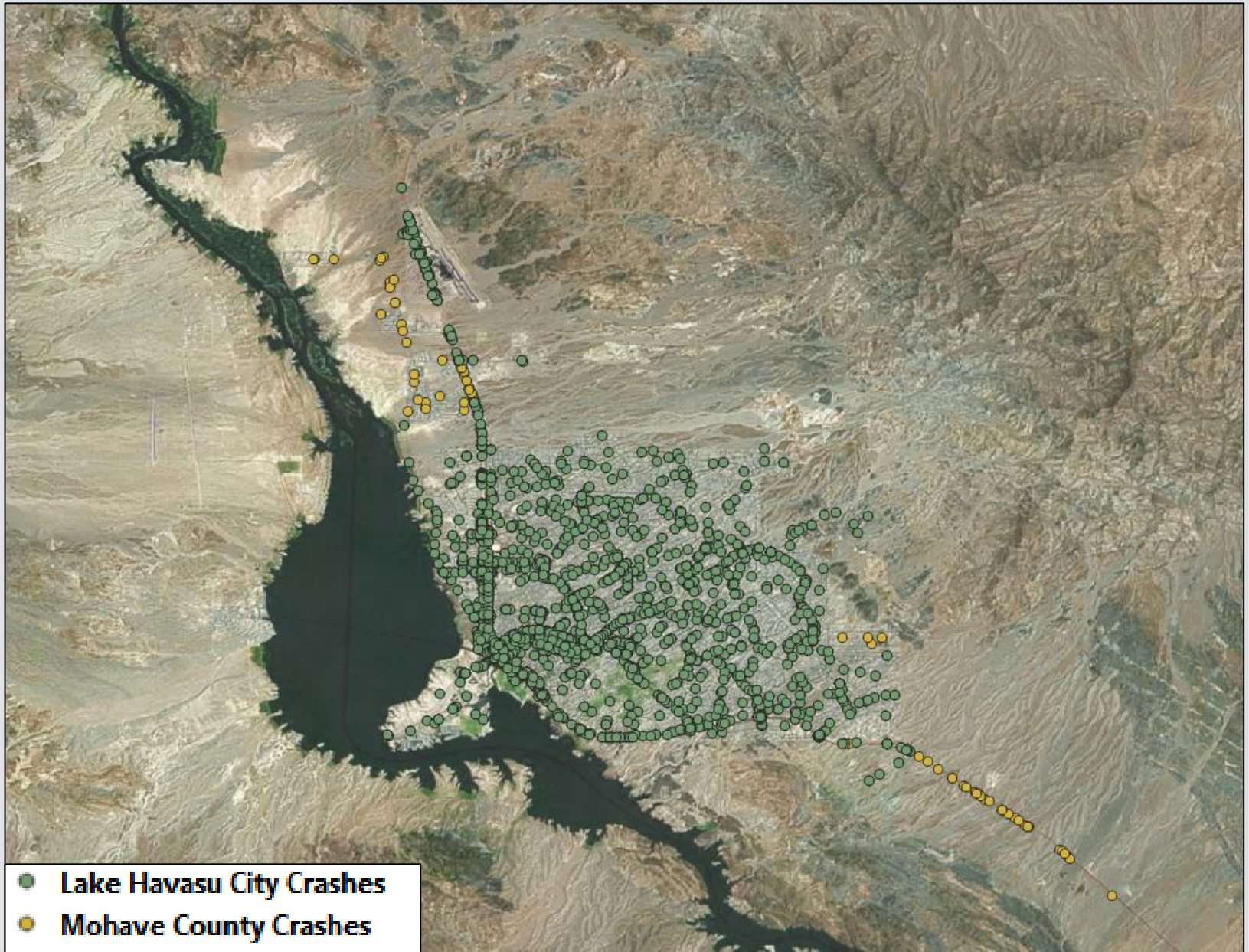
Lake Havasu MPO
METROPOLITAN PLANNING ORGANIZATION

Schedule

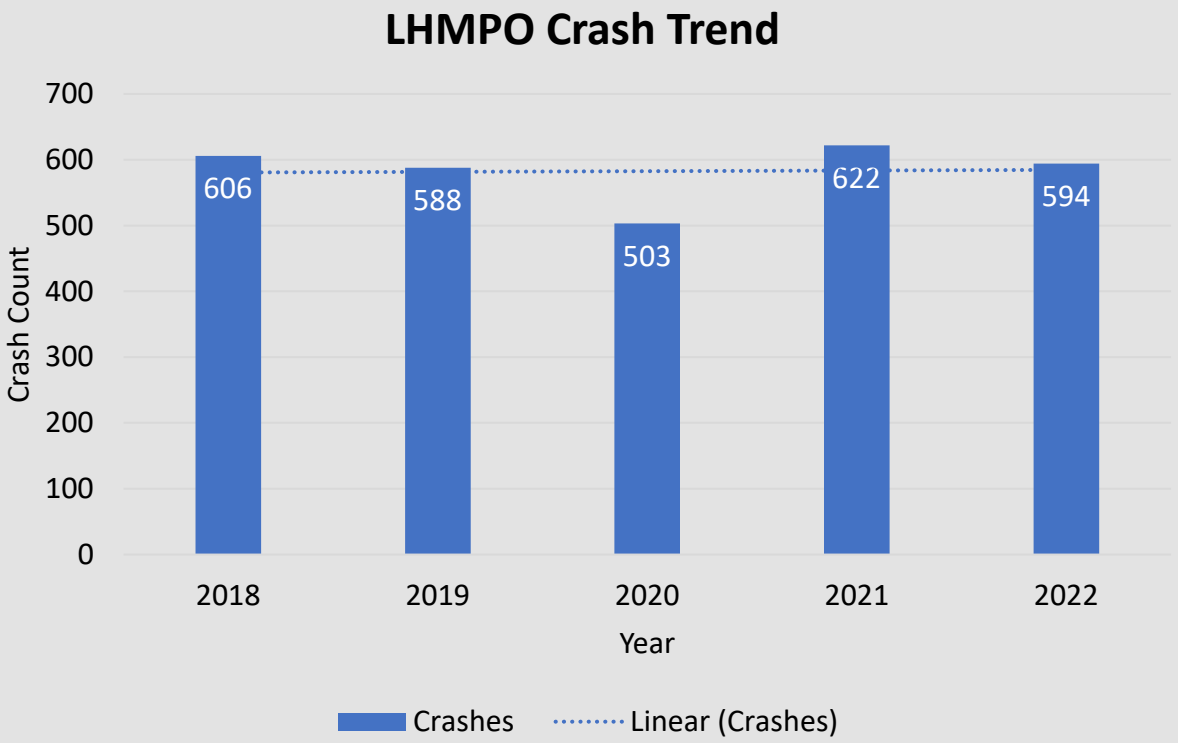
Greenlight Traffic Engineering

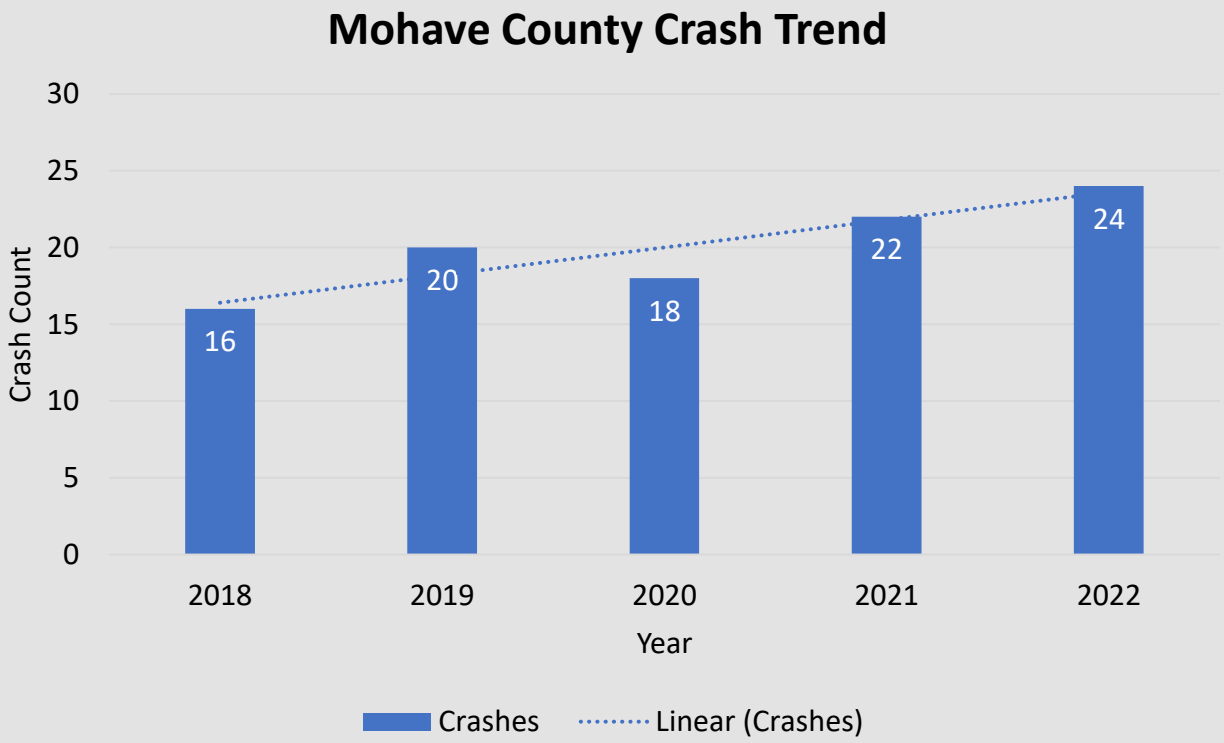


Crash Analysis



Crash Analysis





Source: ADOT crash data from 2018 to 2022

Crash Analysis

Agency	No Injury	Possible Injury	Suspected Minor Injury	Suspected Serious Injury	Fatal	Grand Total
Lake Havasu City	1,896	331	446	117	23	2,813
Mohave County	66	6	21	6	1	100
Grand Total	**1,962**	**337**	**467**	**123**	**24**	**2,913**

Source: ADOT crash data from 2018 to 2022
Note: County data includes all non-listed agencies and unincorporated entities in their areas.

Crash Analysis

Crash Manner	No Injury	Possible Injury	Suspected Minor Injury	Suspected Serious Injury	Fatal	Grand Total
Angle (Front To Side)(Other Than Left Turn)	445	89	128	25	1	688
Head On	30	6	20	10	4	70
Left Turn	199	34	56	13	3	305
Other	80	13	30	11	3	137
Rear End	520	132	95	14	4	765
Rear to Rear	2			1		3
Rear To Side	10					10
Sideswipe Opposite Direction	41	5	3	5	1	55
Sideswipe Same Direction	294	13	15	4		326
Single Vehicle	316	41	118	40	8	523
U Turn	7	3	1			11
Unknown	18	1	1			20
Grand Total	**1,962**	**337**	**467**	**123**	**24**	**2,913**

Crash Analysis

Violation	No Injury	Possible Injury	Suspected Minor Injury	Suspected Serious Injury	Fatal	Grand Total
Aggressive Driving	3	1	2			6
Crossed Median			1			1
Did Not Use Crosswalk			3	3	1	7
Disregarded Traffic Signal	56	23	30	5	1	115
Drove Left Of Center Line	11	6	5	5	3	30
Drove Rode In Opposing Traffic Lane	4	2	1	1		8
Exceeded Lawful Speed	22	5	14	6	2	49
Failed To Keep In Proper Lane	121	8	22	11	1	163
Failed To Yield Right Of Way	366	58	110	22	2	558
Followed Too Closely	75	11	11			97
Made Improper Turn	135	15	16	3		169
No Improper Action	176	16	49	12	2	255
Other	148	18	19	8		193
Other Unsafe Passing	3	1	1			5
Passed In No Passing Zone	9					9
Ran Stop Sign	40	14	12	4	1	71
Speed Too Fast For Conditions	507	135	141	38	8	829
Unknown	153	13	22	5	3	196
Unsafe Lane Change	133	11	7			151
Wrong Way Driving			1			1
Grand Total	**1,962**	**337**	**467**	**123**	**24**	**2,913**

Source: ADOT crash data from 2018 to 2022

Crash Analysis

Safety Device	Crashes	% of Crashes	Serious Injury	% of Crashes	Fatal	% of Crashes
Air Bag Deployed	1	**0.0**		**0.0**		**0.0**
Air Bag Deployed/Shoulder-Lap Belt	12	**0.4**	1	**0.8**		**0.0**
Helmet Used	33	**1.1**	9	**7.3**		**0.0**
Lap Belt	71	**2.4**	2	**1.6**		**0.0**
None Used	141	**4.8**	29	**23.6**	11	**45.8**
Not Applicable	79	**2.7**	14	**11.4**	1	**4.2**
Not Reported	9	**0.3**		**0.0**		**0.0**
Other	1	**0.0**		**0.0**		**0.0**
Shoulder And Lap Belt	2,200	**75.5**	53	**43.1**	10	**41.7**
Unknown	366	**12.6**	15	**12.2**	2	**8.3**
Grand Total	**2,913**	**100.0**	**123**	**100.0**	**24**	**100.0**

Source: ADOT crash data from 2018 to 2022

Contact Information

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  - hembreej@lhcaz.gov

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  - mikeb@greenlightte.com

Appendix II: Public Engagement Summary

Lake Havasu MPO
METROPOLITAN PLANNING ORGANIZATION

Lake Havasu Metropolitan Planning Organization
Strategic Regional Transportation Safety Plan

Survey Summary

November 2024



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Lake Havasu Metropolitan Planning Organization
Strategic Regional Transportation Safety Plan - Survey Summary

Background

Lake Havasu MPO (Metropolitan Planning Organization) launched a survey along with an interactive portal to begin collecting community feedback about transportation safety concerns and driver habits. The Survey was launched in April of 2024 and closed on October 31, 2024. During this time the team received a total of 75 responses. The survey was promoted by Lake Havasu MPO using their social media platforms in addition to attending public events.

Social Media Post

Account: Lake Havasu MPO



Events

Lake Havasu City Council Public Meeting



Below is a list of Facebook posts and shares.

- June 17, 2024 – Shared by Lake Havasu City Municipal Government
- June 19, 2024 – Shared by Lake Havasu City Municipal Government / Councilwoman Campbell / Havasu Opinions
- June 21, 2024
- July 22, 2024 – Shared by Lake Havasu City Municipal Government / Councilwoman Campbell / Havasu Opinions.
- July 24, 2024 – Shared by Lake Havasu City Municipal Government
- July 26, 2024 – Spanish post
- October 3, 2024 – Shared by Councilwoman Campbell
- October 7, 2024
- October 15, 2024 – Shared by Havasu Opinions

Collateral

Below is a copy of the the physical and digital copy that was used to provide a plan updates and survey link. All material was made available in both English and Spanish.





Survey Summary

Response Methods Utilized

During the ten-month outreach period, the team received a total of 75 surveys.

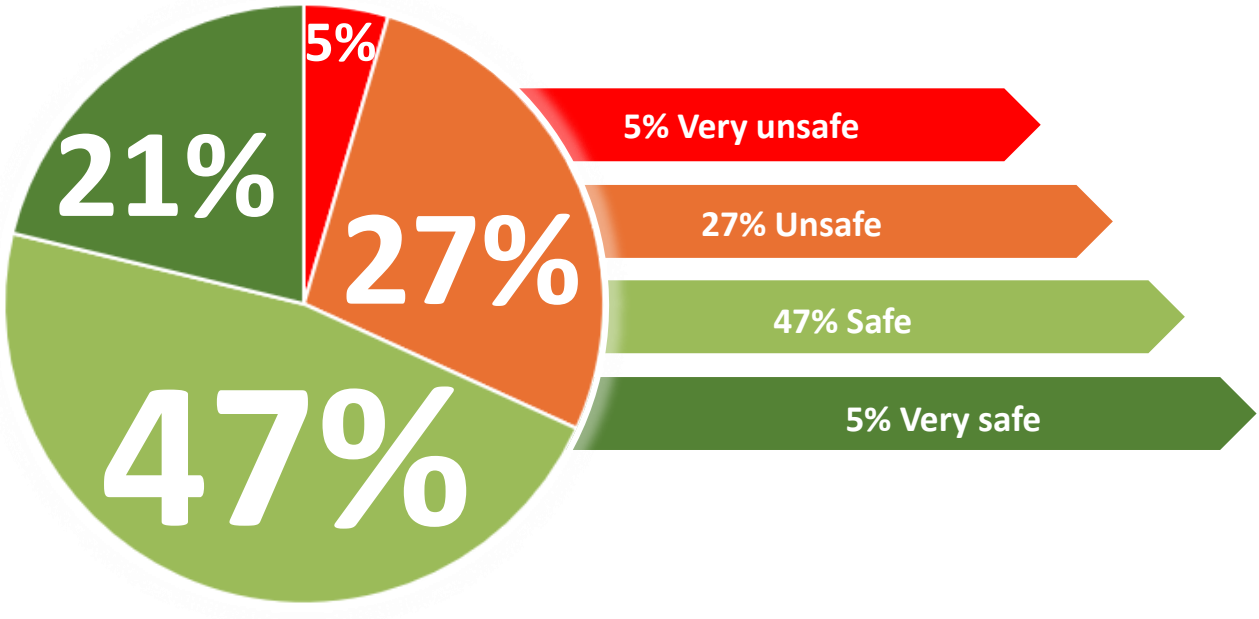
How frequently have you observed drivers doing the following?

	Never	Occasionally	Often
Texting or talking on a cell phone	1%	25%	**74%**
Speeding	0%	27%	**73%**
Failure to use turn signal	1%	28%	**71%**
Not stopping completely at a stop sign	8%	34%	**58%**
Tailgating/ following too closely	4%	44%	**52%**
Drunk or drugged driving	13%	**65%**	22%
Illegal/unsafe turns	10%	**65%**	25%
Not stopping at crosswalks	11%	**63%**	26%
Driving too slowly	7%	**57%**	36%
Reckless (careless) driving	10%	**56%**	34%
Not stopping for a red light	19%	**55%**	26%
Passing illegally (hill or curve, across double yellow lines)	15%	**54%**	31%
Unsafe driving in school zone	33%	**47%**	20%
Not wearing seat belts	39%	**46%**	15%

How safe is it on the streets for the following people?

	Very Safe	Safe	Unsafe	Very Unsafe
Elderly and or disabled persons	2%	35%	54%	9%
Bicyclist	0%	28%	52%	20%
Motorcyclist	0%	45%	45%	10%
Pedestrians	3%	43%	43%	11%
Drivers	9%	60%	28%	3%

How safe do you feel traveling in the community?



Lake Havasu Metropolitan Planning Organization
Strategic Regional Transportation Safety Plan - Survey Summary

What word best describes the behavior of drivers on area streets?



- 23% Hurried
- 22% Inattentive
- 19% Distracted
- 11% Frustrated
- 10% Angry
- 5% Intoxicated
- 5% Safe
- 4% No different than anywhere else
- 1% Other

Which statement below best describes safety attitudes in the community?



- 33% We care about the safety of all road users.
- 33% We don't exhibit a lot of care about road safety.
- 30% We care about the safety of drivers, but vulnerable road users are left out (pedestrians/ bikes/motorcycles/elderly.
- 4% We particularly care about the safety of vulnerable road users (pedestrians/bikes/ motorcycles/elderly)

What do you think is the primary cause of crashes in the area?
**All comments have been organized by theme and are listed verbatim in the appendix.*

The community has identified speed, driver distractions, and cellphone use to be the three main concerns safety concerns. Below is a percentage breakdown of what residents believe to be the main contributor to the crash data.



- 36% Speed
- 30% Distracted drivers
- 10% Cellphone use
- 6% Age
- 6% Bad driver habits
- 4% Drivers under the influence
- 3% Driver education
- 3% Road conditions enforcement
- 2% Signal timing

What do you think needs to be changed to make it safer to travel?
**All comments have been organized by theme and are listed verbatim in the appendix.*

The community believes that the top contributors to increasing public safety will be better police enforcement combined with better infrastructure, roadway, and traffic signal improvements.



- 39% Police enforcement
- 21% Driver education
- 16% Traffic signal improvements
- 6% Bike and ped. improvements
- 6% Policy changes
- 4% Roadway improvements
- 4% Public transit
- 2% Cellphone
- 2% Road Maintenance

Where do you live?
- 94% Lake Havasu City
- 2% Bullhead City
- 2% Kingman
- 2% Parker

Primarily, I'm responding as a…
- 93% Motorist
- 7% Bicyclist

What is you age?
- 28% 55-64 years old
- 22% 65-74 years old
- 17% 45-54 years old
- 16% 35-44 years old
- 7% 25-34 years old
- 5% 75 years or older
- 3% 16-24 years old
- 2% Prefer not to answer

With which gender do you identify?
- 49% Male
- 47% Male
- 4% Prefer not to answer

Interactive Map Exercise

At the end of the original survey, residents were given the option to also participate in an interactive mapping exercise. The mapping tool outlined the study area and allowed for participants to place color coordinated pins to identify an area of concern or of personal experience. The **blue** and **green** pins are locations that received individual comments and the **light green circles** are more concentrated areas that also received multiple comments. All comments have been listed by mode of transportation below.



Driving

14 Comments Received

Driving	
Location	**Comment**
721 Havasupai Boulevard	Needs to be signalized to prevent high number of crashes
25 Riviera Boulevard	Needs to be signalized
2260 Smoketree Avenue North	Needs to be signalized
35 South Acoma Boulevard	Needs to be signalized
2660 Sweetwater Avenue	Block W traffic on Sweetwater between Acoma and Sturgeon. Widen Ballard Way between Acoma & Sturgeon. Make Sweetwater from Acoma to Ballard Way, one way West. This would end the insane traffic conditions at 95 and Acoma.
Arizona Highway 95	Make 95N right hand turn signal shorter. Allowing traffic on LH Ave to start earlier going N & S. This should ease congestion on LH Ave.
1265 Pawnee Drive	Most only take their foot off the gas and cruise thru the School Zone @ 30 MPH
Arizona Highway 95	Too many red-light runners on AZ95
2500 Chenoweth Road	North bound turning lane do not always get triggered. Will go 3 cycles before turning or having to run a red light.
Arizona Highway 95	Southbound turning lane only lets 2-3 cars even if there's 6+....
491 Mulberry Avenue	The wait at this intersection is too long, and lights turn green when no one is waiting on the west side. It is the only intersection in this entire city that is designed this way for some reason. It is a major slowdown for everyone.
2040 North Palo Verde Boulevard	Need flashing yellow light warning drivers light is about to turn. Drivers run light because there is not enough waring to slow down and stop. Speeding. Speed limit approaching light is 45, but most going a lot faster in this stretch of highway 95.
3580 Sweetwater Avenue	Drivers making a right turn on red light do not leave enough room for oncoming traffic.
3210 Oro Grande Boulevard	Drivers turning right on red light, pulling out in front of northbound drivers, requiring drivers to brake or switch lanes.



Biking

2 Comments Received

Biking	
Location	**Comment**
3970 McCulloch Boulevard	No bike lanes, fast traffic. Some drivers even get angry at pedestrians.
349 Tumamoc Drive	I share the road with the cars, but they don't see me. Most people are texting or talking on the phone, and many have the sun in their eyes and aren't thinking there may be walkers or bikers. I have had many encounters with people trying to hit me because they are angry that bikes or runners are out, and many don't understand the road is a shared use pathway. Cars Park on the shoulders making it impossible to ride on the side and sidewalks are less safe. There is too much traffic in the town. It was not designed to accommodate this many vehicles or bikes and people walking or running. Many areas are mostly potholes or have so much filler the cracks open in the summer with the heat and suck in your bike tire or shoe

Appendix – Survey Comments

What do you think is the primary cause of crashes in the area?	
Theme	**Open-Ended Response**
Age	Age of older drivers
	Elderly drivers.
	Age
	elderly drivers.
Bad driver habits	People not obeying traffic laws, specifically the elderly with a slower reaction time and their obliviousness of others.
	following too close
	Do not know rules at 4 way stops
	General lack of respect for others.
Cellphone use	Cell phone distractions
	Cell phones
	Cell phone use gets all sorts of problems.
	Cell phones
	Phones
	Texting
	USING CELL PHONES WHILE DRIVING OR JUST PLAIN NOT PAYING ATTENTION
Distracted drivers	Inattentive drivers,
	Distracted (3 responses)
	Distracted drivers going to fast
	Distracted driving
	Distracted, inattentive drivers
	Distracted, inattentive, heavy traffic especially on weekends
	Distraction and passing a slow moving vehicle
	Impatience
	Inattention and hurried drivers
	Inattentive drivers (3 responses)
	Inattentive, distracted drivers
	not paying attention to others
	Not paying attention to your surroundings.
	Not paying attention, distractions, speed
	Running stop lights / signs, likely due to inattentive driving
	Talentless operators that are distracted easily
Driver education	Drivers who tow without proper training
	Driving skills
Drivers under the influence	Drunk driving.
	Impairment
	Intoxicated
Road conditions	the roads can be confusing to new comers which may cause accidents.
	Lane markings, signage too small
Speed	95 speed and timing of lights

Speed	Being in a hurry
	Driving under the posted speed limit
	Hurried
	Speed over distance average speed to get across town (unless you are lucky enough to have a long un-interrupted by stops route such as 10 miles of McCulloch over the eastern side) is between 12-16 mph (I know I have clipboard this personally) Smiths to the London Bridge is about 2 miles and unless you are driving at 4am, it takes about 10 minutes - that is an average of 12 mph, even though you might get up to 35 mph up to a red light. This is hugely expensive in lost time, wear and tear on vehicles and greatly increases driver stress.
	Impatience
	hurried driving
	Inattention, speed.
	Speed and distracted drivers.
	People in a hurry
	People in a hurry (late for work, ect.)
	Speed (4 responses)
	Speed and inattentive
	Speed, inattentiveness, DUI
	Speed, under the influence, rushing through the stop signs
	Speeding & inattentive driving.
	Speeding, distracted drivers
	speeding, distractions, cell phones, and no emotional control
	Speeding, drunk driving on the holidays, and distractions
	Speeding, inattentive drivers,
	The mix of slow drivers going 10 mph under the speed limit and those who don't know how to use a stop sign with more than 4 lanes
Signal timing	stop lights need better delays for all aspects

What do you think needs to be changed to make it safer to travel?	
Theme	**Open-Ended Response**
Bike and pedestrian improvements	Less distractions, more pedestrian oriented infrastructure for the safety of non-vehicle users on the road).
	Sidewalks throughout the city
	Designated areas for bicyclists to travel. Either on bike paths or shoulders of the road with bike safety signs.
Cellphone	No texting
Driver education	I think send out reeducation on how to properly address four way stops
	I'm in favor of mandatory periodic driving tests, say every 10-15 years.
	Make unsafe slow drivers take a driving test.
	More awareness of the laws
	Don't know how you can change human behavior
	Drivers pay more attention to driving
	More frequent behind the wheel testing of elderly drivers and implementation of something like an AZ operating license for snowbirds.
	reminders of how to handle 3 and 4 way stops
	Slow traffic on highway
	Smarter people that are more aware of their surroundings.
Roadway improvements	A bypass road that takes congestion from the 95.
	Roundabouts at 4-way stops or 4-way stop enforcement
Police enforcement	POLICE CITATIONS FOR CELL PHONE USE WHILE DRIVING AND ILLEGAL RED LIGHT RUNNERS, SPEEDERS, STOP SIGN RUNNERS
	start ticketing drivers that don't obey simple laws
	Stricter enforcement. DUI checkpoints and red-light cameras.
	The presence of traffic enforcement will hold people accountable.
	Ticket excessive speed. McCulloch Blvd near the police station I am passed by nearly everyone and I'm driving at 38 mph
	Added officers patrolling streets & roadways.
	Better enforcement of cell phone distracted drivers
	Enforcement actions on speeding, red light runners (with stop/go lights not coordinated there are lots of these,).
	Enforcement of speed, observation of older drivers
	Fund more police
	Increased police patrols near high accident areas.
	Larger traffic division in police department
	More attentive policing. Education of how 4-way stops work
	More DUI enforcement and frequent senior citizen driving evaluations.
	More enforcement
	More MC police. They seem to be the only ones pulling people over for speeding or stupidity. Fine people that are on their phones!
	More police on the roads
	More visibility of PD and MCSO
	More traffic enforcement by LHCPD

Policy changes	Requirements for elderly to get tested earlier and better roads so that slower traffic can stay in the right lane the outer lanes are so bumpy it's unsafe to drive in that lane so everyone uses the left lane and then people drive side by side going slow so nobody can pass
	Traffic laws should be enforced a bit more.
	Elderly driver consequences, DUI enforcement
Public transit	Less cars on the road We are not set up for heavy traffic with our roadways
	More ride options
Road maintenance	construction more carefully done (there's been a lot of loose nails and potholes just left)
Traffic signal changes	Possibly streetlights at the bigger intersections instead of 4 way stops. maybe look at roundabouts. Enforcement of speed or increase passing lanes on 95 heading towards Parker
	stop lights need better delays for all aspects
	We need signals where the stop signs are not all of them, however in the major intersections
	Fixing the lights on hwy 95 so a person doesn't have to stop at every intersection
	Longer pause after yellow/red for opposing traffics green to start. Too many drivers trying to be the yellow.
	More traffic lights
	my top priority would to be get a signal at Ora Grande and Highway 95 a lot like Mulberry.
	Light timing study,

Appendix III: Network Screening Technical Memorandum

WACOG Strategic Regional Transportation Safety Plan

Network Screening Methodology

Final Report





Prepared By



September 2024

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Appendix A – Top 20 Priority Intersections

Appendix B – Top 20 Priority Segments

1.0 Introduction

United Civil Group (UCG) developed an interactive dashboard using Power BI to analyze Western Arizona Council of Governments (WACOG) and Lake Havasu Metropolitan Planning Organization (LHMPO) crash data. The dashboard provides a comprehensive visual overview of patterns, trends, and key factors that contribute to the reported crashes. **Figure 1** illustrates a summary overview of the interaction tool. By selecting various filters on the graphs and charts, key metrics are identified. By applying relevant filters, such as Collision Manner, Weather Conditions, Lighting Conditions, Violation, Physical Description, Agency and/or Injury Severity, the data is focused on the particular information needed. The data can also be analyzed on a year to year basis to identify trends over time.

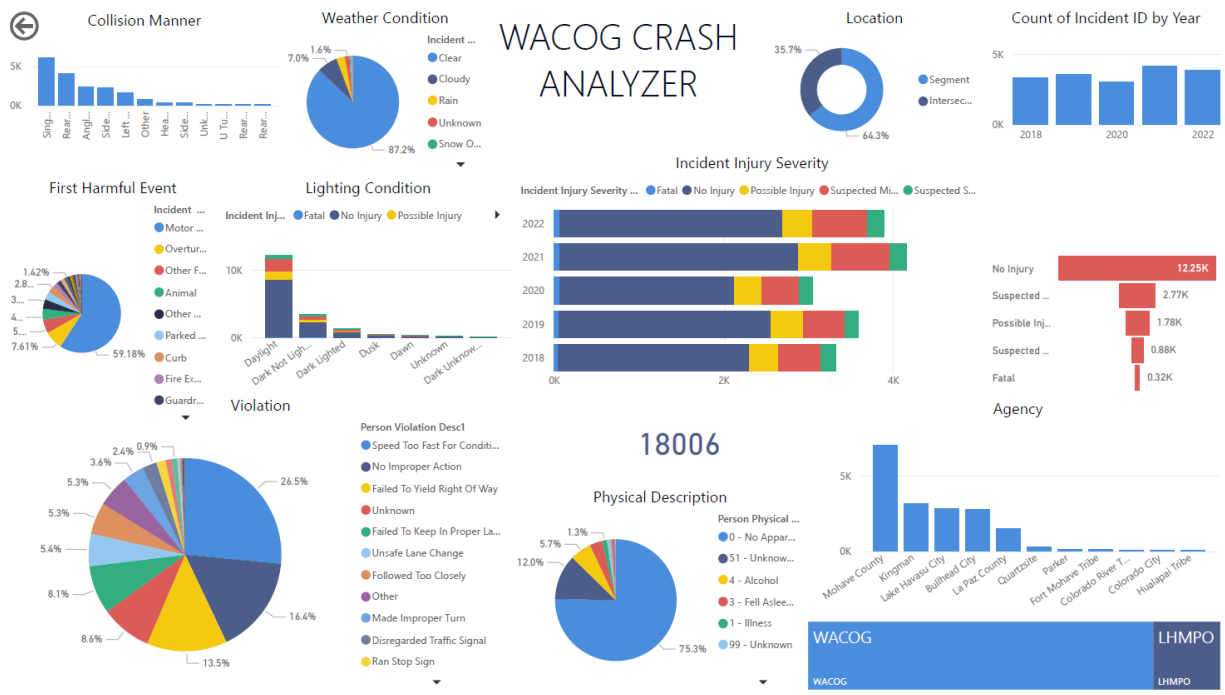


Figure 1. WACOG Crash Analyzer

2.0 Crash Data

The crash data was obtained from Arizona Department of Transportation's (ADOT) Arizona Crash Information System (ACIS). ACIS is a database that collects and stores detailed information about traffic crashes that occurred within the State of Arizona. The data used to populate ACIS is gathered by local police departments, county sheriff's offices, tribal law enforcement, and the Arizona Department of Public Safety (DPS). The information recorded by law enforcement officers is compiled into official crash reports and submitted to ADOT, these reports provide the foundational data for the ACIS system.

For this assessment, data was queried over a 5-year period, January 1, 2018, through December 31, 2022. Within the WACOG and LHMPO regions a total of 18,006 crashes were analyzed, 15,093 within the WACOG region and 2,913 within the LHMPO region. According to the officer on scene, 11,575 crashes were reported as segment crashes (not associated with an intersection) and 6,431 were noted as intersection related. **Figure 2** illustrates all crashes using a heat map within the WACOG and LHMPO regions. This interactive map also shows the percent comparison of severity by region.

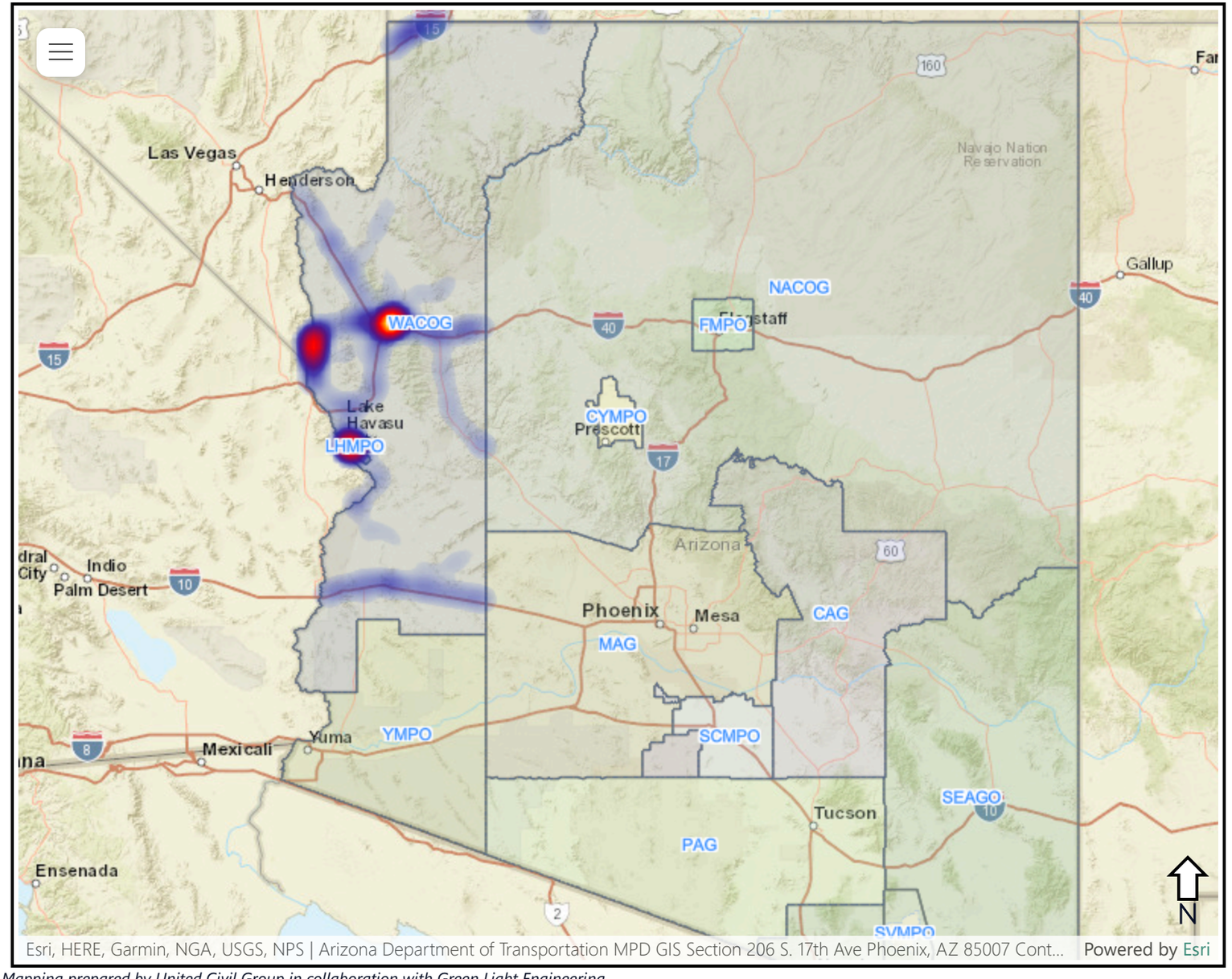
Suspected serious injury and fatal crash maps were created for each agency within the WACOG and LHMPO regions as shown in **Figures 3 through 12**. **Table 1** presents all crashes by agency and injury severity.

Table 1. All Crashes by Agency and Injury Severity 2018 - 2022

Agency	No Injury	Possible Injury	Suspected Minor Injury	Suspected Serious Injury	Fatal	Total
Mohave County	4,550	598	1,273	459	182	7,062
Kingman	2,353	318	352	106	13	3,142
Lake Havasu City	1,896	331	446	117	23	2,813
Bullhead City	1,996	374	312	76	32	2,790
LaPaz County	1,001	107	262	86	46	1,502
Quartzsite	177	15	49	10	11	262
Parker	107	21	8	4	-	139
Fort Mohave Tribe	79	7	38	7	3	134
Colorado River Tribes	52	3	16	9	6	86
Colorado City	36	9	9	9	1	64
Hualapai Tribe	7	1	2	1	1	12
TOTAL	12,253	1,784	2,767	884	318	18,006

For the intersection and segment analyses, the officer's description of the incident location was used. However, because local law enforcement agencies and the Arizona Department of Public Safety (DPS) use different nomenclature and abbreviations, UCG standardized some locations to ensure data compatibility. For example, a DPS officer might record a crash at SR95/M184, while a Lake Havasu Officer might record the same crash at SR95/Acoma Blvd.

WACOG & LHMPO
Crash Heat Map 2018 - 2022



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Incident Injury Severity	LHMPO	WACOG	Total
No Injury	1962	10291	**12253**
Suspected Minor Injury	467	2300	**2767**
Possible Injury	337	1447	**1784**
Suspected Serious Injury	123	761	**884**
Fatal	24	294	**318**
Total	**2913**	**15093**	**18006**

Percent Comparison Injury Severity

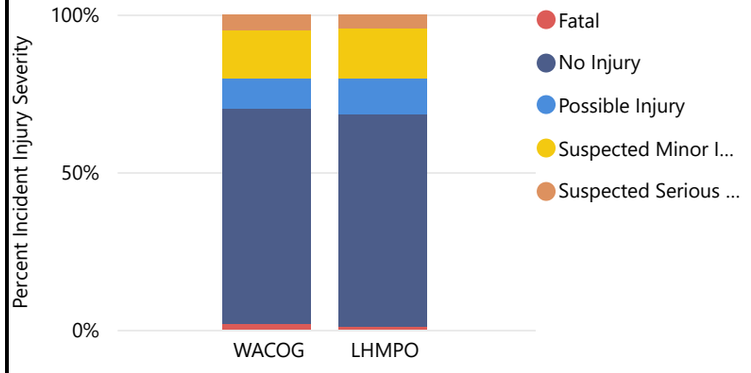
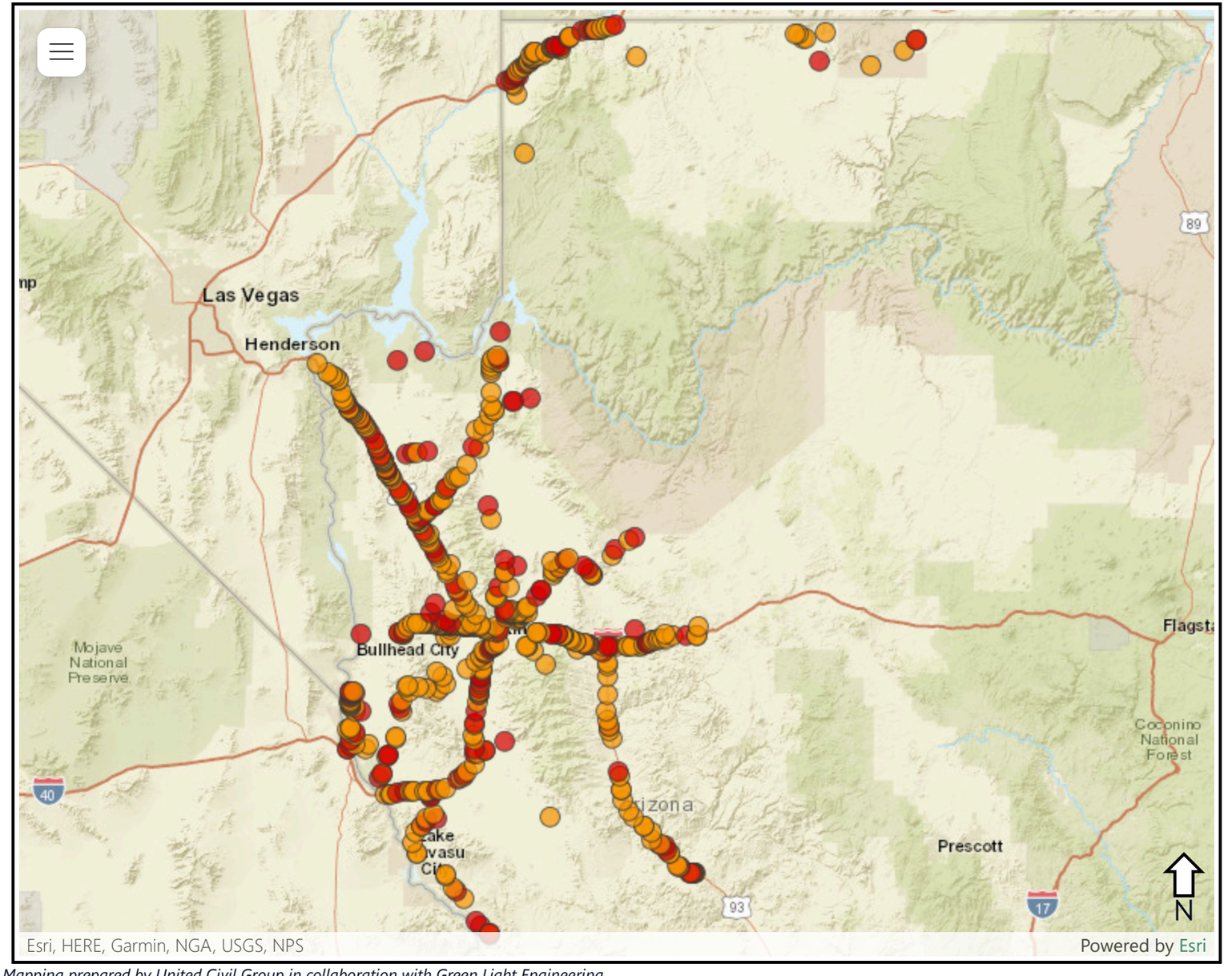


Figure 2. Crash Heat Map 2018 - 2022
WACOG & LHMPO

United Civil Group

Mohave County

Serious Injury and Fatal Crashes 2018-2022



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Description	Crashes
No Injury	4550
Suspected Minor Injury	1273
Possible Injury	598
Suspected Serious Injury	459
Fatal	182
Total	**7062**

Legend

- Suspected Serious Injury
- Fatal

Agency

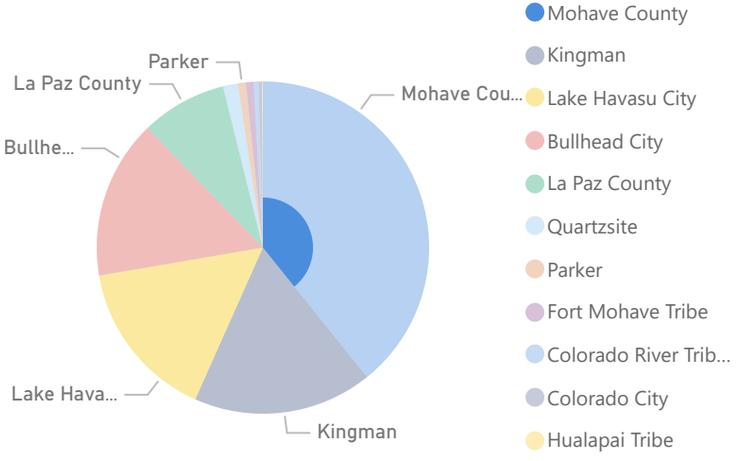
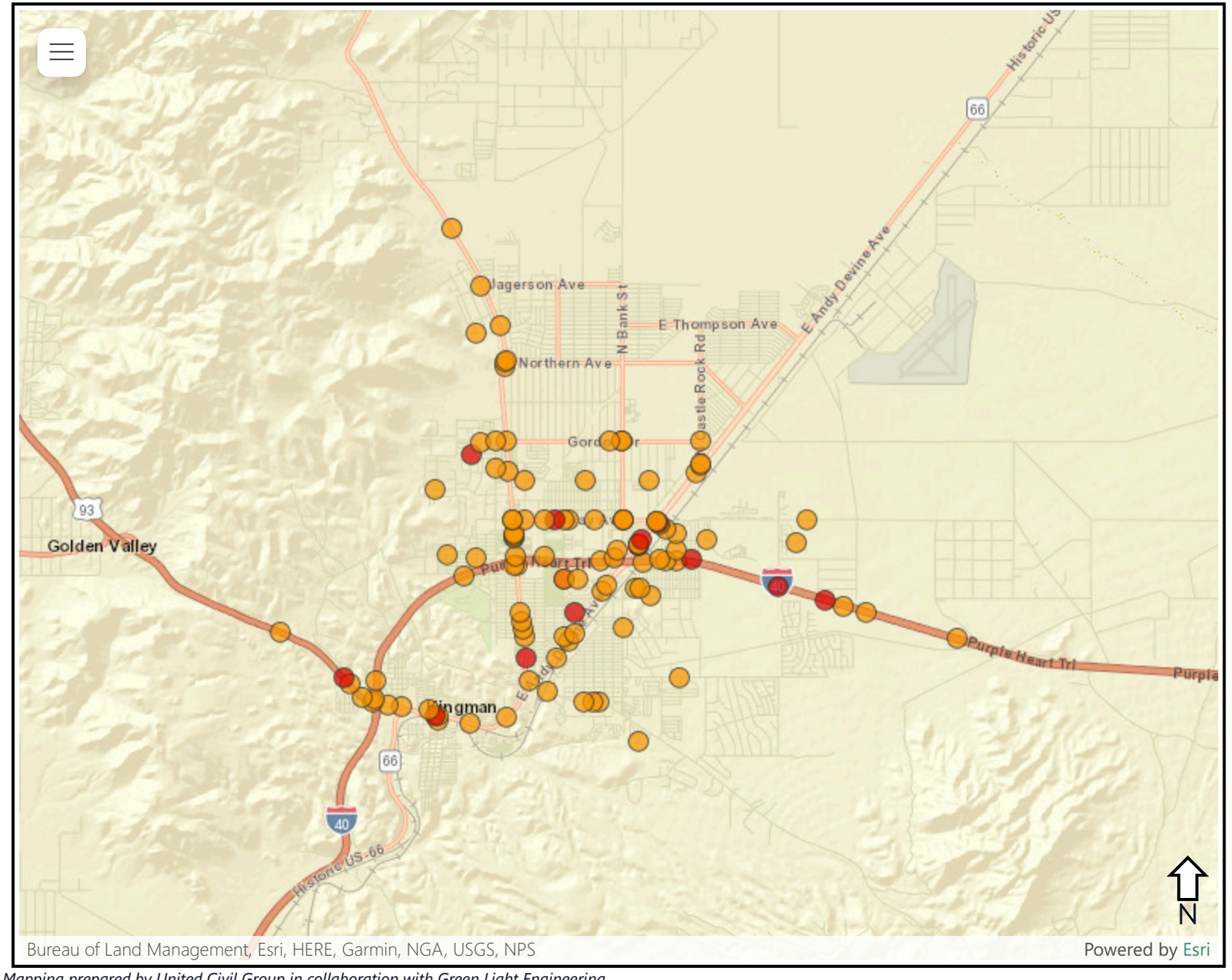


Figure 3. Serious Injury and Fatal Crashes Mohave County

United Civil Group



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Kingman

Serious Injury and Fatal Crashes 2018-2022

Description	Crashes
No Injury	2353
Suspected Minor Injury	352
Possible Injury	318
Suspected Serious Injury	106
Fatal	13
Total	**3142**

Legend

- Suspected Serious Injury
- Fatal

Agency

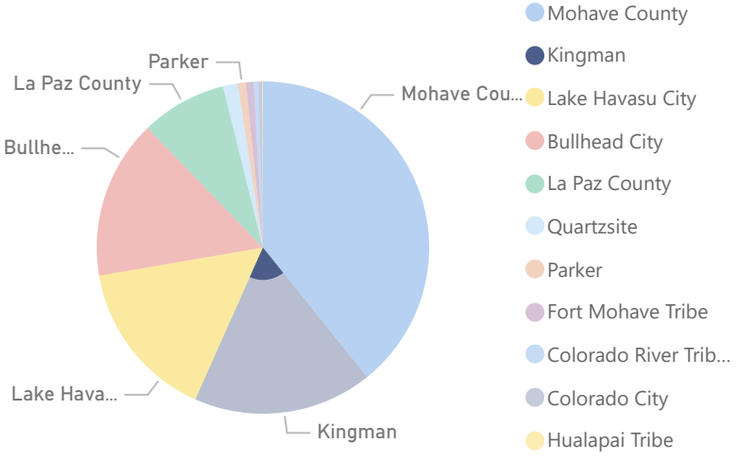
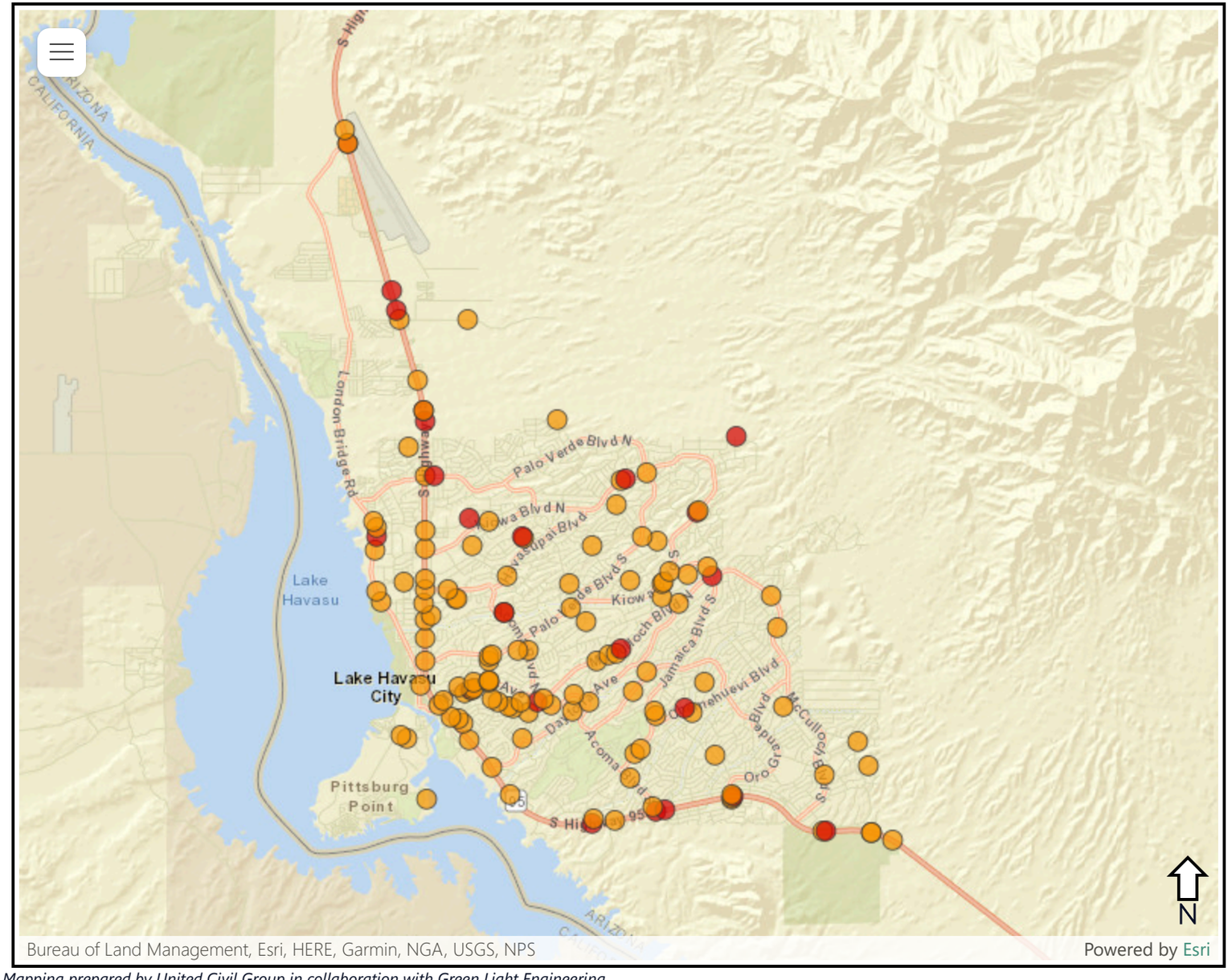


Figure 4. Serious Injury and Fatal Crashes Kingman

United Civil Group

Lake Havasu City

Serious Injury and Fatal Crashes 2018-2022



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Description	Crashes
No Injury	1896
Suspected Minor Injury	446
Possible Injury	331
Suspected Serious Injury	117
Fatal	23
Total	**2813**

Legend

- Suspected Serious Injury
- Fatal

Agency

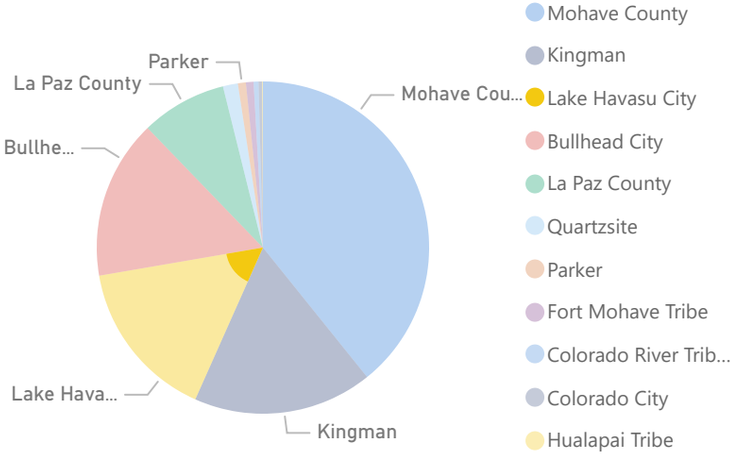
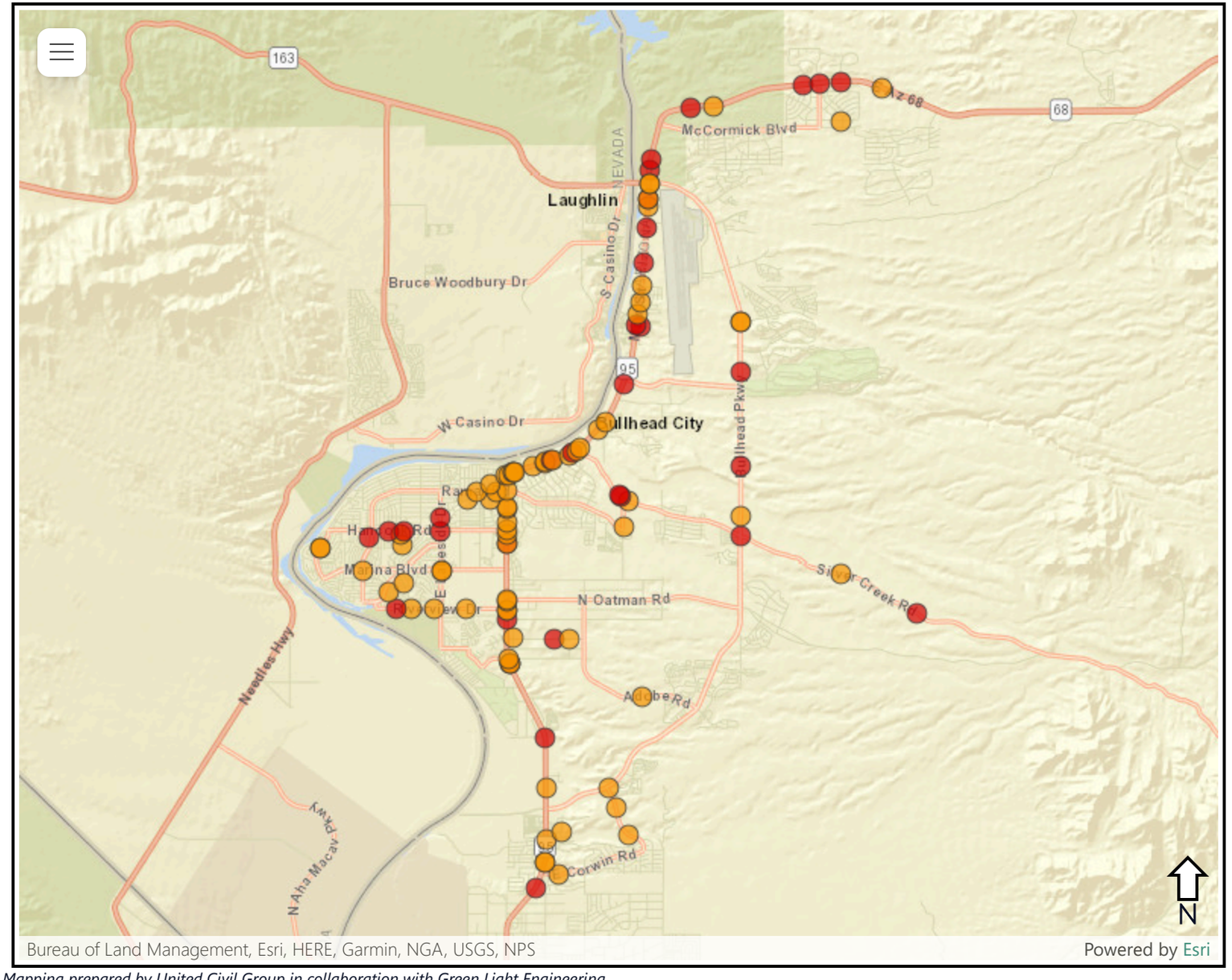


Figure 5. Serious Injury and Fatal Crashes Lake Havasu City

United Civil Group



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Bullhead City

Serious Injury and Fatal Crashes 2018-2022

Description	Crashes
No Injury	1996
Possible Injury	374
Suspected Minor Injury	312
Suspected Serious Injury	76
Fatal	32
Total	**2790**

Legend

- Suspected Serious Injury
- Fatal

Agency

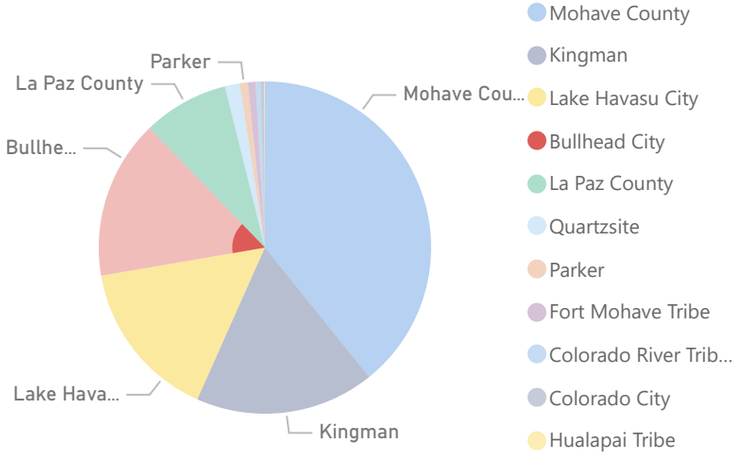
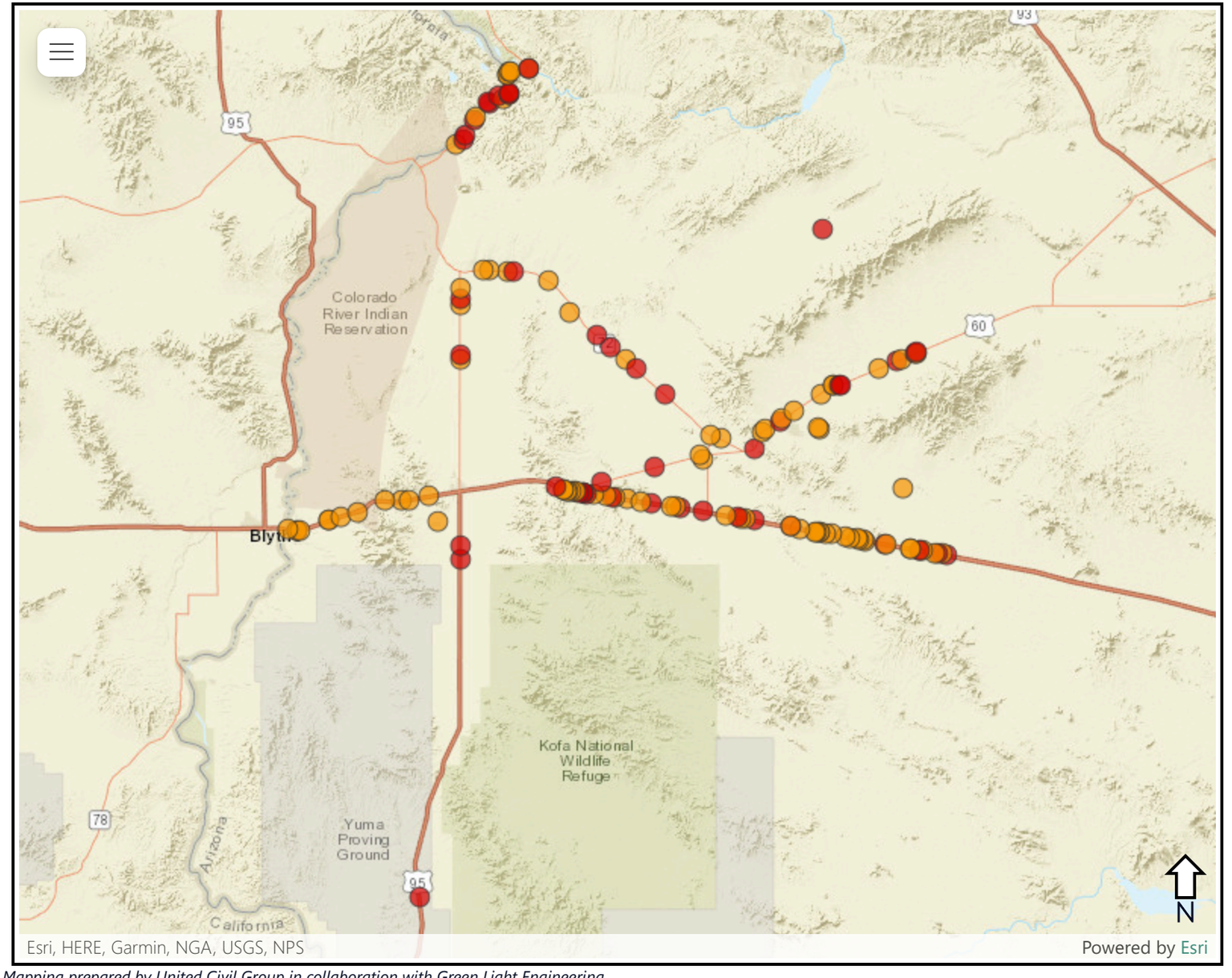


Figure 6. Serious Injury and Fatal Crashes Bullhead City

United Civil Group



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

La Paz County

Serious Injury and Fatal Crashes 2018-2022

Description	Crashes
No Injury	1001
Suspected Minor Injury	262
Possible Injury	107
Suspected Serious Injury	86
Fatal	46
Total	**1502**

Legend

- Suspected Serious Injury
- Fatal

Agency

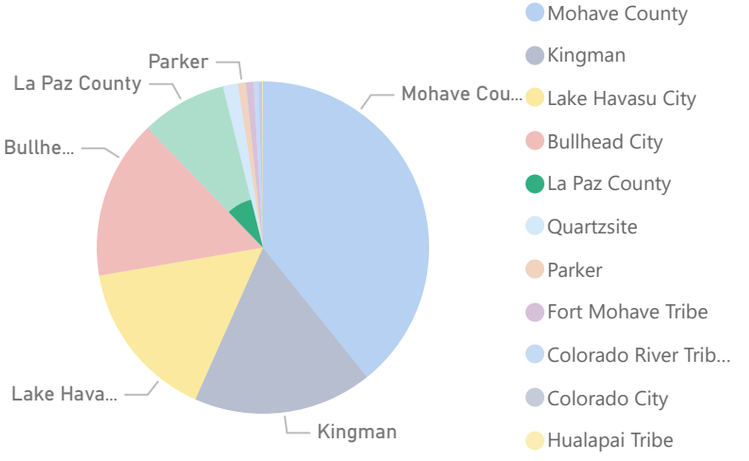
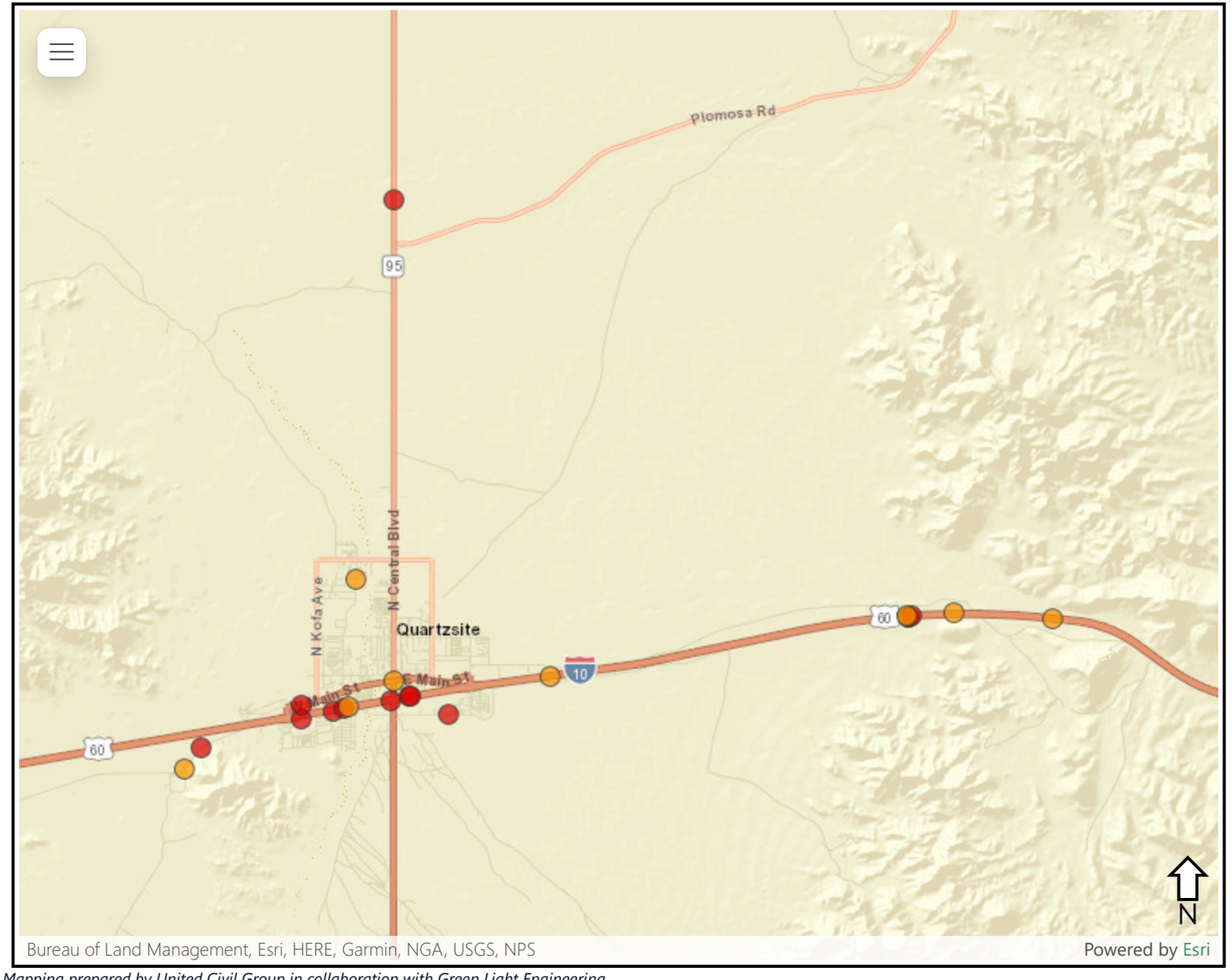


Figure 7. Serious Injury and Fatal Crashes La Paz County

United Civil Group

Quartzsite

Serious Injury and Fatal Crashes 2018-2022



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Description	Crashes
No Injury	177
Suspected Minor Injury	49
Possible Injury	15
Fatal	11
Suspected Serious Injury	10
Total	**262**

Legend

- Suspected Serious Injury
- Fatal

Agency

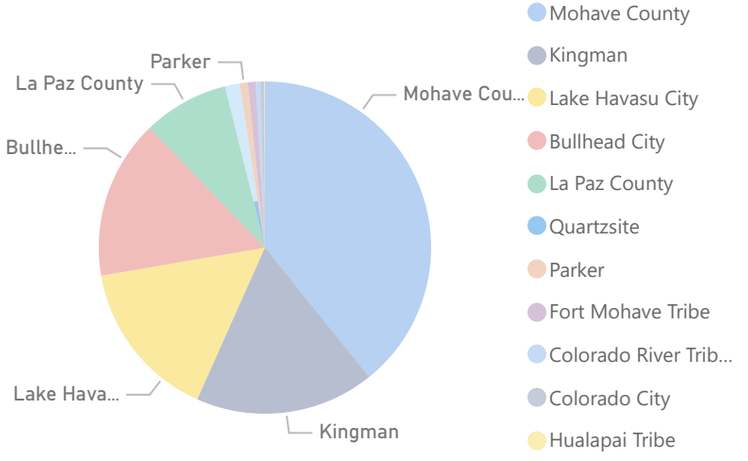
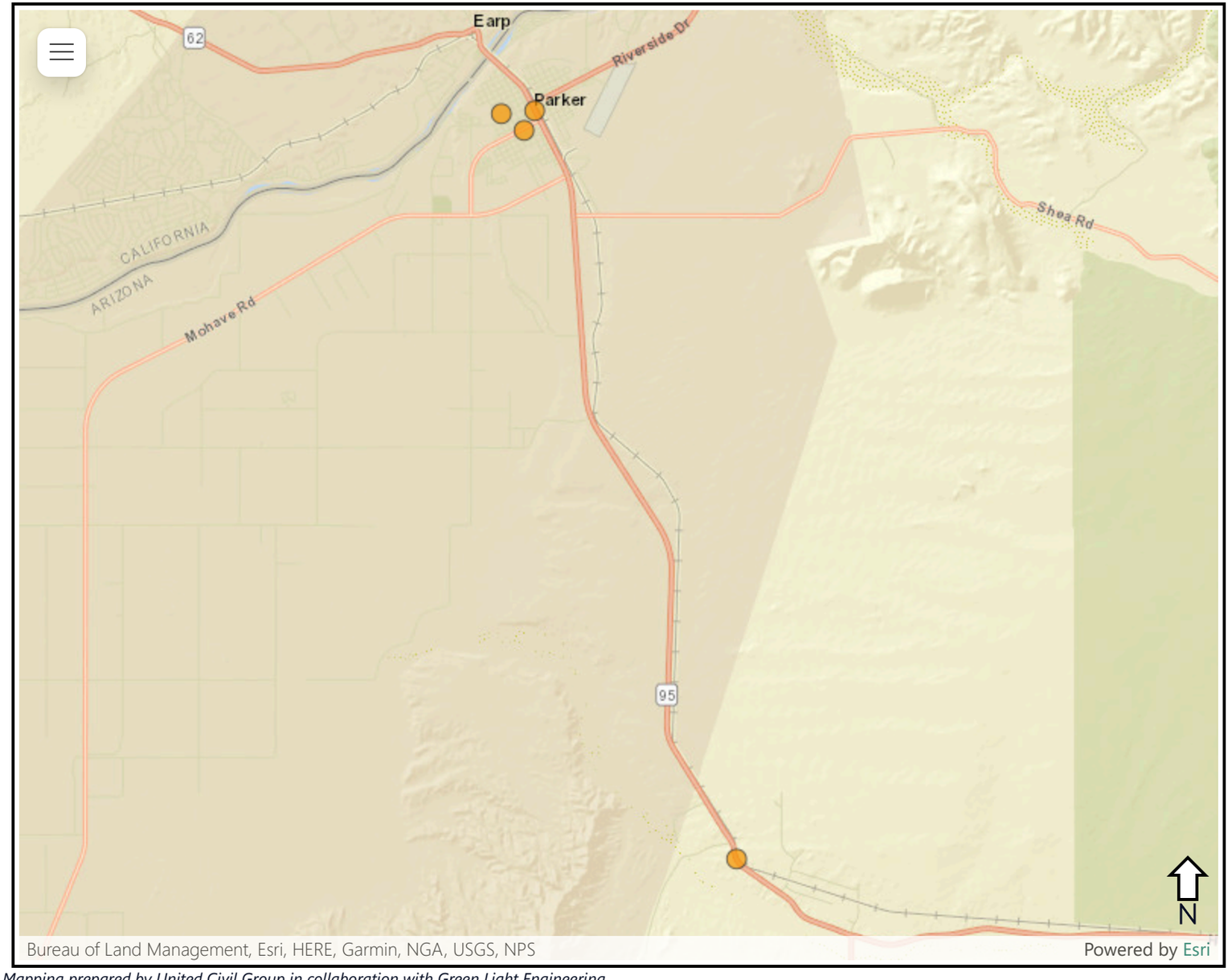


Figure 8. Serious Injury and Fatal Crashes Quartzsite

United Civil Group



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Parker

Serious Injury and Fatal Crashes 2018-2022

Description	Crashes
No Injury	106
Possible Injury	21
Suspected Minor Injury	8
Suspected Serious Injury	4
Total	**139**

Legend

- Suspected Serious Injury
- Fatal

Agency

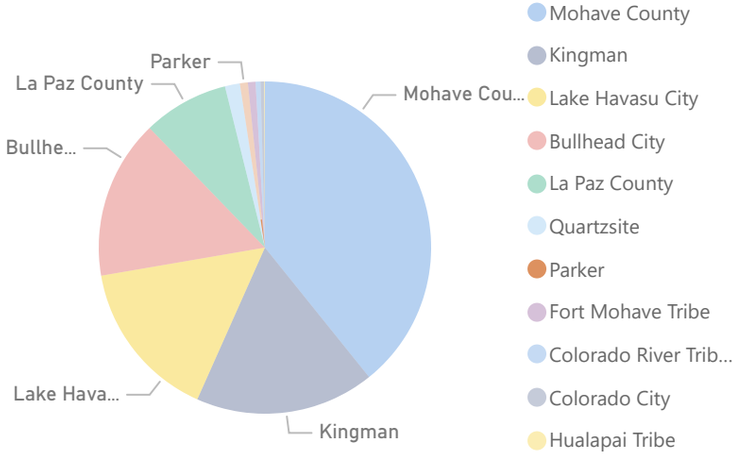
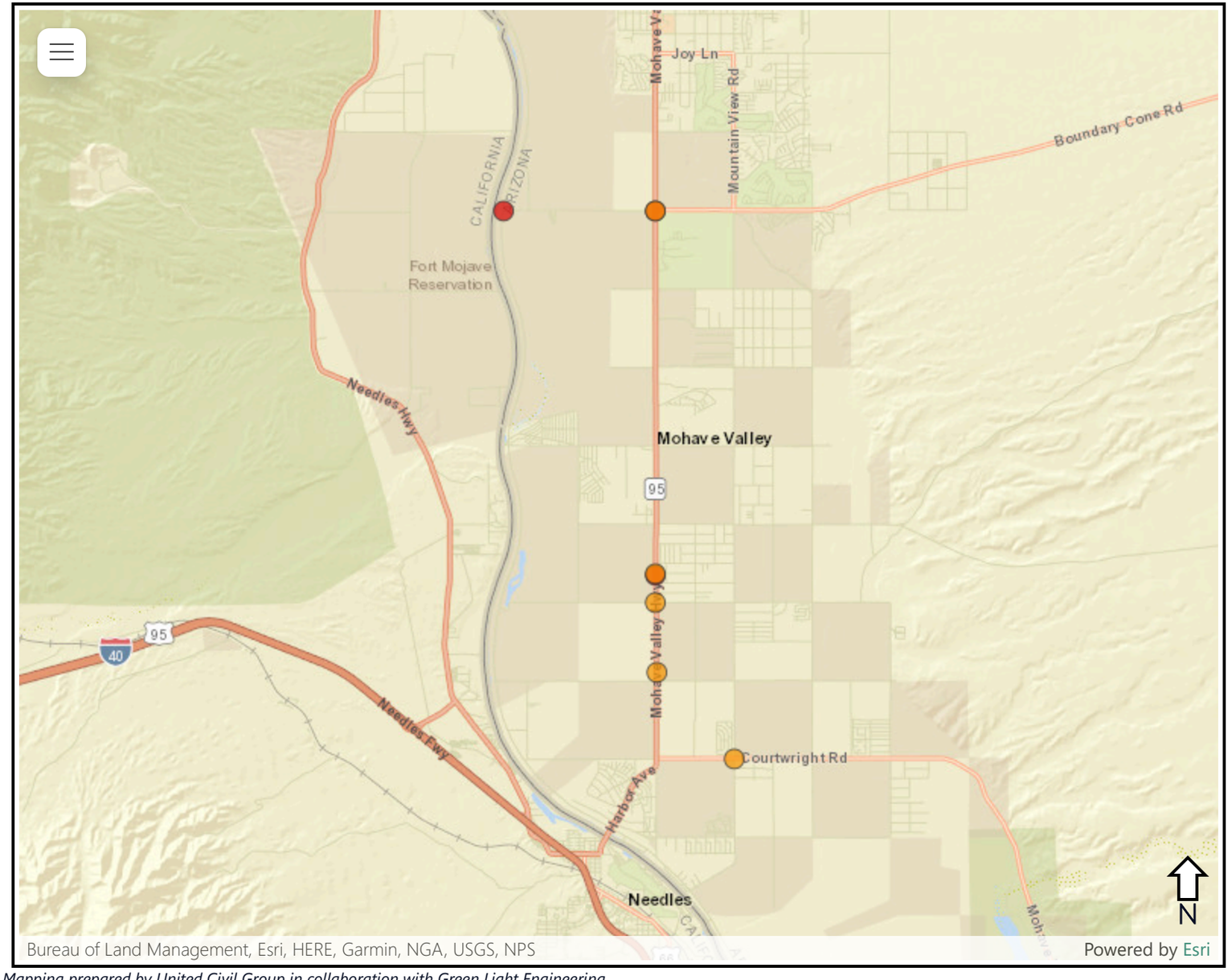


Figure 9. Serious Injury and Fatal Crashes Parker

United Civil Group



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Fort Mohave Tribe

Serious Injury and Fatal Crashes 2018-2022

Description	Crashes
No Injury	79
Suspected Minor Injury	38
Possible Injury	7
Suspected Serious Injury	7
Fatal	3
Total	**134**

Legend

- Suspected Serious Injury
- Fatal

Agency

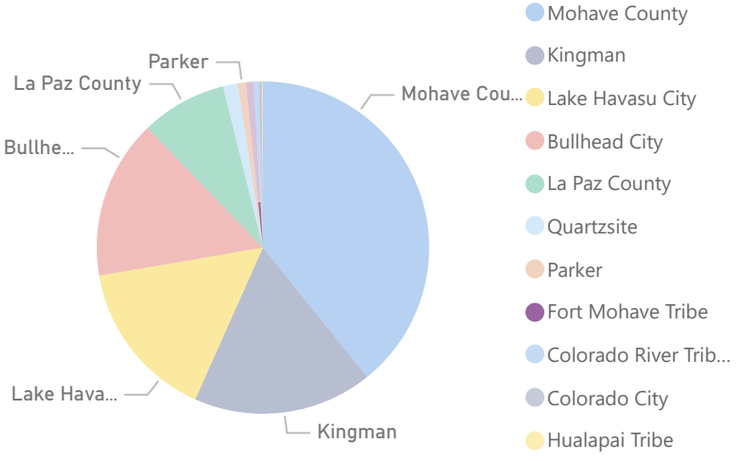
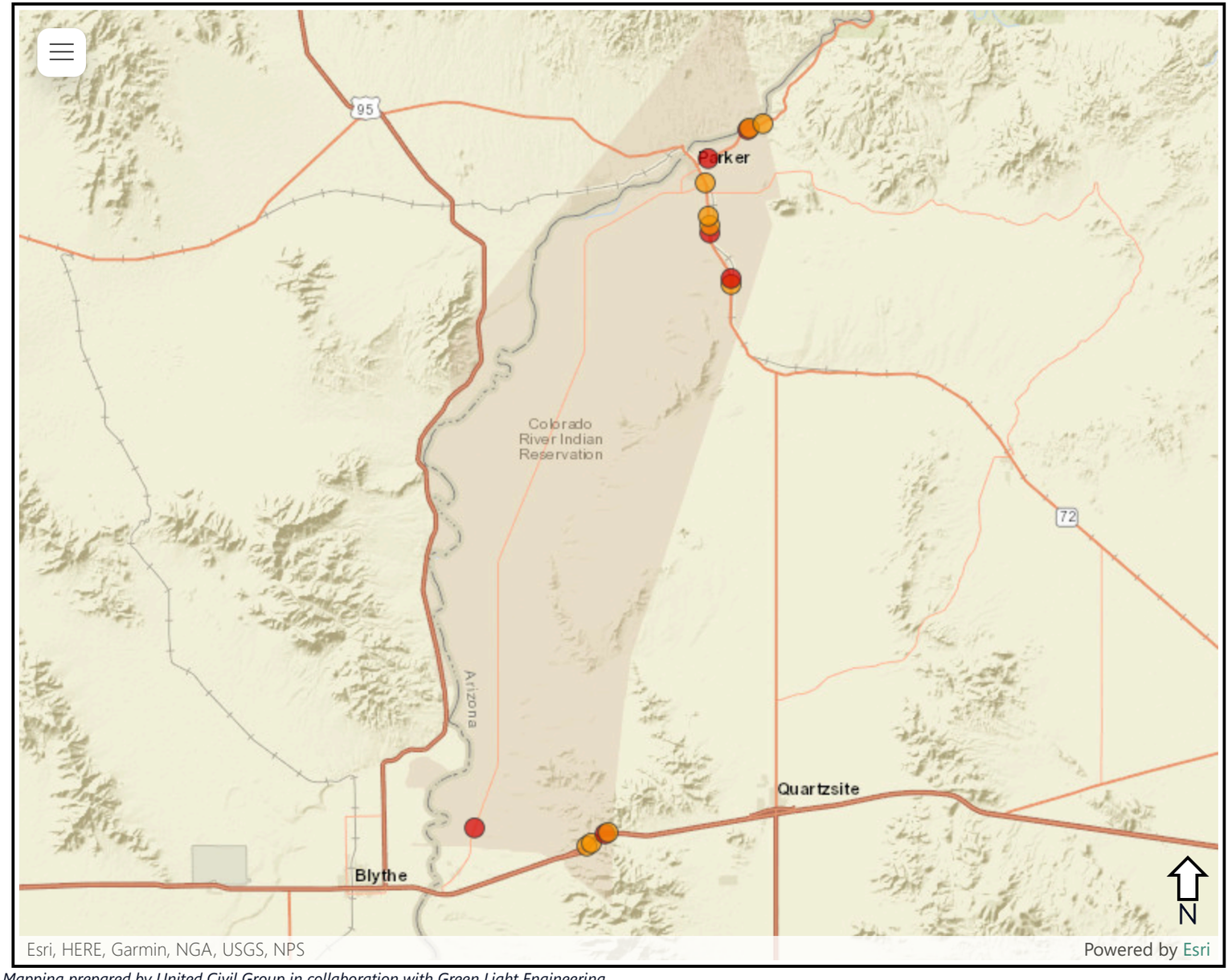


Figure 10. Serious Injury and Fatal Crashes
Fort Mohave Tribe

United Civil Group

Colorado River Tribes

Serious Injury and Fatal Crashes 2018-2022



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Description	Crashes
No Injury	52
Suspected Minor Injury	16
Suspected Serious Injury	9
Fatal	6
Possible Injury	3
Total	**86**

Legend

- Suspected Serious Injury
- Fatal

Agency

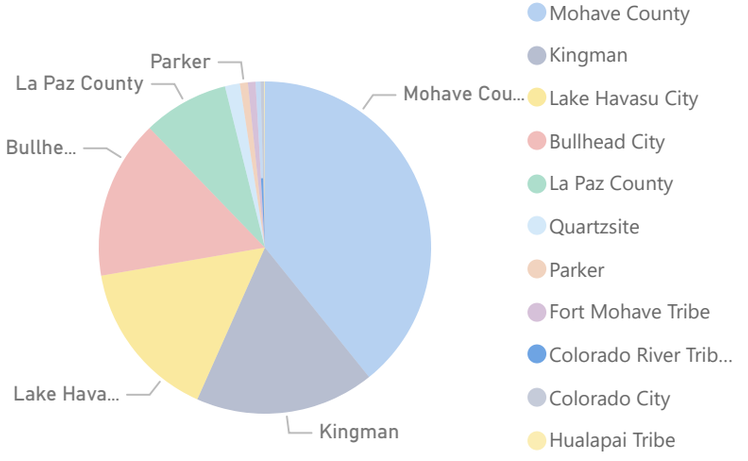
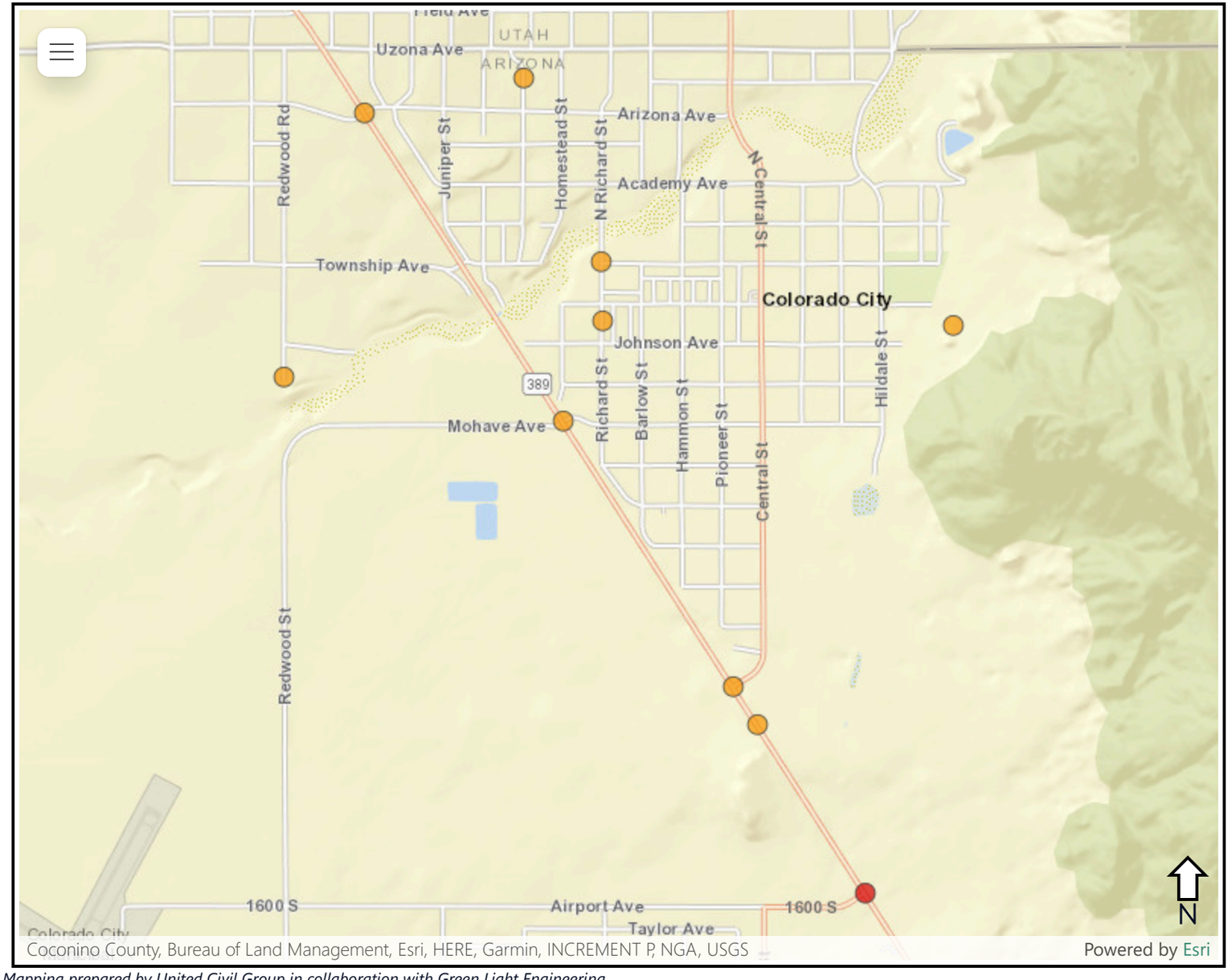


Figure 11. Serious Injury and Fatal Crashes Colorado River Tribes

United Civil Group

Colorado City

Serious Injury and Fatal Crashes 2018-2022



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Description	Crashes
No Injury	36
Possible Injury	9
Suspected Minor Injury	9
Suspected Serious Injury	9
Fatal	1
Total	**64**

Legend

- Suspected Serious Injury
- Fatal

Agency

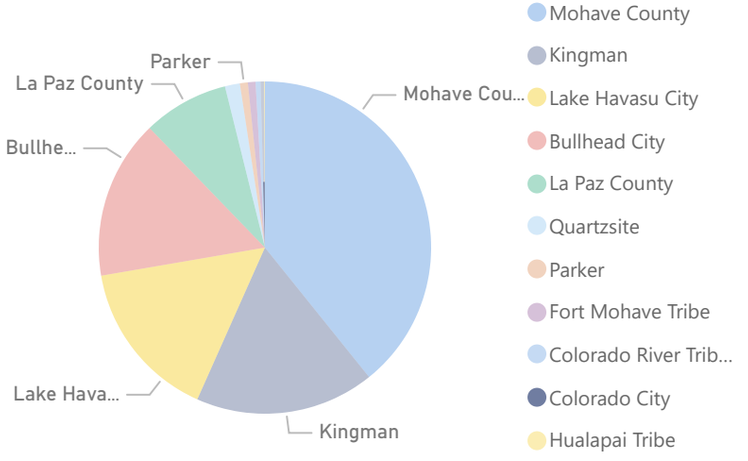
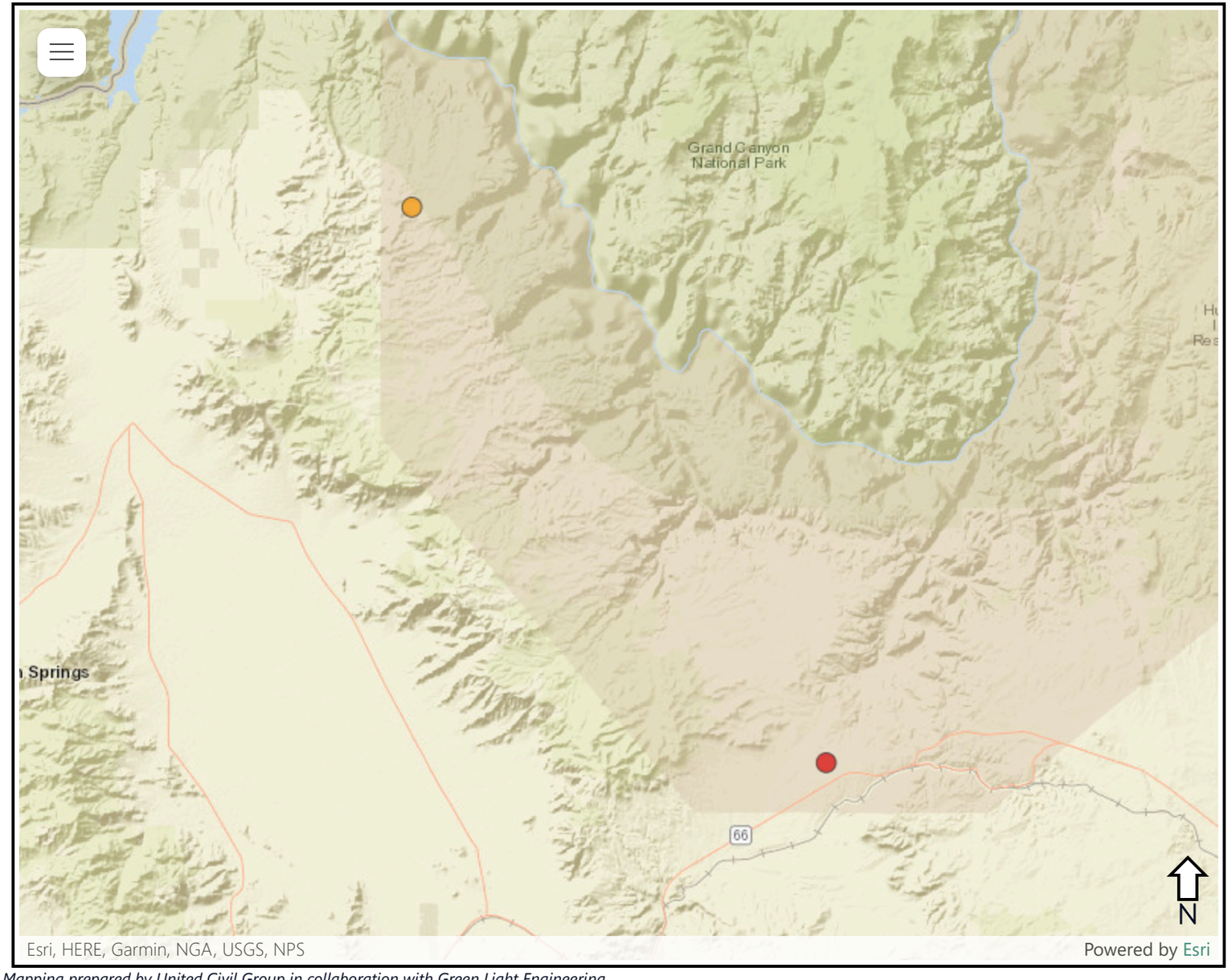


Figure 12. Serious Injury and Fatal Crashes Colorado City

United Civil Group

Hualapai Tribe

Serious Injury and Fatal Crashes 2018-2022



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Description	Crashes
No Injury	7
Suspected Minor Injury	2
Fatal	1
Possible Injury	1
Suspected Serious Injury	1
Total	**12**

Legend

- Suspected Serious Injury
- Fatal

Agency

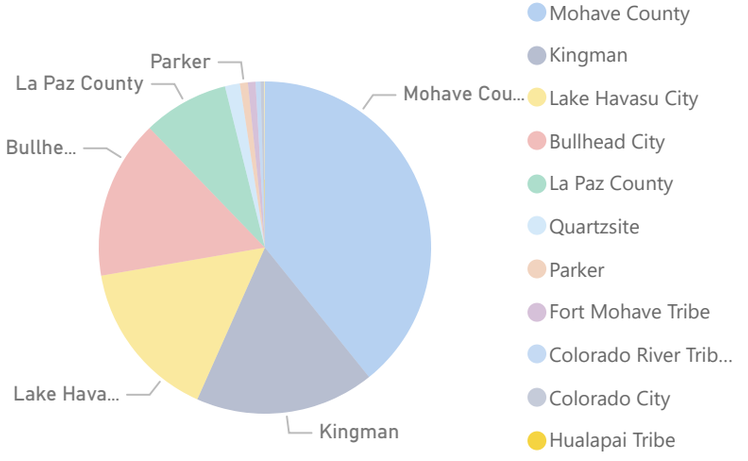


Figure 13. Serious Injury and Fatal Crashes Hualapai Tribe

United Civil Group

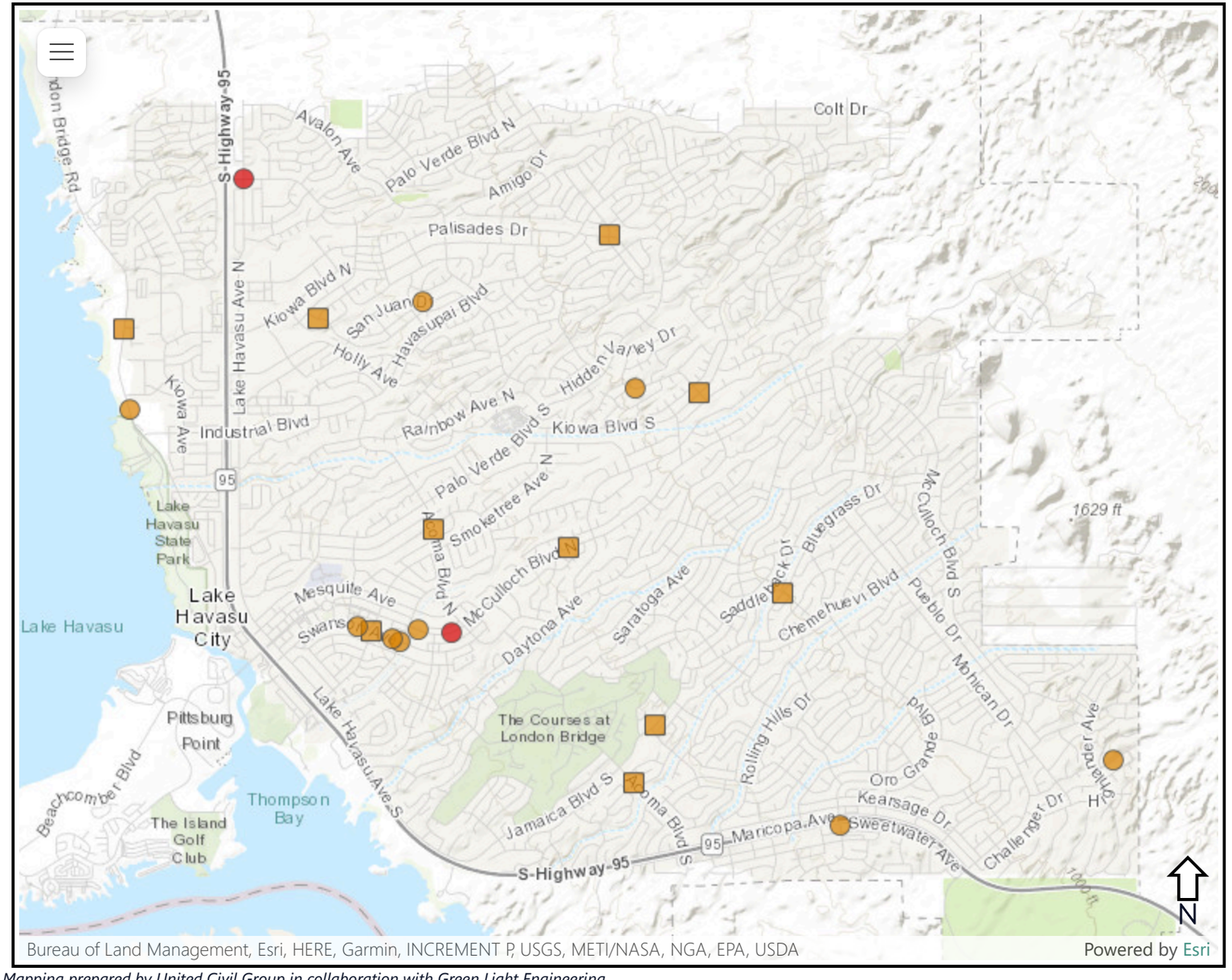
Pedalcycle and pedestrian crashes were also reviewed with the WACOG and LHMPO regions for each agency. **Figures 14 through 21** exhibit the suspected serious and fatal pedalcycle and pedestrian crashes. **Tables 2 and 3** present all pedalcycle and pedestrian crashes by agency and injury severity.

Table 2. All Pedalcycle Crashes by Agency and Injury Severity 2018 - 2022

Agency	No Injury	Possible Injury	Suspected Minor Injury	Suspected Serious Injury	Fatal	Total
Kingman	-	10	13	11	1	35
Lake Havasu City	-	2	22	10	-	34
Mohave County	-	2	6	3	-	11
Bullhead City	-	2	5	1	-	8
LaPaz County	-	-	1	1	-	2
Fort Mohave Tribe	-	-	1	-	-	1
Quartzsite	-	-	1	-	-	1
TOTAL	-	16	49	26	1	92

Table 3. All Pedestrian Crashes by Agency and Injury Severity 2018 - 2022

Agency	No Injury	Possible Injury	Suspected Minor Injury	Suspected Serious Injury	Fatal	Total
Mohave County	1	6	14	19	14	54
Lake Havasu City	1	1	31	9	2	44
Bullhead City	-	7	14	13	8	42
Kingman	-	4	8	12	4	28
LaPaz County	-	-	1	1	3	5
Quartzsite	-	1	-	1	2	4
Colorado River Tribes	-	-	-	1	1	2
Fort Mohave Tribe	-	-	-	1	-	1
TOTAL	2	19	68	57	34	180



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Lake Havasu City

Pedalcycle/Pedestrian Crashes 2018-2022

Description	Pedalcycle	Pedestrian	Total
Suspected Minor Injury	22	31	**53**
Suspected Serious Injury	10	9	**19**
Possible Injury	2	1	**3**
Fatal		2	**2**
No Injury		1	**1**
Total	**34**	**44**	**78**

Legend

- Suspected Serious Injury Pedestrian
- Fatal Pedestrian
- Suspected Serious Injury Pedalcycle
- Fatal Pedalcycle

Agency

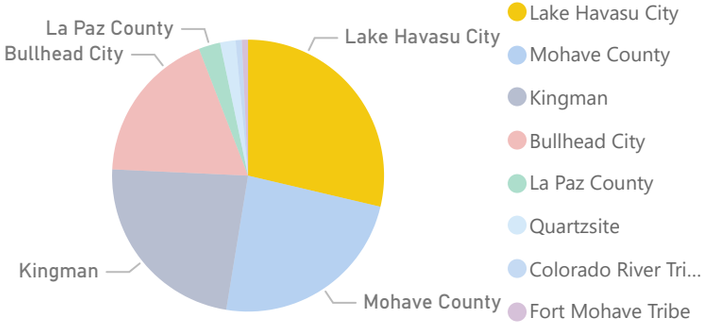
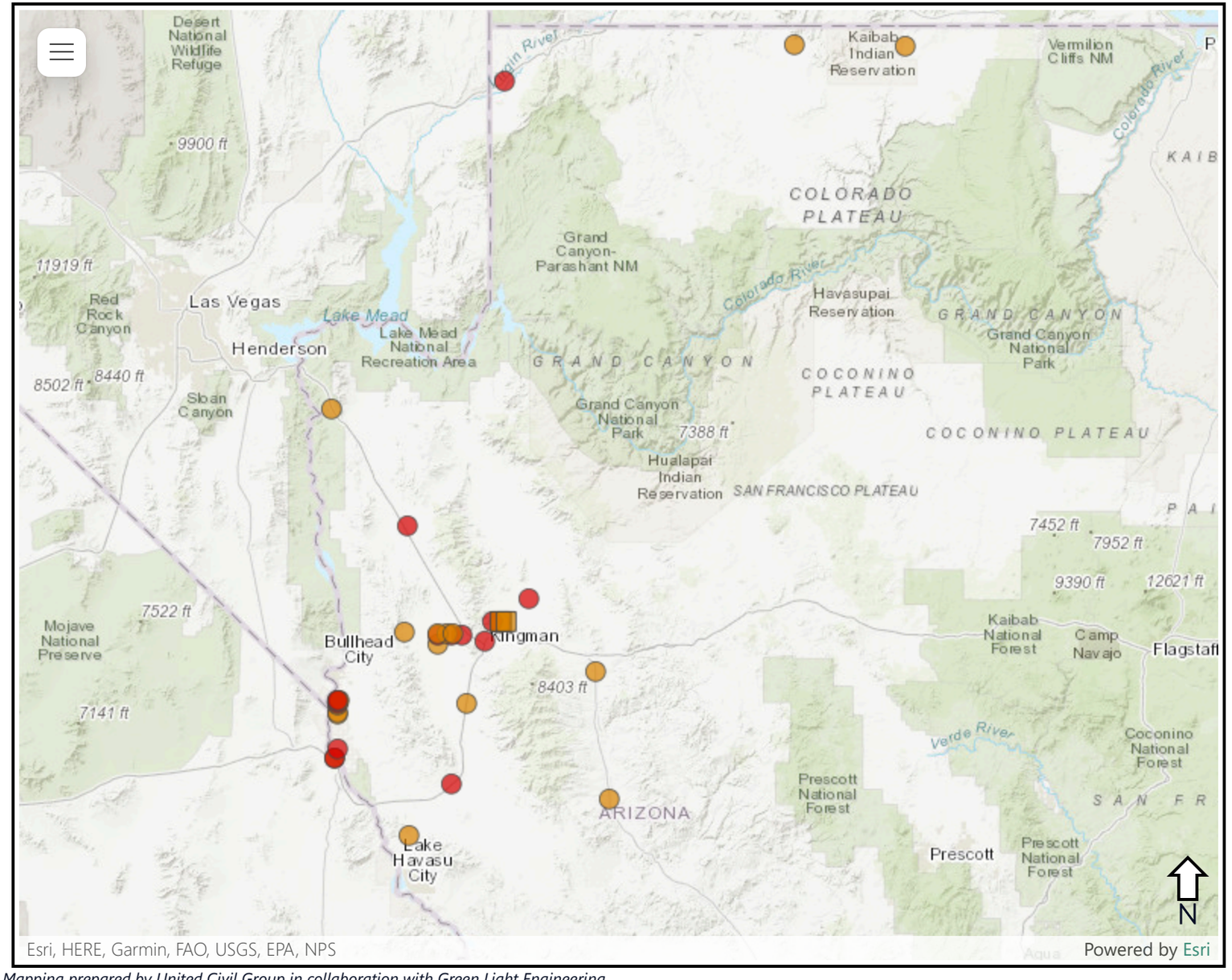


Figure 14. Pedalcycle/Pedestrian Crashes Lake Havasu City

United Civil Group



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Mohave County

Pedalcycle/Pedestrian Crashes 2018-2022

Description	Pedalcycle	Pedestrian	Total
Suspected Serious Injury	3	19	**22**
Suspected Minor Injury	6	14	**20**
Fatal		14	**14**
Possible Injury	2	6	**8**
No Injury		1	**1**
Total	**11**	**54**	**65**

Legend

- Suspected Serious Injury Pedestrian
- Fatal Pedestrian
- Suspected Serious Injury Pedalcycle
- Fatal Pedalcycle

Agency

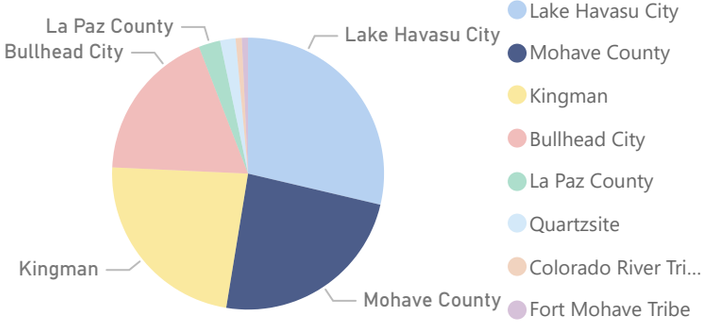
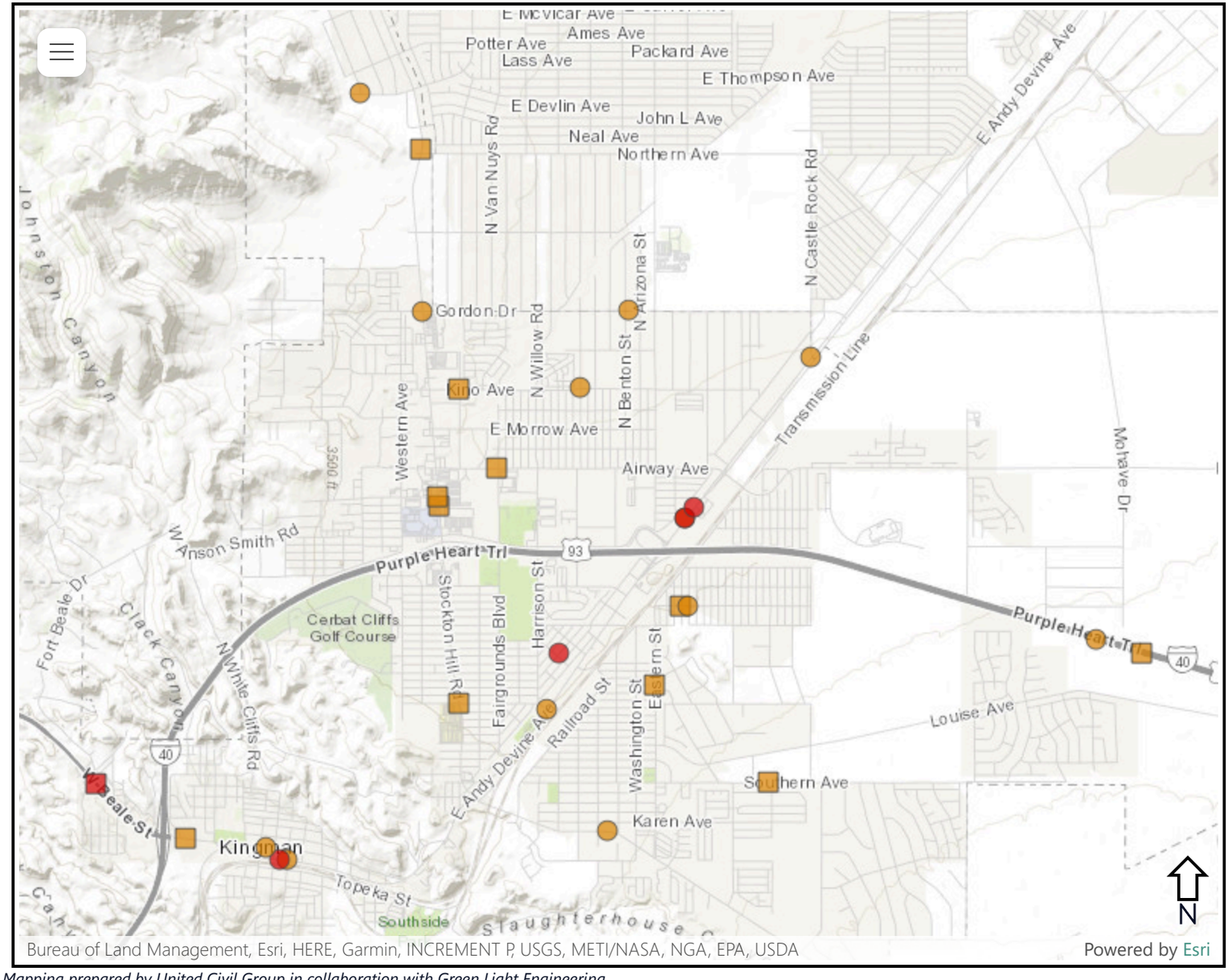


Figure 15. Pedalcycle/Pedestrian Crashes Mohave County

United Civil Group



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Kingman

Pedalcycle/Pedestrian Crashes 2018-2022

Description	Pedalcycle	Pedestrian	Total
Suspected Serious Injury	11	12	**23**
Suspected Minor Injury	13	8	**21**
Possible Injury	10	4	**14**
Fatal	1	4	**5**
Total	**35**	**28**	**63**

Legend

- Suspected Serious Injury Pedestrian
- Fatal Pedestrian
- Suspected Serious Injury Pedalcycle
- Fatal Pedalcycle

Agency

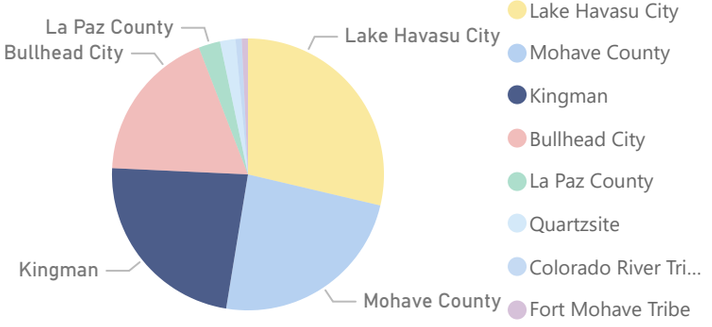


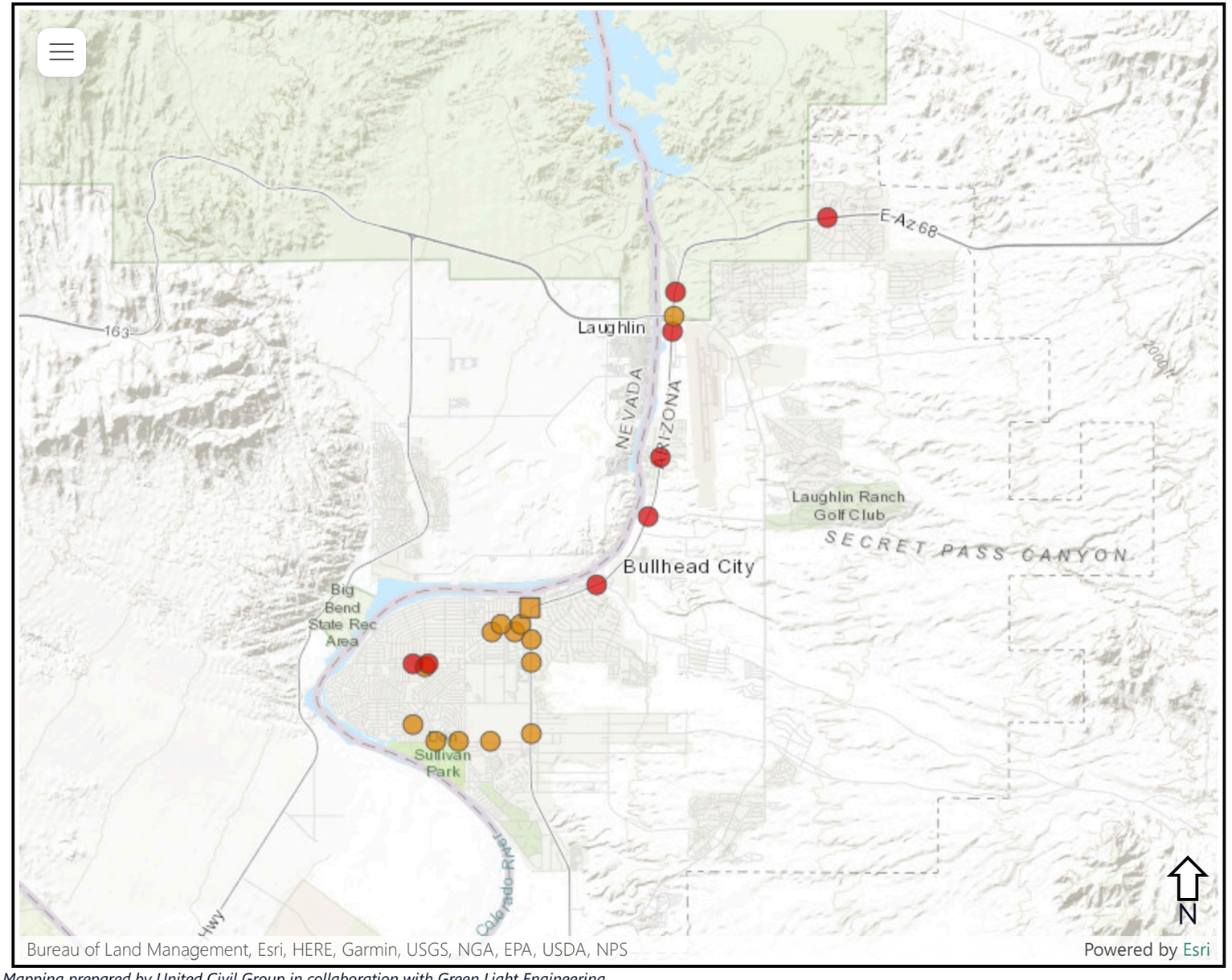
Figure 16. Pedalcycle/Pedestrian Crashes Kingman

United Civil Group

Bullhead City

Pedalcycle/Pedestrian Crashes 2018-2022

Description	Pedalcycle	Pedestrian	Total
Suspected Minor Injury	5	14	**19**
Suspected Serious Injury	1	13	**14**
Possible Injury	2	7	**9**
Fatal		8	**8**
Total	**8**	**42**	**50**



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Legend

- Suspected Serious Injury Pedestrian
- Fatal Pedestrian
- Suspected Serious Injury Pedalcycle
- Fatal Pedalcycle

Agency

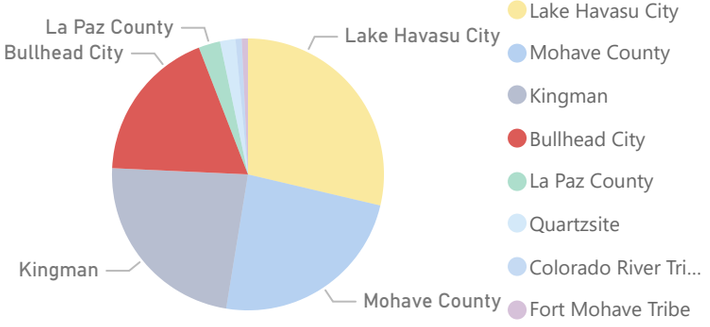
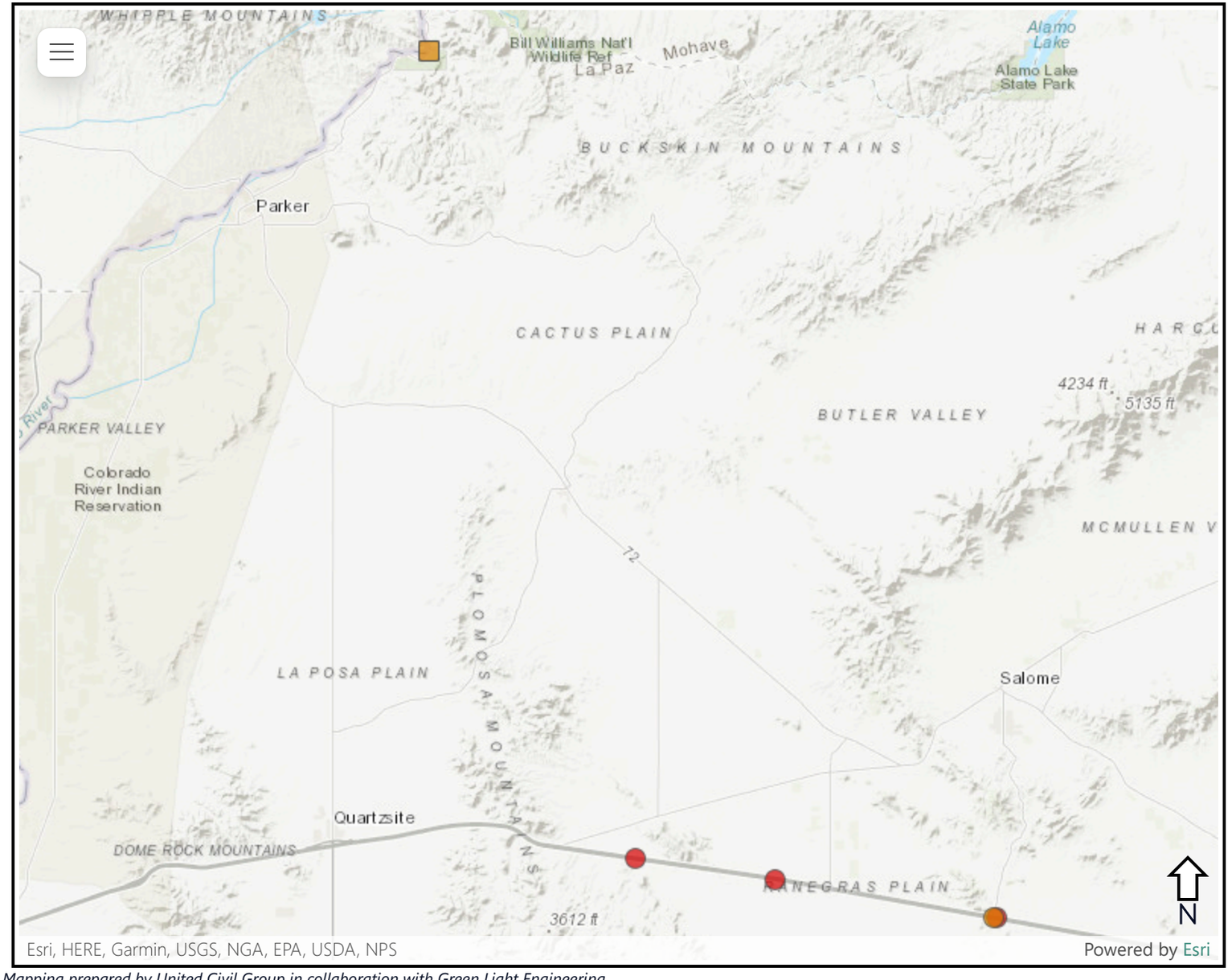


Figure 17. Pedalcycle/Pedestrian Crashes Bullhead City

United Civil Group



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

La Paz County

Pedalcycle/Pedestrian Crashes 2018-2022

Description	Pedalcycle	Pedestrian	Total
Fatal		3	**3**
Suspected Minor Injury	1	1	**2**
Suspected Serious Injury	1	1	**2**
Total	**2**	**5**	**7**

Legend

- Suspected Serious Injury Pedestrian
- Fatal Pedestrian
- Suspected Serious Injury Pedalcycle
- Fatal Pedalcycle

Agency

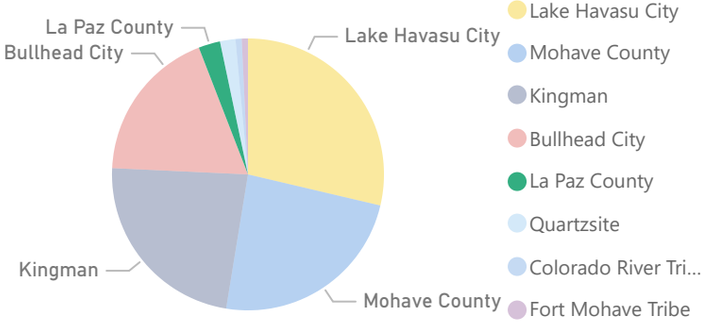
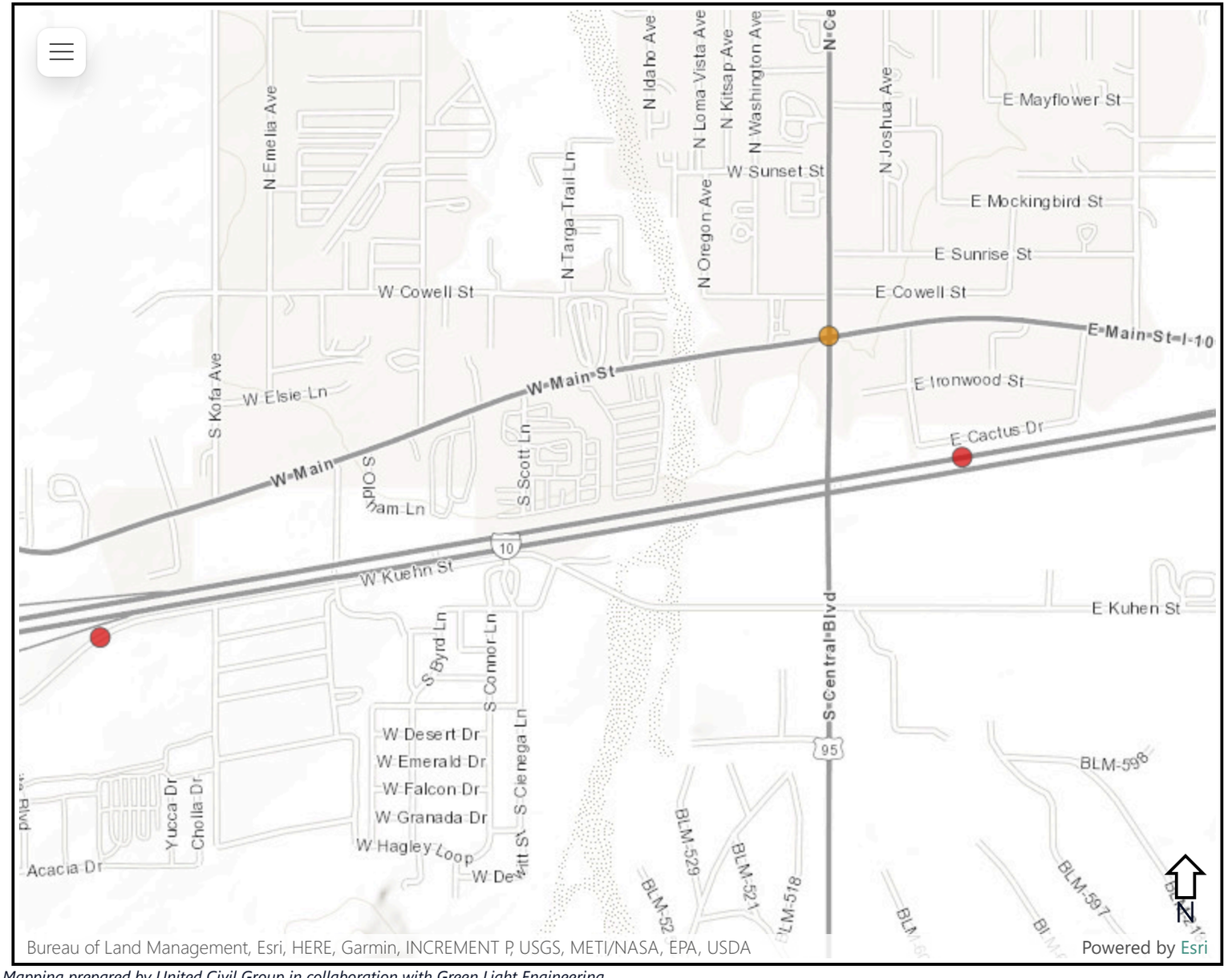


Figure 18. Pedalcycle/Pedestrian Crashes
La Paz County

United Civil Group



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Quartzsite

Pedalcycle/Pedestrian Crashes 2018-2022

Description	Pedalcycle	Pedestrian	Total
Fatal		2	**2**
Possible Injury		1	**1**
Suspected Minor Injury	1		**1**
Suspected Serious Injury		1	**1**
Total	**1**	**4**	**5**

Legend

- Suspected Serious Injury Pedestrian
- Fatal Pedestrian
- Suspected Serious Injury Pedalcycle
- Fatal Pedalcycle

Agency

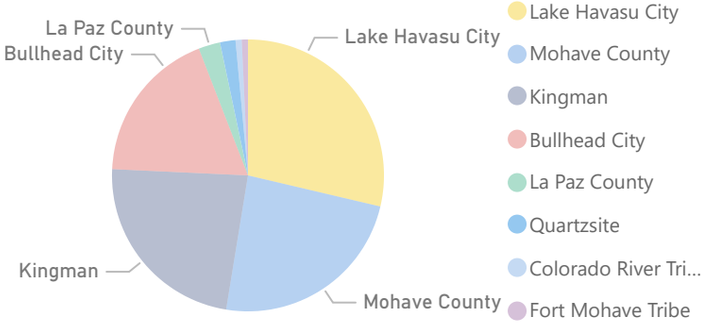


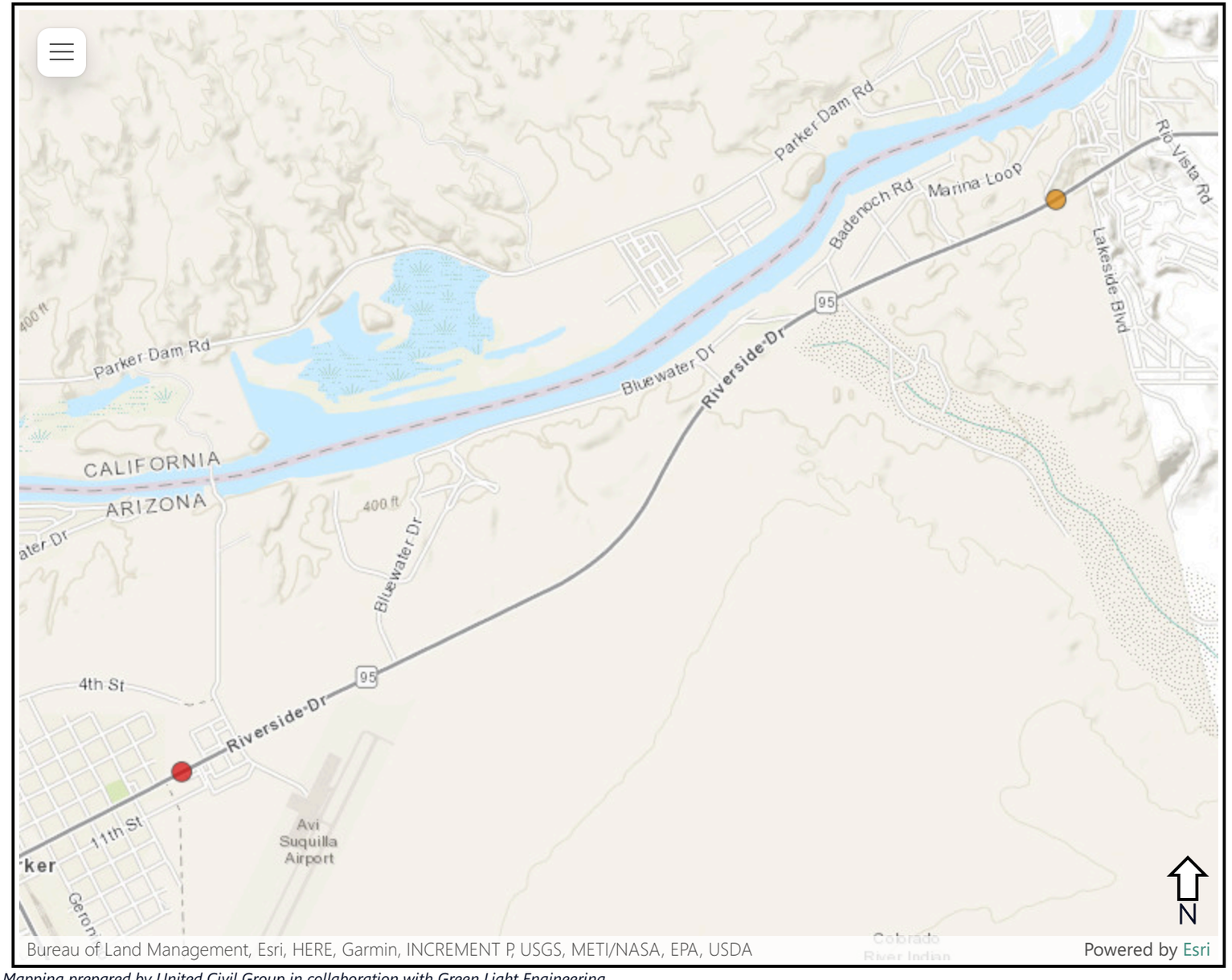
Figure 19. Pedalcycle/Pedestrian Crashes Quartzsite

United Civil Group

Colorado River Tribes

Pedalcycle/Pedestrian Crashes 2018-2022

Description	Pedestrian	Total
Fatal	1	1
Suspected Serious Injury	1	1
Total	**2**	**2**



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Legend

- Suspected Serious Injury Pedestrian
- Fatal Pedestrian
- Suspected Serious Injury Pedalcycle
- Fatal Pedalcycle

Agency

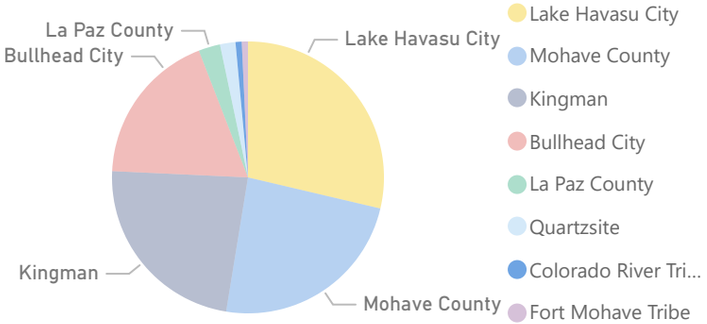
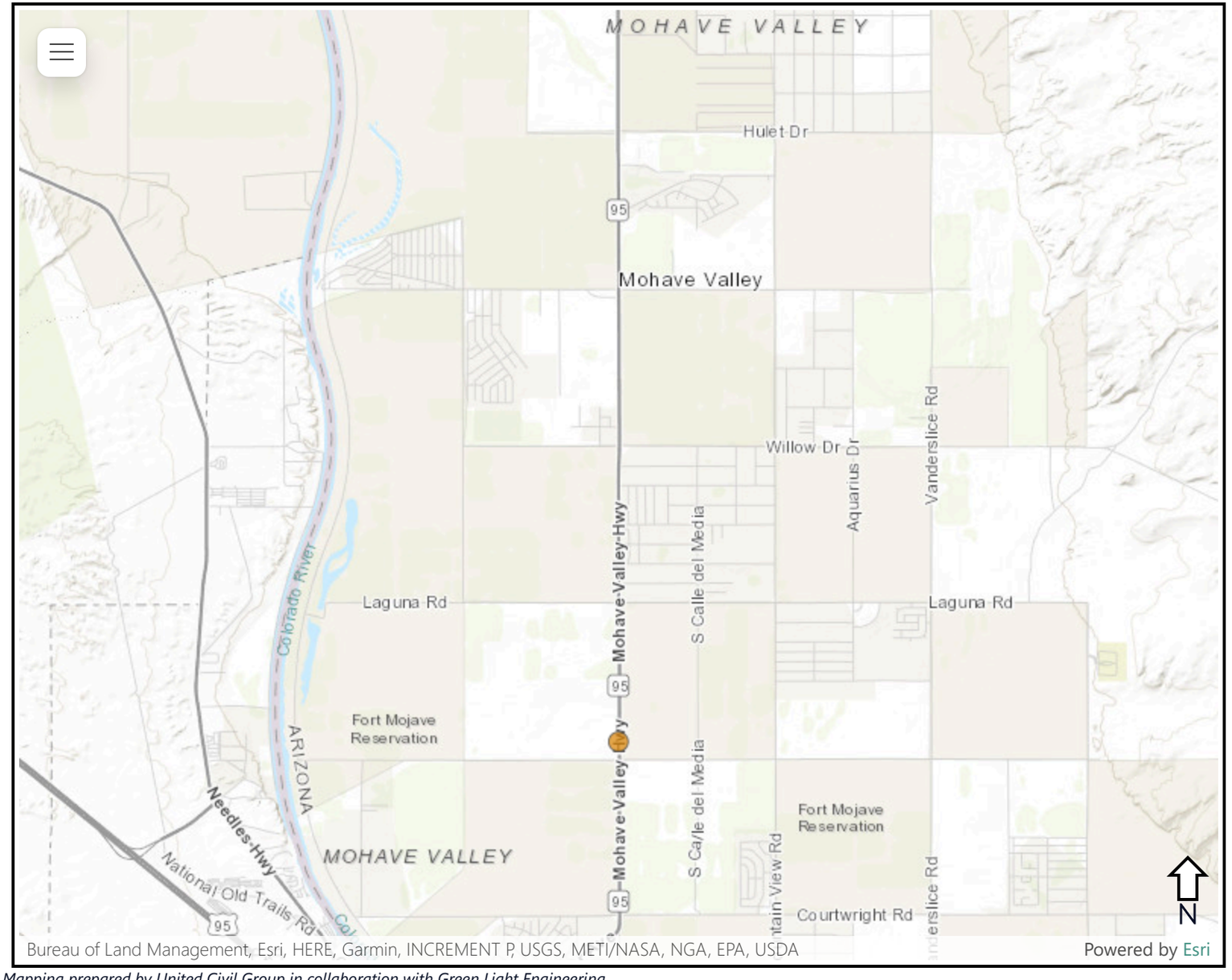


Figure 20. Pedalcycle/Pedestrian Crashes Colorado River Tribes

United Civil Group



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

Fort Mohave Tribe

Pedalcycle/Pedestrian Crashes 2018-2022

Description	Pedalcycle	Pedestrian	Total
Suspected Minor Injury	1		1
Suspected Serious Injury		1	1
Total	**1**	**1**	**2**

Legend

- Suspected Serious Injury Pedestrian
- Fatal Pedestrian
- Suspected Serious Injury Pedalcycle
- Fatal Pedalcycle

Agency

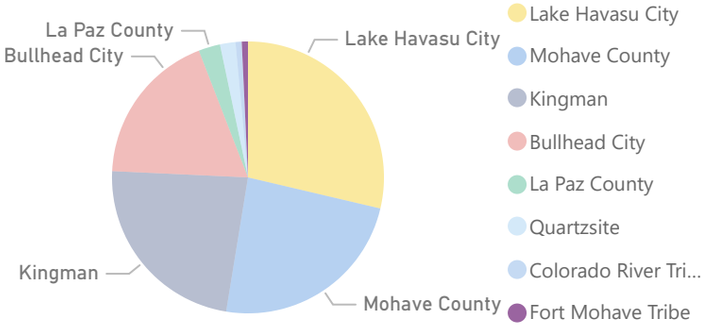


Figure 21. Pedalcycle/Pedestrian Crashes
Fort Mohave Tribe

United Civil Group

3.0 Crash Analysis Methodology

The selection process to identify the top 20 priority intersections and top 20 priority roadway segments for both WACOG and LHMPO was based on a comprehensive crash analysis that incorporates four key metrics: crash frequency, crash rate, severity index and performance index (PI).

For each location—whether an intersection or a segment—these metrics provide a multidimensional view of traffic safety performance. The crash frequency measures the total number of crashes that occurred, while the crash rate accounts for traffic exposure, thereby normalizing the crash frequency relative to the volume of traffic. The severity index offers insight into the magnitude of crashes, emphasizing locations with more severe injury incidents. The performance index (PI) is a general weighted formula that is used in the decision-making process where multiple safety performance aspects need to be considered simultaneously.

In the ranking process, equal weight was assigned to the three calculated metrics: crash frequency, crash rate, and severity index. Therefore, each of these factors were given equal consideration to compute the PI and ensure that the final priority list reflects a complete assessment of the safety conditions.

To determine the top 20 priority intersections and segments the following equations were used:

$$Crash\ Frequency = Number\ of\ Crashes$$

Eq. 1

Where:

- **Number of Crashes:** The total number of reported crashes at the intersection during the analysis period

Intersection:

$$Intersection\ Crash\ Rate\ Measure\ (per\ 100{,}000\ entering\ vehicles) = \frac{Number\ of\ Crashes \times 100{,}000}{365 \times\ Years \times Entering\ ADT}$$

Eq. 2a

Segment:

$$Segment\ Crash\ Rate\ Measure\ (per\ 100{,}000\ vehicle\ miles) = \frac{Number\ of\ Crashes \times 100{,}000}{365 \times Years \times ADT \times Segment\ Length}$$

Eq. 2b

Where:

- **Entering ADT (Average Daily Traffic):** The sum of all vehicles entering the intersection from all approaches
- **ADT:** The average number of vehicles on a segment of roadway
- **Segment Length:** the length of the roadway segment in miles (for segment analysis only)
- **Years:** The number of years provided within the crash data set.
- **365:** Converts the daily traffic count into an annual traffic count

$$Severity\ Index = \frac{\sum(Number\ of\ Crashes\ by\ Severity \times Severity\ Index)}{Total\ Number\ of\ Crashes}$$

Eq. 3

Where:

- **Number of Crashes by Severity:** The number of crashes for each severity level
- **Severity Weight:** A numerical value assigned to each severity level to reflect its magnitude

For this analysis the severity weight is provided in **Table 4.** The severity weight assists in prioritizing locations by the impact the crashes have in terms if injuries and fatalities.

Table 4. Severity Weight

Injury Severity	Severity Weight
No Injury	1
Possible Injury	2
Suspected Minor Injury	3
Suspected Serious Injury	4
Fatal	5

$$Performance\ Index\ (PI) = W_1 \times Crash\ Frequency + W_2 \times Crash\ Rate\ Measure + W_3 \times Severity\ Index$$

Eq. 4

Where:

- W_1, W_2 and W_3: Weights assigned to each metric, adding up to one

Within the WACOG Analyzer Dashboard, W_1, W_2 and W_3 can be adjusted if it is determined that a particular key metric should be weighted higher than the other metrics.

3.1 Intersection Related Crashes

Using the complete array of crash data from 2018 through 2022, crashes that were defined by the reporting officer within the "Intersection Type Desc" category: Five Point or More, Four Way Intersection, Intersection As Part of Interchange, Roundabout, T Intersection, Traffic Circle and Y Intersection were defined as an intersection related crash. Within this data set, a total of 6,431 intersection related crashes were identified; 5,005 within the WACOG region and 1,426 within the LHMPO region.

The entering average daily traffic (ADT) volumes were gathered from data provided within the ADOT Multimodal Planning Traffic Count (TCDS) website. Transportation Data Management System (ms2soft.com). Where available, directional data was used to compute the entering ADT for the intersection. If bidirectional data was not provided or within a reasonable distance to the intersection then the ADT was used for both directions of travel to estimate the entering ADT for the intersection analyses.

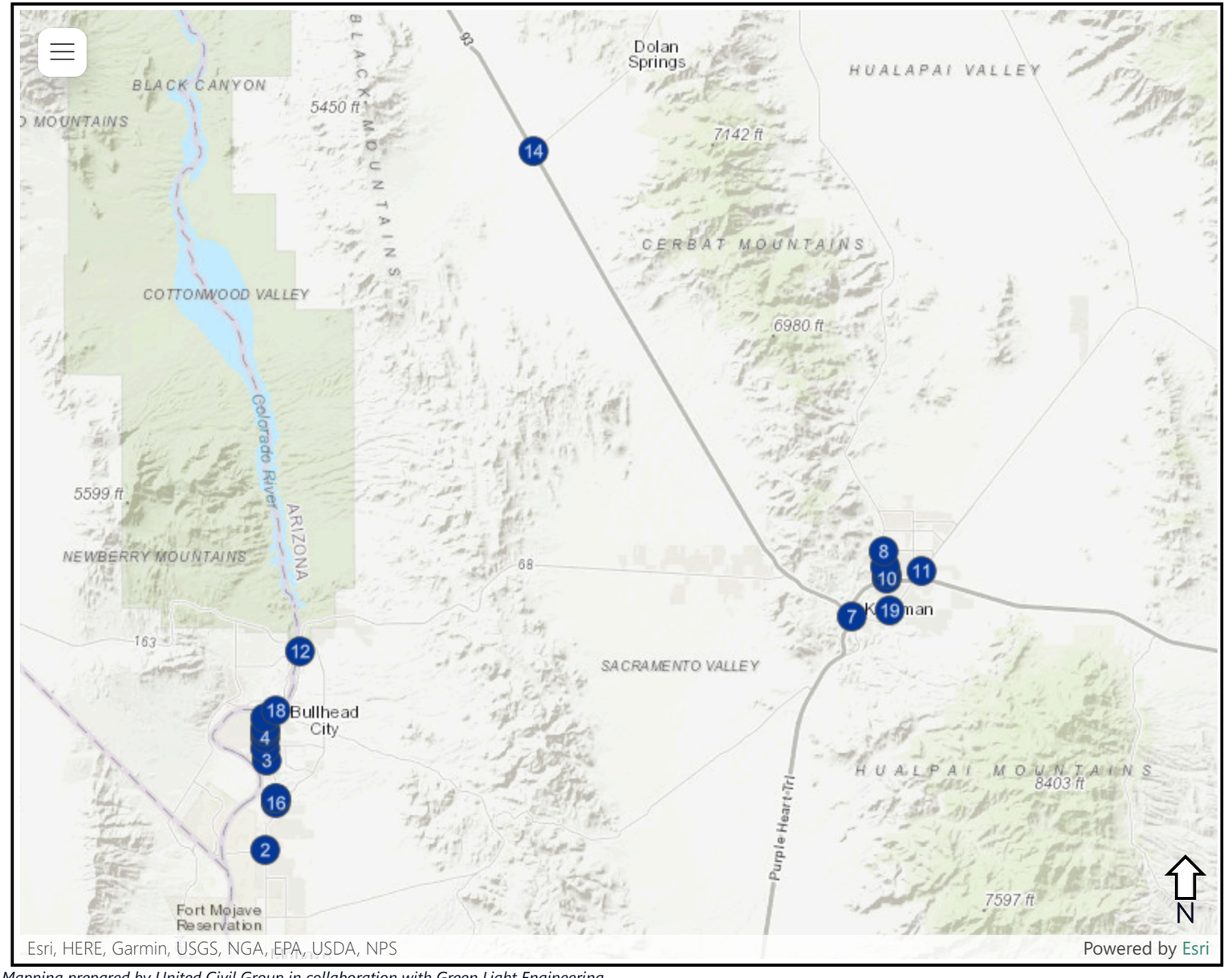
Figures 22 and 23 illustrate the Top 20 Priority Intersections for WACOG and LHMPO, respectively. **Appendix A** provides a screen print of the WACOG Crash Analyzer Dashboard for the top 20 intersections and corresponding calculated crash frequency, crash measure, severity index and PI with the associated ranking.

3.2 Segment Related Crashes

Within the 2018-2022 data set, crashes that were not described as an intersection crash, "Not At An Intersection", "Not Reported", and "Unknown" were determined to be a crash on a segment of roadway. Within this dataset, a total of 11,575 segment crashes were identified; 10,088 within the WACOG region and 1,487 within the LHMPO region.

The ADT volumes were gathered from data provided within ADOT's TCDS website. The selected ADT provided was closest to the center of the segment for each location.

Figures 24 and 25 show the Top 20 Priority Segments for WACOG and LHMPO. **Appendix B** provides a screen print of the WACOG Crash Analyzer Dashboard for the top 20 segments and corresponding calculated crash frequency, crash measure, severity index and PI with the associated ranking.



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

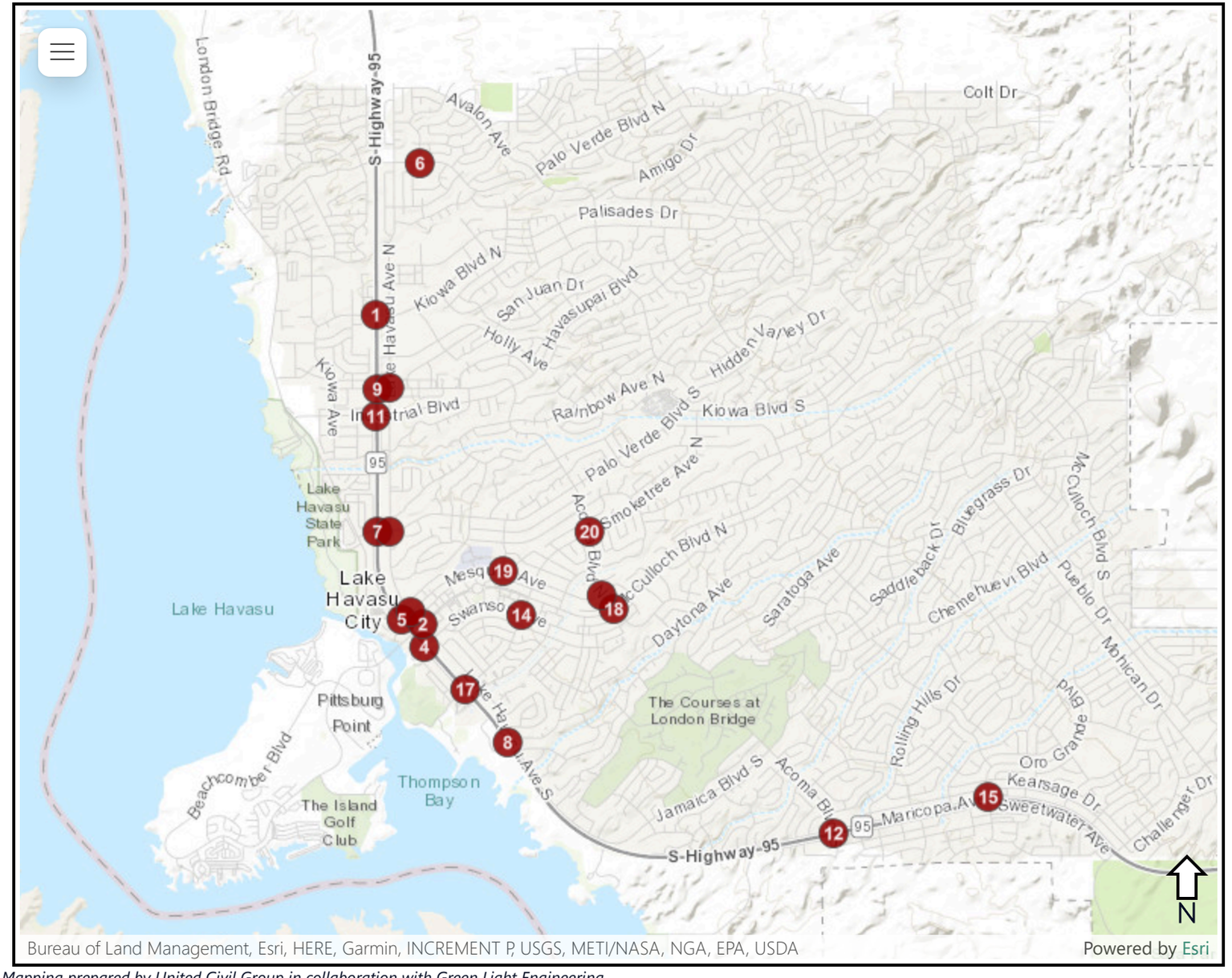
WACOG

Top 20 Priority Intersections

PI Rank	Intersection
12	Airport Center Dr & SR-95
11	Airway Ave & Andy Devine Ave
1	Airway Ave & Stockton Hill Rd
19	Andy Devine Ave & Stockton Hill Rd
2	Aztec Rd & SR-95
7	Beale St & I-40
10	Beverly Ave & Stockton Hill Rd
15	Bullhead Pkwy & SR-95
13	Bullhead Pkwy South & SR-95
8	Gordon Dr & Stockton Hill Rd
9	Hancock Rd & SR-95
16	Long Ave & SR-95
4	Marina Blvd & SR-95
3	Mohave Dr & SR-95
14	Pierce Ferry Rd & US-93
18	Plata Dr & SR-95
17	Ramar Rd & SR-95
5	Riverview Dr & SR-95
20	SR-95 & Thunderstruck Dr
6	Stockton Hill Rd & Sycamore Ave

Figure 22. Top 20 Priority Intersections
WACOG

United Civil Group



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

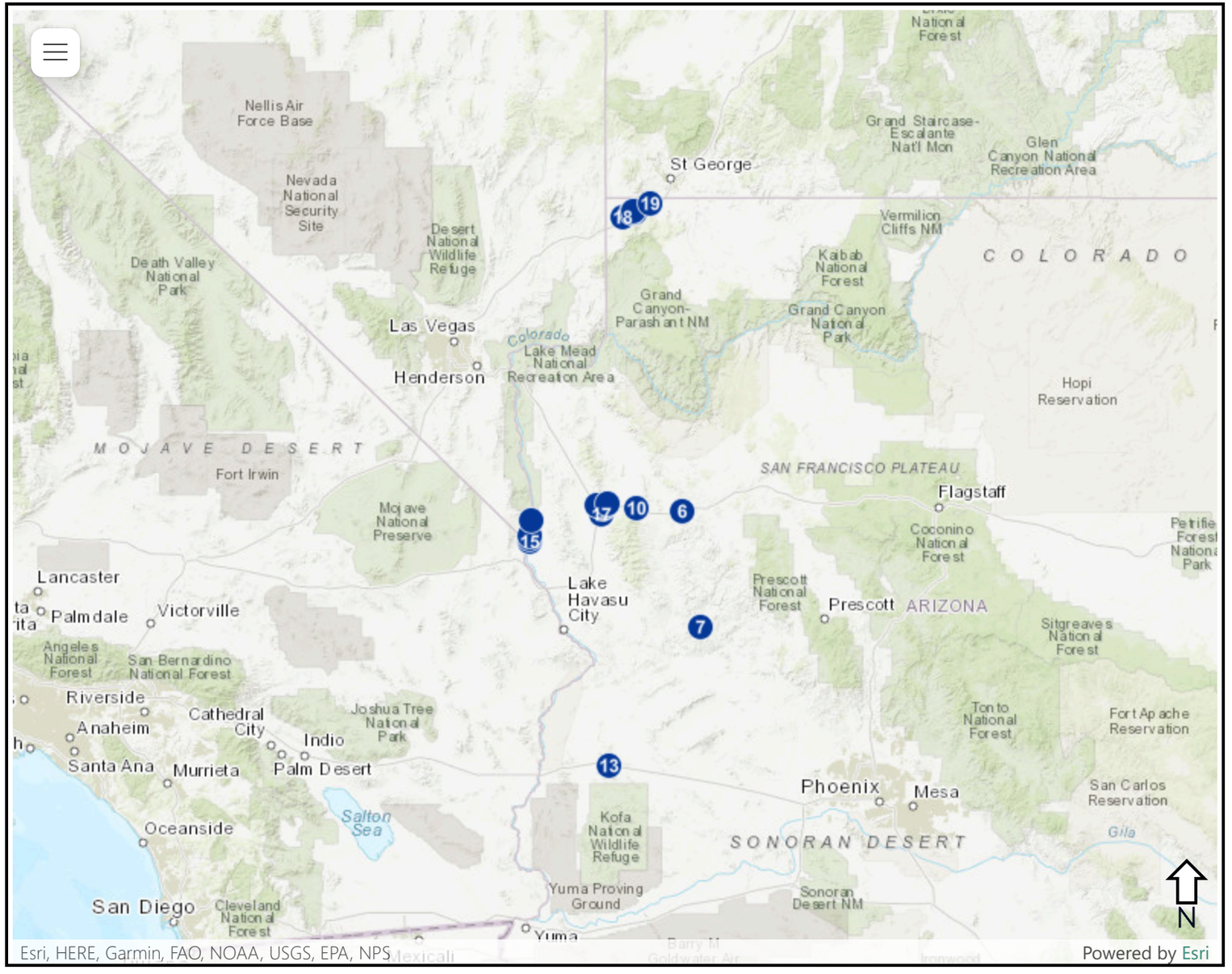
LHMPO

Top 20 Priority Intersections

PI Rank	Intersection
1	Kiowa Blvd & SR-95
2	Lake Havasu Ave & McCulloch Blvd
3	Lake Havasu Ave & Mesquite Ave
4	SR-95 & Swanson Ave
5	Mesquite Ave & SR-95
6	Palo Verde Blvd North & SR-95
7	Palo Verde Blvd South & SR-95
8	Mulbettery Ave & SR-95
9	Acoma Blvd North & SR-95
10	Acoma Blvd & Lake Havasu Ave
11	Industrial Blvd & SR-95
12	Acoma Blvd South & SR-95
13	Acoma Blvd & Mesquite Ave
14	Smoketree Ave & Swanson Ave
15	Maricopa Ave & Oro Grande Blvd
16	Lake Havasu Ave & Palo Verde Blvd South
17	Smoketree Ave & SR-95
18	Acoma Blvd & McCulloch Blvd
19	Mesquite Ave & Riviera Blvd
20	Acoma Blvd & Smoketree Ave

Figure 23. Top 20 Priority Intersections
LHMPO

United Civil Group



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

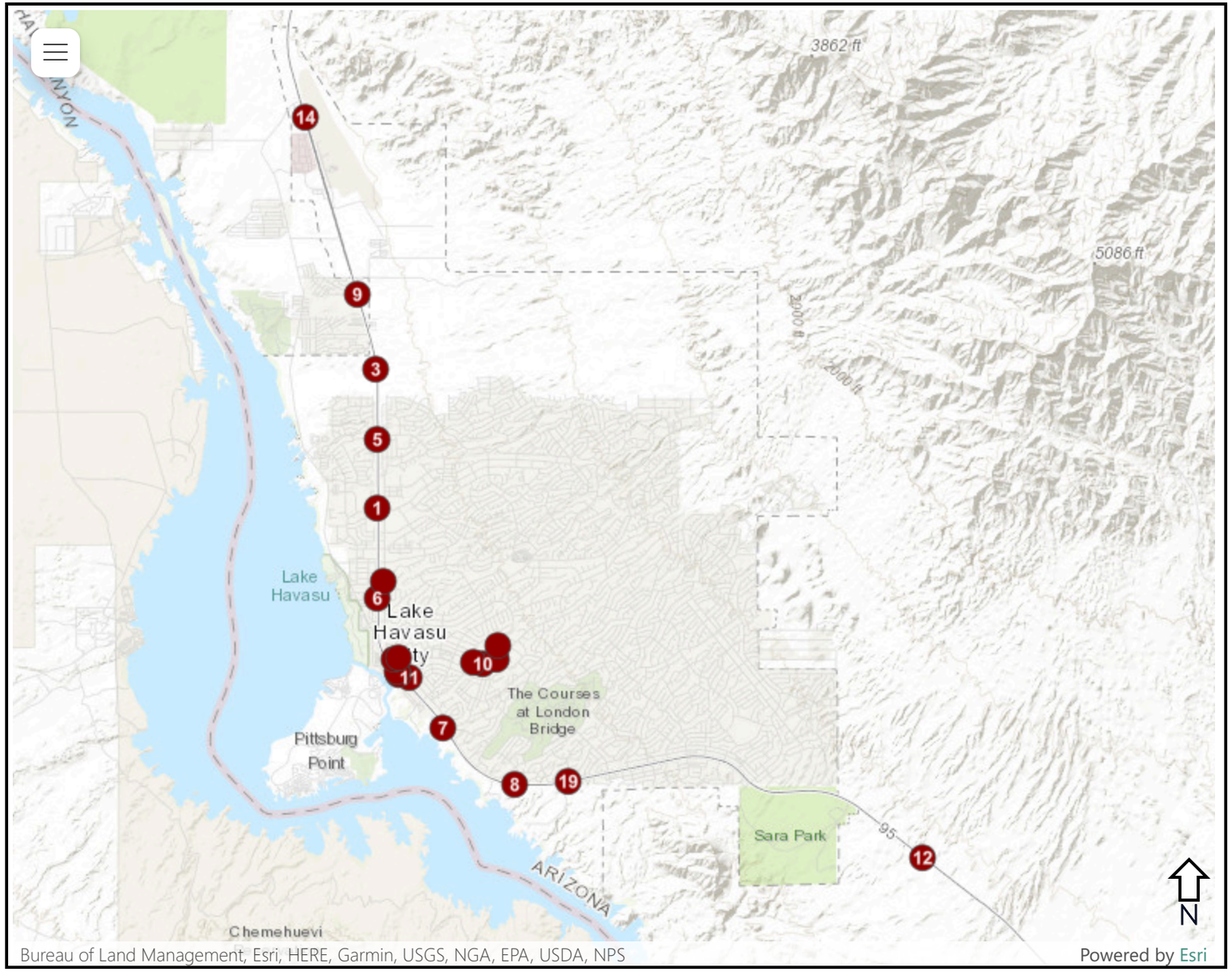
WACOG

Top 20 Priority Segments

PI Rank	On Road	From (Approximate)	To (Approximate)
1	SR-95	Valencia Rd (M239)	Gemini St (M238)
2	SR-95	Aztec Rd (M238)	Hammer Ln (M237)
3	Beale St	Alma Ave	I-40
4	I-40	Wagon Trail Rd (M049.5)	Beale St(M049)
5	US-93	US Highway 93 (M068)	Wagon Trail Rd (M069)
6	I-40	M083	M084
7	US-93	M146	M147
8	I-40	White Cliffs Rd (M050)	Stone St (M049.5)
9	SR-95	Palma Way (M245)	Arcadia Blvd (M246)
10	I-40	M064	M065
11	I-15	M014	M015
12	I-40	S of White Cliffs Rd (M050)	N of White Cliffs Rd (M050.3)
13	I-10	M030	M031
14	I-15	M013	M014
15	SR-95	M236	M237
16	I-40	M051	M052
17	I-40	M046	M047
18	I-15	M008	M009
19	I-15	M022	M023
20	I-15	M012	M013

Figure 24. Top 20 Priority Segments
WACOG

United Civil Group



Mapping prepared by United Civil Group in collaboration with Green Light Engineering

LHMPO

Top 20 Priority Segments

PI Rank	On Road	From (Approximate)	To (Approximate)
1	SR-95	College Dr Alignment (M185)	N Acoma Blvd (M184)
2	Lake Havasu Ave	Willow Ave	N McCulloch Blvd
3	SR-95	Lake Dr (M187)	Cabana Dr (M186)
4	SR-95	Paseo del Sol (M183)	Smoketree Ave (M182)
5	SR-95	Felicidad Dr (M186)	Kirk Dr Alignment (M185)
6	SR-95	Industrial Blvd (M184)	Topaz Dr alignment (M183)
7	SR-95	Smoketree Ave (M182)	Jones Dr (M181)
8	SR-95	Pena Dr (M180.5)	Bryce Ct Alignment (M180)
9	SR-95	Chenoweth Dr	Michael Dr Alignment
10	McCulloch Blvd	Pima Sq	Biren Sq
11	Lake Havasu Ave	N McCulloch Blvd	Cliffrose Dr Alignment
12	SR-95	M175	M174
13	McCulloch Blvd	Isla Circle Dr	Capri Blvd
14	Lake Havasu Ave	Corona Dr Alignment	Sea Angler Dr (Alignment)
14	SR-95	London Bridge Rd (M190)	M189
16	Mesquite Ave	SR-95	Del Rio Ln
17	McCulloch Blvd	Biren Sq	Agave Bay
18	McCulloch Blvd	Pima Sq	Mulberry Ave
19	Acoma Blvd	Birch Sq	Van Villet Ln
19	SR-95	M180	S Acoma Blvd (M179)

Figure 25. Top 20 Priority Segments
LHMPO

United Civil Group

4.0 Conclusions

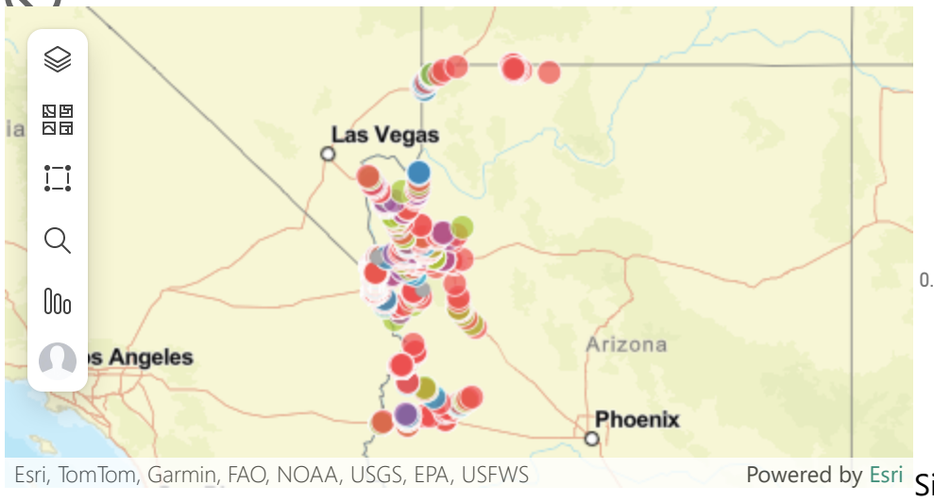
UCG conducted a comprehensive crash analysis for the WACOG and LHMPO regions. This analysis provides detailed insights into the traffic safety performance across these regions. By leveraging the interactive dashboard developed using Power BI, this data can be analyzed and visualized more effectively, enabling the identification of key patterns, trends, and contributing factors to crashes.

Key findings from the analysis include:

1. **Suspected Serious Injury and Fatal Crash Maps:** For each agency within the WACOG and LHMPO regions, maps were prepared that illustrate all crashes and pedalcycle/pedestrian crashes from years 2018 through 2022.
2. **Priority Intersections and Segments**: The analysis identified the top 20 priority intersections and roadway segments within both the WACOG and LHMPO regions based on crash frequency, crash rate, and severity index. The locations were identified according to the highest ranked PI.
3. **Interactive Dashboard Utility**: An interactive dashboard was developed that will assist WACOG and LHMPO to easily apply filters to the crash data to provide useful information. The interactive features are based on various crash facts, such as agency, collision manner, weather conditions, first harmful event, physical description, and injury severity that can provide tailored insights and facilitate informed decision-making.
4. **Yearly Trends**: By examining data over the five-year period (2018-2022), the dashboard can be used to assist in identifying trends in crash occurrences.

APPENDIX A

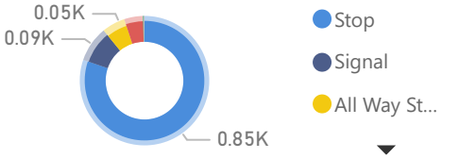
Crash Map



Intersection Crashes by MPO



Intersection Traffic Control



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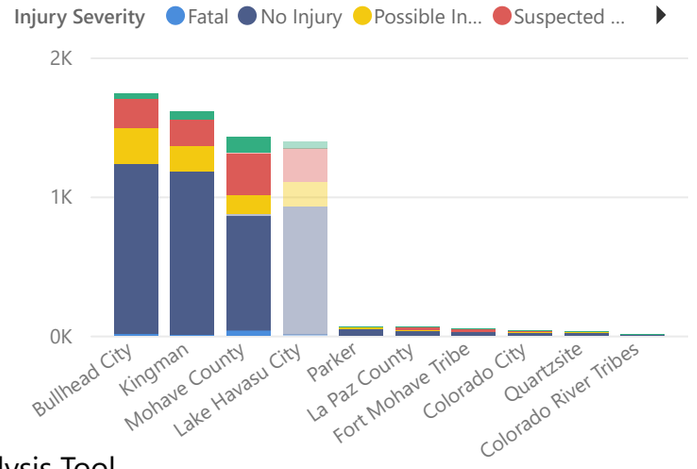
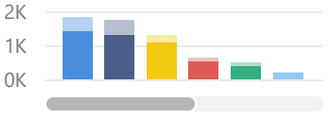
Intersection Crashes by Agency and Severity



Collision Manner



Crash Frequency Rank ...

33

Crash Rate Rank Perce...

33

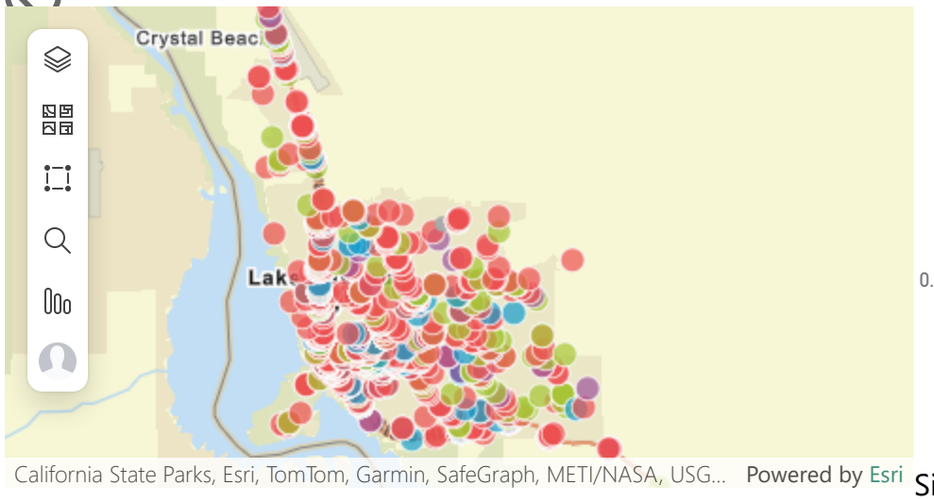
Severity Index Rank Per...

34

Signalized/Unsignalized Crash Analysis Tool

Agency	UCG Intersection Name	UCG Traffic Control	UCG ADEV	No Injury	Possible Injury	Suspected Minor Injury	Suspected Serious Injury	Fatal	Crash Frequency	Crash Frequency Rank	Crash Rate Measure	Crash Rate Rank	Severity Index	Severity Index Rank	PI	PI Rank
Kingman	Airway Ave & Stockton Hill Rd	Signal	34800	103	12	9	2		126	1	0.20	6	1.29	92	42.08	1
Mohave County	Aztec Rd & SR-95	Signal	39900	79	9	28	2		118	2	0.16	10	1.60	56	39.54	2
Bullhead City	Mohave Dr & SR-95	Signal	39000	66	16	10	3		95	3	0.13	16	1.47	73	31.90	3
Bullhead City	Marina Blvd & SR-95	Signal	40100	59	11	17			87	4	0.12	19	1.52	69	29.27	4
Bullhead City	Riverview Dr & SR-95	Signal	38000	53	9	17	2		81	5	0.12	21	1.60	55	27.31	5
Kingman	Stockton Hill Rd & Sycamore Ave	Signal	29500	57	10	3	5		75	6	0.14	12	1.41	77	25.28	6
Kingman	Beale St & I-40	Signal	49100	60	2	5	1		68	7	0.08	51	1.22	101	22.88	7
Kingman	Gordon Dr & Stockton Hill Rd	Signal	27100	38	10	11	1		60	8	0.12	18	1.58	60	20.38	8
Bullhead City	Hancock Rd & SR-95	Signal	42000	38	7	9	2		56	9	0.07	52	1.55	64	19.03	9
Kingman	Beverly Ave & Stockton Hill Rd	Stop	34700	40	11	4			55	10	0.09	39	1.35	85	18.64	10
Kingman	Airway Ave & Andy Devine Ave	Signal	28500	41	5	6	2		54	11	0.10	27	1.43	76	18.34	11
Bullhead City	Airport Center Dr & SR-95	Signal	21600	36	8	8		1	53	12	0.13	15	1.53	68	18.05	12
Bullhead City	Bullhead Pkwy South & SR-95	Signal	40100	42	4	6			52	13	0.07	55	1.31	89	17.63	13
Mohave County	Pierce Ferry Rd & US-93	Stop	10500	23	3	10	11	3	50	15	0.26	4	2.36	22	17.39	14
Bullhead City	Bullhead Pkwy & SR-95	Signal	40100	41	5	4	1		51	14	0.07	56	1.31	87	17.30	15
Bullhead City	Long Ave & SR-95	Signal	34000	43	5	3			51	14	0.08	46	1.22	102	17.27	16
Bullhead City	Ramar Rd & SR-95	Signal	35100	36	9	4	1		50	15	0.08	49	1.40	80	17.00	17
Bullhead City	Plata Dr & SR-95	Signal	31800	36	6	6	1		49	16	0.08	40	1.43	75	16.68	18
Kingman	Andy Devine Ave & Stockton Hill Rd	Signal	28300	40	5	4			49	16	0.09	34	1.27	96	16.63	19
Bullhead City	SR-95 & Thunderstruck Dr	Signal	30600	34	6	5	1	1	47	17	0.08	42	1.49	71	16.04	20

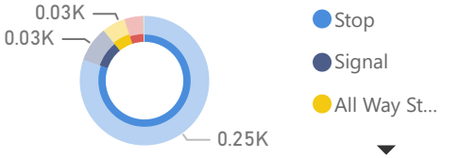
Crash Map



Intersection Crashes by MPO



Intersection Traffic Control



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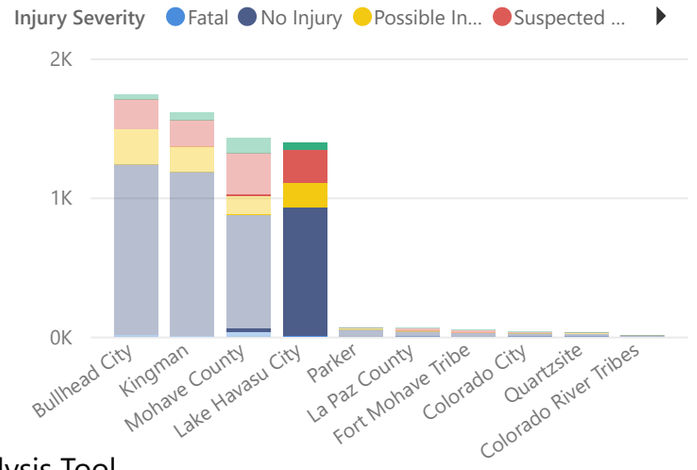
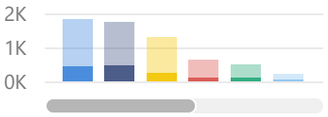
Intersection Crashes by Agency and Severity



Collision Manner



Crash Frequency Rank ...

33

Crash Rate Rank Perce...

33

Severity Index Rank Percen...

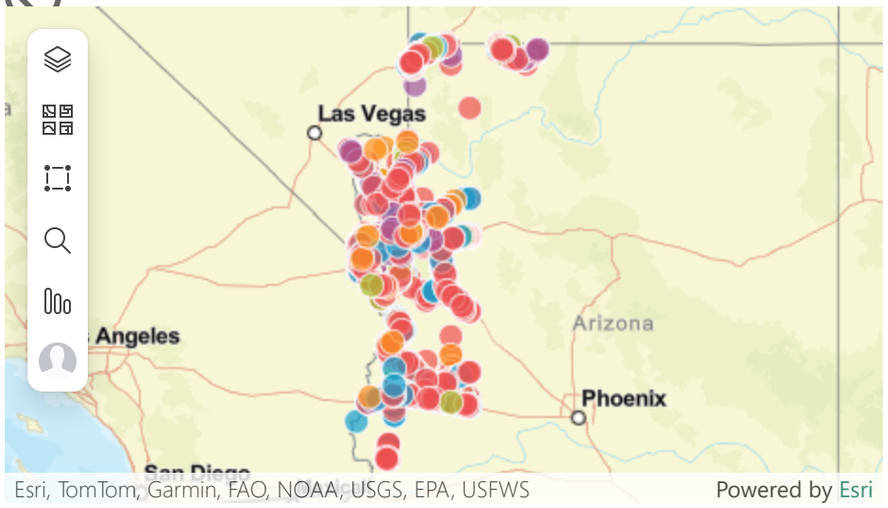
34

Signalized/Unsignalized Crash Analysis Tool

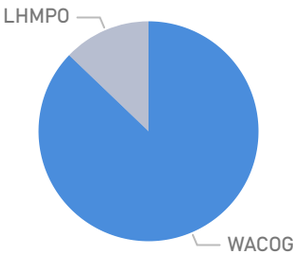
Agency	UCG Intersection Name	UCG Traffic Control	UCG ADEV	No Injury	Possible Injury	Suspected Minor Injury	Suspected Serious Injury	Fatal	Crash Frequency	Crash Frequency Rank	Crash Rate Measure	Crash Rate Rank	Severity Index	Severity Index Rank	PI	PI Rank
Lake Havasu City	Kiowa Blvd & SR-95	Signal	26600	33	5	7	1		46	1	0.09	10	1.48	32	15.71	1
Lake Havasu City	Lake Havasu Ave & McCulloch Blvd	Signal	20900	36	4	3			43	2	0.11	7	1.23	43	14.65	2
Lake Havasu City	Lake Havasu Ave & Mesquite Ave	Signal	26500	31	6	3	1		41	3	0.08	13	1.37	39	14.02	3
Lake Havasu City	SR-95 & Swanson Ave	Signal	23800	23	5	7	1		36	4	0.08	14	1.61	25	12.46	4
Lake Havasu City	Mesquite Ave & SR-95	Signal	29200	23	6	4	1		34	5	0.06	23	1.50	30	11.75	5
Lake Havasu City	Palo Verde Blvd North & SR-95	Signal	22500	21	3	5	2		31	6	0.08	19	1.61	24	10.80	6
Lake Havasu City	Palo Verde Blvd South & SR-95	Signal	19400	23	5	2	1		31	6	0.09	12	1.39	37	10.73	7
Lake Havasu City	Mulberry Ave & SR-95	Signal	31600	20	7	2	1		30	7	0.05	34	1.47	33	10.42	8
Lake Havasu City	Acoma Blvd North & SR-95	Signal	24800	16	5	6	2		29	8	0.06	22	1.79	15	10.20	9
Lake Havasu City	Acoma Blvd & Lake Havasu Ave	All Way Stop	11400	19	6	3			28	9	0.13	5	1.43	34	9.77	10
Lake Havasu City	Industrial Blvd & SR-95	Signal	27600	17	7	3			27	10	0.05	31	1.48	31	9.43	11
Lake Havasu City	Acoma Blvd South & SR-95	Signal	17800	16	5	4		1	26	11	0.08	15	1.65	21	9.17	12
Lake Havasu City	Acoma Blvd & Mesquite Ave	Signal	10500	16	3	3			22	12	0.11	6	1.41	35	7.78	13
Lake Havasu City	Smoketree Ave & Swanson Ave	Stop	2400	11	5	3	1		20	13	0.46	2	1.70	19	7.33	14
Lake Havasu City	Maricopa Ave & Oro Grande Blvd	Stop	1800	15	3	1	1		20	13	0.61	1	1.40	36	7.28	15
Lake Havasu City	Lake Havasu Ave & Palo Verde Blvd South	Signal	21300	15	3	2			20	13	0.05	35	1.35	40	7.08	16
Lake Havasu City	Smoketree Ave & SR-95	Signal	22900	11	1	6	1		19	14	0.05	48	1.84	13	6.91	17
Lake Havasu City	Acoma Blvd & McCulloch Blvd	Signal	16800	13	2	3	1		19	14	0.06	25	1.58	27	6.83	18
Lake Havasu City	Mesquite Ave & Riviera Blvd	All Way Stop	13800	13	1	1	3		18	15	0.07	20	1.67	20	6.53	19

APPENDIX B

Crash Map



Segment Crashes by MP...



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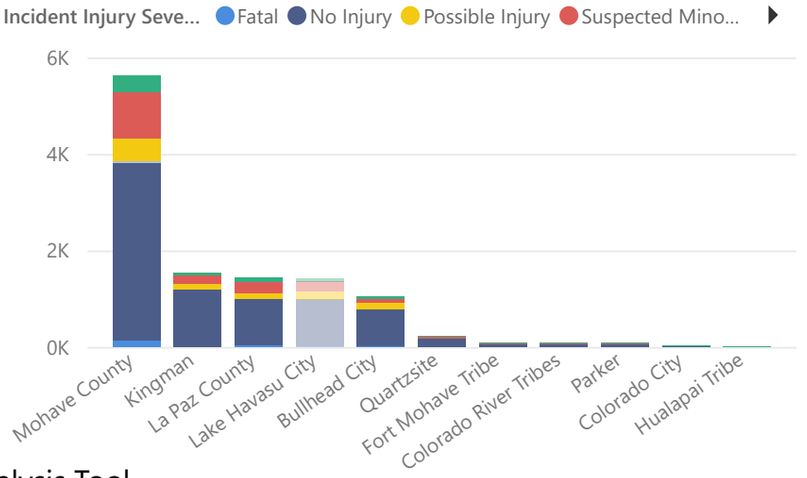
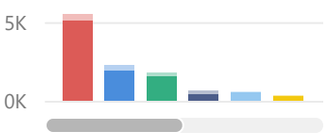
Segment Crashes by Agency



Collision Manner



Crash Frequency Rank ...

33

Crash Rate Rank Perce...

33

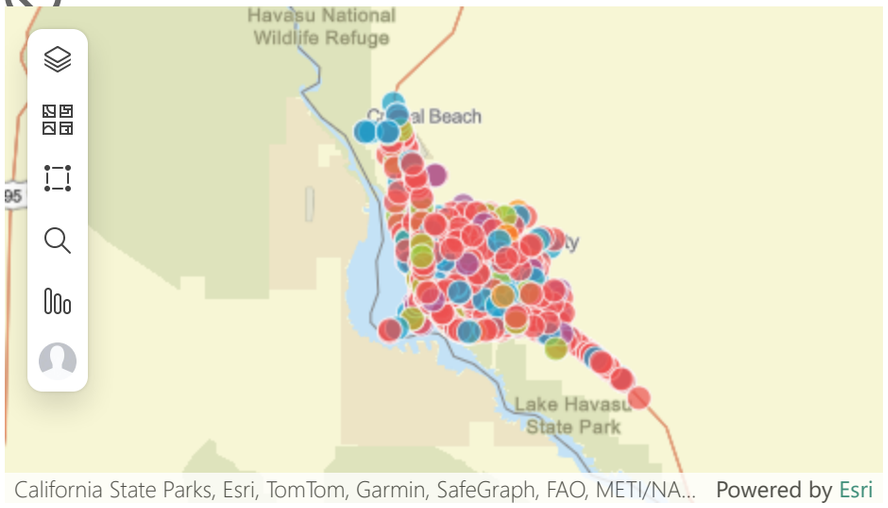
Severity Index Rank Percen...

34

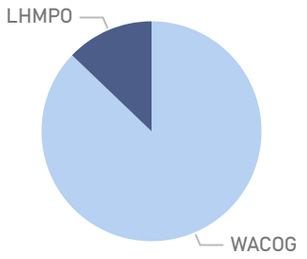
Segment Crash Analysis Tool

Agency	UCG On Road	Incident Crossing Feature	UCG Seg ADT	No Injury	Possible Injury	Suspected Minor Injury	Suspected Serious Injury	Fatal	Crash Frequency Seg	Crash Freq Rank Seg	UCG Crash Rate Measure Seg	Severity Index Seg	Severity Index Seg Rank	PI Seg	PI Seg Rank
Mohave County	SR-95	M238	36400	55	10	24	1	1	91	1	0.14	1.71	87	30.61	1
Mohave County	SR-95	M237	34200	50	7	15	1	2	75	2	0.12	1.64	101	25.31	2
Kingman	Beale St	Lampton Ave	19500	60	7	5	1		73	3	0.21	1.27	153	24.52	3
Kingman	I-40	M049	28400	48	8	3	1		60	4	0.20	1.28	152	20.24	4
Mohave County	US-93	M068	30900	34	6	11	2	1	54	5	0.10	1.70	90	18.40	5
Mohave County	I-40	M083	15600	31	3	11	2	1	48	6	0.17	1.73	84	16.43	6
Mohave County	US-93	M146	9500	23	5	13	2	1	44	7	0.25	1.93	55	15.18	7
Mohave County	I-40	M049	28400	27	6	10		1	44	7	0.20	1.68	94	15.09	8
Bullhead City	SR-95	M245	29900	34	6	4			44	7	0.08	1.32	143	14.97	9
Mohave County	I-40	M064	27200	29	1	8	4		42	8	0.08	1.69	93	14.43	10
Mohave County	I-15	M014	32000	27	5	7	3		42	8	0.07	1.67	95	14.43	11
Mohave County	I-40	M050	28400	31	4	5	1	1	42	8	0.14	1.50	119	14.37	12
La Paz County	I-10	M030	25900	26	2	8	5		41	9	0.09	1.80	71	14.14	13
Mohave County	I-15	M013	32000	27	5	5	2	2	41	9	0.07	1.71	88	14.11	14
Mohave County	SR-95	M236	19800	31	2	7			40	10	0.11	1.40	132	13.68	15
Kingman	I-40	M051	28400	30	3	5	1		39	11	0.08	1.41	130	13.35	16
Mohave County	I-40	M046	17300	18	2	10	5	3	38	12	0.12	2.29	30	13.32	17
Mohave County	I-15	M008	32000	21	4	8	5		38	12	0.07	1.92	57	13.19	18
Mohave County	I-15	M022	31300	23	2	10	1	1	37	13	0.06	1.78	76	12.82	19
Mohave County	I-15	M012	32000	26	2	6	2	1	37	13	0.06	1.65	98	12.77	20

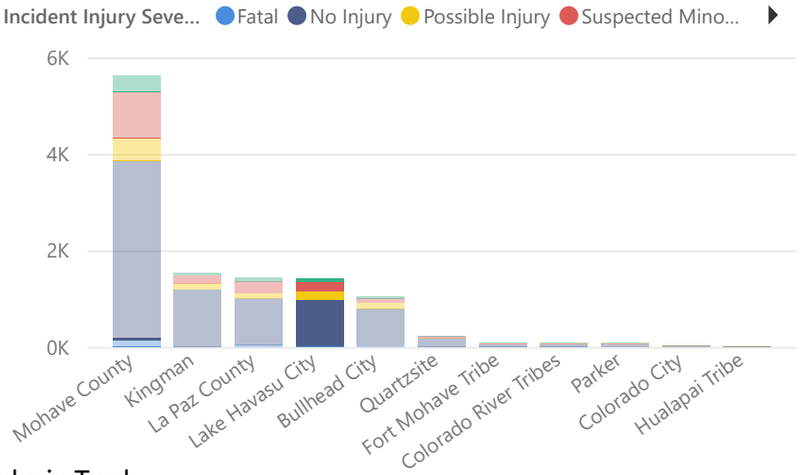
Crash Map



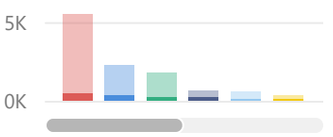
Segment Crashes by MP...



Segment Crashes by Agency



Collision Manner



Crash Frequency Rank ...

33

Crash Rate Rank Perce...

33

Severity Index Rank Percen...

34

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Segment Crash Analysis Tool

Agency	UCG On Road	Incident Crossing Feature	UCG Seg ADT	No Injury	Possible Injury	Suspected Minor Injury	Suspected Serious Injury	Fatal	Crash Frequency Seg	Crash Freq Rank Seg	UCG Crash Rate Measure Seg	Severity Index Seg	Severity Index Seg Rank	PI Seg	PI Seg Rank
Lake Havasu City	SR-95	M184	22000	21	7	6			34	1	0.08	1.56	25	11.75	1
Lake Havasu City	Lake Havasu Ave	Mesquite Ave	20000	18	5	3			26	2	0.07	1.42	30	9.06	2
Lake Havasu City	SR-95	M186	17000	13	1	7	2	2	25	3	0.10	2.16	15	8.98	3
Lake Havasu City	SR-95	M182	22000	16	4	2			22	4	0.05	1.36	33	7.72	4
Lake Havasu City	SR-95	M185	20000	15	3	1			19	5	0.05	1.26	38	6.70	5
Lake Havasu City	SR-95	M183	22000	14	2		2		18	6	0.04	1.44	28	6.43	6
Lake Havasu City	SR-95	M181	12500	12	4	1			17	7	0.07	1.35	34	6.07	7
Lake Havasu City	SR-95	M180	9000	9	3	3			15	8	0.09	1.60	22	5.49	8
Mohave County	SR-95	M187	17000	10	1	1	2		14	9	0.06	1.64	21	5.18	9
Lake Havasu City	McCulloch Blvd	Mulberry Ave	4800	11	2				13	10	0.15	1.15	41	4.68	10
Lake Havasu City	Lake Havasu Ave	Sunflower Dr	19500	9		2	1		12	11	0.03	1.58	23	4.50	11
Mohave County	SR-95	M174	9000	10		1	1		12	11	0.07	1.42	31	4.44	12
Lake Havasu City	McCulloch Blvd	N Lake Havasu Ave	9300	8	2	1			11	12	0.06	1.36	33	4.09	13
Lake Havasu City	Lake Havasu Ave	Bahama Ave	13200	6	1	2	1		10	13	0.04	1.80	18	3.91	14
Lake Havasu City	SR-95	M189	17000	6	1	2	1		10	13	0.03	1.80	18	3.91	14
Lake Havasu City	Mesquite Ave	Lake Havasu Ave	10200	8	1	1			10	13	0.05	1.30	36	3.74	16
Lake Havasu City	McCulloch Blvd	N Acoma Blvd	4900	9	1				10	13	0.11	1.10	43	3.67	17
Lake Havasu City	McCulloch Blvd	Querio Dr	5600	7		1	1		9	14	0.09	1.56	26	3.50	18
Lake Havasu City	Acoma Blvd	N McCulloch Blvd	10500	6	2	1			9	14	0.05	1.44	28	3.46	19
Lake Havasu City	SR-95	M179	9000	7	1		1		9	14	0.05	1.44	28	3.46	19

Appendix IV: Complete Streets and Vision Zero

Complete Streets and Vision Zero Policies

Presented by: Greenlight Traffic Engineering

Complete Streets Policy

Greenlight Traffic Engineering

Complete Streets in FHWA:

A Complete Street is safe, and feels safe, for all users.

U.S. Department of Transportation Federal Highway Administration

What is a Complete Streets Implementation Strategy?

1. Understanding the **community** and **network** context
2. Identifying **safety**, **connectivity**, and **equity** concerns
3. **Implementing** improvements over time
4. Evaluating impacts by **monitoring** and **measuring** success

https://highways.dot.gov/complete-streets/complete-streets-fhwa

Complete Streets Policy

Greenlight Traffic Engineering



Complete Streets Policy

Greenlight Traffic Engineering



10 Elements of a Complete Streets Policy

1. Establishes commitment and vision
2. Prioritizes underinvested and underserved communities
3. Applies to all projects and phases
4. Allows only clear exceptions
5. Mandates coordination
6. Adopts excellent design guidance
7. Requires proactive land-use planning
8. Measures progress
9. Sets criteria for choosing projects
10. Creates a plan for implementation

Complete Streets Policy

Greenlight Traffic Engineering

City of Phoenix
Complete Streets Policy *Only 5 pages

Vision: To help the City of Phoenix

- Become more **walkable**, **bikeable** and **public transit** friendly
- Foster **social engagement**
- Instill **community** pride
- **Grow** the local economy and property values
- Identify projects that will improve **equitable transportation access** for vulnerable and transit-dependent populations
- Improve the **livability** and long-term **sustainability** of the region.

Complete Streets Policy

Greenlight Traffic Engineering

GOALS: Ensure the rights-of-way:

- Are planned, designed, constructed, operated, and maintained with the ultimate goal of **serving a variety of transportation modes**
- Will contribute to **active transportation and public health**
- Accommodate transportation users of **all ages and abilities**
- Are economically and environmentally **sustainable**
- Are designed to be compatible with the surrounding contexts and **connecting transportation networks**
- Comply with state and federal law and City code and Ordinance S-41094
- Follow the **Complete Streets Planning and Design Principles** which **will be integrated** into the Street Transportation Design Guidelines
- Provide **new or improved connectivity** between all transportation modes and adjacent land uses.

Complete Streets Policy

Greenlight Traffic Engineering

Howard County, Maryland
Complete Streets Policy



Complete Streets Policy

Greenlight Traffic Engineering

Vision:

“To ensure that Howard County is a place for individuals of all backgrounds to live and travel freely, safely, and comfortably, public and private roadways in Howard County shall be **safe and convenient** for residents of all ages and abilities who **travel by foot, bicycle, public transportation or automobile, ensuring sustainable communities** Countywide."

Complete Streets Policy

Greenlight Traffic Engineering

Above and beyond policy details:

- Developed a **design manual** for complete streets
- Integrated Pedestrian and Bicycle **master plans**
- **Scoped projects** for design and construction
- Developed 9-part Complete Streets **training videos**
  - For developers, designers, and the general public
- Developed a **sidewalk policy**
- Developed a transportation **project prioritization system**



Complete Streets Policy

Greenlight Traffic Engineering

Transportation Project Prioritization System

A project scoring mechanism for all potential capital transportation projects

Project scoring system (50 possible points)

- Multimodal access and safety (20 possible)
- Equity (10 possible)
- Crash history (10 possible)
- System preservation/maintenance (10 possible)
- Bonus points for cost sharing (10 points)

Greenlight Traffic Engineering

Questions/Discussion

Vision Zero Policy

Greenlight Traffic Engineering

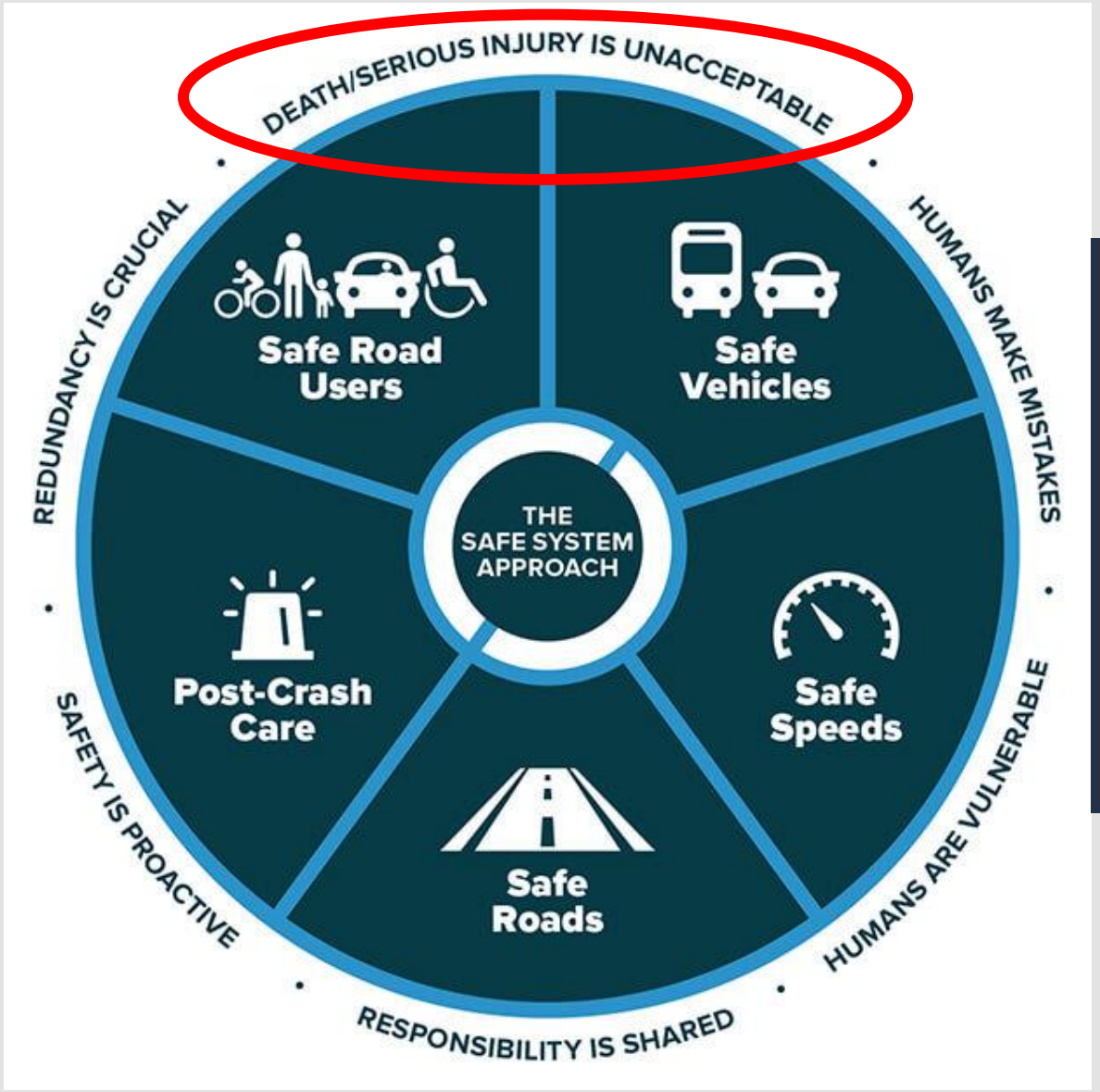
U.S. Department of Transportation
Federal Highway Administration

THE SAFE SYSTEM APPROACH

Zero is our goal. A Safe System is how we get there.

The **zero deaths** vision acknowledges that even one death on our transportation system is unacceptable and focuses on safe mobility for **all road users**.

Vision Zero Policy



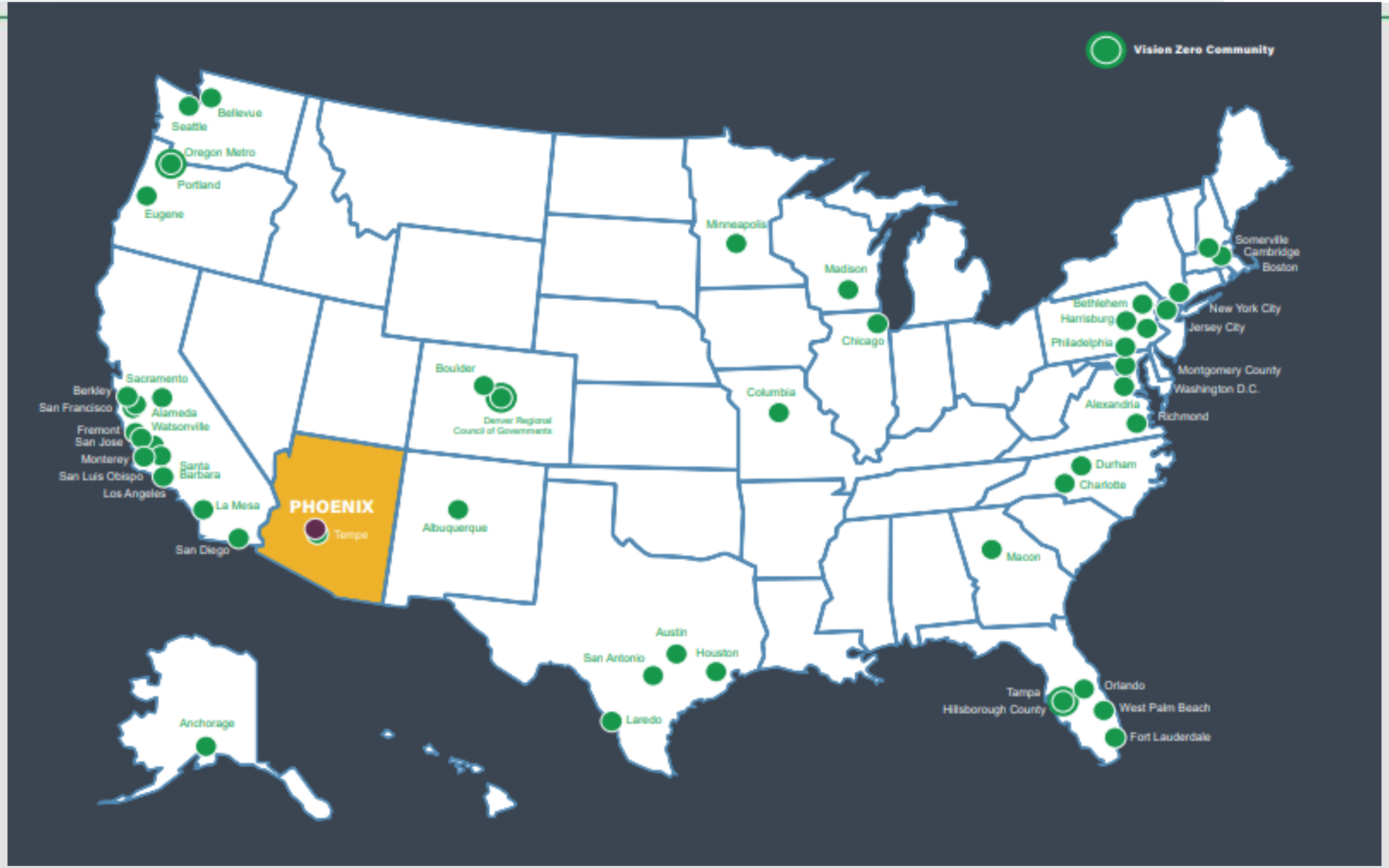
HUMAN-CENTRIC APPROACH



1. Death/serious injury is unacceptable
2. Humans make mistakes
3. Humans are vulnerable
4. Responsibility is shared
5. Safety is proactive
6. Redundancy is crucial

Vision Zero Policy

Greenlight Traffic Engineering



Vision Zero Policy

Greenlight Traffic Engineering

City of Phoenix 2022 Vision Zero Action Plan

CHAPTER 1 — INTRODUCTION 1
- An Urgent Need 3
- The Planning Process 5
- Vision Zero Commitment 7
- The Safe Systems Approach 9
- Vision & Goals 10

CHAPTER 2 — THE FACTS 11
- Quick Facts 12
- Crash Factors 13
- High Injury Network 15

CHAPTER 3 — THE 5 E'S 17
- Evaluation 19
- Engineering 20
- Enforcement 21
- Education 22
- Equity 23

CHAPTER 4 — ENGAGING PHOENICIANS 25
- What Phoenix is Saying 27
- Using Phoenician Input 29

CHAPTER 5 — TAKING ACTION 31
- How to Read This Section 33
- General Strategies 35
- Behavior Related 37
- Pedestrians & Bicyclists 39
- Intersections 41
- Segments 43
- Toolboxes 45

CHAPTER 6 — A PATH FORWARD 49
- Strategy Prioritization 50
- Foundational Change 51
- Systemic Implementation 57
- Addressing the HIN 63
- Resources 76
- Reporting & Tracking 77

Vision Zero Policy

Greenlight Traffic Engineering

VISION

Phoenix aspires to reduce the number of fatal and serious injury crashes on its streets to ZERO by 2050

GOALS

- Create a Road Safety Action Plan that moves to VISION ZERO
- Engage the public through an inclusive engagement process
- Use data to drive decisions
- Embrace the 5 E's of safety
  (Evaluation, Engineering, Enforcement, Education, & Equity)
- Establish a culture of safety
- Develop and implement strategies and countermeasures
- Establish performance measures for evaluation

Vision Zero Policy

Greenlight Traffic Engineering

HIN INTERSECTIONS

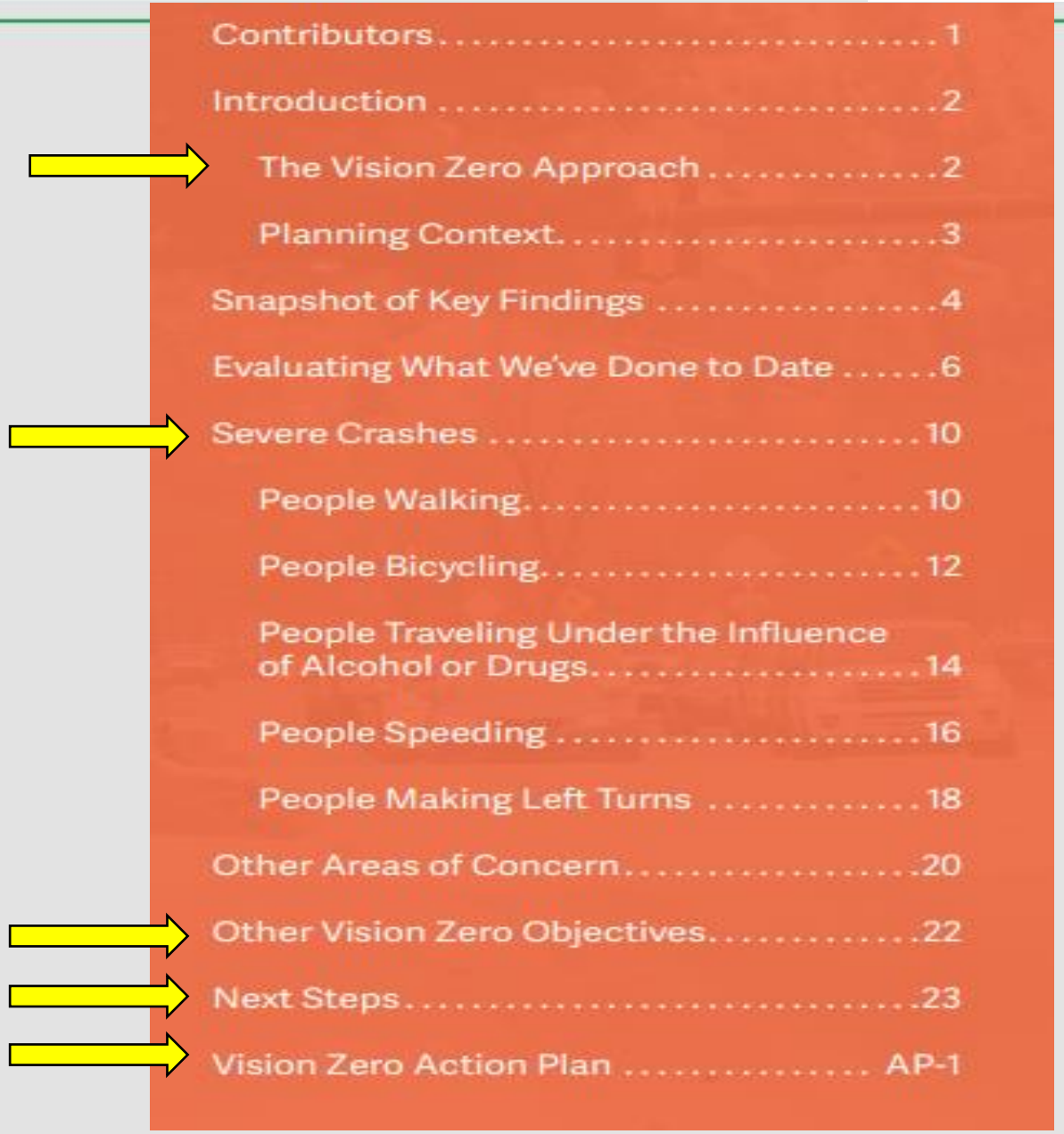
Location	HIN Segment Tier (1-3)	RSAP Equity Analysis	USDOT Underserved Community	Key Crash Characteristics	Status: RC, PC, P, F
35th Ave & Glendale Ave	1	Yes	Yes	- 50% Left-Turn (LT) crashes - 50% nighttime - 3 ped & 1 bike crashes (40%) - Fatal crash ped south of crosswalk	P
51st Ave & McDowell Rd	1	Yes	Yes	- 56% nighttime or dawn/dusk - 44% peds (3 on west leg) - 75% peds at night or dawn/dusk	P

HIN SEGMENTS PROJECTS

Location	HIN Segment Tier (1-3)	RSAP Equity Analysis	USDOT Underserved Community	Key Crash Characteristics	Status: RC, PC, P, F
35th Ave: Moreland St to Van Buren St	1	Yes	Yes	- 8 ped crashes (32% of all crashes) accounted for 4 fatalities (57%). All but 1 ped crash were within 300' of a signalized intersection - 1 bicyclist crash accounted for an additional fatality - Near even mix of daytime and darkness crashes	P
7th St: Hatcher Rd to Mountain View Rd	1	Yes	Yes	- 55% peds (2 fatal) - 1 bike crash (fatal) - 64% nighttime - 55% in 2017	P

Vision Zero Policy

City of Boulder, CO
2023
Vision Zero Action Plan



*Less emphasis on community engagement efforts than Phoenix

Vision Zero Policy

Greenlight Traffic Engineering

***Vision Zero** is Boulder's goal to eliminate all severe traffic crashes involving people using all modes of travel.*

*no end date

There are five Vision Zero objectives:

1. Eliminate crashes resulting in serious injuries and fatalities.
2. Reduce other types of crashes.
3. Improve travel comfort and security.
4. Enhance awareness of and community engagement with Vision Zero.
5. Improve data and be transparent.

Vision Zero Policy

Greenlight Traffic Engineering

Action	4 E's	Timeframe	Partners*	Performance Metric(s)
1. Implement **specific countermeasures** at high crash locations (peds, bikes, vehicles)		Ongoing	Transportation, PD	% of intersections addressed on an annual basis ***Target:*** *45 intersections with specific mitigation identified for implementation*
2. Continue to **pursue federal funding** for and construct Highway Safety Improvement Program projects		Ongoing	Transportation	# of projects funded and completed ***Target:*** *3 projects per funding cycle*
3. Proactively implement **new signal timing practices** at identified intersections to improve pedestrian, bicyclist, and		Ongoing	Transportation	% of intersections addressed on an annual basis ***Target:*** *50 intersections identified*

*Less scoping to actions

Vision Zero Policy

Greenlight Traffic Engineering

Questions/Discussion

Appendix V: Recommended Projects

LHMPO High-Level Estimate of Probable Project Cost

Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Cost	Estimated Cost	Long (x)
Lake Havasu City	ADOT	Kiowa Blvd & SR-95	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$16,509	$17,000	-114.349412
Lake Havasu City	Lake Havasu City	Lake Havasu Ave & McCulloch Blvd	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$16,509	$17,000	-114.3442
Lake Havasu City	Lake Havasu City	Lake Havasu Ave & Mesquite Ave	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$16,509	$17,000	-114.3455
Lake Havasu City	ADOT	SR-95 & Swanson Ave	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$16,509	$17,000	-114.343896
Lake Havasu City	ADOT	Mesquite Ave & SR-95	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$16,509	$17,000	-114.3466
Lake Havasu City	ADOT	Palo Verde Blvd North & SR-95	Intersection	Top Crash Intersections, Social Pinpoint	Install retroreflective signal backplates	$16,509	$17,000	-114.3495
Lake Havasu City	ADOT	Palo Verde Blvd South & SR-95	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$16,509	$17,000	-114.3493
Lake Havasu City	ADOT	Mulberry Ave & SR-95	Intersection	Top Crash Intersections, Social Pinpoint	Install retroreflective signal backplates and refresh/enhance pavement markings	$43,779	$44,000	-114.3345
Lake Havasu City	ADOT	Acoma Blvd North & SR-95	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$16,509	$17,000	-114.34939
Lake Havasu City	Lake Havasu City	Acoma Blvd & Lake Havasu Ave	Intersection	Top Crash Intersections	Install traffic signal if warranted	$1,077,721	$1,078,000	-114.3480
Lake Havasu City	ADOT	Industrial Blvd & SR-95	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$16,509	$17,000	-114.3494
Lake Havasu City	ADOT	Acoma Blvd South & SR-95	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$16,509	$17,000	-114.2978

LHMPO High-Level Estimate of Probable Project Cost

Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Cost	Estimated Cost	Long (x)
Lake Havasu City	Lake Havasu City	Acoma Blvd & Mesquite Ave	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$16,509	$17,000	-114.3239
Lake Havasu City	Lake Havasu City	Smoketree Ave & Swanson Ave	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$1,077,721	$1,078,000	-114.3332
Lake Havasu City	Lake Havasu City	Maricopa Ave & Oro Grande Blvd	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$1,077,721	$1,078,000	-114.2801
Lake Havasu City	Lake Havasu City	Lake Havasu Ave & Palo Verde Blvd South	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$16,509	$17,000	-114.3480
Lake Havasu City	ADOT	Smoketree Ave & SR-95	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$16,509	$17,000	-114.3394
Lake Havasu City	Lake Havasu City	Acoma Blvd & McCulloch Blvd	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$16,509	$17,000	-114.3226
Lake Havasu City	Lake Havasu City	Mesquite Ave & Riviera Blvd	Intersection	Top Crash Intersections, Social Pinpoint	Install retroreflective signal backplates	$1,113,251	$1,113,000	-114.3351
Lake Havasu City	Lake Havasu City	Acoma Blvd & Smoketree Ave	Intersection	Top Crash Intersections, Social Pinpoint	Install retroreflective signal backplates and refresh pavement markings	$1,077,721	$1,078,000	-114.3253
Lake Havasu City	Lake Havasu City	Acoma Blvd & Swanson Ave	Intersection	Social Pinpoint	Install retroreflective signal backplates	$1,077,721	$1,078,000	-114.32107
Lake Havasu City	Lake Havasu City	Havasupai Boulevard & Acoma Blvd	Intersection	Social Pinpoint	Install traffic signal if warranted	$1,077,721	$1,078,000	-114.33395
Lake Havasu City	Lake Havasu City	Lake Havasu Ave: Willow Ave To S Smoketree Ave	Segment	Top Crash Segments	Install retroreflective signal backplates	$107,597	$108,000	-114.34753
Lake Havasu City	ADOT	SR-95: M184 To M188	Segment	Top Crash Segments	Install retroreflective signal backplates	$137,453	$137,000	-114.35779
Lake Havasu City	ADOT	SR-95: Industrial Blvd To M180	Segment	Top Crash Segments, Social Pinpoint	Install retroreflective signal backplates	$137,453	$137,000	-114.34938
Mohave County	ADOT	SR-95: M175 To Lost Surveyor Rd	Segment	Top Crash Segments	Install traffic signal if warranted	$137,477	$137,000	-114.23348
Lake Havasu City	Lake Havasu City	McCulloch Blvd: Isla Circle Dr To Civic Center Ln	Segment	Top Crash Segments	Install traffic signal if warranted	$107,597	$108,000	-114.35039
Lake Havasu City	Lake Havasu City	N Lake Havasu Ave: Industrial Blvd To Sabino Dr	Segment	Top Crash Segments	Install retroreflective signal backplates	$74,598	$75,000	-114.34793

LHMPO High-Level Estimate of Probable Project Cost

Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Cost	Estimated Cost	Long (x)
Lake Havasu City	ADOT	SR-95: London Bridge Rd (M190) To M189	Segment	Top Crash Segments	Install retroreflective signal backplates	$124,106	$124,000	-114.36811
Lake Havasu City	Lake Havasu City	Mesquite Ave: SR-95 To Del Rio Ln	Segment	Top Crash Segments	Install retroreflective signal backplates	$41,599	$42,000	-114.34367
Lake Havasu City	Lake Havasu City	McCulloch Blvd: Agave Bay To 550' West of Smoketree Ave	Segment	Top Crash Segments	Install traffic signal if warranted and refresh pavement markings	$107,597	$108,000	"114.32111
Lake Havasu City	ADOT	SR 95: McCulloch Blvd S To M176	Segment	Top Crash Segments	Install traffic signal if warranted	$107,597	$108,000	-114.26578
Lake Havasu City	Lake Havasu City	Kiowa Blvd: 650' East of Avalon Ave To 570' West of Avalon Ave	Segment	Top Crash Segments	Install traffic signal if warranted	$32,999	$33,000	-114.32636
Lake Havasu City	Lake Havasu City	Mesquite Ave: Smoketree Ave To Acoma Blvd	Segment	Top Crash Segments	Install traffic signal if warranted	$107,597	$108,000	-114.32985
Lake Havasu City	Lake Havasu City	London Bridge Rd: Paseo del Sol Ave To Marlboro Dr	Segment	Top Crash Segments	Install speed feedback signs and narrow travel lanes	$1,545,814	$1,546,000	-114.34686
Lake Havasu City	Lake Havasu City	Acoma Blvd: Lake Havasu Ave To Havasupai Blvd	Segment	Top Crash Segments	Install speed feedback signs, optimize traffic signal timing along the segment*, install overhead signal ahead warning signs with flashing beacons, and narrow travel lanes	$6,900,120	$6,900,000	-114.34792
Lake Havasu City	Lake Havasu City	Acoma Blvd: Polaris Dr To Rainbow Ave	Segment	Top Crash Segments	Install speed feedback signs, optimize traffic signal timing along the segment*, install overhead signal ahead warning signs with flashing beacons, and narrow travel lanes	$107,597	$108,000	-114.33401
Lake Havasu City	Lake Havasu City	Industrial Blvd: Lake Havasu Ave To Acoma Blvd	Segment	Top Crash Segments	Install shoulder rumble strips, speed feedback signs, and narrow travel lanes	$9,440,366	$9,440,000	-114.34772
Lake Havasu City	Lake Havasu City	McCulloch Blvd: Isle Cir Dr To 1200' North of McCulloch Blvd	Segment	Top Crash Segments	Install speed feedback signs and narrow travel lanes	$107,597	$108,000	-114.35044
Lake Havasu City	Lake Havasu City	London Bridge Rd: 400' North of Industrial Blvd To 200' South of Boat Launch Rd	Segment	Top Crash Segments	Install speed feedback signs and narrow travel lanes	$58,099	$58,000	"114.35687

LHMPO High-Level Estimate of Probable Project Cost

Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Cost	Estimated Cost	Long (x)
Lake Havasu City	Lake Havasu City	London Bridge Rd: Kirk Dr To 440' South of Vista del Lago Loop	Segment	Top Crash Segments	Install retroreflective backplates at signalized intersections, speed feedback signs, and narrow travel lanes	$205,205	$205,000	"114.36086
Lake Havasu City	Lake Havasu City	Swanson Ave: Lake Havasu Ave To 470' South of Capri Blvd	Segment	Top Crash Segments	Install speed feedback signs	$1,545,814	$1,546,000	"114.34269
Lake Havasu City	ADOT	SR-95 From Pena Ln (M180.5) To Oro Grande Blvd	Segment	Top Crash Segments	Refresh pavement markings and install speed feedback signs	$153,962	$154,000	-114.325434

*** The cost for this item is not included as it is considered an operational enhancement rather than a construction activity.**

LHMPO High-Level Estimate of Probable Systemic Project Cost

Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Estimated Cost
Lake Havasu City	ADOT	Kiowa Blvd & SR-95; Lake Havasu Ave & McCulloch Blvd; Lake Havasu Ave & Mesquite Ave; SR-95 & Swanson Ave; Mesquite Ave & SR-95; Palo Verde Blvd North & SR-95; Palo Verde Blvd South & SR-95; Mulberry Ave & SR-95; Acoma Blvd North & SR-95; Industrial Blvd & SR-95; Industrial Blvd & SR-95; Acoma Blvd South & SR-95; Acoma Blvd & Mesquite Ave; Lake Havasu Ave & Palo Verde Blvd South; Smoketree Ave & SR-95; Acoma Blvd & McCulloch Blvd	Intersection	Top Crash Intersections	Install retroreflective signal backplates	$264,000
Lake Havasu City	Lake Havasu City	Acoma Blvd & Lake Havasu Ave; Smoketree Ave & Swanson Ave; Maricopa Ave & Oro Grande Blvd; Mesquite Ave & Riviera Blvd; Acoma	Intersection	Top Crash Intersections, Social Pinpoint	Install traffic signal if warranted	$7,544,000

LHMPO High-Level Estimate of Probable Systemic Project Cost

Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Estimated Cost
		Blvd & Smoketree Ave; Acoma Blvd & Swanson Ave; Havasupai Boulevard & Acoma Blvd				
Lake Havasu City	Lake Havasu City	Mesquite Ave & Riviera Blvd; McCulloch Blvd: Agave Bay To 550' West of Smoketree Ave; Acoma Blvd: Lake Havasu Ave To Havasupai Blvd; London Bridge Rd: 400' North of Industrial Blvd To 200' South of Boat Launch Rd	Intersection, Segment	Top Crash Intersections, Social Pinpoint, Top Crash Segments	Refresh pavement markings	$184,000
Lake Havasu City	Lake Havasu City	Lake Havasu Ave: Willow Ave To S Smoketree Ave; SR-95: M184 To M188; SR-95: Industrial Blvd To M180; SR-95: M175 To Lost Surveyor Rd; McCulloch Blvd: Isla Circle Dr To Civic Center Ln; N Lake Havasu Ave: Industrial Blvd To Sabino Dr; SR-95: London Bridge Rd (M190) To M189; Mesquite Ave: SR-95 To Del Rio Ln; McCulloch Blvd: Agave Bay To 550' West of Smoketree Ave; SR 95: McCulloch Blvd S To M176; Mesquite Ave: Smoketree Ave To Acoma Blvd; Acoma Blvd: Polaris Dr To Rainbow Ave; McCulloch Blvd: Isle Cir Dr To 1200' North of McCulloch Blvd; London Bridge Rd: 400' North of Industrial Blvd To 200' South of Boat Launch Rd; SR-95 From Pena Ln (M180.5) To Oro Grande Blvd	Segment	Top Crash Segments	Install speed feedback signs	$624,000
Lake Havasu City	Lake Havasu City	Lake Havasu Ave: Willow Ave To S Smoketree Ave; SR-95: M184 To M188; SR-95: Industrial Blvd To M180; SR-95: M175 To Lost Surveyor Rd; SR-95: London Bridge Rd (M190) To M189; SR 95: McCulloch Blvd S To M176; Kiowa	Segment	Top Crash Segments	Narrow travel lanes	$66,000

LHMPO High-Level Estimate of Probable Systemic Project Cost

Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Estimated Cost
		Blvd: 650' East of Avalon Ave To 570' West of Avalon Ave; Mesquite Ave: Smoketree Ave To Acoma Blvd; Acoma Blvd: Lake Havasu Ave To Havasupai Blvd; Acoma Blvd: Polaris Dr To Rainbow Ave; McCulloch Blvd: Isle Cir Dr To 1200' North of McCulloch Blvd; SR-95 From Pena Ln (M180.5) To Oro Grande Blvd				
Lake Havasu City	ADOT	SR-95: M184 To M188; SR-95: Industrial Blvd To M180; SR-95 From Pena Ln (M180.5) To Oro Grande Blvd	Segment	Top Crash Segments, Social Pinpoint	Install overhead signal ahead warning signs with flashing beacons	$90,000
Lake Havasu City	ADOT	SR-95: M184 To M188; SR-95: Industrial Blvd To M180; SR-95 From Pena Ln (M180.5) To Oro Grande Blvd	Segment	Top Crash Segments	Optimize traffic signal timing along the segment*	-
Lake Havasu City	Lake Havasu City	London Bridge Rd: Paseo del Sol Ave To Marlboro Dr; Industrial Blvd: Lake Havasu Ave To Acoma Blvd; Swanson Ave: Lake Havasu Ave To 470' South of Capri Blvd	Segment	Top Crash Segments	Install raised medians	$9,926,000
Lake Havasu City	ADOT/Lake Havasu City	Intersections of SR 95 and Kiowa Blvd, SR 95 and Swanson Ave, SR 95 and Mesquite Ave, SR 95 and Palo Verde Blvd N, SR 95 and Palo Verde Blvd S, SR 95/Lake Havasu Ave and Mulberry Ave, SR 95 and Acoma Blvd N, SR 95 and Acoma Blvd S, SR 95 and Industrial Blvd, SR 95 and Smoketree Ave, SR 95 and McCulloch Blvd South, SR 95 and Oro Grande Blvd, SR 95 and Havasu Riviera Pkwy, SR 95 and London Bridge Rd, SR 95 and Centre Loop, SR 95 and The Shops Blvd, SR 95 and Airport Centre Blvd, SR 95 and Retail Centre Blvd, SR 95 and	Intersection	Agency Comment	Install retroreflective signal backplates	$522,000

LHMPO High-Level Estimate of Probable Systemic Project Cost

Location	Roadway Ownership	Intersection/ Segment	Project Type	Selection Method	Scope	Estimated Cost
		Chenoweth Dr, SR 95 and Lake Dr, Lake Havasu Ave and McCulloch Blvd, Lake Havasu Ave and Mesquite Ave, Lake Havasu Ave and Palo Verde Blvd S, Acoma Blvd and Mesquite Ave, Acoma Blvd and McCulloch Blvd, Lake Havasu Ave and S Smoketree Ave, Lake Havasu Ave and Swanson Ave, Lake Havasu Ave and Industrial Blvd, McCulloch Blvd and Riviera Blvd, McCulloch Blvd and Capri Blvd, McCulloch Blvd and Smoketree Ave, and Palo Verde Blvd S and Kiowa Blvd S				

*** The cost for this item is not included as it is considered an operational enhancement rather than a construction activity.**