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Member of the SNC-Lavalin Group

City of North Las Vegas
Local Road Safety Plan

Template Outline

Task 3 Deliverable (Draft Deliverable)

June 26, 2023

ATKINS

Member of the SNC-Lavalin Group

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Atkins North America, Inc.		

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Abbreviations	
AADT	Annual Average Daily Traffic
CEA	Critical Emphasis Area
CMF	Crash Modification Factor
CNLV	City of North Las Vegas
EA	Emphasis Area
FHWA	Federal Highway Administration
GIS	Geographic Information Systems
HPMS	Highway Performance Monitoring System
HSIP	Highway Safety Improvement Program
KA	Fatal and Serious Injury Crashes
LRSP	Local Road Safety Plan
NCHRP	National Cooperative Highway Research Program
NDOT	Nevada Department of Transportation
NHTSA	National Highway Traffic Safety Administration
RSA	Road Safety Audit
RTC	Regional Transportation Commission of Southern Nevada
SHSP	Strategic Highway Safety Plan
SMP	Safety Management Plan
SPF	Safety Performance Function
SR	State Route
USDOT	United States Department of Transportation
K	Fatal Injury
A	Serious/Incapacitating Injury
B	Non - Incapacitating Injury
C	Possible Injury
O	No Injury/Property Damage

1. INTRODUCTION

The purpose of the City of North Las Vegas (CNLV) Local Road Safety Plan (LRSP) is to identify safety issues and assist with making informed safety investment decisions to reduce fatalities and serious injuries for all road users. The LRSP is data driven with goals of reducing severe crashes by selecting critical emphasis areas, documenting at-risk locations, and identifying effective safety improvement strategies. Outcomes of the LRSP better position the City to compete for available safety funds.

Emphasis areas identified for CNLV are based on data analysis, stakeholder input, and a comparison with the Nevada Strategic Highway Safety Plan (SHSP). The strategies identified are proactive measures based on current crash trends and roadway risk factors, which will effectively address safety issues.

This plan integrates strategies from the Six E's of Traffic Safety:

- Engineering
- Enforcement
- Education
- Emergency services
- Equity
- Everyone

The CNLV LRSP included a stakeholder group assembled to provide input on key elements of the plan, identify region-specific challenges, prioritize emphasis areas, and create strategies; the stakeholder group is expected to lead implementation of this plan.

The LRSP is intended to be a living document, updated periodically. The distribution of crashes changes over time, as roadway and traffic conditions that contribute to the occurrence of crashes change. As a result, CNLV is encouraged to periodically update the LRSP once it has supplemented most of the recommended safety projects, or after approximately five years.

Document Review of Other Regional Plans

This section provides a brief overview of known policies, plans, and studies related to the Local Road Safety Plan (LRSP) study area. These documents helped to identify critical areas of concern and proposed improvements within the city. A detailed summary of plans and policies reviewed is presented in Appendix-A. The following subsections provide a summary of the items reviewed and are organized by the following governing agencies:

- Nevada Department of Transportation (NDOT)
- City of North Las Vegas (CNLV)
- Regional Transportation Commission of Southern Nevada (RTC)

- Southern Nevada Strong
- City of Las Vegas

Nevada Department of Transportation

The Nevada Department of Transportation (NDOT) is responsible for maintaining and improving Nevada's highway system, which includes U.S. highways and Interstate highways within the state's boundaries. Summarized in this subsection are those plans and studies related to the Safety Management Plans (SMPs) and Road Safety Assessments (RSAs) from NDOT.

- 2021–2025 Nevada Strategic Highway Safety Plan (SHSP)
- Nevada Highway Safety Improvement Program (HSIP)
- Eastern Avenue and Civic Center Drive RSA
- Lake Mead Boulevard: Las Vegas Boulevard to I-15 NB Ramps – Pedestrian RSA
- Craig Road RSA: Jones Boulevard to Losee Road
- I-15, MP CL 48.41 to CL 50.67 RSA
- I-15, MP CL 48.00 to CL 58.00 RSA
- Lake Mead Boulevard: Civic Center Drive to Pecos Road – RSA
- Eastern Avenue/Civic Center Drive SMP
- Jones Boulevard/Cheyenne Avenue SMP
- East Carey Avenue SMP
- Craig Road SMP
- Rancho Drive SMP

City of North Las Vegas

The following plans from the City of North Las Vegas (CNLV) were reviewed for this study:

- Comprehensive Master Plan City of North Las Vegas
- Citywide Pedestrian and Bicycle Plan North Las Vegas
- Comprehensive Trails and Bikeways Master Plan City of North Las Vegas
- City of North Las Vegas Complete Streets Policy
- North Las Vegas Downtown Master Plan and Investment Strategy

RTC Southern Nevada

The following are the policies, plans, and studies reviewed for this study:

- RTC Bicycle and Pedestrian Plan
- Regional Bicycle and Network Gap Analysis Plan
- Complete Streets Design Guidelines for Livable Communities
- Clark County Area Access Management Plan
- Regional Transportation Plan (Access 2040)

Southern Nevada Strong

The following plans were reviewed for this study:

- Southern Nevada Strong Regional Plan
- Downtown North Las Vegas Implementation Strategies Report

City of Las Vegas

The following plans from the City of Las Vegas for this study include:

- City of Las Vegas Mobility Master Plan
- City of Las Vegas 2050 Master Plan

Background

Effective safety programs use evidence-based data analysis to enhance the decision-making process. This method provides a means to quantify safety performance and target investments with more confidence. LRSPs are an example of the application of this evidence-based approach.

LRSPs provide a framework to identify, analyze, and prioritize roadway safety issues and identify low-cost countermeasures to address them. The basic plan development includes some common steps, but then the plan is individually tailored to reflect the community's needs. The successful adoption of this process provides a strong basis for establishing safety policies and decision making for safety investments and it provides the basis for justification of highway safety projects. LRSPs are a proven approach to help reduce severe crashes on local roads.

The planning process also provides an opportunity to improve relationships among stakeholders by helping them work through a collaborative process and leveraging limited resources to address safety challenges unique to their region, resulting in improved road safety that benefits everyone.

This plan was developed in partnership with CNLV and NDOT. The LRSP stakeholder group was assembled to provide input on key elements of the plan, identify region-specific challenges, prioritize emphasis areas, select strategies, and provide feedback about implementation of this plan.

Nevada Statistics

Federal Highway Administration (FHWA) defines fatalities and injury levels as follows: a fatality (identified as "K") is defined as an injury that results in death within thirty 30 days of the accident; a serious injury (identified as "A") is defined as any injury that prevents the injured party from walking, driving, or normally continuing the activities that he/she was capable of performing prior to the accident. A "B" injury is defined as any injury that is evident to any person other than the injured at the scene of the accident. Includes lumps on head, abrasion, minor lacerations. A "C" injury is defined

as any injury reported or claimed that is not a fatal, incapacitating, or non-incapacitating evident injury. Possible injury includes momentary unconsciousness, claim of injuries not evident, limping, complaint of pain, nausea, or hysteria.

This plan targets reduction in fatalities and serious injuries on the local and state roadways for CNLV. Nevada SHSP recognizes the importance of reducing fatalities and serious injuries in the state. Nevada roadways had 1,599 fatalities and 5,828 serious injuries during the period from 2015 to 2019. From 2015 – 2019, there is a 7% decrease in fatalities and a 25% decrease in serious injuries. ***Figure 1*** and ***Figure 2*** below present the historical statistics for Nevada fatalities and serious injury related crashes.

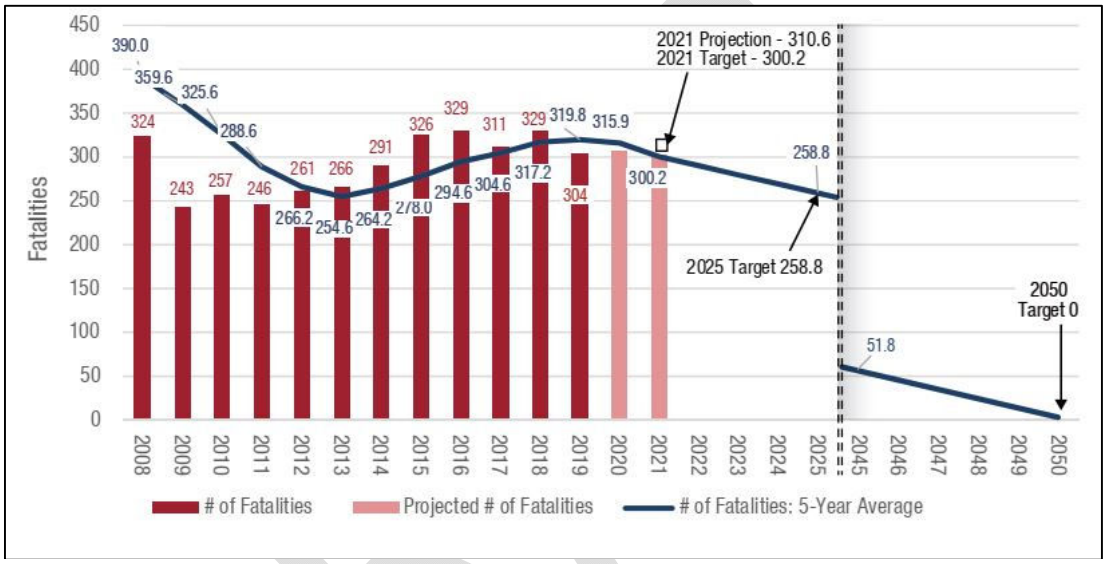

Figure 1: Nevada Fatalities, Five-Year Average and 2025 Target (Source: Nevada SHSP)

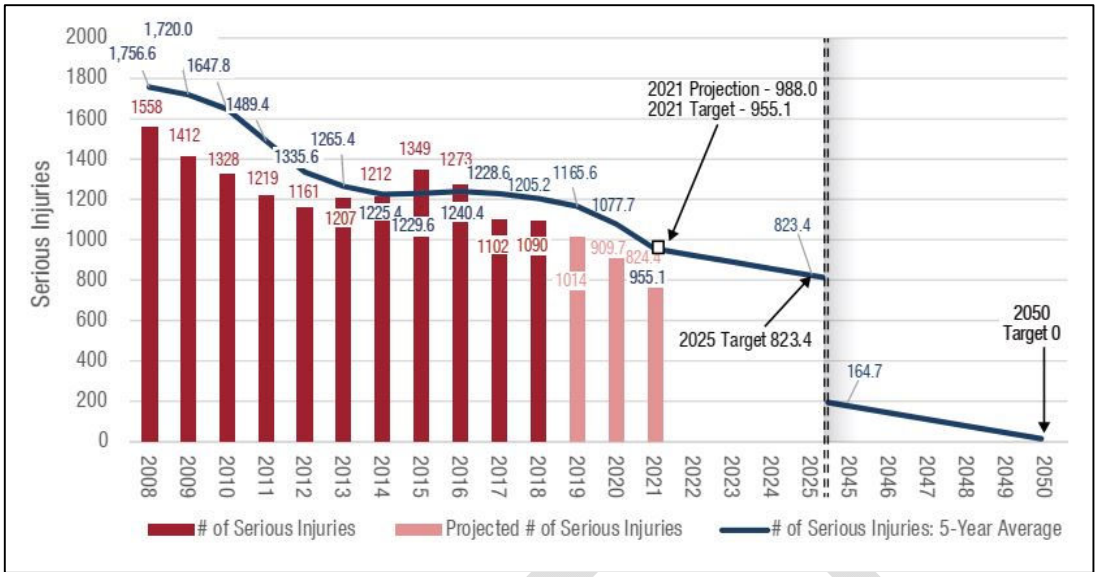

Figure 2: Nevada Serious Injuries, Five-Year Average and 2025 Target (Source: Nevada SHSP)

CNLV Statistics

North Las Vegas is a urban city in Clark County, Nevada, United States, in the Las Vegas Valley. As of the 2021 census it had a population of 274,133. It is the fourth largest city in the state of Nevada. North Las Vegas sits northeast of Las Vegas. According to the United States Census Bureau, North Las Vegas has a total area of 101.4 square miles (262.6 km2). The major highways/roads serving North Las Vegas are Interstate 15, Clark County Route 215, U.S. Route 93, Las Vegas Boulevard (SR 604) and Rancho Drive (SR 599). This LRSP analyzed all the local and state roadways within the City of North Las Vegas. ***Figure 3*** below shows the CNLV boundary.

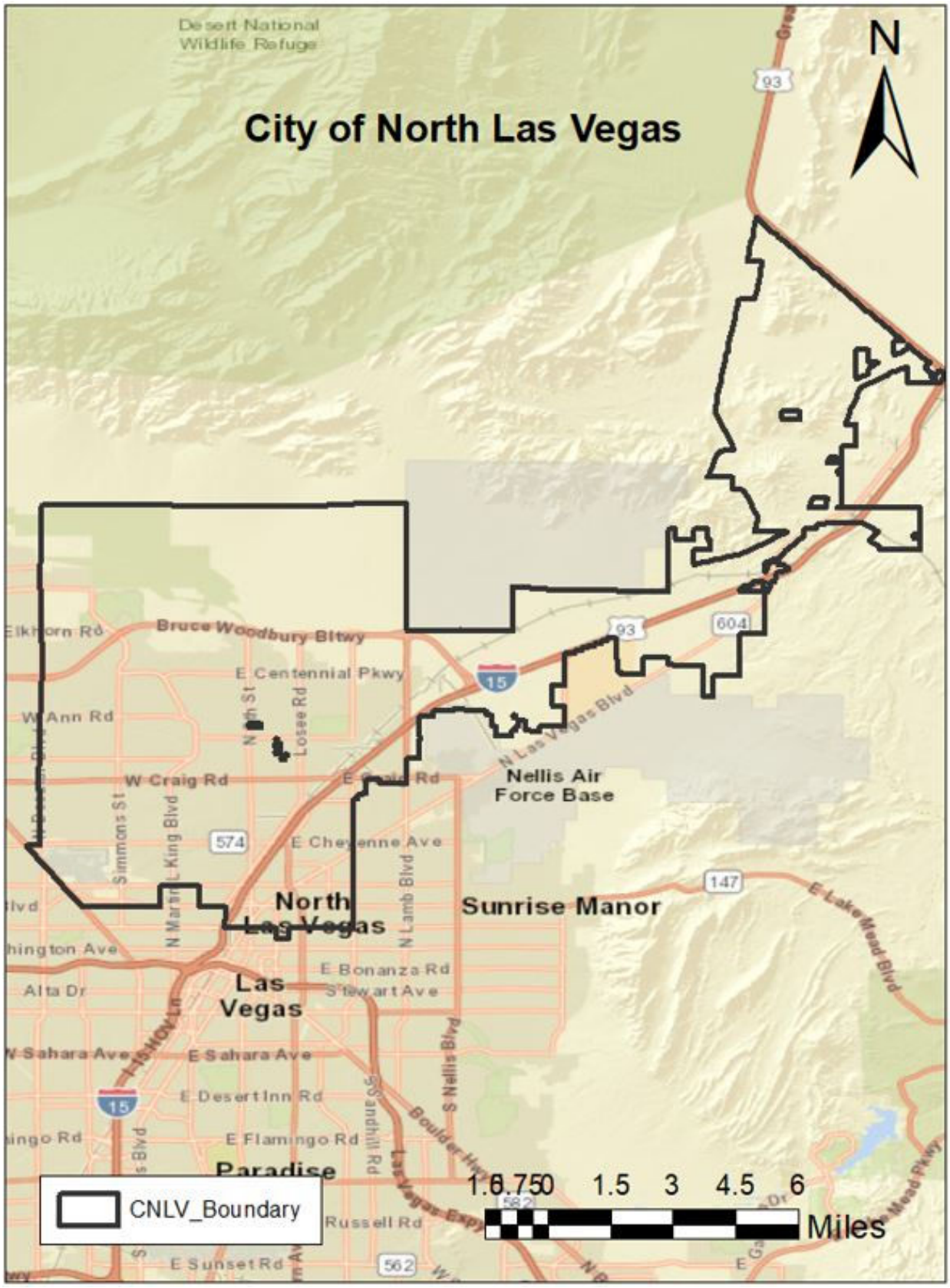

Figure 3: Map showing CNLV Boundary

CNLV fatalities and serious injuries on local and state roads generally are on a downward trend. There is a 65% decrease in fatalities and serious injuries on local and state roads for CNLV from 2015 – 2019. ***Figure 4*** shows the fatalities and serious injury trends on local and state roads for CNLV.

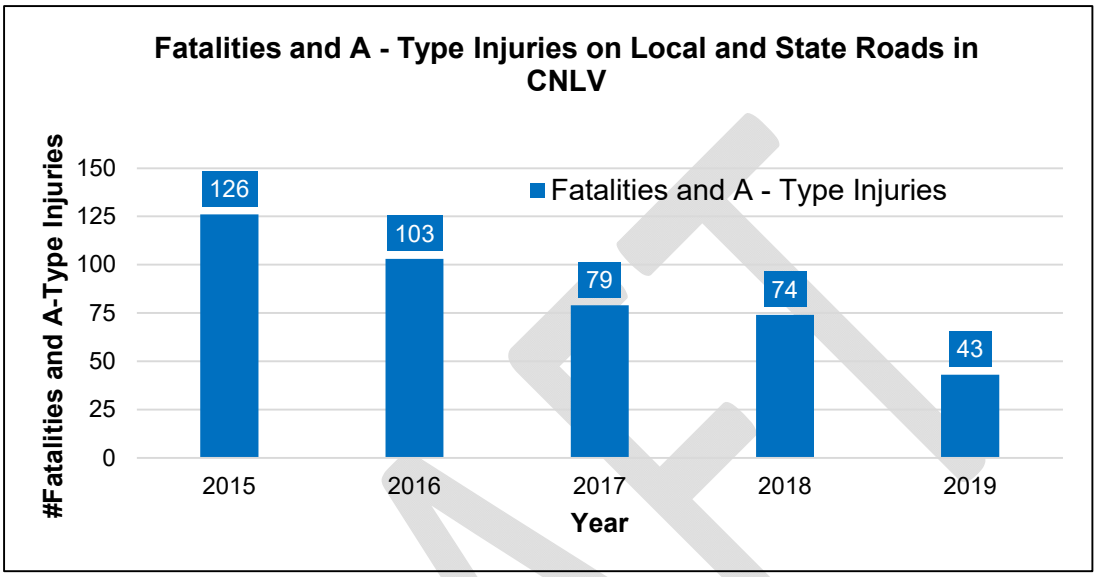

Figure 4: Fatalities and Serious Injuries on Local and State Roads in CNLV from 2015 – 2019

CNLV LRSP Vision and Mission

CNLV LRSP Vision:
"***The City of North Las Vegas LRSP identifies the greatest causes of fatalities and serious injuries on city roadways. The plan provides a prioritized list of issues, risks, actions, and improvements for reducing crashes that cause fatalities and serious injuries, improving safety for all road users."***

CNLV LRSP mission is:
"*The City of North Las Vegas LRSP mission is to eliminate traffic-related fatalities and serious injuries on city roads by year 2040.*"

The CNLV LRSP shares NDOT's vision, which is consistent with the statewide vision outlined in the Nevada SHSP of achieving zero fatalities. NDOT, in coordination with many safety stakeholders, developed the Nevada SHSP, which outlines a clear set of actions and proposed strategies to be taken to save lives on all roadways within the State.

2. LOCAL ROAD SAFETY PLAN METHODOLOGY AND APPROACH

Process

The LRSP process entails the six general steps identified in ***Figure 5***, described briefly in the sections below. The process begins by establishing the LRSP leadership. A diverse stakeholder group, which consisted of safety stakeholders and partners from various local agencies, including police (local and State), school administration, Nevada Department of Transportation (NDOT), Department of Public Works, and County and other local government officials, participated to facilitate the plan development. The second step entailed a high-level safety data analysis to understand some of the primary safety issues on the local and state roadway system.

Stakeholders reviewed this preliminary data analysis and background information at a workshop organized with CNLV. The meeting engaged stakeholders in discussions on various traffic safety issues. From the data analysis and subsequent discussion with stakeholders, CNLV determined the top emphasis areas (discuss in Section 3 of this LRSP).

Figure 5: Steps for LRSP Development

The next steps involved determining the focus crash and facility types. In addition, a systematic evaluation conducted using risk factors helped identify and prioritize

locations with identified risk factors that could be potential candidates for safety investments.

Gather Safety Data

Crash data and other safety data help identify safety issues in the local system, select appropriate safety countermeasures, and evaluate performance. Data obtained from the NDOT for analysis included:

Nevada Strategic Highway Safety Plan. The Nevada Strategic Highway Safety Plan (SHSP) used a data-driven approach to analyze trends and prioritize emphasis areas. The SHSP provided valuable information used in development of the CNLV LRSP. For instance, the State's emphasis areas were a good starting point to define the City's emphasis areas.

Crash Data. Geolocated crash data for 2015 to 2019 included variables such as severity, crash type, contributing factors, environmental conditions (weather, lighting), temporal characteristics (time of day, day of week, month), crash location type (urban vs. rural, intersection vs. segment, tangent vs. curve), age, alcohol involvement, seating position, restraint information, vehicle type, and work zone, among others. The crash data, divided into three datasets (crash data, person data, and vehicle data), contain data attributes needed to identify emphasis areas.

Roadway Data. The Highway Performance Monitoring System (HPMS) provided roadway data for CNLV for the year 2018. The layer provides a comprehensive list of roadway attributes needed for analysis. The roadway layer and crash data were combined to generate crash summaries for each roadway in the City. Data elements included system type (i.e., State, local), facility type (i.e., freeway, arterial), setting type (i.e., urban, rural), number of lanes, speed limit etc. The 2018 HPMS roadway layer is the most recent roadway inventory data.

Traffic Volumes. The HPMS roadway layer also provided annual average daily traffic (AADT) data for all segments and intersections.

Other Data. Additional data to identify potential risk factors included:

- Intersection data, including number of approaches, proximity to transit and school.
- Emphasis area tables and graphs
- Crash data trees

The analysis used on development of an LRSP usually focuses on the bigger picture and does not focus on analyzing crash data for a specific site. Risk factors commonly associated with focus crash types are identified by available data.

Equity Analysis

As part of the process to create a Local Range Safety Plan (LRSP) for the City of North Las Vegas (CNLV), an equity analysis is being conducted to determine the geographic location of disadvantaged communities within the City. The analysis has precedence, as the current federal administration is championing the Justice40 Initiative to confront and address decades of underinvestment in disadvantaged communities. The U.S. Department of Transportation (USDOT) is targeting the Justice40 Initiative by working toward the goal that at least 40% of the benefits from many of their grants, programs, and initiatives flow to these communities. This includes many of the USDOT discretionary grant programs under the Bipartisan Infrastructure Law. Several of these programs place emphasis on transportation safety and reducing roadway crashes (e.g., Safe Streets for All), particularly in disadvantaged communities, which makes this analysis key in identifying candidate projects for these programs. This equity analysis will provide the locations of disadvantaged communities (by census tract) within the CNLV and will overlay crashes with these census tracts to indicate areas where the CNLV and its partners should consider projects for federal funding opportunities.

Statistics in ***Table 1*** indicate that the City attracts a more diverse population because of its lower home prices. However, lower per capita income and slightly higher mean travel time to work within the CNLV compared to Clark County indicates the need for safer roadways and safe, accessible transportation options (beyond driving) Citywide.

Table 1: U.S. Census Bureau, American Community Survey 5-Year Estimates

	Clark County, Nevada	City of North Las Vegas, Nevada
African American population	13.6%	22.1%
Hispanic or Latino population	32.3%	42%
Median value of owner-occupied housing units (in 2021 dollars)	$308,800	$279,800
Mean travel time to work	25 minutes	27.4 minutes
Persons in poverty	15.1%	12.9%
Per capita income in past 12 months (in 2021 dollars)	$33,461	$24,853

Historically Disadvantage Census Tracts in North Las Vegas
U.S. Department of Transportation Definition

Typically, USDOT discretionary grant programs ask applicants to identify if a proposed project is within a historically disadvantaged (please note – USDOT often references historically disadvantaged as "transportation disadvantaged" in some of their discussions on this subject) census tract(s) or area of persistent poverty. This request has been amplified with the recent approvals of the Justice40 Initiative and Bipartisan Infrastructure Law. As such, the USDOT identified disadvantaged census tracts throughout the country and provided a mapping tool to assist applicants in identifying whether a project located in a disadvantaged community.

In general, the USDOT would identify a census tract as historically disadvantaged if it exceeds the 50th percentile (75th for resilience) across at least 4 of 6 indicator categories. These categories include transportation access, health, environmental, economic, resilience, and equity. Specifically, a census tract is considered to be disadvantaged from a transportation access standpoint if it has areas that spend more and take longer to get where residents need to go. Data sources for the transportation access indicator include the Centers for Disease Control Social Vulnerability Index, the U.S. Census Bureau American Community Survey, the Environmental Protection Agency Smart Location Map, and the U.S. Department of Housing and Urban Development Location Affordability Index**.**

Historically Disadvantaged Census Tracts

Figure 6 shows the location of historically disadvantaged census tracts, including ones that reach the threshold for the transportation access disadvantage indicator. In general, the identified census tracts are typically in the older, more established areas of the City. They are within Downtown North Las Vegas, between Interstate 15 and Las Vegas Boulevard North, and/or south of Bonanza Road.

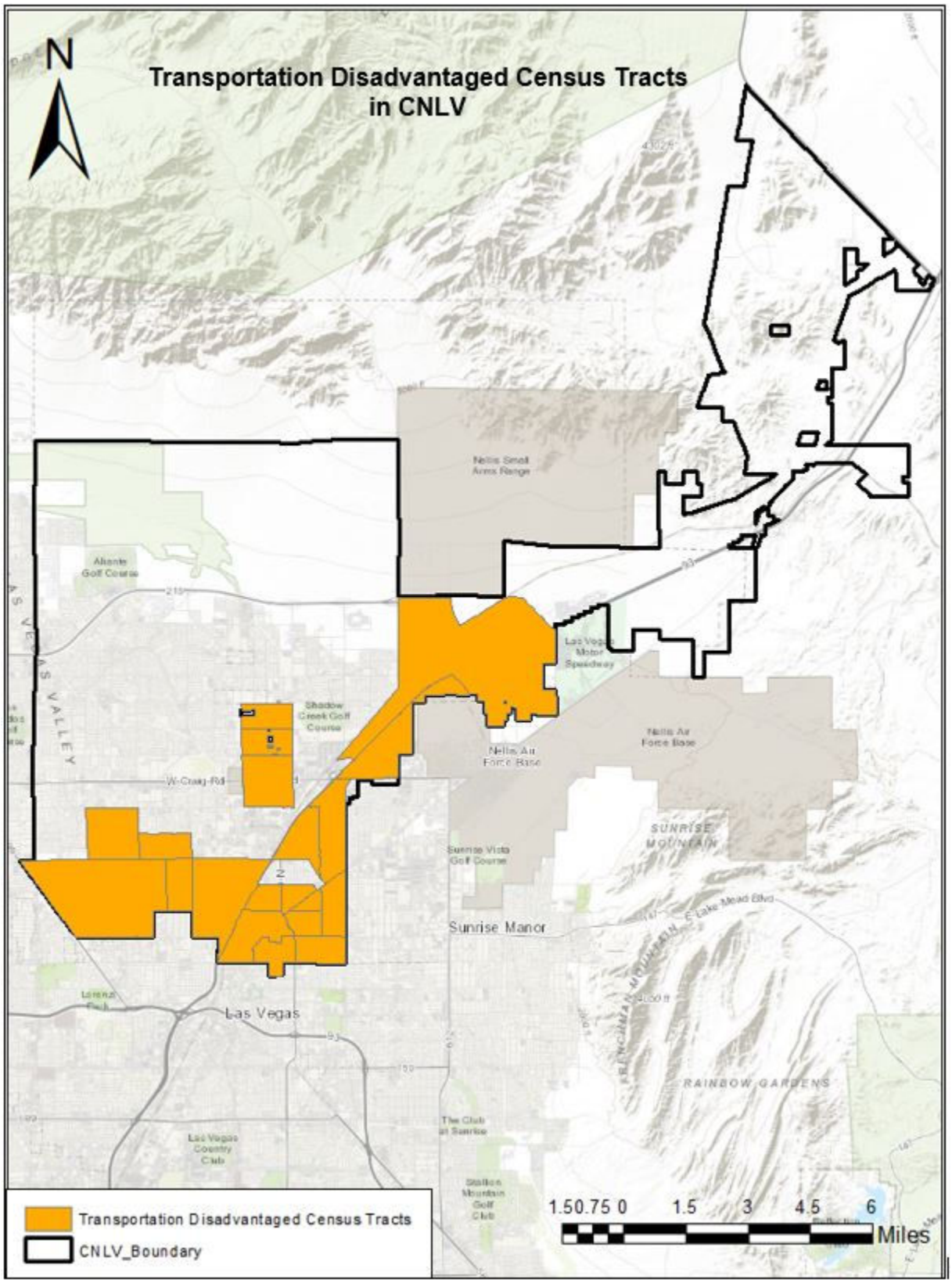

Figure 6: Transportation Disadvantage Census Tracts in CNLV

Figure 7 and ***Figure 8*** below shows crash data (on local and state roadways within the CNLV) from 2015 to 2019 overlaid with historically disadvantaged census tracts. Specifically, ***Figure 7*** shows fatal and serious injury crashes, while ***Figure 8*** shows all crashes. The main takeaway is that 58% of fatal and serious injury crashes, on local and state roadways within the CNLV, are distributed over disadvantaged census tracts.

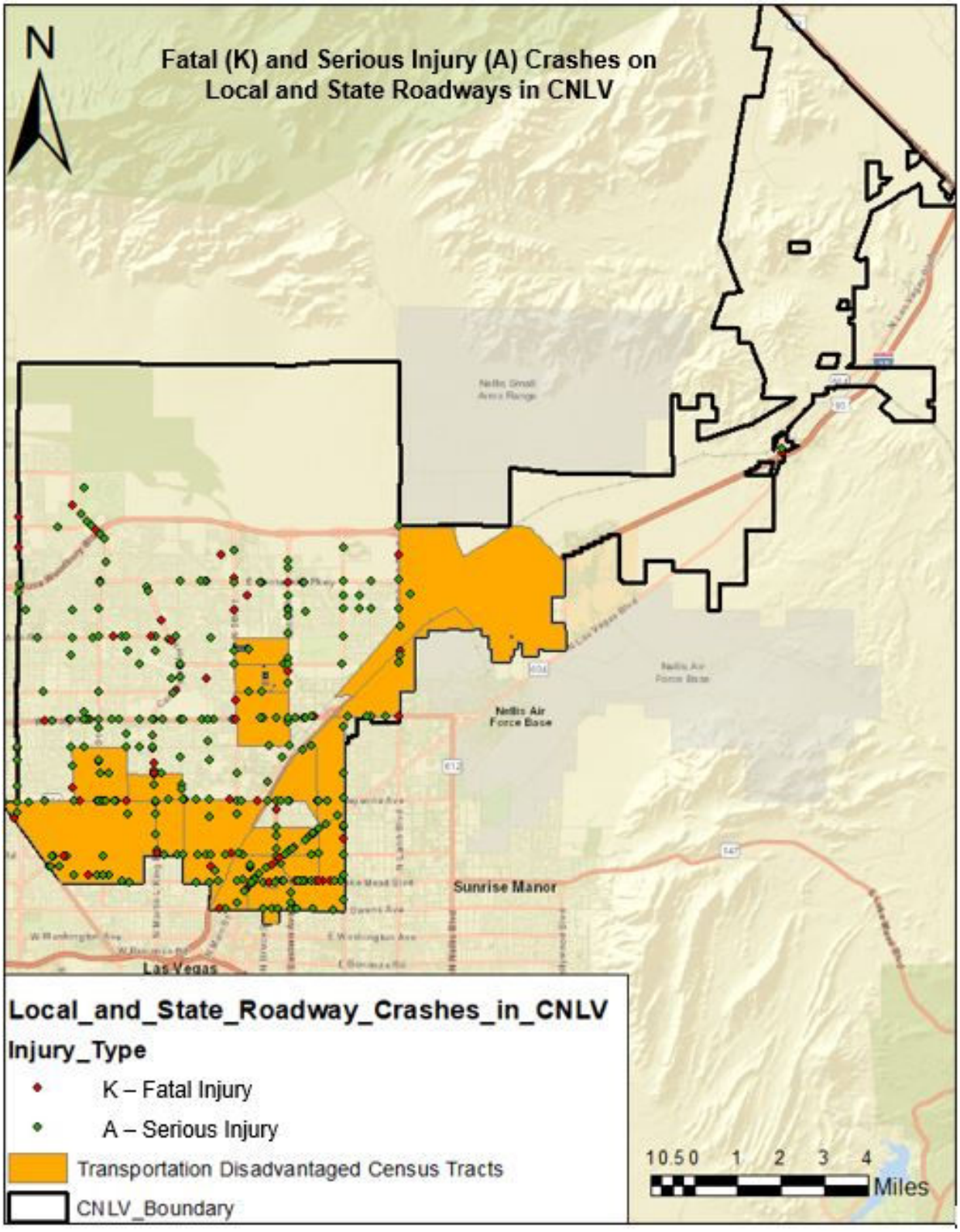

Figure 7: Fatal and Serious Injury Crashes Overlaid with Disadvantaged Census Tracts

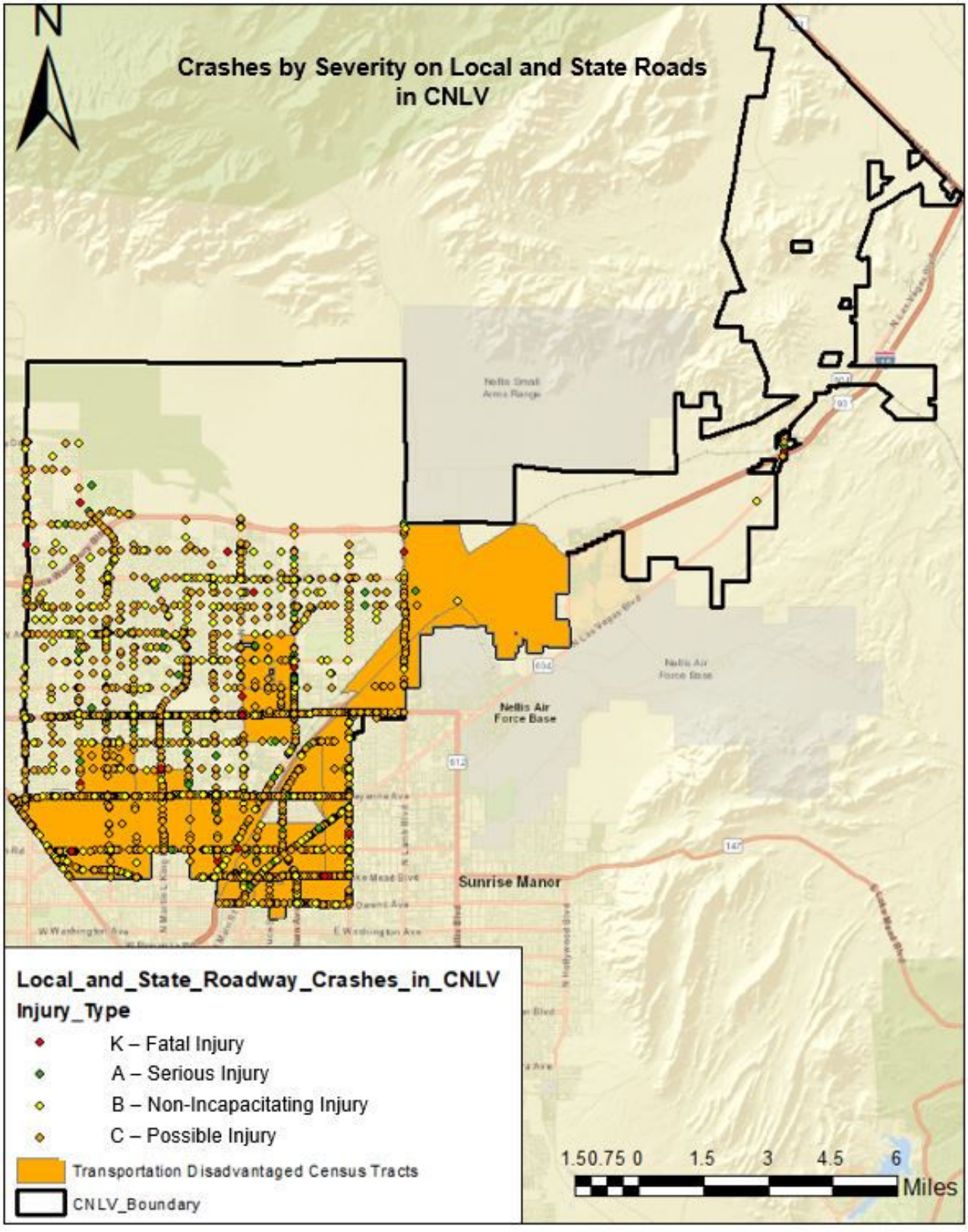

Figure 8: All Crashes Overlaid with Disadvantage Census Tracts

Public Opinion

Public input was incorporated into the development of this LRSP by developing a survey questionnaire. The survey allowed participants to provide input on improving transportation safety and to provide feedback on locations of concern with respect to traffic safety. The public survey questionnaire and its results will be enclosed in Appendix-B.

3. EMPHASIS AREAS, FOCUS CRASH TYPES, RISK FACTORS, AND SAFETY STRATEGIES

Emphasis Areas and Focus Crash Types

A key component of the LRSP is to identify key emphasis areas that contribute to crashes in the city. The objective of the emphasis areas is to help agencies identify the safety priorities for their system using crash data provided by the State.

Emphasis areas provide the opportunity to improve safety through a comprehensive Four Es of Traffic Safety approach where appropriate as shown in ***Figure 9***.

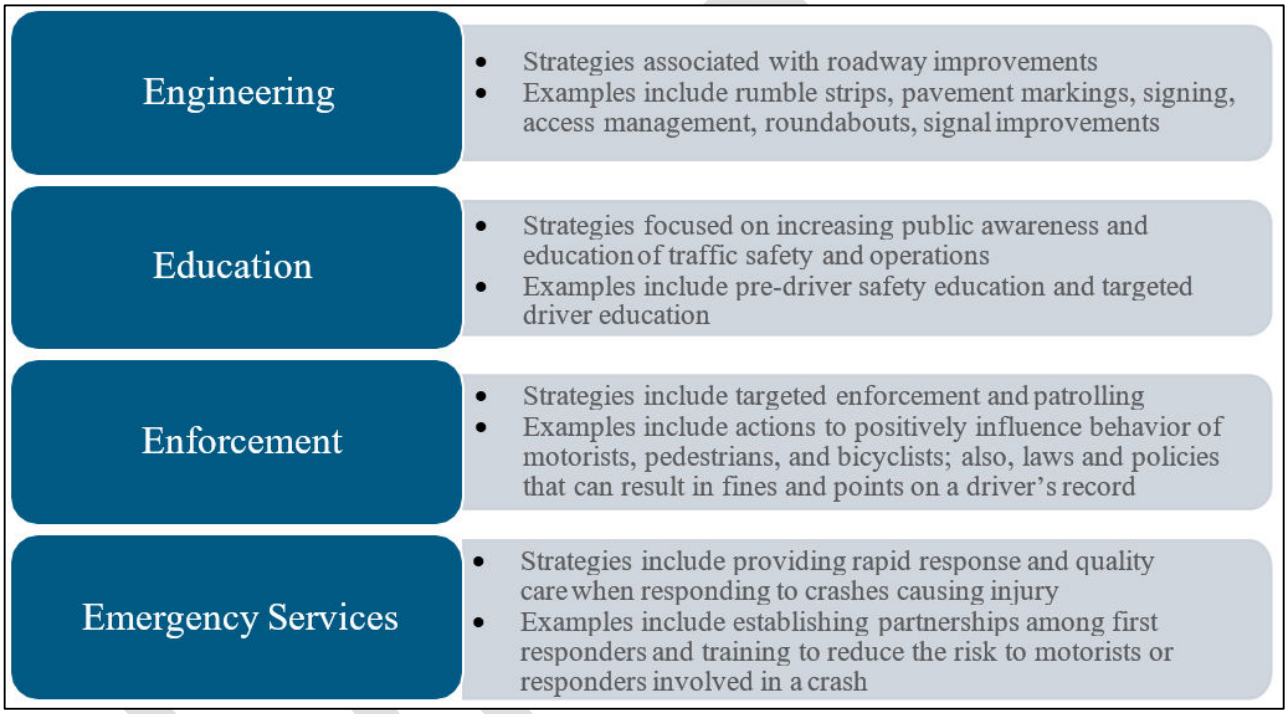

Figure 9: Four Es of Traffic Safety (Source: FHWA)

For the 2021-2025 SHSP Update, the 13 emphasis areas are organized under four Key Areas. The Key Areas are intended to promote collaboration between the emphasis areas to strengthen SHSP implementation. The four Key Areas include Safer Roads, Vulnerable Road Users, Safer Drivers and Passengers, and Impaired Driving Prevention.

As shown in the ***Figure 10*** below, nine of the 13 emphasis areas are Critical Emphasis Areas (CEAs) with specific strategies and action steps. The nine CEAs include Safe Speed, Lane Departures, Intersections, Pedestrians, Motorcyclists, Occupant Protection, Older Drivers, Young Drivers, and Impaired Driving. Based on the most recently available crash data, focusing on the nine CEAs could have the greatest

potential for reducing fatalities and serious injuries as these emphasis areas historically have higher numbers of fatalities and serious injuries.

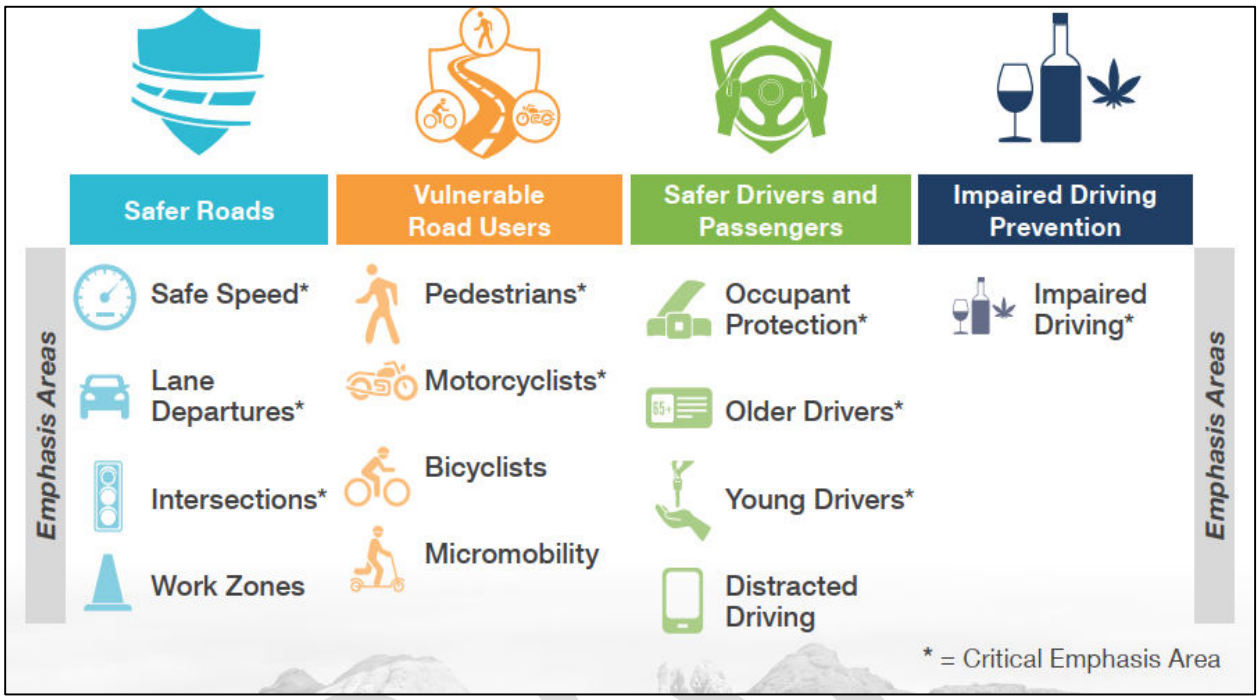

Figure 10: Nevada Strategic Highway Safety Plan (SHSP) Emphasis Areas

The CNLV emphasis areas were selected from 13 emphasis areas used by Nevada SHSP based on the greatest frequency of fatalities and serious injuries. ***Table 2*** shows the count of fatalities and serious injuries on CNLV local and state roads from 2015 – 2019 by emphasis area.

- A single crash may be included in multiple emphasis areas. Hence, the sum of fatalities and serious injuries for all emphasis areas may be greater than the total frequency for the City.
- The bold face text in the rows indicates the largest category percentage.
- The highlighted cells in yellow indicate the Top 4 percentage categories.

Table 2: City of North Las Vegas (CNLV) and Statewide (Nevada SHSP) Emphasis Areas

Emphasis Area	Local and State Roadways (CNLV)		All Roadways (CNLV)		Nevada State 2014-2018 (SHSP)	
	Fatalities & A-type injuries		Fatalities & A-type injuries		Fatalities & A - Type Injuries	
	Percent	Frequency	Percent	Frequency	Percent	Frequency
Total Crashes	**425**		**517**		**7,612**	
Safe Speed	17%	72	17%	89	17%	1274
Lane Departures	15%	65	20%	104	27%	2043
Intersections	**45%**	191	**41%**	211	**34%**	2612
Work Zones	3%	13	3%	16	N.A	N.A
Pedestrians	18%	76	18%	93	16%	1231
Motorcyclists	19%	79	19%	98	20%	1512
Bicyclists	3%	12	3%	14	N.A	N.A
Micro mobility	0%	0	0%	0	N.A	N.A
Occupant Protection	22%	93	21%	110	22%	1647
Older Drivers	14%	60	14%	72	17%	1280
Young Drivers	17%	73	17%	87	13%	983
Distracted Driving	13%	54	11%	57	N.A	N.A
Impaired Driving	9%	38	10%	54	23%	1747

Four high-priority emphasis areas chosen for the plan each capture local safety issues identified by the stakeholder group to better utilize limited resources (financial, expertise, and time) available to put them into practice. Each emphasis area includes specific safety strategies that, if implemented, can potentially impact the vision of reducing fatalities to zero. **The four emphasis areas for the CNLV LRSP include Intersections, Occupant Protection, Motorcyclists, and Pedestrians.** Focusing efforts on these four emphasis areas represents the greatest potential to significantly reduce the number of severe crashes in CNLV.

Analyze Data

A data analysis used the safety data to identify clusters of crashes by specific emphasis areas. This was particularly helpful to identify overrepresented locations within the City limits. ***Figure 11*** and ***Figure 12*** show CNLV crash density maps for intersection and occupant protection related fatalities and serious injuries (KA) crashes on the local and state roadway system.

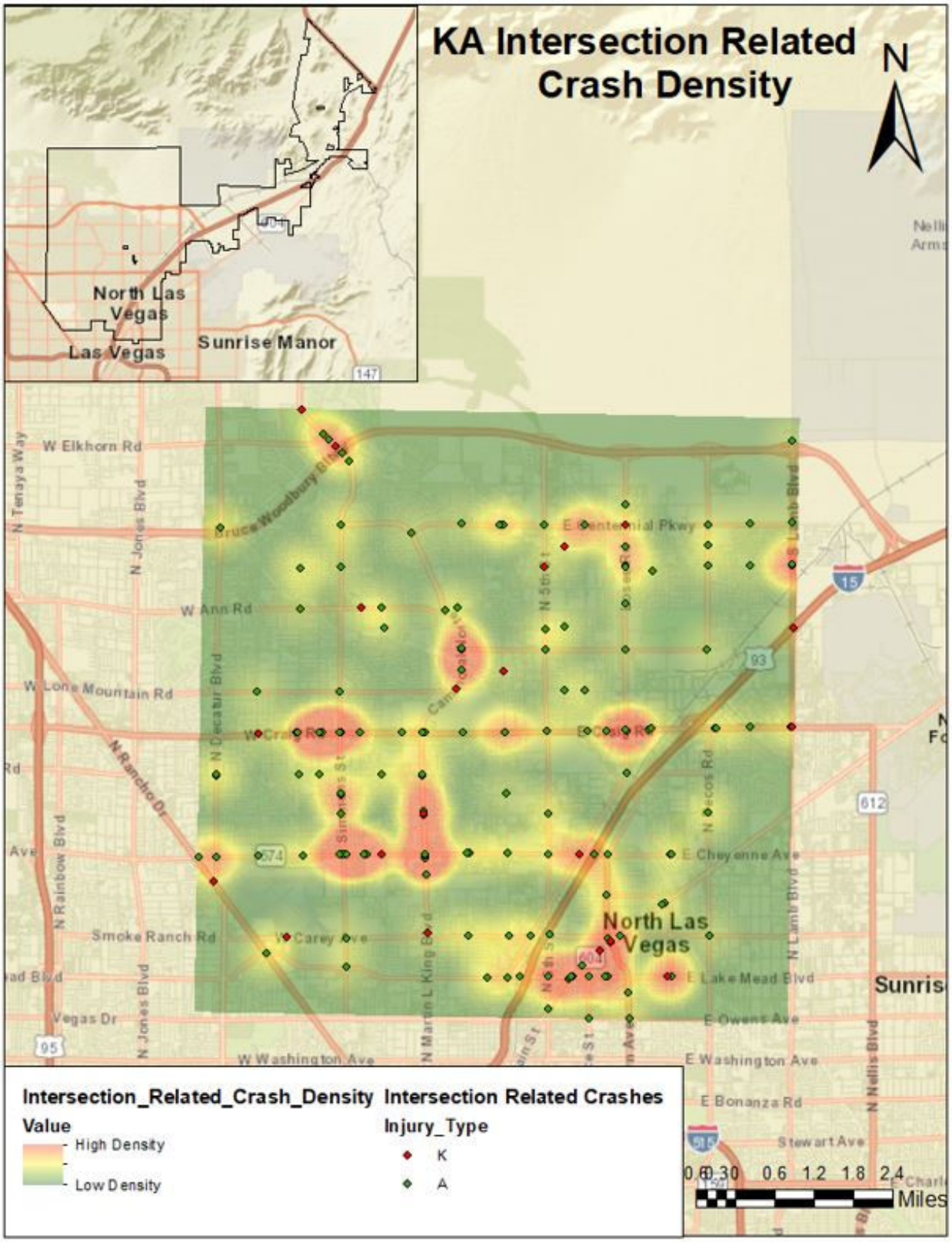

Figure 11: Map. Fatal (K) and Serious Injury (A) Intersection Related Crash Density

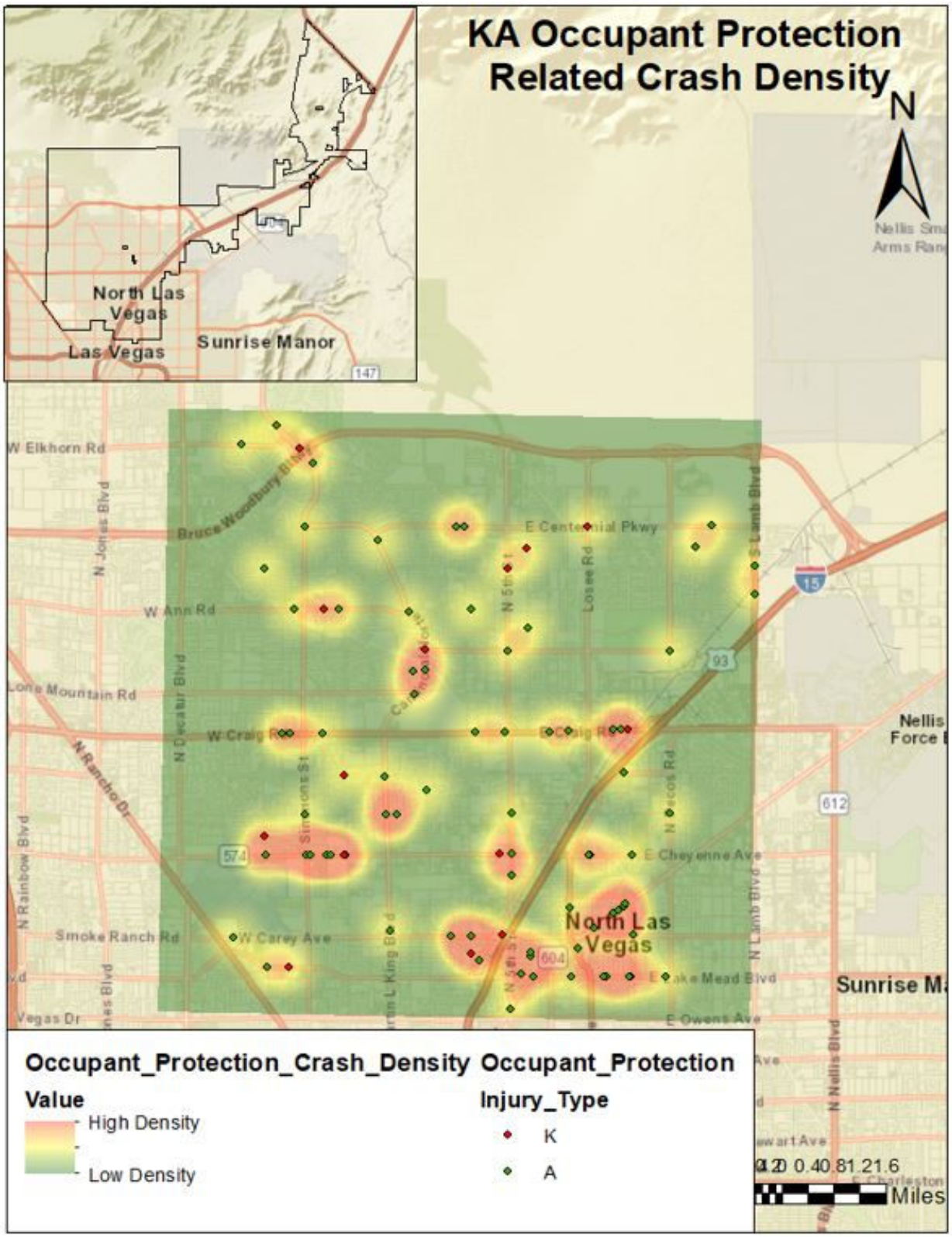

Figure 12: Map. Fatal (K) and Serious Injury (A) Occupant Protection – Related Crash Density

Focus Facilities

After selecting focus crash types/emphasis areas for CNLV, it is important to know where these crashes occur. A crash data tree diagram is the tool used to narrow down where focus crashes occur most frequently. Crash data trees include local and state roads in CNLV. Focus crash types include intersection, occupant protection, Motorcyclists, and pedestrians. Crash data trees provided by the State narrow down where some of the focus crash types occur. Also, crash data trees breakdown crash data into two severity groups: KA and K-Fatal, A- Serious Injury, B- Non Incapacitating Injury, C – Possible Injury, O – No Injury/Property damage (KABCO) crash fatalities and injuries.

A dataset consisting of CNLV crash data was collected. This dataset contained a total of 420 fatalities and serious injuries. Typically, it is recommended to use three to five years of crash data to achieve a desired level of statistical reliability and minimize regression to the mean bias. This plan uses five years of crash data (2015 to 2019). The dataset indicated that CNLV averages approximately 85 fatalities and serious injuries per year on State and Local Roads. For the five-year period a total of 13,908 crashes were recorded on the local and state roads. ***Figure 13*** shows a sample data tree for crashes occurred on intersections in CNLV.

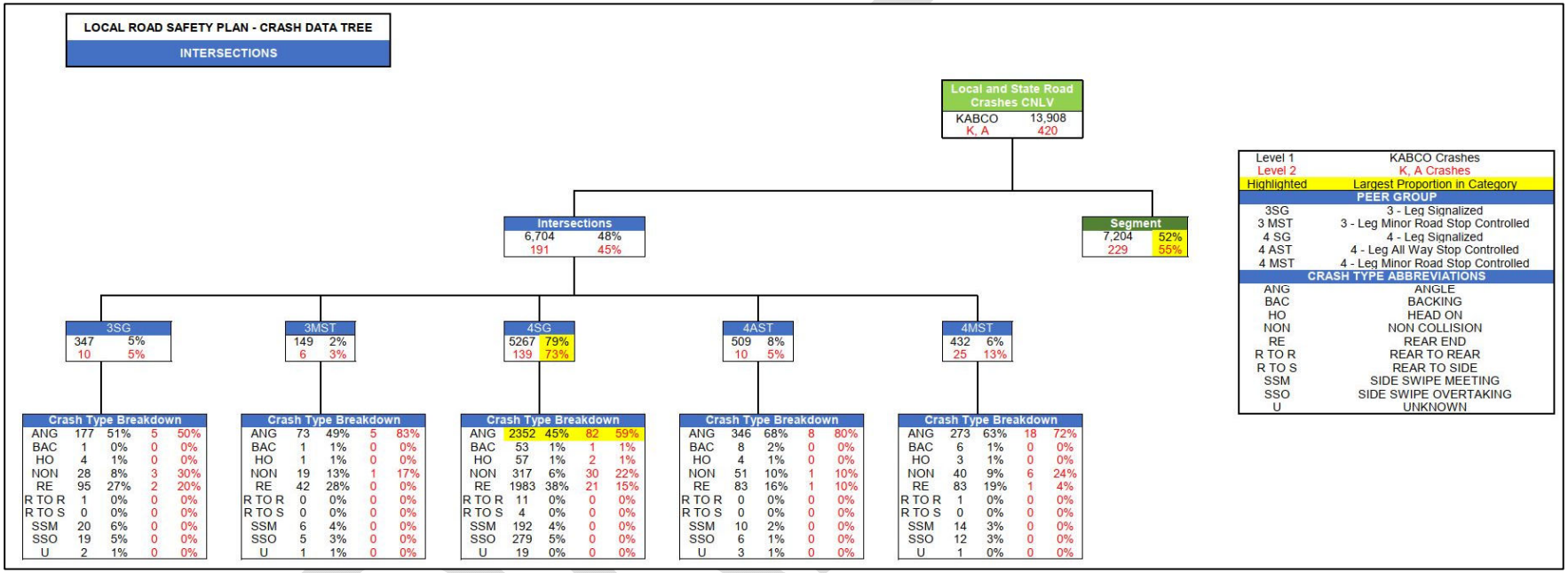

Figure 13: Data Trees: CNLV Intersections

Risk Factors

Main Risk Factors

In this section of the analysis, focus facilities where most of the crash types occur are further defined by capturing the most common characteristics of locations where severe crashes occurred (also known as risk factors). Risk factors help identify and prioritize locations with few or no crashes that could be potential candidates for safety investments. The process begins by determining which risk factors to evaluate. Based on data availability, the analysis for each emphasis area uses a set of characteristics selected as risk factors.

Safety Strategies

Following identification of high-priority emphasis areas, a short-list of potential safety improvement strategies was compiled. Through the LRSP development process, road safety projects identified as being at risk based on crash, traffic volume, and roadway characteristics data analysis involve the application of low-cost safety strategies on CNLV's road system.

The source of the initial list of potential safety strategies is the Federal Highway Administration (FHWA) Proven Safety Countermeasures, National Highway Traffic Safety Administration (NHTSA) Countermeasures that Work, and the FHWA Crash Modification Factor (CMF) Clearinghouse. These different sources include cost-effective safety strategies that could be applied at a spot or systemic level. Most of the countermeasures from sources listed above:

- Include information related to their effectiveness and targeted crash severity and crash type
- Summarize countermeasure use and implementation time
- Provide references to research summaries and individual studies

The FHWA CMF Clearinghouse is a comprehensive database that provides all information available about the CMFs. A CMF is a multiplicative factor used to compute the expected number of crashes after implementing the countermeasure. A CMF represents the safety effect of the selected safety countermeasure and can be above or below 1.0, indicating an increase or decrease in crashes, respectively. Some of these include the CMF value and all published details about the CMF and star ratings that provide an indication of the quality of each CMF. Another CMF source includes the NCHRP 600 Human Factors Guide for behavior-related CMFs.

The following sections documents the development of CNLV's list of high-priority safety strategies assembled for each of the selected emphasis areas. The strategies are assigned to two basic categories: infrastructure and driver behavior.

Intersections

Intersections are locations where two or more roads cross one another. Crossing and turning maneuvers that occur at intersections create opportunities for vehicle-vehicle, vehicle-pedestrian, and vehicle-bicycle conflicts, which may result in crashes. Intersections constitute a small portion of the overall roadway network, yet more than 50 percent of the combined fatal and injury crashes occur at or near intersections. Furthermore, congestion at intersections is an issue when traffic volumes are high, creating inefficiency that results in user delay and frustration. As a major focal point in traffic engineering, intersection innovations such as traffic signals, intelligent communications systems, alternative layouts (e.g., roundabouts), and visual enhancements all seek to reduce serious injuries and fatalities.

- Intersections accounted for 55% of fatalities and serious injuries
- A total of 255 intersections were analyzed. 124 (49%) of the analyzed intersections were signalized

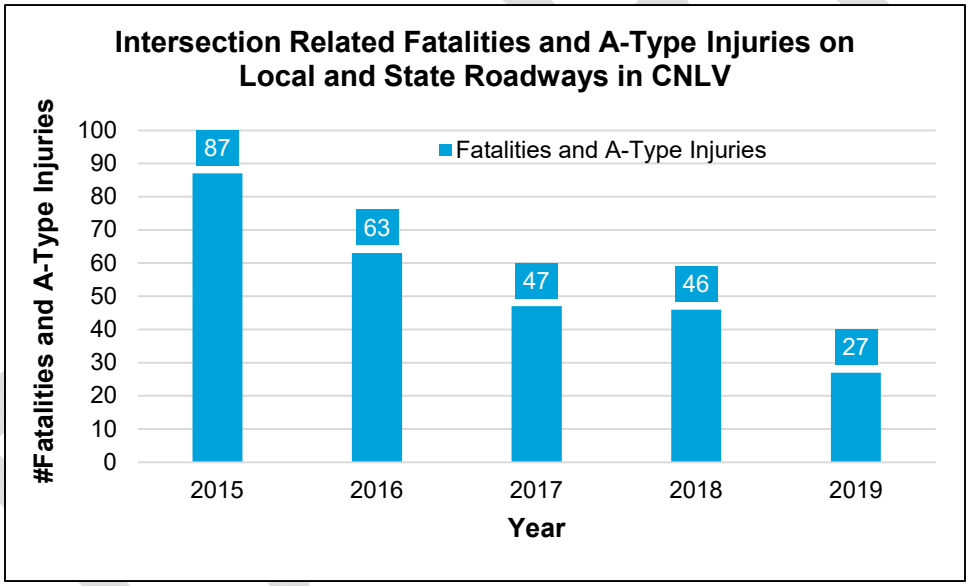

Figure 14: Graph. CNLV Intersection Related Fatalities and Serious Injuries on Local and State Roads

Intersection Strategies

Implement ranked and prioritized high-risk intersection locations. This plan provides a ranking of intersection locations with disproportionate numbers of intersection-related crashes. Agencies in CNLV should use these locations to make necessary safety improvements; this should be integrated into crash analysis and prioritization efforts.

Develop a region-wide intersection inventory. Roadway data provided by HPMS can be used to derive intersection-related fields using geographic information system (GIS) geoprocessing tools. For the Federal-aid system, data such as traffic volume, functional classification, and number of lanes are available within the FHWA Highway Performance Monitoring System. A City-wide intersection database should be developed to support more-detailed analysis of intersection crashes. Most of the data could be collected using GIS mapping and online tools. The following is an initial list of data used in the new SPF, which should be considered for collection on a countywide basis:

- Type of traffic control (available)
- Presence of a median (available in roadway data but processing needed)
- Presence and type of pedestrian signal
- Presence of lighting
- Posted speed limit
- Presence of no turn on red prohibitions
- Presence of a left-turn lane and presence of left-turn signal phase

Conduct road safety audits/reviews of high-risk intersections. Areas demonstrating disproportionately high numbers of intersection crashes are good potential candidates for road safety assessments (RSA), also known as road safety reviews. An RSA is a formal safety performance examination of an existing or future road or intersection by an independent and multi-disciplinary team. CNLV should coordinate with NDOT and other agencies to develop a process and funding strategy for conducting intersection RSAs. This effort should be coordinated with similar strategies for lane departure and pedestrian/bicycle issues at intersections.

Implement intersection safety-focused engineering countermeasures. Several examples of engineering countermeasures to target intersection crashes that should be considered for initial or wider application across CNLV include:

- Flashing beacons at stop-controlled intersections
- Light-emitting diode edge-lit flashing beacons
- Overhead flashing beacons at high-speed stop-controlled intersections
- “Cross street does not stop” plaque (W4-4p) at two-way stop-controlled intersections
- Supplemental flashers on stop sign for two-way stop-controlled intersection
- Advanced intersection warning signs and flashers
- Advanced stop pavement marking lines
- Pedestrian countdown signals and signal timing for high pedestrian areas
- Access management near intersections
- Enhanced traffic signal layout
- Intersection sight distance

- Roundabouts

Develop intersection outreach materials. An intersection task force or champion should review the various safety-focused countermeasures to prepare informational documents to inform C and local officials across the region. The goal behind this strategy is to promote lesser- known intersection alternatives to motivate their use across CNLV. A second benefit is this material can educate the public on the operational characteristics and reasoning for implementing newer or alternative intersection designs. This will help drivers to understand how to navigate these new designs.

Similarly, safety strategies and countermeasures are proposed for other emphasis areas using Federal Highway Administration (FHWA) Proven Safety Countermeasures, National Highway Traffic Safety Administration (NHTSA) Countermeasures that Work, and the FHWA Crash Modification Factor (CMF) Clearinghouse.

Summary

Identification of critical emphasis areas, focus crash types, and risk factors provides key information for selecting the right strategies. An outcome of this chapter is documentation of countermeasures, which will be used in future program evaluation. Based on all the information previously discussed, a short list of safety countermeasures was identified for each focus crash type. These countermeasures will be used in the safety project development efforts described in the upcoming chapters.

4. PRIORITIZATION PROCESS, PROJECT SELECTION, AND IMPLEMENTATION

In this step, a prioritization process was used to rank all the segments and intersections using a combined approach that integrates statewide safety analyses and this project's systematic approach based on risk factors. The application of the combined approach allows identification of sites on focus facility types that share specific geometric and operational characteristics. Locations are prioritized by emphasis areas by assigning a level of risk to each site based on the common site-specific characteristics identified during the analysis. The analysis also provides an overall ranking.

Segment Prioritization

Emphasis areas and an overall ranking used the ranking approach of the segment prioritization process. Locations with the highest score using the overall priority ranking capture issues associated with different emphasis areas.

Intersection Prioritization

The intersection prioritization process using the ranking approach was conducted with multiple factors aggregated into a single overall ranking. Overall ranking takes into consideration Annual Average Daily Traffic (AADT) cross product, frequency of severe crashes (KA), proximity to transit stop, proximity to school, and transportation disadvantage census tracts.

AADT Cross Product

The AADT cross product is the multiplication of the average major road and minor road approaches entering AADT at an intersection. ***Figure 15*** is a sample chart showing that 4-Legged Signalized intersections in CNLV having AADT cross product in the ranges 0-200 million and 600 -700 million experienced a disproportionately high number of severe crashes, relative to the number of intersections at that AADT volume. Therefore, these intersections received 1 point.

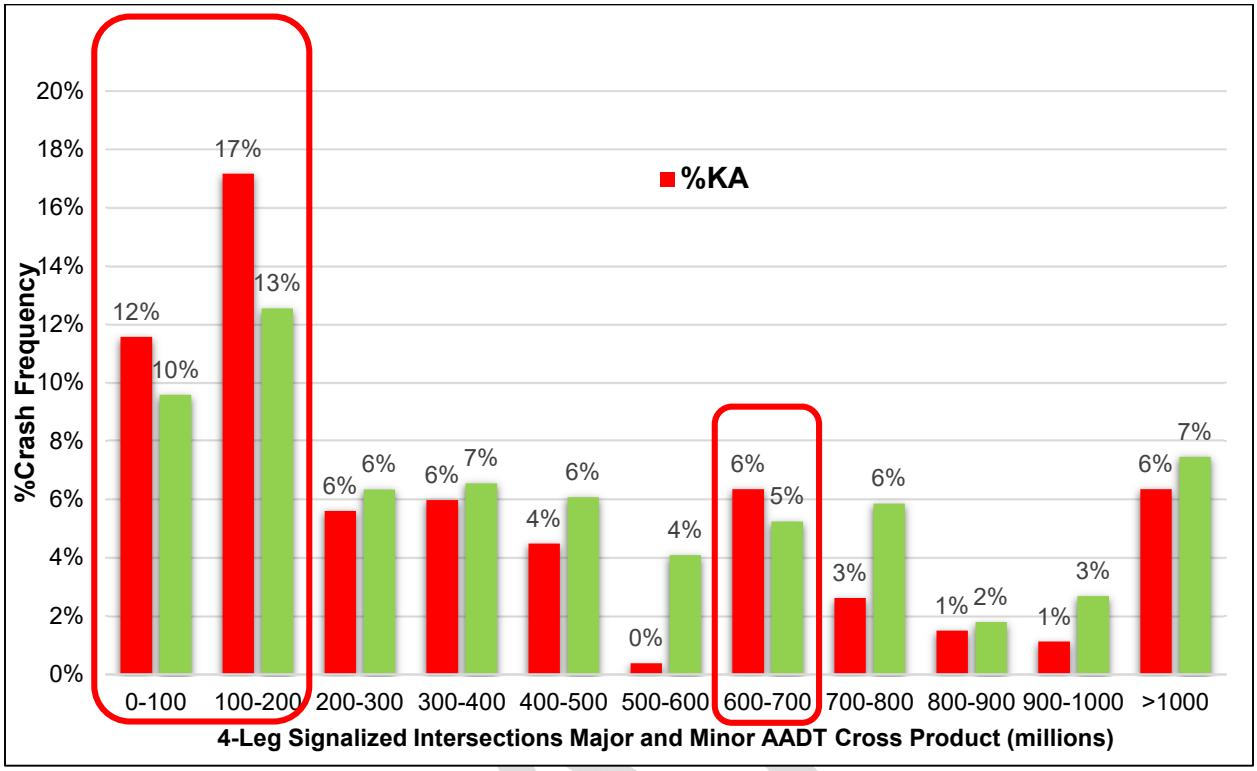

Figure 15: 4-Legged Signalized Intersection, AADT Cross Product (in millions)

Frequency of Fatal/Serious Injury Crashes

Buffers of radius 250 feet are generated for intersections. The intersections having at least one fatal/serious injury crash (K type or A type) within 250 feet buffer received one point.

Proximity to Transit

The intersections having at least one fatal/serious injury crash (K type or A type) and are within proximity to a transit stop (<1000 feet) received one point.

Proximity to School

The intersections having at least one fatal/serious injury crash (K type or A type) and are within proximity to a school (<1000 feet) received one point.

Equity

The intersections having at least one fatal/serious injury crash (K type or A type) and are within the transportation disadvantage census tracts in the City of North Las Vegas received 1 point.

Table 3 below explains the ranking criteria for various intersection risk factors.

Table 3: Ranking Criteria

Intersections Risk Factors	Ranking Criteria
AADT Cross Product	Intersections having high number of fatal/serious injury crashes, relative to the number of intersections at that AADT volume are ranked "1", others are ranked "0"
Frequency of Fatal/Serious Injury Crashes	If number of KA crashes > 0 then rank "1", else "0"
Proximity to Transit	If frequency of KA crashes >0 and nearest bus stop is within 1000 feet, then rank "1", else "0"
Proximity to School	If frequency of KA crashes > 0 and nearest school is within 1000 feet, then rank "1", else "0"
Equity	If number of KA crashes > 0 and intersection is within transportation disadvantage census tracts, then rank "1", else "0"

Having five risk factors, provides intersection priority ranking ranging from "1" to "5". The priority ranking was estimated by summing up the ranking criteria of intersections risk factors. ***Table 4*** explains the category of priority ranking. ***Figure 16*** shows prioritized intersections based on the identified risk factors.

Table 4: Category of Priority Ranking

Overall Priority Ranking	Overall Priority Ranking
5 – Very High Priority Intersection	Very High Potential for Safety improvements
4 – High Priority Intersection	High Potential for Safety Improvements
3 – Moderate Priority Intersection	Moderate Potential for Safety Improvements
2 – Medium Priority Intersection	Medium Potential for Safety Improvements
1 – Low Priority Intersection	Low Potential for Safety Improvements

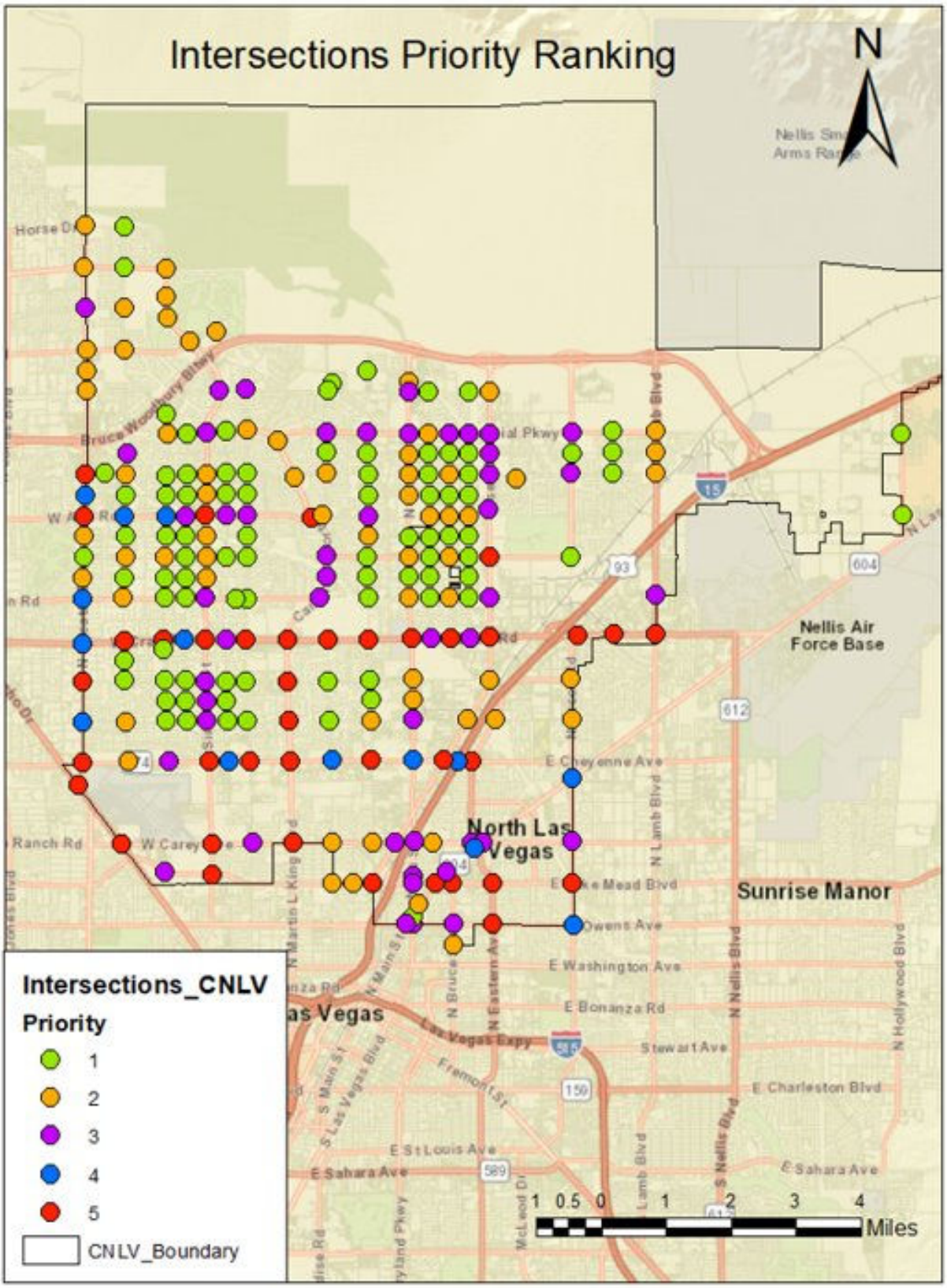

Figure 16: Prioritized Signalized Intersections

Safety Projects Summary

After the Local Road Safety Plan (LRSP) prioritization step is complete, CNLV decision makers need to select safety projects to be implemented for their system. To invest highway safety funds in a cost-effective manner, the City should consider focusing on strategies that are lower cost with high safety effectiveness addressing predominantly fatal and serious injury crashes. Selecting low-cost strategies allows for the maximum number of intersections or miles of roadway to be improved and, when appropriate, the City can use their own funds for implementation.

Implementation and Evaluation of the Plan

The next steps for the City are to implement the prioritized strategies provided in the safety plan and use the analysis to identify locations for funding. Implementation, evaluation, and updating of the safety plan is important for accountability.

It is recommended that the City coordinates with other safety stakeholders—including the Six Es of Traffic Safety—to implement the safety plan, integrating strategies when appropriate in ongoing and new transportation projects and programs in the City. This helps to provide accountability and keep stakeholders informed and engaged. City should develop short-term targets and set milestones to measure progress.

This safety plan identifies both systemic and spot locations and prioritizes emphasis areas and countermeasures so that City can seek opportunities to implement them. Agencies should work with partner local agencies and NDOT to identify which recommended low-cost safety solutions would best improve identified safety issues on their roadways.

APPENDIX A. REGIONAL PLANS, POLICIES, AND STUDIES REVIEWED

APPENDIX B. PUBLIC OPINION SURVEY QUESTIONNAIRE AND RESULTS

APPENDIX C. SEGMENTS AND INTERSECTIONS RISK FACTORS

APPENDIX D. MAPS OF PRIORITIZED LOCATIONS

APPENDIX E. PRIORITIZATION RANKING RESULTS

APPENDIX F. COUNTERMEASURES TOOLKIT

APPENDIX G. PRIORITIZED LIST OF SEGMENT AND INTERSECTION LOCATIONS

Note: ***Appendices are not enclosed as of now***