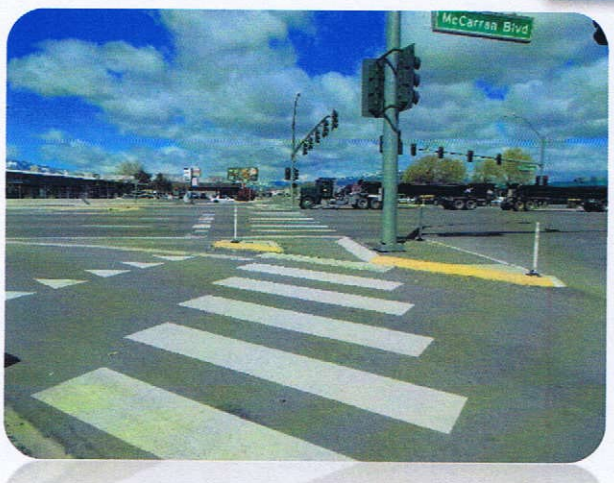

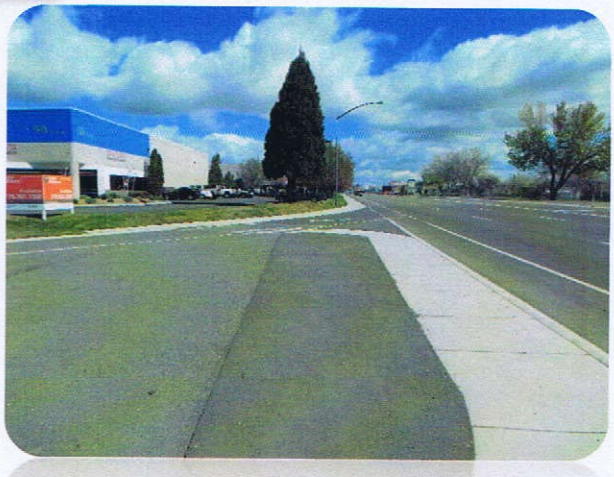

McCarran Boulevard

Greg Street to Probasco Way in Sparks, Nevada

SAFETY MANAGEMENT PLAN

Final Report

January 2018

PROFESSIONAL ENGINEER-STATE OF NEVADA
CHAD ANSON
Exp: 12/31/19
CIVIL
No. 14136
2/20/18

zero Fatalities
Drive Safe Nevada

SAFETY MANAGEMENT PLAN

McCarran Boulevard from Greg Street to Probasco Way

Final Report

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Executive Summary

E.1 Purpose of a Safety Management Plan

The purpose of a Safety Management Plan (SMP) is to conduct a safety-focused corridor study concentrated towards all road users and to include collaboration with stakeholders and the public. A SMP includes the development of short, mid, and long-range transportation safety improvement projects that incorporate traffic studies, access management, public and stakeholder input, crash analyses, benefit-cost analysis, and other impacts to all road users. The SMP process is consistent with the Nevada Strategic Highway Safety Plan's goal of zero fatalities and reducing serious injuries on Nevada's roadways.

E.2 Project Overview

The Nevada Department of Transportation (NDOT) Traffic Safety Engineering Division initiated a SMP to be conducted for a portion of McCarran Boulevard from Greg Street to Probasco Way in Sparks, Nevada. McCarran Boulevard is classified as a *Principal Arterial Urban – Other*. A *Principal Arterial Urban – Other* is defined, by the American Association of State Highway and Transportation officials (AASHTO), as a high-capacity road to deliver traffic from collector roads to freeways or expressways at the highest level of service possible.

McCarran Boulevard, for this SMP, was separated into three specific designations. The first section, Greg Street to Nugget Avenue, is designated the Industrial Section. The second section, Nugget Avenue to Prater Way, is designated the Commercial section. The third section, Prater Way to Probasco Way, is designated as the Residential section. These three sections are seen through the entire SMP.

The roadway consists of two through lanes in each direction from Prater Way to Probasco Way, and three lanes of travel from Greg Street to Prater Way. The entire length has a raised median island with designated left-turn lanes.

McCarran Boulevard has curb, gutter, and sidewalks along the following locations:

- On the west side from Greg Street to Glendale Avenue and Nugget Avenue to Victorian Boulevard
- Both sides from Victorian Boulevard to Nichols Boulevard
- On the east side from Nichols Boulevard to Prater Way
- Both sides from Prater Way to Baring Boulevard

McCarran Boulevard is a mix of edge conditions along the following locations:

- From Greg Street to Kresge Lane and Nugget Avenue to Victorian Avenue along the east side is curb and gutter only
- From Glendale Avenue to Nugget Avenue along the west side is concrete barrier rail
- From Kresge Lane to Nugget Avenue along the east side is concrete barrier rail
- From Nichols Boulevard to Prater Way on west side is a graded shoulder
- From Baring Boulevard to 4th Street along both sides is curb and gutter only

The SMP process conducted an existing conditions analysis that includes reviewing existing traffic, crash data, land use, and field conditions. The existing conditions analysis provided the foundation for development, evaluation, and recommendations for improvements to enhance safety for all users within the corridor.

A Technical Advisory Committee (TAC) was created to help with the development of the SMP to ensure the plan was consistent with the needs of the stakeholders along the corridor. The TAC included individuals from the City of Sparks, NDOT, the Regional Transportation Commission of Washoe County (RTC), Nevada Highway Patrol (NHP), and stakeholders along the corridor. **Figure 1** illustrates the corridor in relation to the City of Sparks. This corridor was selected by NDOT's Safety Engineering Division as a high crash corridor with a need for identifying safety improvements to reduce fatalities and serious injuries of all road users.

The McCarran SMP is organized into 14 separate sections that detail the various studies used to analyze and develop the final recommendations.

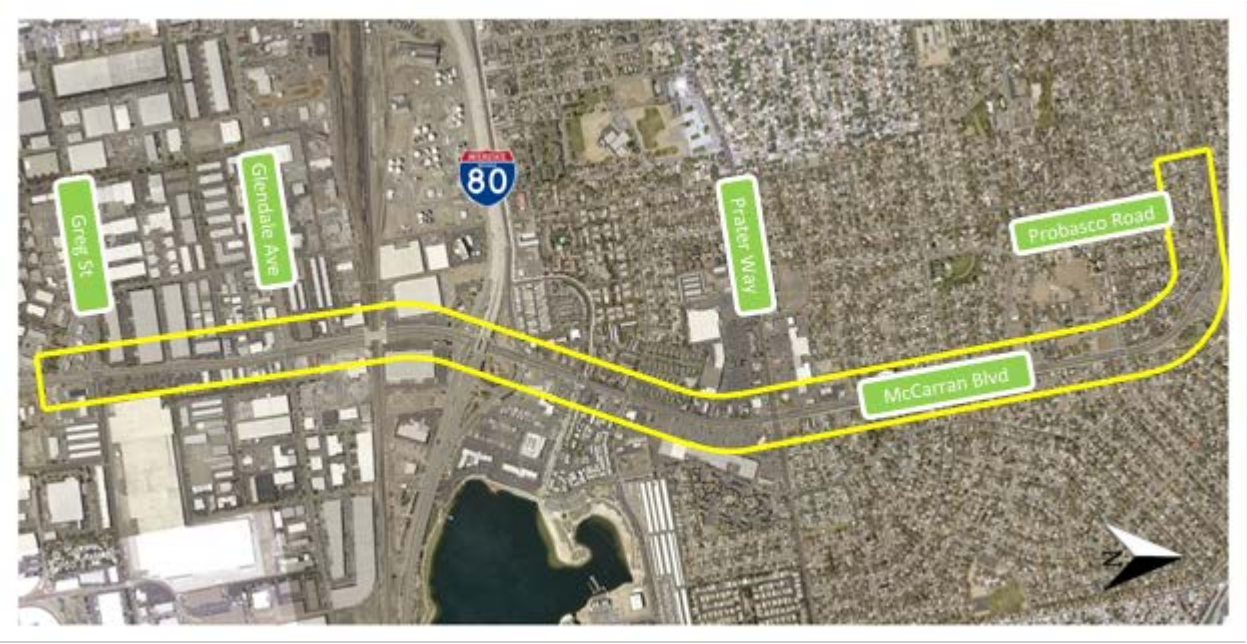

Figure 1. Project Study Area of McCarran Boulevard SMP Corridor

E.2.1 Review and Analysis of Existing Corridor Conditions

A review and analysis of existing conditions was conducted for the corridor. A corridor crash analysis and an intersection crash analysis were performed utilizing the crash data provided by NDOT. The corridor crash analysis included all crashes along the corridor for the five-year period (2011-2016), while the intersection crash analysis includes crashes within 500 feet of an intersection. The intersection crashes included crashes from both the major and minor streets for the five-year period.

The crash rates for McCarran Boulevard have been compared to other NDOT roadways with the same roadway classification and year. The crash rate used for this analysis uses the total number of crashes that occurred along the corridor within the study time period, the total number of vehicles using the corridor, expressed in Average Annual Daily Traffic (AADT), the number of years of crash data and the length of the roadway in miles. **Table 1,** as shown below, is the analysis of this data.

Table 1. McCarran Boulevard Crash Rates

Crash Type	NDOT Urban Principal Arterial Other (2015)	McCarran Boulevard (2015)	Difference
Fatal	**.0193**	**.0314**	**+.0121 (162.7%)**
Injury	**1.4078**	**2.1871**	**+0.7793 (155.4%)**
PDO	**1.2534**	**3.2532**	**+1.9998 (256.6%)**
Total	***2.6805***	***5.4717***	***+2.7912 (204.1%)***
Serious Injury (Subset of Injury Crashes)	**0.0724**	**0.0627**	**-0.0097 (-13.4%)**

Crash rates per 100 million vehicle-miles

This review also included the identification of the following:

- existing lane configuration – number of lanes, turn lanes, and medians
- traffic control at the key intersections – signalized or stop-controlled
- existing right-of-way
- location of existing driveways, marked crosswalks, parking lots and street lighting
- American Disabilities Act (ADA) compliance – evaluate all pedestrian ramps for slopes and cross slopes
- Identification of adjacent land use – malls, casinos, apartments, traffic and pedestrian generators

A field review was conducted Monday, March 13 and Tuesday, March 14, 2017 to investigate and identify potential safety concerns along the corridor. In addition, the TAC met on August 23, 2017 to collectively generate alternatives and recommendations for the corridor.

Finally, a review of the existing road users was completed along the corridor. The road users that are identified along McCarran Boulevard are vehicles, pedestrians and bicycles. This analysis included peak-hour volume data at key intersections, the average daily traffic volume data, pedestrian and bicycle volumes, and calculated crash rates for the corridor at each key intersection.

E.2.2 Review of Regional Policies, Plans, and Studies

A review of known policies, plans, and studies related to the corridor was conducted to help in the development of proposed improvements. This review focused on identifying recommendations and other relevant information specific to the corridor that should be incorporated into the development of proposed improvements. Included in this review was analysis of existing and future land uses and economic development plans for the surrounding area. The review of these documents is found in **Section 6** and **Section 7**.

E.2.3 Identification of Crashes and Risk Factors

Based on the review and analysis of existing project conditions and the review of related policies, plans, and studies, a list of crashes and risk factors was determined for the corridor. McCarran Boulevard has been identified as having a corridor with a crash frequency higher than the statewide average for the same type of corridor. All identified crashes and risk factors were considered in the development of proposed improvement projects. The following list is a summary of crashes and risk factors that have been identified:

- High number of crashes and high number of severe crashes
- Intersections in close proximity of each other
- High number of large trucks
- Existing driveways with some in close proximity of each other
- Lack of bicycle and pedestrian facilities
- Shortage of pedestrian crossings
- Sidewalk obstructions such as utility poles and landscaping or substandard sidewalk width
- Sections with no bicycle lanes or shoulders
- Insufficient street lighting along the corridor
- Intersection geometry without proper sight triangles
- Speeding

E.2.4 Development and Evaluation of Proposed Improvements

A list of short-term, mid-term, and long-term proposed safety improvements were developed and evaluated for the corridor. These improvements were developed based on the results of the analysis of existing project conditions and with the coordination from the TAC. These project lists were developed with the intent to be implemented at specific locations along the corridor and could be constructed independently or within a mid-term or long-term project as funding for projects becomes available.

Safety Improvement Lists

The list of short-term safety improvements was developed with the intent of providing NDOT with potential projects that could be implemented within a relatively short time period, involving lower costs. The list of short-term improvements are provided in **Table 2**.

The list of mid-term safety improvements was developed with the intent of providing NDOT with potential projects that could be implemented over a 5- to 10-year period. These improvements were grouped by projects under $4,000,000 and/or will require right-of-way that will vary in need (medium to low) and may include utility impacts. The list of mid-term improvements are found in **Table 3**.

The list of long-term safety improvements was developed with the intent of providing NDOT with potential projects that could be implemented over a 10-to 15-year period. These improvements were grouped by projects over $4,000,000 and/or will require right-of-way that will vary in need (high to medium) and may include utility impacts. The list of long-term improvements is provided in **Table 4**. Additional information such as cost, impact to right-of-way, utilities, benefit-cost ratios (BCR) and figures for each improvement is found in **Section 9**.

Table 2. Short-Term Safety Improvements

Improvement and Location	Description	Improvement Types
Improve existing right-turn lanes. • Prater Way	Reconstruct pork chop islands and right-turn lanes to enhance vehicle and pedestrian sight distance, reduce turning vehicle speeds and provide proper lane width and radius to accommodate semi-tractor trailer trucks and to prevent trucks off-tracking onto the sidewalk.	Pedestrian and ADA Improve Intersection Geometry
Access management • Gleeson Way • Mongolo Drive	Modify access at Gleeson Way and Mongolo Drive to eliminate left turns out.	Vehicular, Motorcycle, and Transit
Install corridor street lighting.	Installation of corridor street lighting to improve vehicular night time sight distance and illuminate pedestrians and bicyclists	Pedestrian and Bicycles Vehicular, Motorcycle, and Transit
Install new reflective border on backplates along corridor.	Install new reflective backplates to improve visibility.	Vehicular, Motorcycle, and Transit
Replace pedestrian curb ramps along corridor.	Replace non-compliant pedestrian curb ramps to current NDOT standards. Adjust for utility poles in conflict with sidewalk or ramp.	Pedestrian and ADA

Table 3. Mid-Term Safety Improvements

Improvement and Location	Description	Improvement Types
Midblock crossing w/pedestrian-activated hybrid beacon and refuge Island • Nichols Boulevard to Prater Way	Installation of pedestrian crossing midblock between intersections to provide shorter walking distances to pedestrian crosswalks. Includes installation of pedestrian-activated hybrid beacons.	Pedestrian and ADA
Intersection improvements • Construct roundabout at Baring Boulevard.	Convert existing signalized intersection to 2-lane roundabout.	Vehicular, Motorcycle, and Transit Improve Intersection Geometry
Access management • Private and commercial approaches	Private and commercial driveway access to potentially remove, consolidate or convert to right in and right out.	Vehicular, Motorcycle, and Transit
Bicycle and pedestrian improvements • Construct 10-foot shared use path from Nichols Boulevard to Prater Way along east side. Construct 5-foot sidewalk along west side.	Provide shared use path to accommodate both bicycles and pedestrian facilitates within a limited right-of-way corridor. New 5-foot sidewalk on east side provides connectivity between intersections where no facility currently exists.	Pedestrian, ADA and bicycles

Improve existing right-turn lanes • **Construct right turn lane along southbound McCarran at Glendale Avenue (NW quadrant).** • **Improve right-turn lanes along southbound McCarran at Greg Street (NE & NW quadrants).**	**Provide dedicated turn lane to improve intersection safety.** **Reconstruct pork chop islands and right-turn lanes to enhance vehicle and pedestrian sight distance, reduce turning vehicle speeds and provide proper lane width and radius to accommodate semi-tractor trailer trucks and to prevent trucks off-tracking onto the sidewalk.**	**Vehicular, Motorcycle, and Transit Improve Intersection Geometry**

Table 4. Long-Term Safety Improvements

Improvement and Location	Description	Improvement Types
Interchange improvements • **Construct diverging diamond interchange at I-80/McCarran Boulevard.**	**Convert existing interchange to a Diverging Diamond Interchange.**	**Vehicular, Motorcycle, and Transit Improve Intersection Geometry**
Intersection improvements • **Construct right-turn lane for westbound I-80 on-ramp.** • **Construct continuous flow intersection at Glendale Avenue.**	**Construct dedicated right-turn lane for westbound I-80 on-ramp. This includes new bridges over McCarran Boulevard for additional lane width.** **Construct continuous flow intersection at Glendale Avenue. Continuous flow intersection moves the left-turn conflict out of the intersection and synchronizes it with the signal cycle of the intersecting road.**	**Vehicular, Motorcycle, and Transit Improve Intersection Geometry**
Pedestrian and bicycle improvements • **Construct shared use path on west side of McCarran from Glendale Avenue to Nugget Avenue.** • **Construct sidewalk along both sides of McCarran from Baring Boulevard to 4th street.** • **Construct sidewalk along east side of McCarran from Greg Street to Glendale Avenue.**	**Provide shared use path on west side of McCarran from Glendale Avenue to Nugget Avenue. Reduces bike and pedestrian conflicts with vehicular traffic.** **Provide sidewalk along both sides of McCarran from Baring Boulevard to 4th Street. Provides pedestrian connectivity between intersections.** **Provide sidewalk along east side of McCarran from Greg Street to Glendale Avenue. Provides pedestrian connectivity between intersections.**	**Pedestrian, ADA and bicycles**

E.2.4.1 Traffic Level of Service

For each improvement at key intersections, the AM and PM peak-hour Level of Service (LOS) analysis was performed using the expected construction year (2017) traffic volumes and the 20-year horizon (2040) traffic volumes. **Table 5** provides a summary of the LOS analysis results for no-build at each intersection. **Table 6** provides a summary of the LOS analysis results for the identified improvements at each intersection. **Table 7** provides a brief summary of the LOS definitions for signalized intersections.

Table 5. LOS Results at Intersections (No-Build)

Intersection	2017				2040			
	AM		PM		AM		PM	
	Delay(s)	LOS	Delay(s)	LOS	Delay(s)	LOS	Delay(s)	LOS
Greg Street	77.2	E	88.3	F	62.7	E	51.6	D
Glendale Avenue	21.6	C	40.9	D	31.8	C	44.1	D
Nugget Avenue	15.7	B	23.9	C	28.2	C	28.3	C
I-80 Eastbound on-ramps	105.1	F	25.0	C	145.5	F	35.6	D
I-80 Westbound Ramps and Victorian Avenue	18.7	B	21.6	C	51.1	D	33.4	C
Nichols Boulevard	17.5	B	24.2	C	17.8	B	38.2	D
Lincoln Way	19.6	B	22.6	C	49.8	D	42.2	D
Prater Way	44.1	D	79.4	E	44.6	D	57.4	E
Greenbrae Drive	21.1	C	24.0	C	24.8	C	27.8	C
York Way	22.2	C	20.2	C	25.4	C	19.5	B
Baring Boulevard	88.1	F	26.4	C	18.9	B	17.6	B
Probasco Way	13.9	B	12.7	B	14.3	B	13.3	B

Table 6. LOS Results at Intersections (Selected Improvements)

Intersection	Proposed Improvement	2040 (no-build)				2040 (with improvement)			
		AM		PM		AM		PM	
		Delay(s)	LOS	Delay(s)	LOS	Delay(s)	LOS	Delay(s)	LOS
Greg Street	Improve right-turn lane	62.7	E	51.6	D	61.4	E	51.6	D
Glendale Avenue	Construct right-turn lane	31.8	C	44.1	D	32.0	C	33.0	C
Baring Boulevard	Roundabout	18.9	B	17.6	B	9.3	A	15.8	C
Baring Boulevard	High-T Intersection	18.9	B	17.6	B	39.9	D	30.2	C

Table 7. Level of Service Definitions

Level of Service	Signalized Intersection Average Total Delay (sec/veh)
A	≤10
B	>10 and ≤20
C	>20 and ≤35
D	>35 and ≤55
E	>55 and ≤80
F	≤80

Note: Definitions provided from the Highway Capacity Manual, Special Report 209, Transportation Research Board, 2010.

E.2.5 Public Involvement

A public information meeting was held to solicit input from the community for the McCarran SMP's proposed improvements. The public meeting was held at the Dilworth Middle School, from 4:00 PM to 7:00 PM on Thursday, November 16, 2017. The meeting was advertised in the Reno Gazette Journal two weeks prior and the day before the meeting. Along with the newspaper advertisement, notices were mailed out to property owners and residents within a one-quarter mile of the study corridor. Visual displays of the proposed improvements along with an overview of the project were presented.

Visual representations of the proposed improvements were displayed along with an overview of the corridor. A total of 30 individuals attended the public meeting including representatives from NDOT, RTC, the City of Sparks, CA Group and members of the general public. All comments were reviewed and incorporated into the proposed improvements, as appropriate.

All comments from the public meeting are in **Appendix H,** along with a copy of the presentation boards.

E.2.6 SMP Final Report

The McCarran SMP Final Report is to identify and summarize the existing conditions, investigate crash information and provide potential safety improvement projects, develop safety BCRs, and provide recommendations enhancing user safety within the corridor. This document is a guideline for the various jurisdictions that are associated with the corridor for planning safety improvement projects. The McCarran SMP Final Report is divided into the following sections:

Section 1. Introduction: introduces the definition of Safety Management Plan and provides an overview of the project corridor.

Section 2. Crash Analysis: provides existing crash information and analysis for the corridor and key intersections

Section 3. Existing Roadway Conditions: presents the existing roadway features and conditions along the corridor.

Section 4. Traffic Analysis: provides a description of the methodology used to determine traffic volume growth rates, road user data in relation to peak-hour volumes, average daily traffic, crash rates, and level of service (LOS) analysis.

Section 5. Regional Policies, Plans and Studies: covers an overview of known policies, plans, and studies related to the corridor.

Section 6. Land Use Analysis: presents the land use analysis for the areas surrounding the corridor.

Section 7. Economic Development: provides an overview of economic development for the areas surrounding the corridor.

Section 8. Crashes and Risk Factors: summarizes the identified crashes and risk factors for the corridor.

Section 9. Safety Improvement Introduction: identifies the proposed short-term, mid-term, and long-term improvements with costs, BCRs, right-of-way need and utility impacts.

Section 10. Safety Improvement Cost Analysis: identifies the proposed short-term, mid-term, and long-term improvements with costs, BCRs, right-of-way need and utility impacts.

Section 11. Right-of-Way Need and Utility Impacts: identifies the right-of-way need required to implement each improvement and potential impacts to utilities.

Section 12. Benefit-Cost and Crash Reduction Factors: provides a summary of the BCR and crash reduction factor associated with each proposed improvement.

Section 13. Public Involvement: provides an overview of the public information meeting.

Section 14. Conclusion: provides an overview of all proposed safety improvements and recommendations.

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List of Acronyms

AADT	Annual Average Daily Traffic
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
BCR	Benefit-Cost Ratio
CMF	Crash Modification Factor
FHWA	Federal Highway Administration
HCM	Highway Capacity Manual
HSM	Highway Safety Manual
IDR	Intermediate Density Residential
LED	Light Emitting Diode
LLR	Large Lot Residential
LOS	Level of Service
NNTS	Northern Nevada Traffic Study
MPH	Miles per Hour
MUC	Mixed Use Commercial
MUD	Mixed Use District
MVMT	Million Vehicle Miles Travelled
NDOT	Nevada Department of Transportation
NHP	Nevada Highway Patrol
PHB	Pedestrian Hybrid Beacon
PDO	Property Damage Only
ROW	Right-of-Way
RRFB	Rectangular Rapid Flashing Beacon
RSA	Road Safety Assessment
RTC	Regional Transportation Commission
SHSP	Strategic Highway Safety Plan
SMP	Safety Management Plan
STIP	Statewide Transportation Improvement Program
SWG	Stakeholder Working Group
TAC	Technical Advisory Committee
TMRPA	Truckee Meadows Regional Planning Agency
TOD	Transit Oriented Development
TRINA	Traffic Records Information Access
TRIC	Tahoe Reno Industrial Center
UPRR	Union Pacific Railroad

1. Introduction

The Nevada Department of Transportation (NDOT) Traffic Safety Engineering Division is developing a Safety Management Plan (SMP) for McCarran Boulevard, from Greg Street to Probasco Way in Sparks, Nevada. The purpose of a SMP is to conduct a safety-focused corridor study concentrated towards all road users and includes collaboration with stakeholders and the public. A SMP includes the development of short, mid, and long-term transportation safety improvement projects that incorporates traffic studies, access management, public and stakeholder input, crash analyses, benefit-cost analysis, and other impacts to all road users. The SMP process is consistent with the Nevada Strategic Highway Safety Plan's goal of zero fatalities and reducing serious injuries on Nevada's roadways.

A Technical Advisory Committee (TAC) was created to help with the development of the SMP to ensure the plan was consistent with the needs of the stakeholders along the corridor. The TAC were individuals from the City of Sparks, NDOT, and the Regional Transportation Commission of Washoe County (RTC). **Figure 1** illustrates the corridor in relation to the City of Sparks. This corridor was selected by NDOT's Traffic Safety Engineering Division as a high crash corridor with a need for identifying safety improvements to reduce fatalities and serious injuries of all road users.

The McCarran SMP Final Report is to identify and summarize the existing conditions, investigate crash information and provide potential safety improvement projects, develop safety benefit-cost ratios (BCR), and provide recommendations enhancing user safety within the corridor. This document is a guideline for the various jurisdictions that are associated with the corridor for planning safety improvement projects.

2. Crash Analysis

The following section presents the crash analysis of crash data obtained from NDOT for the five-year period from May 1, 2011 to April 30, 2016. A corridor crash analysis and an intersection crash analysis were performed utilizing the crash data provided. The corridor crash analysis included all crashes along the corridor for the five-year period while the intersection crash analysis includes crashes within 500 feet of a key intersection. The intersection crashes include crashes from both the major and minor streets for the five-year period. Detailed crash data along McCarran Boulevard and existing intersections is found in **Appendix A**.

2.1 Existing Intersection Crash Data Analysis

Intersection crashes include all crashes within 500 feet of the intersection, including crashes on side streets, which are not included in the corridor crash analysis. The SMP corridor includes sixteen intersections, twelve signalized and four non-signalized intersections these were analyzed as part of the intersection crash analysis. The study time period was 5 years (May 1, 2011 to April 30, 2016).

The crash rate was calculated with the following variables:

- R = Crash rate for the intersection expressed as crashes per million entering vehicle
- C = Total number of intersection crashes in the study time period
- V = Total number of vehicles entering the intersection daily
- N = Number of years of data

$$R = \frac{1{,}000{,}000 \times C}{365 \times N \times V}$$

The summary of crashes in the corridor intersections are shown in **Table 8.**

Table 8. Intersection Crash Rates

INTERSECTION	INJURY CRASH RATE	FATAL CRASH RATE	TOTAL CRASH RATE
McCarran @ Stanford	0.17	0.00	0.17
McCarran @ Greg	0.33	0.00	0.78
McCarran @ Kresge	0.00	0.03	0.08
McCarran @ Glendale	0.36	0.00	0.94
McCarran @ Nugget	0.20	0.00	0.56
McCarran @ I80 EB (on & off)	0.26	0.00	0.73
McCarran @ Victorian / I80 WB off	0.31	0.00	0.76
McCarran @ Nichols	0.52	0.01	1.42
McCarran @ Lincoln	0.34	0.00	0.84
McCarran @ Prater	0.65	0.00	1.41
McCarran @ Gleeson	0.04	0.00	0.10
McCarran @ Greenbrae	0.09	0.00	0.39
McCarran @ Mongolo	0.05	0.00	0.14
McCarran @ York	0.74	0.00	1.71
McCarran @ Baring	0.45	0.00	1.05
McCarran @ Probasco	0.31	0.00	0.58

Crash rates per 1,000,000 entering vehicles

2.2 Existing Corridor Crash Data Analysis

The crash data along McCarran Boulevard was evaluated and analyzed from 500 feet South of Greg Street to 500 feet west of Probasco Way. The crash data is from the NDOT's crash warehouse from May 1, 2011 through April 30, 2016. The crash rate for McCarran Boulevard has been compared to other NDOT roadways with the same roadway classification and year. The crash rate was calculated with the following variables:

- R = Crash rate for the corridor expressed as crashes per 100 million vehicle-miles
- C = Total number of crashes along the corridor in the study time period
- V = Total number of vehicles using the corridor, expressed in Average Annual Daily Traffic AADT
- N = Number of years of data
- L = Length of the corridor in miles

$$R = \frac{C \times 100{,}000{,}000}{V \times 365 \times N \times L}$$

Table 9, as shown below, is the analysis of this data. The crash rate for this corridor exceeds the average for the following: property damage only (PDO) crash rate, the injury crash rate, the fatal crash rate, the total crash rate, and the injury crash rate.

Table 9. McCarran Boulevard Crash Rates

Crash Type	NDOT Urban Principal Arterial Other (2015)	McCarran Boulevard (2015)	Difference
Fatal	.0193	.0314	+.0121 (162.7%)
Injury	1.4078	2.1871	+0.7793 (155.4%)
PDO	1.2534	3.2532	+1.9998 (256.6%)
Total	*2.6805*	*5.4717*	*+2.7912 (204.1%)*
Serious Injury (Subset of Injury Crashes)	0.0724	0.0627	-0.0097 (-13.4%)

Crash rates per 100 million vehicle-miles

McCarran Boulevard, in the study time period of 5 years (May 1, 2011 to April 30, 2016), had a total of 698 crashes within corridor limits stated in the above paragraph. Of these crashes, there were 4 pedestrian fatalities, 6 serious injury crashes with 8 serious injuries, and 279 injury crashes with 379 injuries. The predominant crash types, descending by the number of crashes are Rear-End crashes (374), Angle crashes (166), Sideswipe Same Direction crashes (82) and Non-Collision crashes (62). During the development of this SMP, there have been two additional pedestrian fatalities. **Table 10** provides the Corridor Crash Analysis and further break down of these crashes.

Table 10. Corridor Crash Analysis

Corridor Crash Analysis		
Overall Crash Data	• 698 total crashes during 05/01/2011 through 04/30/2016 o 4 fatal crashes with 4 fatalities • 279 injury crashes with 379 injuries	
Overall Crash Rates	**NDOT Urban Principal Arterial-Other (2015)** Total Crash Rate 2.6805 Fatal Crash Rate 0.0193 Injury Crash Rate 1.4078 Serious Injury Rate 0.0724 PDO Crash Rate 1.2534	**McCarran Boulevard Urban Principal Arterial-Other (2015)** Total Crash Rate 5.4716 Fatal Crash Rate 0.0314 Injury Crash Rate 2.1871 Serious Injury Rate 0.0627 PDO Crash Rate 3.2532
Predominant Crash Types	• 374 Rear-end crashes • 166 Angle crashes • 82 Sideswipe Same Direction crashes • 62 Non-Collision crashes o 4 fatal crashes with 4 fatalities • 7 Backing crashes • 6 Unknown crash type 1 Rear-To-Rear crash	
Motorcycle Crashes	• 17 Motorcycle crashes	
Motor Scooter Crashes	• 4 Motor Scooter crashes	
Moped Crashes	• 2 Moped crashes	
Pedestrian Crashes	• 9 Pedestrian crashes o 4 fatal crashes with 4 fatalities	
Pedal Cycle Crashes	• 14 Pedal Cycle crashes	
Bus Crashes	• 3 crashes involving buses	
Weather Conditions	• 524 Clear o 3 fatal crashes with 3 fatalities • 131 Cloudy • 24 Rain o 1 fatal crashes with 1 fatalities • 9 Unknown • 7 Snow • 2 Fog, Smog, Snow, Other • 1 Blowing Sand, Dirt, Snow	
Lighting Conditions	• 503 Daylight • 152 Dark – Spot Lighting o 3 fatal crashes with 3 fatalities • 19 Dark – Continuous Lighting o 1 fatal crashes with 1 fatalities • 18 Dusk • 6 Dawn	

3. Existing Roadway Conditions

The following section presents the existing roadway conditions along McCarran Boulevard from Greg Street to Probasco Way.

3.1 Roadway Characteristics

McCarran Boulevard is classified as a *Principal Arterial Urban – Other*. A *Principal Arterial Urban – Other* is defined, by the American Association of State Highway and Transportation officials (AASHTO), as a high-capacity road to deliver traffic from collector roads to freeways or expressways at the highest level of service possible.

McCarran Boulevard has two through lanes in each direction from Prater Way to Probasco Way, and three lanes of travel from Stanford Way to Prater Way. The entire length has a raised median island with designated left-turn lanes.

The existing posted speed limit from Greg Street to Probasco Way is shown below. **Figure 2** through **Figure 4** show the approximate locations of the existing posted speed limits along McCarran Boulevard.

McCarran Boulevard existing posted speed limits

- Northbound direction
  - Greg Street to Nichols Boulevard 45mph
  - Nichols Boulevard to Gleeson Way 40mph
  - Gleeson Way to Probasco Way 45mph
- Southbound direction
  - Probasco Way to Gleeson Way 45mph
  - Gleeson Way to Nugget Avenue 40mph
  - Nugget Avenue to Greg Street 45mph

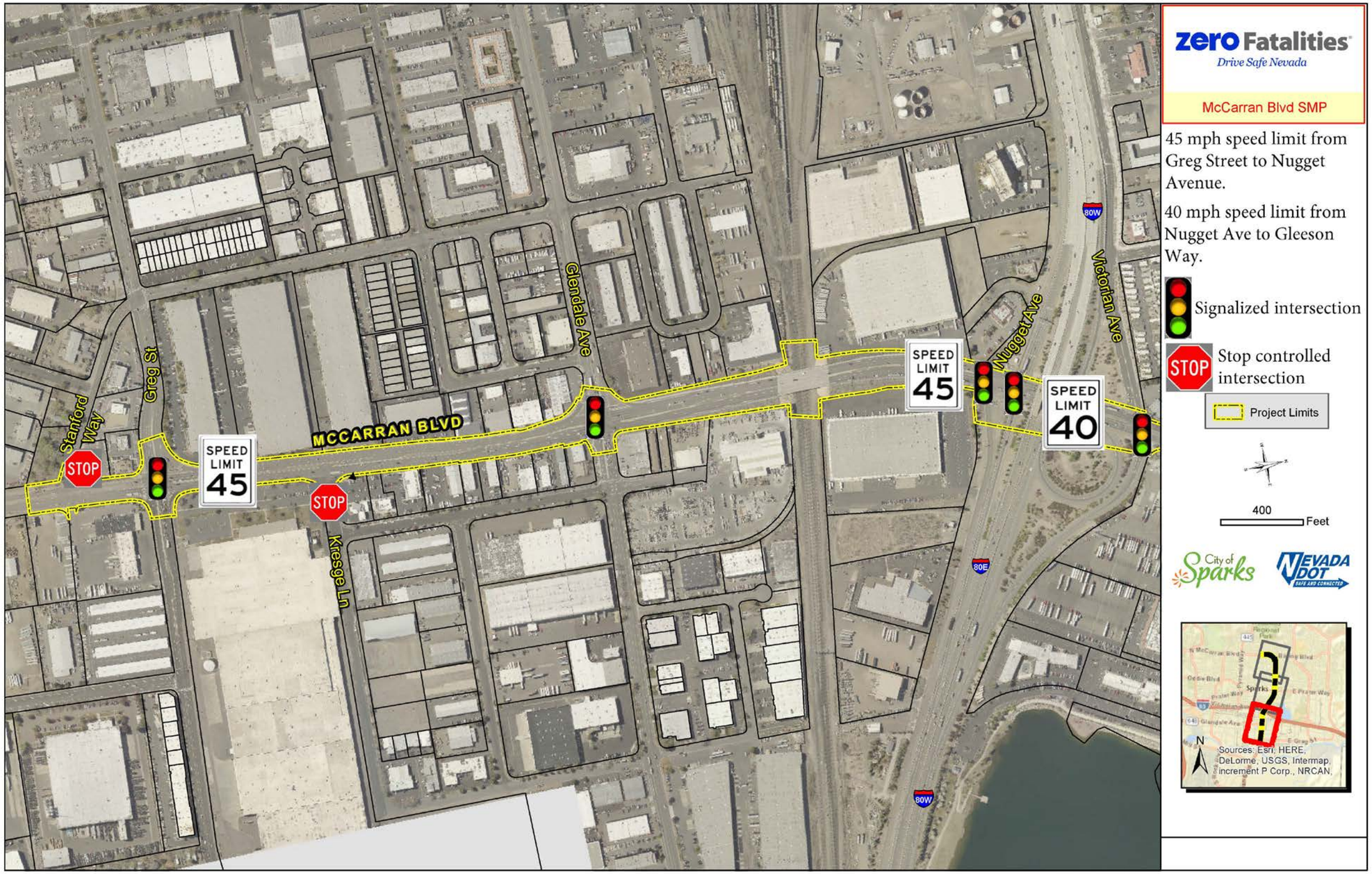


Figure 2. Posted Speed Limit (Industrial Section)

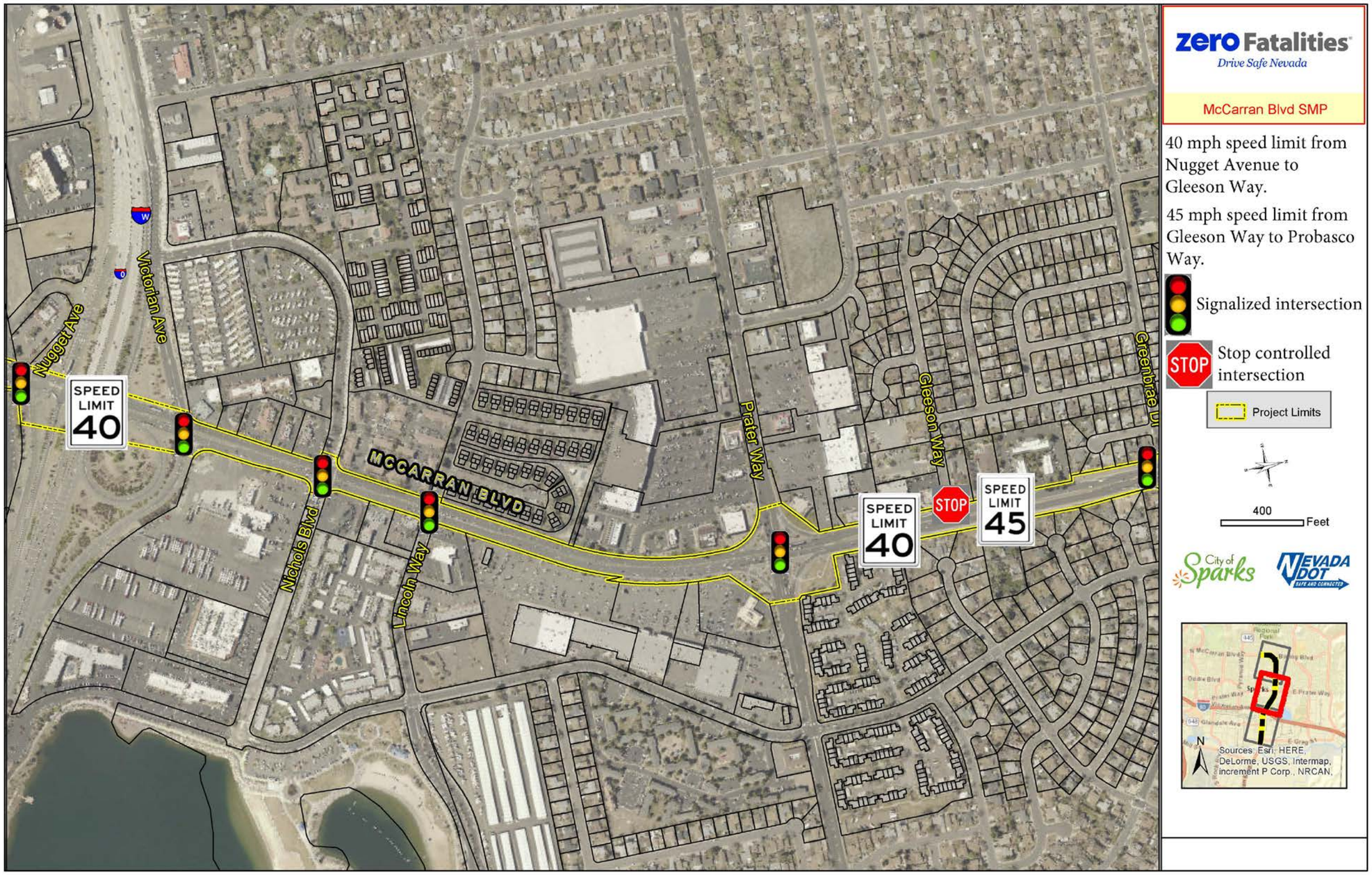


Figure 3. Posted Speed Limit (Commercial Section)

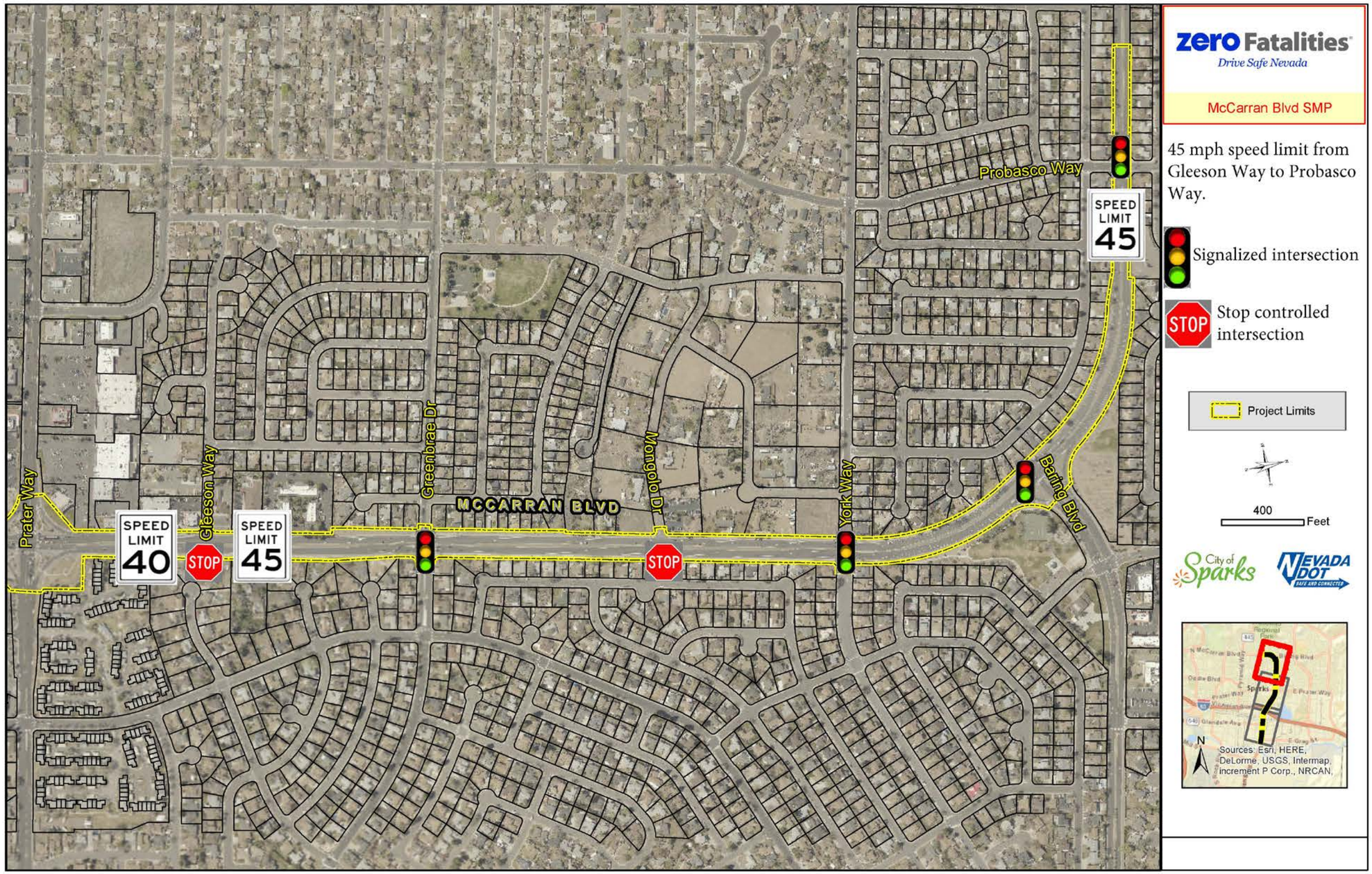


Figure 4. Posted Speed Limit (Residential Section)

There are 12 signalized intersections located at the following cross-streets: Greg Street, Glendale Avenue, Nugget Avenue, I-80 EB on- and off-ramps, Victorian Avenue / I-80 WB off-ramp, Nichols Avenue, Lincoln Way, Prater Way, Greenbrae Drive, Baring Boulevard and Probasco Way. All of the signalized intersections have four legs with the exception of Baring Boulevard, which only has three legs. Side streets are controlled with stop signs at Stanford Way, Kresge Lane, Gleeson Way and Mongolo Drive. All of the non-signalized intersections have three legs. **Figure 2** through **Figure 4,** shown above, depict the signalized and non-signalized intersections along McCarran Boulevard. **Table 12**, shown below, depicts the existing characteristics of the signalized intersections.

There are bike lanes in both directions from Greg Street to Nugget Avenue and from Prater Way to Probasco Way. The section between Nugget Avenue and Prater Way does not have bike lanes. **Figure 5** and **Figure 6** depict sections along McCarran with and without bike lanes respectively. **Table 13**, shown below, depicts the existing characteristics of the non-signalized intersections.

Location:
Northbound McCarran near Lincoln Way

Figure 5. Existing Section without Bike Lanes

Location:
Southbound McCarran near Glendale Avenue

Figure 6. Existing Section with Bike Lanes

McCarran Boulevard has curb, gutter, and sidewalks along the following locations:

- On the west side from Stanford Way to Victorian Boulevard
- Both sides from Victorian Boulevard to Nichols Boulevard
- On the east side from Nichols Boulevard to Prater Way
- Both sides from Prater Way to Baring Boulevard

McCarran Boulevard is a mix of edge conditions along the following locations:

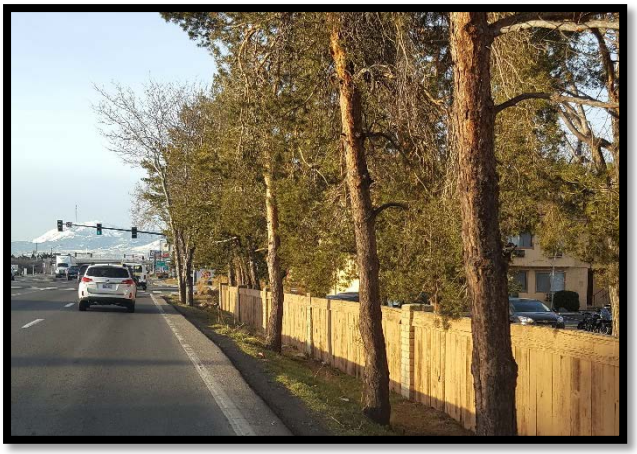
- From Stanford Way to Victorian Avenue along the east side is curb and gutter only
- From Nichols Boulevard to Prater Way on west side is a graded shoulder
- From Baring Boulevard to 4th Street along both sides is curb and gutter only

McCarran Boulevard has no dedicated street lighting. Existing lighting is located at all signalized and non-signalized intersections, these intersections are listed in **Table 12** and **Table 13** shown below. Some commercial lighting does spill over on the roadway between I-80 and Prater Way.

Figure 7 and **Figure 8** depict sections along McCarran Boulevard with typical edge conditions with and without curb, gutter, and sidewalk.

Location:
SW corner of Gleeson Way

Figure 7. Existing Section with C&G - Sidewalk



Location:
Southbound McCarran at Lincoln Way

Figure 8. Existing Section w/o C&G - Sidewalk

3.2 Speed Study

On July 2017, a speed study was conducted by NDOT Traffic Information within the subject corridor. The corridor was split into three separate segments for analysis. The speed study indicated the 85th percentile speed was within 5 miles per hour of the posted speed within all segments. **Table 11** provides a summary of the speed study, the 85th percentile[1] speed and US Limits 2[2]. The entire speed study can be found in **Appendix B.**

Table 11. NDOT Speed Study Analysis – July 2017

Segment	Posted Speed	85th Percentile[1]	US Limits 2[2]
Segment 1 – Probasco Way to Gleeson Way	45 MPH	50 MPH	45 MPH
Segment 2 – Gleeson Way to I-80 Eastbound Ramps	40 MPH	45 MPH	40 MPH
Segment 3 – I-80 Eastbound Ramps to Stanford Way	45 MPH	50 MPH	50 MPH

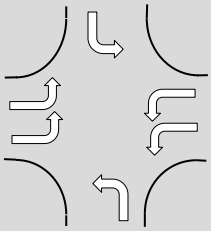
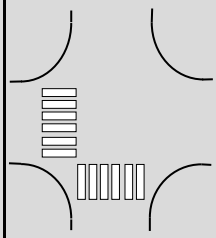
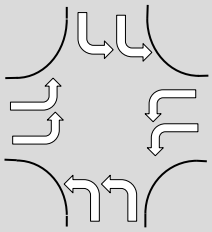
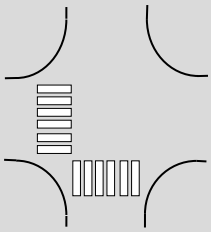
[1] *ITE Speed Zoning Guidelines*

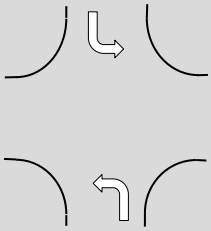
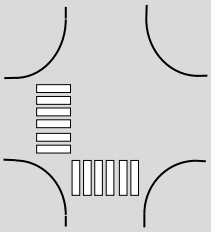
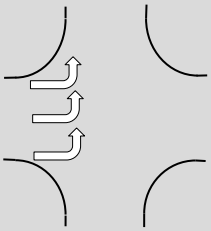
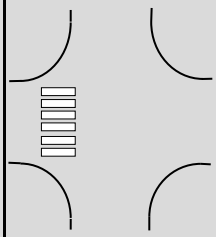
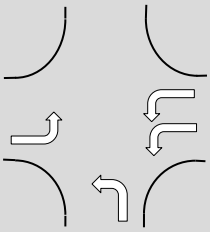
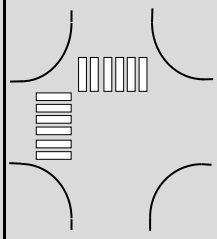
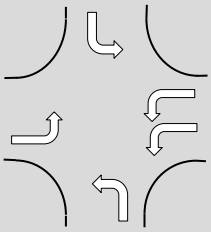
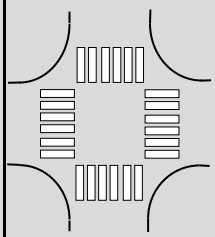
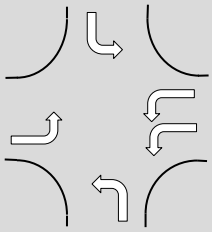
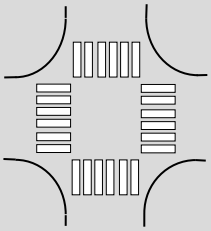
[2] *US Limits 2 Expert System for Recommending Speed Limits in Speed Zones*

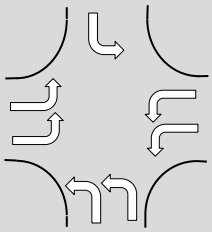
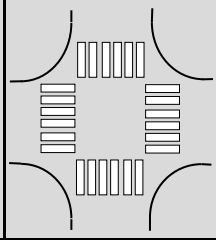
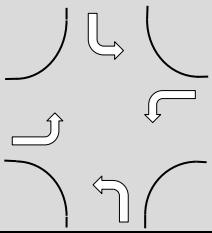
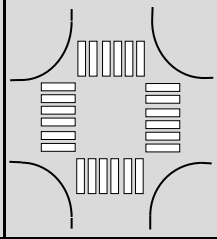
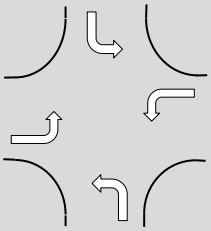
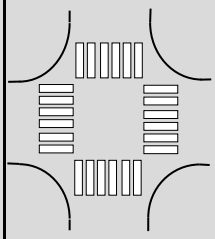
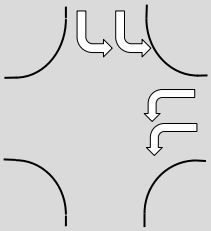
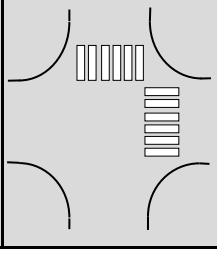
3.3 Signalized Intersections

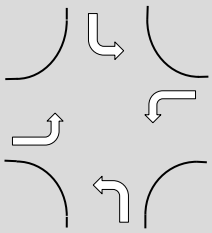
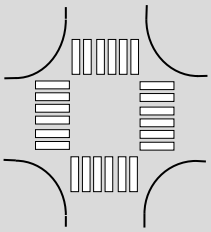
There are 12 signalized intersections within the corridor. These signal systems are currently maintained by the City of Sparks through an interlocal agreement with NDOT. **Table 10** provides a summary of the signalized intersections and characteristics.

Table 12. Existing Signalized Intersection Characteristics

Cross Street	No. of Lanes on Cross Street	Left-Turn Treatment	Crosswalk Locations	ADA Non-Compliant	Notes
Greg Street	Two lanes WB and one right W-N; two lanes EB	Dual Protected W-S and E-N; Single Protected N-W and S-E 	South and West legs 	Ramp and signal upgrades required	No Sidewalk in NE Quadrant. High-speed right-turn pockets in three quadrants. No sidewalk in NE quadrant.
Glendale Avenue	Two lanes WB and one right W-N; two lanes EB and one right E-S	Dual protected in all directions 	South and West legs 	Ramp and signal upgrades required	No sidewalk in NE and SE quadrants. Sight distance concerns due to barrier in NW quadrant.

Cross Street	No. of Lanes on Cross Street	Left-Turn Treatment	Crosswalk Locations	ADA Non-Compliant	Notes
Nugget Avenue	One shared left W-S/thru WB/right W-N; one shared left E-N/thru EB/right E-S	Single protected N-W and S-E movements 	South and West legs 	Ramp and signal upgrades required	Approximately 50 feet south of I-80 Eastbound signalized intersection; bike lanes begin/end south of intersection.
I-80 Eastbound	One shared left E-N/thru EB/right E-S and one right E-S	Protected E-N movement 	West leg 	Ramp and signal upgrades required [1]	Signal is coordinated with Nugget Avenue; both are controlled by same controller.
I-80 Westbound Victorian	One right W-N and one shared left W-S/thru WB; one right E-N	Single protected W-S, E-N and N-W movements 	West and North legs 	Ramp and signal upgrades required [1]	High amount of truck traffic turning right to truck stop.
Nichols Boulevard	One shared right turn E-S/thru EB; one shared left W-S/thru WB and one right W-N	Dual protected W-S; all others single protected 	All legs 	Ramp and signal upgrades required	Cycle track on north side of Nichols is push button activated for bicycles. Lack of sidewalk connectivity in NW quadrant.
Lincoln Way	One shared right turn E-S/thru EB ; one shared left W-S/thru WB/right W-N	Dual protected W-S; all others single protected 	All legs 	Ramp and signal upgrades required	Tight W-S turning movement; pole in NE corner sidewalk; lack of sidewalk connectivity on west side.

Cross Street	No. of Lanes on Cross Street	Left-Turn Treatment	Crosswalk Locations	ADA Non-Compliant	Notes
Prater Way	Two lanes WB and one right W-N; two lanes EB and one right E-S	Dual protected N-W; single protected S-E; and single protected permissive flashing yellows W-S and E-N 	All legs 	Ramp and signal upgrades required	High-speed right turns in all quadrants; bike lane begins/ends north of intersection; and lack of sidewalk connectivity in SW quadrant.
Greenbrae Drive	One shared right-turn E-S/thru EB; one thru WB and one right W-N	Single protected S-E and N-W; single protected permissive W-S and E-N 	All legs 	Ramp and signal upgrades required	Combine pedestrian push buttons to one post in the NE quadrant.
York Way	One shared left E-N/thru EB and one right E-S; one shared left W-S/thru WB and one right W-N	Single protected 	All legs 	Ramp and signal upgrades required	Signal pole in pedestrian curb ramp in the NW quadrant.
Baring Boulevard	One right W-N	Dual protected for S-E and E-S 	North and East legs 	Ramp and signal upgrades required	Bike lane markings in NE quadrant; lack of sidewalk connectivity in SE quadrant; intersection located on curve; and minimal acceleration taper for E-N right turn merge.

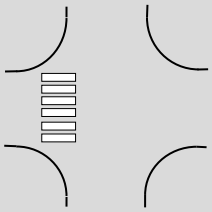
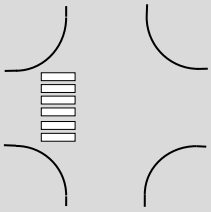
Cross Street	No. of Lanes on Cross Street	Left-Turn Treatment	Crosswalk Locations	ADA Non-Compliant	Notes
Probasco Way	One shared left S-E/thru SB; one shared N-W/thru NB	Single protected 	All legs 	Ramp and signal upgrades required	No sidewalks on either side of McCarran and pedestrian sight distance concerns in NE and SW quadrants.

1- NDOT Contract 3668 to upgrade

3.4 Non-Signalized Intersections

Four non-signalized intersections also exist within the corridor. These intersections are two-way stop-controlled on the minor roads. **Table 13** summarizes the characteristics of the non-signalized intersections and potential concerns.

Table 13. Existing Non-Signalized Intersections Characteristics

Cross Street	No. of Lanes on Cross Street	Stop Control	Crosswalk Locations	ADA –Non Compliant	Notes
Stanford Lane	One right-turn lane E-S	Stanford Lane (Minor Road) only		ADA Compliant	East leg is a commercial driveway. Both sides are right in/right out.
Kresge Lane	One right-turn lane W-N	Kresge Lane (Minor Road) only	No Crosswalk	Ramp upgrades required	West leg is a commercial right-in only. East side is right-in/right-out for Kresge.
Gleeson Way	One shared right E-S/left E-N	Gleeson Way (Minor Road) only		Ramp upgrades required	Convert ramps to parallel type
Mongolo Drive	One shared right E-S/left E-N	Mongolo Drive (Minor Road) only	No Crosswalk	Ramp upgrades required	Convert ramps to parallel type

3.5 Pedestrian and Bicycle facilities

Bicycle lanes exist on both sides of McCarran Boulevard from Greg Street to south of the I-80 interchange with the width varying from three feet to ten feet. No bike lanes are provided from McCarran Boulevard from Nugget Avenue to Prater Way. Dedicated bicycles lanes are then provided again north of Prater Way to Probasco Way with the width varying from four feet to six feet. In addition, a cycle track is located along Nichols Boulevard, which crosses McCarran Boulevard with a push button-activated signal for the bicycles. The only concerns associated with bicyclists would be the non-continuity of the dedicated bike lane from I-80 to Prater Way and the bike lanes being un-buffered. Changing the un-buffered bike lanes to buffered bike lanes would enhance the safety of the bicyclists by providing a striped buffer between the vehicles and the bicycles.

Pedestrian access is prevalent throughout the corridor with the following exception where no sidewalk exists:

- East side of McCarran Boulevard from Greg Street to the Westbound I-80 Off-ramp/Victorian Way Intersection
- West side of McCarran Boulevard from Nichols Boulevard to Prater Way
- Both sides of McCarran Boulevard from Baring Way to Probasco Way

Other pedestrian concerns identified during the field review include:

- Sidewalks impacted by poles and landscaping
- Areas of damaged sidewalks
- Pedestrian crossing times
- Substandard ADA ramps

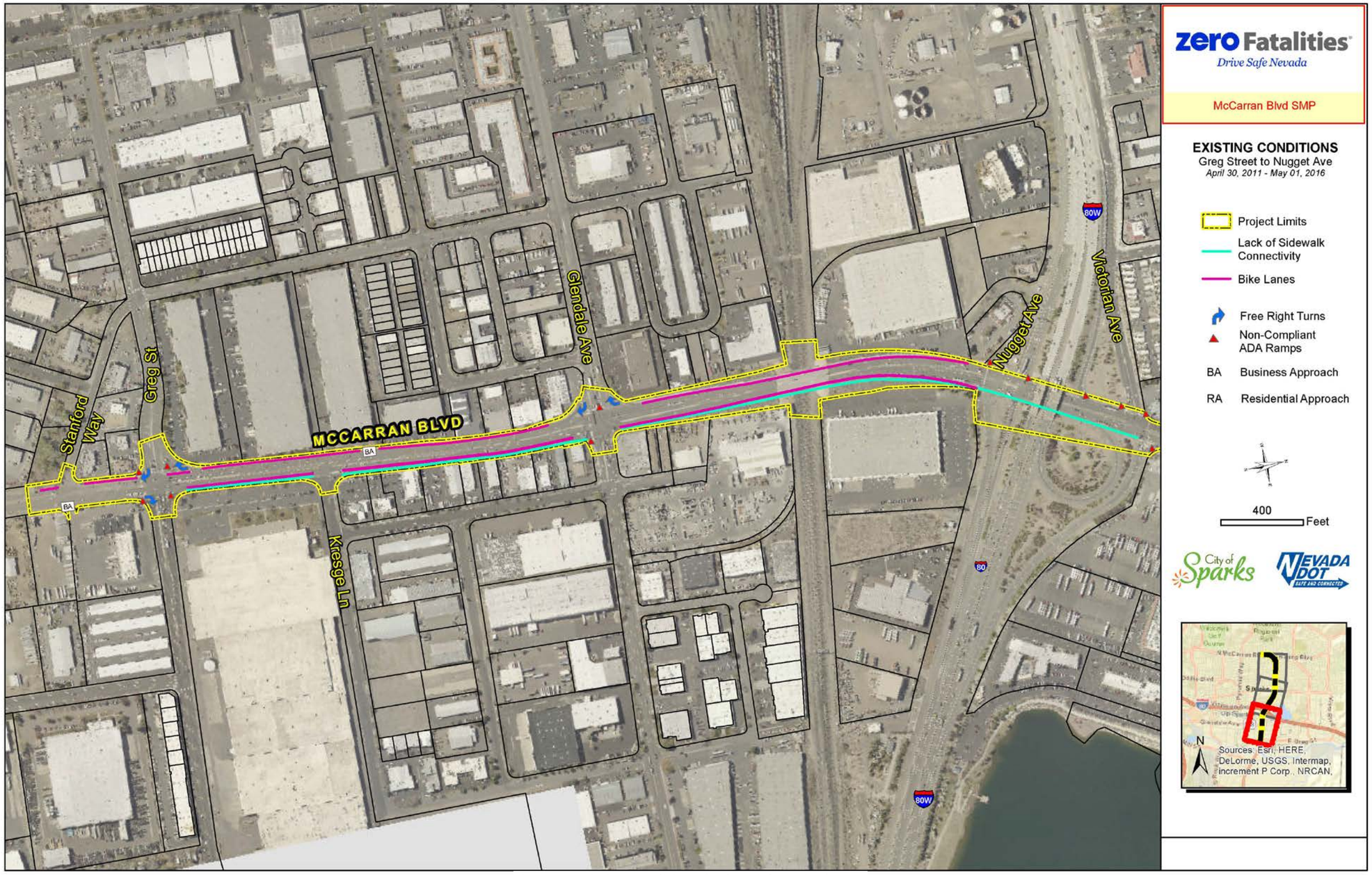


Figure 9. Existing conditions (Industrial Section)

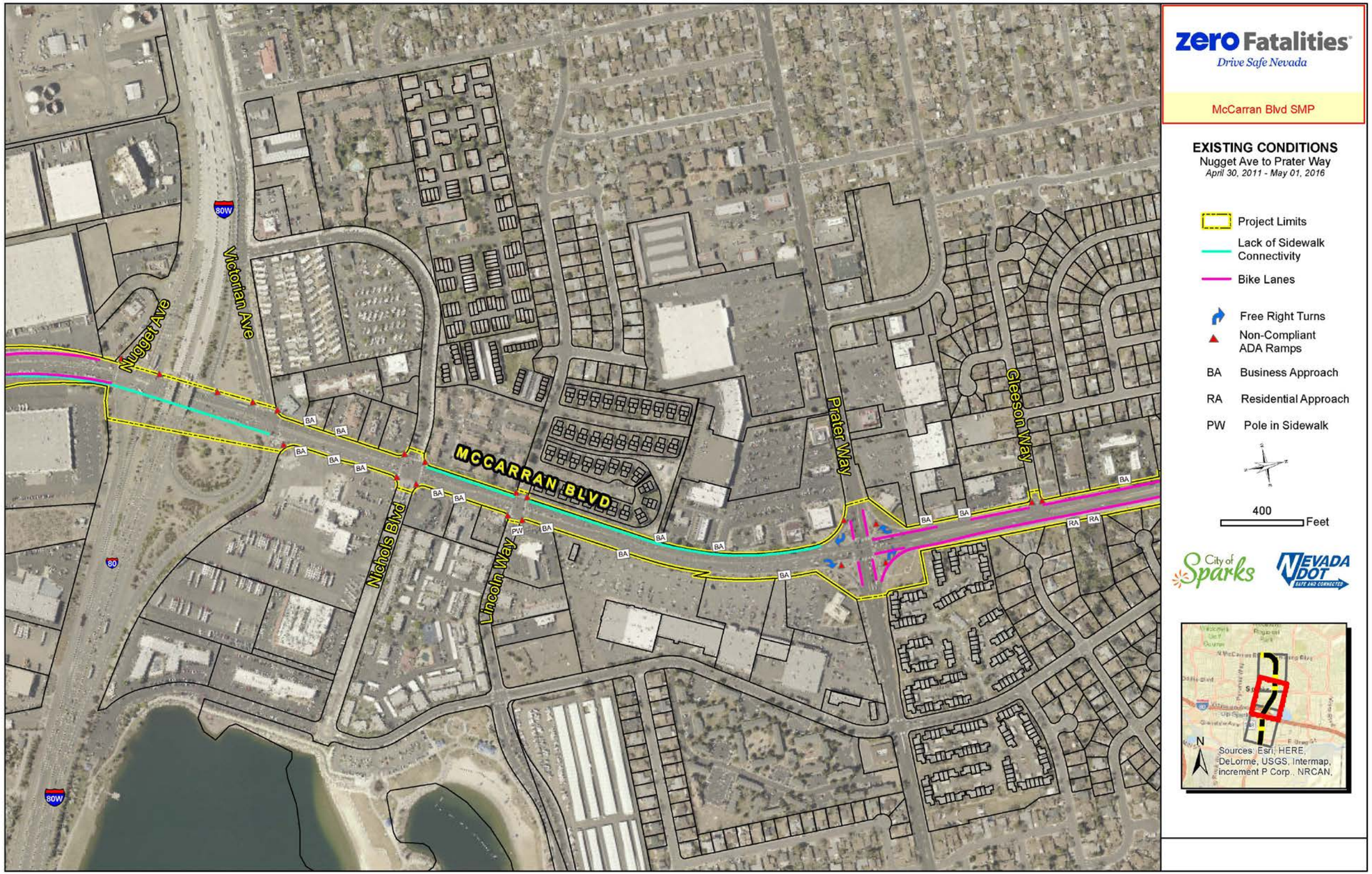


Figure 10.Existing conditions (Commercial Section)

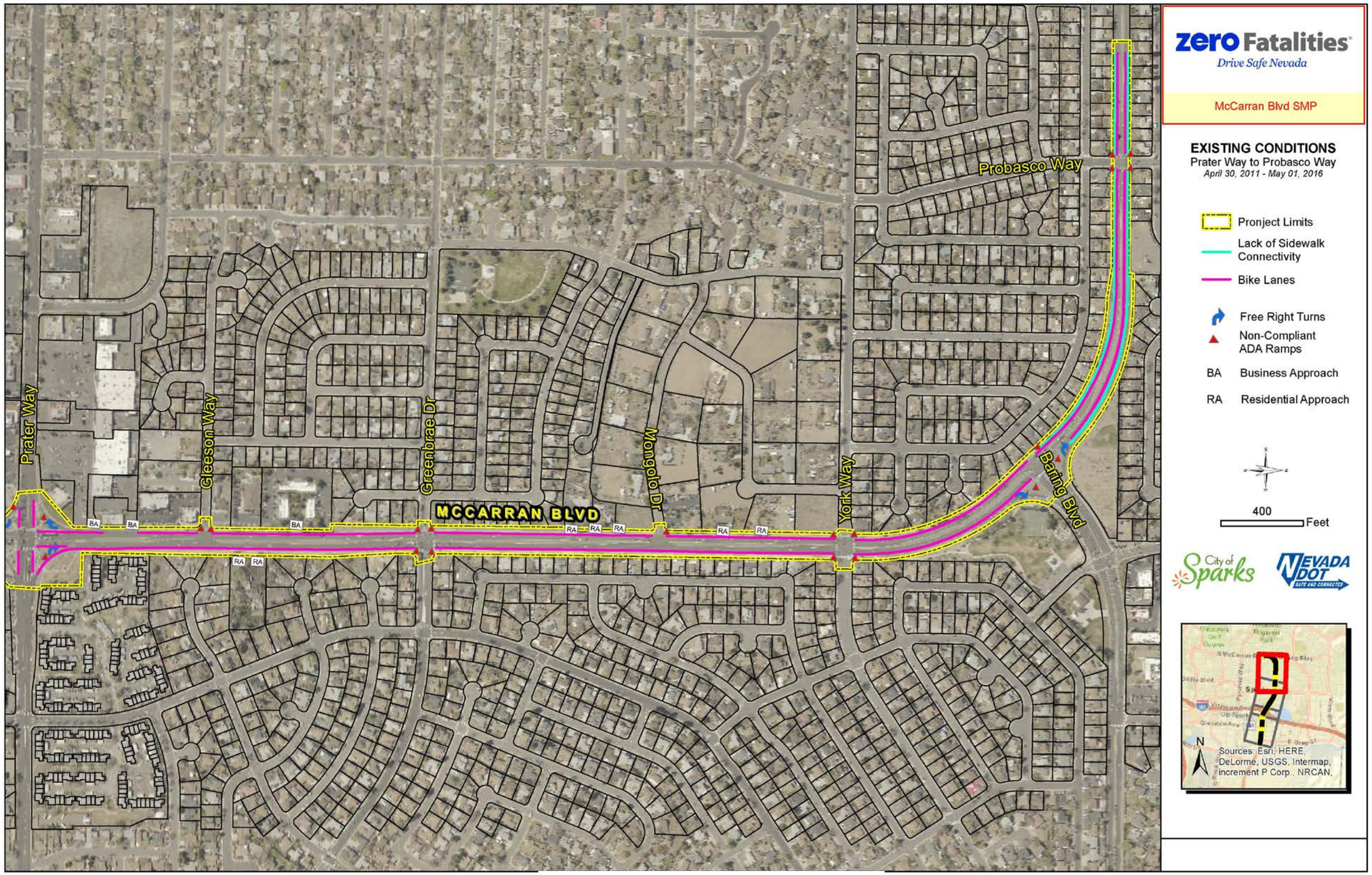


Figure 11. Existing conditions (Residential Section)

4. Traffic Analysis

The McCarran Boulevard SMP analyzed the corridor looking at all modes of transportation during existing conditions and for future conditions focusing on enhancing safety for all road users. The calculation of the current and projected growth rates are an important component to the successful development and evaluation of proposed projects.

The Traffic Analysis was used in the development of short, mid, and long-term projects to reduce the high number of severe crashes along the corridor.

4.1 Existing Traffic Volume

To calculate the existing Average Annual Daily Traffic (AADT), traffic counts were collected from NDOT's Traffic Records Information Access (TRINA) at seven count stations along the corridor. TRINA is a web-based GIS-enabled application that provides maps and reports of traffic count and classification data. Single or multiple traffic count stations can be selected either through a map interface or through a database query. Descriptions of the locations and the calculated AADT volumes are summarized in **Table 14 and Table 15.**

Table 14. 2016 Existing AADT Volumes

Count Location	NDOT Count Station	2016 AADT
McCarran .1 mi South of Greg Street	0310257	30,000
McCarran .1 mi South of Glendale Avenue	0310255	23,209
McCarran .1 mi North of Glendale Avenue	0310254	32,325
McCarran .18 mi North of Prater Way	ATR 31232	21,800
McCarran .2 mi South of Prater Way	0310517	28,000
McCarran 150 feet West of York Way	0310316	17,631
McCarran 250 feet west of Probasco Way	0310466	16,000

Table 15. 2006 – 2016 NDOT Count Station Data

NDOT Station	2006 AADT	2007 AADT	2008 AADT	2009 AADT	2010 AADT	2011 AADT	2012 AADT	2013 AADT	2014 AADT	2015 AADT	2016 AADT
0310466	20,000	18,000	16,000	15,000	15,000	15,000	16,000	15,500	15,000	15,500*	16,000
0310316	20,800	20,000*	20,000	18,000	17,000	17,000*	15,000	14,500*	18,000	17,500	18,000
ATR 31232	24,800	25,000	24,000	22,500	22,000	21,800	21,600	21,500	21,700	21,500	21,800
0310517	31,500	30,000	28,000	27,000	26,000	26,000	26,500	26,000*	26,500*	27,500*	28,000
0310254	37,000	35,000	35,000	30,000	30,000*	31,000	30,500	31,000	32,500	28,000	33,000
0310255	27,100*	26,000	24,000	21,000	25,000	25,000	22,500	25,500	23,500	25,000*	24,000
0310257	31,500	31,000*	27,000	25,000	24,000*	24,000*	22,000*	28,000	28,000	29,500*	30,000

*Data Adjusted or Estimated

4.2 Growth Rate Calculations

In order to forecast the 2040 volumes, the growth rate from the historical data (AADT) from NDOT counters were calculated for the past 10 years. **Table 16** shows that there was a negative growth for the past 10 years along this corridor. In addition, travel demand model from RTC Washoe was obtained and reviewed to determine the growth rate from their base model (2015) to the horizon year (2035).

Table 17 shows the growth rate calculation from the RTC Washoe TransCAD model. The travel demand model also shows a negative growth from 2015 to 2035. The methodology was to use the highest growth rate from the above two methods to forecast the 2040 volumes. As both the NDOT historical AADT and RTC Washoe's travel demand model data resulted in less than 0.5% growth rate, based on NDOT guidelines, a minimum growth rate of 0.5% was used to forecast the 2040 volumes.

The growth rate analysis was submitted to NDOT Traffic Information Section for review and approval. The submitted Growth Rate Memorandum and approval letter can be found in **Appendix B**.

Table 16. NDOT Historical AADT and Growth Rate on McCarran Boulevard

NDOT Station	AADT											Growth Rate
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	10 Years
0310466	20,000	18,000	16,000	15,000	15,000	15,000	16,000	15,500	15,000	15,500	16,000	-1.90%
0310316	20,800	20,000*	20,000	18,000	17,000	17,000	15,000	14,500	18,000	17,500	18,000	-2.25%
ATR 31232	24,800	25,000	24,000	22,500	22,000	21,800	21,600	21,500	21,700	21,500	21,800	-1.44%
0310517	31,500	30,000	28,000	27,000	26,000	26,000	26,500	26,000	26,500	27,500	28,000	-1.37%
0310254	37,000	35,000	35,000	30,000	30,000	31,000	30,500	31,000	32,500	28,000	33,000	-1.96%
0310255	27,100	26,000	24,000	21,000	25,000	25,000	22,500	25,500	23,500	25,000	24,000	-0.59%
0310257	31,500	31,000*	27,000	25,000	24,000	24,000	22,000	28,000	28,000	29,500	30,000	-1.01%
Average Growth Rate												-1.50%

Table 17. RTC Travel Demand Model AADT Data on McCarran Boulevard

Location	2015	2035	Annual Growth Rate
West of Probasco Way	10,107	11,775	0.8%
East of Probasco Way	8,531	10,259	0.9%
South of Baring Blvd	10,723	8,716	-1.0%
South of York Way	11,149	9,330	-0.9%
South of Mongolo Dr	11,597	10,030	-0.7%
South of Greenbrae Dr	26,575	23,046	-0.7%
South of Gleeson Way	27,089	23,721	-0.7%
North of Prater Way	26,485	22,949	-0.7%
South of Prater Way	35,057	32,567	-0.4%
North of Lincoln Way	37,137	34,646	-0.3%
South of Lincoln Way	35,814	33,031	-0.4%
North of Nichols Blvd	35,814	33,031	-0.4%
South of Nichols Blvd	40,266	38,014	-0.3%
North of Victorian Ave	39,624	37,273	-0.3%
South of Victorian Ave	46,965	43,312	-0.4%
North of Loop Ramp	33,536	30,923	-0.4%
South of Loop Ramp	38,185	34,201	-0.5%
North of Nugget Ave	30,458	25,837	-0.8%
South of Nugget Ave	30,158	25,470	-0.8%
South of Glendale Ave	18,923	13,835	-1.6%
North of Greg St	20,580	15,060	-1.5%
South of Greg St	18,556	11,948	-2.2%
South of Stanford Way	19,783	13,446	-1.9%
Average Annual Growth Rate of McCarran Boulevard			-0.7%

4.3 Traffic Count Analysis

Traffic counts for the McCarran Boulevard SMP were completed at 16 intersections. Twelve of these intersections are controlled by traffic signals and four of them are stop-controlled on the cross-streets. All counts were taken manually between April 11 and April 13, 2017. The counts at each intersection include all vehicle movements through the intersection and bicycles and pedestrians using the intersection as indicated in **Tables 18** and **Table 19**. The peak counts were completed as follows: AM counts were collected from 7:00 am and 9:00 am, and the PM counts were collected from 4:00 pm and 6:00 pm.

Once the traffic counts were completed, the data was sorted by vehicles, pedestrians, and bicycles. **Appendix B** shows the date the counts were conducted and the specific time when the AM and PM peak-hour occurred for each intersection.

4.4 Vehicle Count Summary

The peak period vehicular traffic varies significantly from the south end of the study limits to the north. This is attributed to the varying land use along the corridor. Land use transitions from commercial and industrial south of I-80 to retail between I-80 and Prater and then residential north of Prater. **Table 18** summarizes the total PM peak traffic within each of the counted intersections along the study corridor from south to north.

Table 18. Vehicle Traffic Summary PM Peak (4 PM-6 PM)

Intersection	Land Use	Signalized	Vehicular PM Peak Count (4 PM - 6 PM)
Stanford Way	Industrial and Commercial	No	11,790
Greg Street		Yes	14,617
Kresge Lane		No	7,348
Glendale Avenue		Yes	11,720
Nugget Avenue		Yes	11,819
I-80 Eastbound Ramps		Yes	12,750
I-80 Westbound Ramps and Victorian Avenue		Yes	13,149
Nichols Boulevard	Commercial and Retail	Yes	10,860
Lincoln Way		Yes	9,508
Prater Way		Yes	12,750
Gleeson Way	Residential	No	6,834
Greenbrae Drive		Yes	7,766
Mongolo Drive		No	6,144
York Way		Yes	6,673
Baring Boulevard		Yes	7,646
Probasco Way		Yes	4,366

4.5 Bike and Pedestrian Count Summary

There were a total of 239 pedestrians counted on the McCarran Boulevard corridor between Probasco Way to Greg Street. The pedestrian counts shown in **Table 19** represent the number of pedestrians that used the intersection during both peak-hour periods. The highest area of pedestrian traffic resides between I-80 and Prater where commercial and retail land use is prevalent.

The bicycle counts shown in **Table 19** represent the number of bicycles that used each intersection during both peak periods. Similar to the pedestrian movements, the bicycles volumes are highest within the commercial and retail area between I-80 and Prater. Detailed data collection of bike and pedestrian counts are in **Appendix B.**

Table 19. Pedestrian and Bicycle Totals by Intersection PM Peak (4 PM-6 PM)

Intersection	Land Use	Signalized	Pedestrian PM Peak Count (4 PM - 6 PM)	Bicycle PM Peak Count (4 PM - 6 PM)
Stanford Way	Industrial and Commercial	No	10	1
Greg Street		Yes	7	5
Kresge Lane		No	2	3
Glendale Avenue		Yes	12	2
Nugget Avenue		Yes	34	11
I-80 Eastbound Ramps		Yes	29	10
I-80 Westbound Ramps and Victorian Avenue		Yes	30	11
Nichols Boulevard	Commercial and Retail	Yes	71	9
Lincoln Way		Yes	66	8
Prater Way		Yes	65	7
Gleeson Way	Residential	No	16	5
Greenbrae Drive		Yes	12	11
Mongolo Drive		No	0	0
York Way		Yes	19	6
Baring Boulevard		Yes	4	2
Probasco Way		Yes	5	1

4.6 Traffic Level-of-Service

The key intersections were analyzed based on average total delay analysis for signalized and unsignalized intersections presented in the Transportation Research Board's Highway Capacity Manual 6th Edition (Special Report 209). Under the unsignalized analysis, the LOS for a two-way stop-controlled intersection is determined by the computed or measured control delay and is defined for each minor movement. LOS for a two-way stop-controlled is not defined for the intersection as a whole. LOS for a signalized or four-way stop-controlled intersection is defined for the intersection as a whole. **Table 20** shows the definition of LOS for intersections.

Table 20. Level of Service Definitions

Level of Service	Signalized Intersection Average Total Delay (sec/veh)
A	≤10
B	>10 and ≤20
C	>20 and ≤35
D	>35 and ≤55
E	>55 and ≤80
F	≤80

Note: Definitions provided from the Highway Capacity Manual 6th Edition, Special Report 209, Transportation Research Board

An existing level of service (LOS) was conducted based on those traffic counts obtained in April 2017 utilizing Synchro traffic macro-analysis software for the AM and PM Peak-hour. **Table 21** provides a summary of the overall signalized intersection, including approach and individual movement delays and LOS for both peak hours. **Table 22** provides a summary of the overall signalized intersection, including approach and individual movement delays and LOS for both peak hours for the 20-year horizon (2040) traffic volumes. **Appendix B** provides additional detailed Synchro output for all the intersections.

Table 21. Existing Signalized Intersection LOS

Intersection	AM (2017)		PM (2017)	
	Delay (s)	LOS	Delay (s)	LOS
Greg Street	77.2	E	88.3	F
Glendale Avenue	21.6	C	40.9	D
Nugget Avenue	15.7	B	23.9	C
I-80 Eastbound Ramps	105.1	F	25.0	C
I-80 Westbound Ramps and Victorian Avenue	18.7	B	21.6	C
Nichols Boulevard	17.5	B	24.2	C
Lincoln Way	19.6	B	22.6	C
Prater Way	44.1	D	79.4	E
Greenbrae Drive	21.1	C	24.0	C
York Way	22.2	C	20.2	C
Baring Boulevard	88.1	F	26.4	C
Probasco Way	13.9	B	12.7	B

Table 22. LOS Results at Intersections (No-Build)

Intersection	2017				2040			
	AM		PM		AM		PM	
	Delay(s)	LOS	Delay(s)	LOS	Delay(s)	LOS	Delay(s)	LOS
Greg Street	77.2	E	88.3	F	62.7	E	51.6	D
Glendale Avenue	21.6	C	40.9	D	31.8	C	44.1	D
Nugget Avenue	15.7	B	23.9	C	28.2	C	28.3	C
I-80 Eastbound on-ramps	105.1	F	25.0	C	145.5	F	35.6	D
I-80 Westbound Ramps and Victorian Avenue	18.7	B	21.6	C	51.1	D	33.4	C
Nichols Boulevard	17.5	B	24.2	C	17.8	B	38.2	D
Lincoln Way	19.6	B	22.6	C	49.8	D	42.2	D
Prater Way	44.1	D	79.4	E	44.6	D	57.4	E
Greenbrae Drive	21.1	C	24.0	C	24.8	C	27.8	C
York Way	22.2	C	20.2	C	25.4	C	19.5	B

Baring Boulevard	88.1	F	26.4	C	18.9	B	17.6	B
Probasco Way	13.9	B	12.7	B	14.3	B	13.3	B

An existing level-of-service (LOS) was conducted for each improvement at key intersections, the AM and PM peak-hour LOS analysis was performed using the expected construction year (2017) traffic volumes and the 20-year horizon (2040) traffic volumes. **Table 23** provides a summary of the LOS analysis results for no-build each intersection.

Table 23. LOS Results at Intersections (Selected Improvements)

Intersection	Proposed Improvement	2040 (no-build)				2040 (with improvement)			
		AM		PM		AM		PM	
		Delay(s)	LOS	Delay(s)	LOS	Delay(s)	LOS	Delay(s)	LOS
Greg Street	Improve right-turn lane	62.7	E	51.6	D	61.4	E	51.6	D
Glendale Avenue	Construct right-turn lane	31.8	C	44.1	D	32.0	C	33.0	C
Baring Boulevard	Roundabout	18.9	B	17.6	B	9.3	A	15.8	C
Baring Boulevard	High-T Intersection	18.9	B	17.6	B	39.9	D	30.2	C

4.7 Left-Turn Storage Analysis

A left-turn storage bay analysis was conducted using Synchro for 95th percentile queue length. Results of the analysis for the key intersections are provided in **Table 24**. The existing storage bay length meets the preferred storage bay length unless otherwise shown in red. Left-turn storage pocket analysis is found in **Appendix B.**

Table 24. 2017 Existing Left-Turn Bay Storage

Intersection	Intersection Left-Turn Movement	Existing (2017) Storage Length	Preferred (2040) Storage Length
Greg Street	Northbound to Westbound	200’	220’
	Southbound to Eastbound	450’	--
	Eastbound to Southbound	Dual 300’	--
	Westbound to Northbound	Dual 300’	Dual 350’
Glendale Avenue	Northbound to Westbound	Dual 500’	--
	Southbound to Eastbound	Dual 330’	--
	Eastbound to Southbound	Dual 350’	--
	Westbound to Northbound	200’	210’
Nugget Avenue	Northbound to Westbound	500’	--
	Southbound to Eastbound	135’	--
I-80 Eastbound Ramps	Southbound to Eastbound	225’	--
I-80 Westbound Ramps and Victorian Avenue	Northbound to Westbound	150’	420’
Nichols Boulevard	Northbound to Westbound	300’	--
	Southbound to Eastbound	200’	--
	Eastbound to Southbound	200’	--
	Westbound to Northbound	400’	--
Lincoln Way	Northbound to Westbound	150’	--
	Southbound to Eastbound	300’	--
	Eastbound to Southbound	150’	--
	Westbound to Northbound	150’	270’

Intersection	Intersection Left-Turn Movement	Existing (2017) Storage Length	Preferred (2040) Storage Length
Prater Way	Northbound to Westbound	Dual 550’	--
	Southbound to Eastbound	225’	250’
	Eastbound to Southbound	350’	--
	Westbound to Northbound	200’	320’
Greenbrae Drive	Northbound to Westbound	200’	--
	Southbound to Eastbound	150’	--
	Eastbound to Southbound	200’	--
	Westbound to Northbound	220’	--
York Way	Northbound to Westbound	180’	--
	Southbound to Eastbound	150’	--
Baring Boulevard (T-Intersection)	Southbound to Eastbound	330’	--
	Westbound to Southbound	500’	--
Probasco Way	Westbound to Southbound	100’	--
	Eastbound to Northbound	130’	--

Figure 12 and **Figure 13** show the 2017 AM (PM) and 2040 AM (PM) peak-hour turning movement counts at each intersection along McCarran Boulevard, respectively.

Figure 12. 2017 AM (PM) Peak Hour Turning Movement Counts

Figure 13. 2040 AM (PM) Peak Hour Turning Movement Counts

5. Regional Policies, Plans and Studies

This section presents a brief overview of known policies, plans, and studies related to the corridor. The project team completed a review of all the existing plans, policies, and studies that have been completed by the RTC of Washoe County, City of Sparks, and NDOT. All of the findings from this review are listed below by agency. Links to Documents of regional policies, plans and studies are found in **Appendix C.**

5.1 Regional Transportation Commission of Washoe County

Reno Sparks Bicycle and Pedestrian Plan ADA Transition Plan (October 2011)
(http://rtcwashoe.wpengine.com/wp-content/uploads/2017/04/ADA-Transitation-Plan.pdf)

- Existing Bicycle Lane Deficiencies and Recommended Improvements
  - North McCarran Boulevard from Baring Boulevard to York Way Bike Lane, Widen Bike Lane to Minimum of 4 Feet
  - North McCarran Boulevard North of Prater Way Bike Lane, Widen Bike Lane to Minimum of 4 Feet

- Proposed Bicycle Facilities
  - Baring Boulevard from North McCarran Boulevard to Vista Boulevard, Bike Lane
  - Existing Bicycle Lane Deficiencies and Recommended Improvements

- Missing Sidewalk Segments
  - North McCarran Boulevard from El Rancho Drive to Baring Boulevard, Both sides
  - North McCarran Boulevard from Baring Boulevard to Prater Way, East side
  - North McCarran Boulevard from Prater Way to Lincoln Way, West side
  - South McCarran Boulevard from I-80 Ramps to Nugget Avenue, Both sides

Complete Streets Master Plan (July 2016)
(http://rtcwashoe.wpengine.com/wp-content/uploads/2017/04/Complete-Streets-Master-Plan.pdf)

- Complete Street Considerations for Further Review and Study
  - Baring Boulevard from McCarran Boulevard to Vista Boulevard, Bike lanes
  - McCarran Boulevard from Greg Street to Prater Way, Sidewalks and Bike lanes

2016-2020 RTIP:

- Street and Highway Improvements
  - SR-648 Glendale Avenue Reconstruction, Reconstruct roadway and install multimodal improvements from Kietzke Lane to McCarran Boulevard of Distance (mile) 2.66 milepost begins at 2.7 ends at 5.36 FED FY 2017 $16,350,000

2040 RTP:
(Regional Transportation Plan (RTP) - RTC Washoe

- Baring Boulevard from McCarran Boulevard to Vista Boulevard, Bike lanes Federal/State/Local RTC Multimodal
  - Total TP FY 2027-2040: $10,200,000

- McCarran Boulevard from Greg Street to Prater Way, Sidewalks and Bike lanes Federal/State/Local RTC Multimodal
  - Total TP FY 2027-2040: $9,000,000

5.2 Nevada Department of Transportation

Electronic Statewide Transportation Improvement Program (eSTIP) and all projects for the FFY2016-FFY2019:
(https://estip.nevadadot.com/default.asp**)**

- McCarran Boulevard STIP project WA20170121; Pedestrian
  - Install Audible Push Buttons
  - Construction date to be determined. Estimated construction cost: $270,000
- McCarran Boulevard STIP project WA20130005; ITS Infrastructure
  - Install ITS Infrastructure along North McCarran Boulevard from I-80 to US 395
  - Construction date to be determined. Estimated construction cost: $10,000,000
- McCarran Boulevard STIP project WA20130068; I-80 Widening
  - Widen I-80 from McCarran Boulevard to Vista Boulevard
  - Construction date to be determined. Estimated construction cost: $535,200,000
- McCarran Boulevard STIP project WA20150070; ITS Infrastructure
  - Construction of regional ITS network for connectivity and virtual traffic operations center; incudes installation of fiber-optic cable, installation of network equipment, installation and purchase of equipment and interconnect on Prater Way from Sparks City Hall to McCarran Boulevard.
  - Construction FFY2017; Estimated construction cost: $350,000
- McCarran Boulevard STIP project WA20150071; ITS Infrastructure
  - Construction ITS infrastructure including new fiber-optic cable and equipment in various locations including McCarran Boulevard from Greg Street to Barring Boulevard.
  - Construction FFY2017; Estimated construction cost: $893,300
- McCarran Boulevard STIP project WA20160079 (@Nichols); Bike Lane Conflict Striping
  - Install green colored bike stamps at high conflict corridors and signalized intersections including Nichols Boulevard cycle track
  - Construction FFY2017; Estimated construction cost: $156,567
- McCarran Boulevard STIP project WA20130005; ITS Infrastructure
  - Install ITS Infrastructure along North McCarran Boulevard from I-80 to US 395
  - Construction date to be determined. Estimated construction cost: $10,000,000

5.3 Nevada State Freight Plan

(https://www.nevadadot.com/home/showdocument?id=8628)

The Nevada State Freight Plan is the comprehensive multimodal plan identifying the state's freight infrastructure and distribution of freight. This plan has identified multiple goals and objectives and strategies to achieve or implement these goals.

Identified as one of the goals is truck parking along I-80. Although the goal identified is to achieve truck parking amenities every 2 hours, this is achieved along I-80. Of the 26 truck stops along the I-80 corridor, there are only three that can accommodate 200 trucks, one of which is the truck stop located in the northeast quadrant of the I-80 and North McCarran interchange.

Themes that were discussed about the truck parking program are:

- Adverse weather conditions have a significant impact on parking capacity, availability, and safety.
- The safety challenge due to the mix of trucks and passenger vehicles at parking locations and the truck drivers must also take into account whether a facility's design allows safe ingress and egress as well as movement throughout the facility. The TA Travel Center of America located along McCarran Boulevard off of WB I-80 has 200 parking spaces, the second most number of parking spaces along I-80, with amenities including fuel, restrooms, food, and showers.

The Nevada State Freight Plan also identifies the 6-mile section of McCarran Boulevard from I-580 to I-80E and the 4.5-mile section of McCarran Boulevard from US 395 to I-80E as a portion of the Critical Urban Freight Network. This is important due to I-80 being a Primary Highway Freight System for the northern part of the state.

5.4 City of Sparks Comprehensive Plan

(http://cityofsparks.us/wp-content/uploads/2016/12/CS-Comprehensive-Plan-Final_s.pdf)

The 2015 City of Sparks Comprehensive Plan, called Ignite Sparks, was a multi-level process that provided Sparks' residents a voice in assessing the City of Sparks currently to identify trends and future opportunities for the input and development of a new Comprehensive Plan. This Comprehensive Plan replaces Sparks' current master plan and serves as the newest tool for guiding the City of Sparks into the future.

Chapter four of the Comprehensive Plan for the City of Sparks echoes the visions of the community that are organized into topics branded as the Policy Framework to promote the Comprehensive Plan. Two of the seven topics listed are listed below:

- Connectivity – This section of the Comprehensive Plan identifies how the City of Sparks intends to move people and goods by using all modes of transportation. There are three goals and nine policies identified with this section.
    - Goal C1 – Develop a complete, efficient transportation system that gives Sparks' residents of all ages and visitors access to employment, housing, services and recreation throughout urban Washoe County.
    - Goal C2 – Provide a transportation network that supports business formation and attractions and economic vitality.
    - Goal C3- Facilitate non-motorized travel throughout the community.
    - Policy C2 – Work with the RTC to add roadway capacity as necessary to accommodate Sparks' growth.
    - Policy C4 – Require sidewalks for pedestrians on all street networks within the City.

- Community Character – This section identifies how the residents of the City of Sparks define that the city has a typical small town feel and would like to maintain that feeling as the city continues to grow. There is one goal and ten policies that were identified with this section.
    - Goal CC1 – Ensure that Sparks' physical environment, services, and amenities make it a city of choice for residents and businesses.

- Policy CC10 – Work with the RTC and the NDOT to plan and design major road capacity expansions to minimize the degree to which the widening of roads divides neighborhoods or adds barriers for pedestrians, bicyclists and other non-motorized travel.

Table 25 provides a summary of the various policies, plans and studies that may affect the McCarran Boulevard study area.

Table 25. Summary of Policies, Plans and Studies

Agency	Project/Study	Focus
RTC	Reno Spark Bicycle and Pedestrian Plan	Planning level document identifying region-wide bicycle and pedestrian improvements.
	Complete Streets Master Plan	Planning level document identifying region-wide complete street locations encompassing bike and ped improvements.
	2040 RTP	Planning level document identifying all region-wide roadway improvements.
Sparks	Comprehensive Plan	Planning level document need and plan for multi-modal connectivity throughout Sparks.
NDOT	STIP WA20130005	Construction of ITS infrastructure along McCarran Boulevard within the study area.
	STIP WA20130068	I-80 Widening potentially impacting the McCarran/I-80 interchange.
	STIP WA20150070	Construction of ITS infrastructure within and adjacent to the study area.
	STIP WA20150071	Construction of ITS infrastructure along the entire project study area.
	STIP WA20160079	Installation of green bike stamps along the Nichols Boulevard cycle track.
	STIP WA20170121	Washoe County Audible Push Buttons
	Nevada State Freight Plan	Statewide planning level document discussing I-80 truck parking which includes one of the largest I-80 truck stops and parking areas at the I-80/McCarran interchange.

6. Land Use Analysis

This section presents the land use analysis for the areas surrounding the corridor. Included in this section is an analysis of both existing land uses and proposed future land uses.

6.1 Existing Land Uses

The McCarran Boulevard corridor from Greg Street to Probasco Way has a mix of zoning designations including "Industrial", "Mixed Use", "Commercial". The section of McCarran Boulevard from Greg Street to I-80 is designated as Industrial. Within this section, there is one vacant building on the northeast corner of McCarran Boulevard and Greg Street. The section of McCarran Boulevard from I-80 to Prater Way is designated as mostly Mixed Use District and Mixed Use Commercial. The section of McCarran Boulevard from Prater Way to Gleeson Way is classified as Mixed Use District and Mixed Use Commercial and the northeast corner of Prater Way is Mixed Use District Residential. The last section of McCarran Boulevard from Prater Way to Probasco Way is designated mostly as Intermediate Density Residential with two small portions being designated as Commercial and Large Lot Residential. See **Appendix C** for City of Sparks Land Use and Zoning maps.

6.2 Proposed Future Land Uses

During a meeting with the City of Sparks Planning Manager to discuss existing and future land use, it was stated that there has been discussion of the possibility to remove the old box building that housed Target, located on Prater Way just west of McCarran, and develop High-Density living. The further development of the TRIC center and the completion of the Southeast Connector may play a big role in what occurs at and around the McCarran Boulevard-Prater Way intersection, which could change the dynamics of this section of the McCarran Boulevard corridor. This section of McCarran Boulevard also falls within a Primary Transit-Oriented Development (TOD) corridor for the Regional Plan for the Truckee Meadows Regional Planning Agency (TMRPA). This TOD is within the City of Sparks and encompasses downtown Sparks, the Sparks Marina, and several Major Activity centers, two of these being along McCarran Boulevard and one near the Sparks Marina. The major activity centers are identified in **Appendix C** on the City of Sparks Land Use map.

7. Economic Development

This section presents the evaluation of economic development surrounding the corridor. Various plans and studies were reviewed to determine the existing and planned economic developments along the corridor.

7.1 City of Sparks Comprehensive Plan

McCarran Boulevard from Greg Street to Probasco Way is generally built out to capacity and affords very little room for new construction, there are a couple of areas that may have the opportunity to fulfill the gap and improve or enhance economic gains along the corridor. As mentioned in the Land Use section above, there are two specific locations that could be utilized. Also during a meeting to discuss existing and future land use, the following two items were discussed. First, the box store that was once a Target may have a good chance of being redeveloped as a high-capacity living area, which would increase both the need for the shopping in the area and the possibility of utilizing public transportation to get to their destination. This development would possibly have to rely on the further development of the TRIC center, which would require the need for housing for many new jobs in that area.

The second location is a vacant industrial building on the northeast corner of McCarran Boulevard and Greg Street. This building has over 1 million square feet of space that could house a multitude of different companies, and this location is adjacent to a rail line and is a few blocks away from the I-80 corridor.

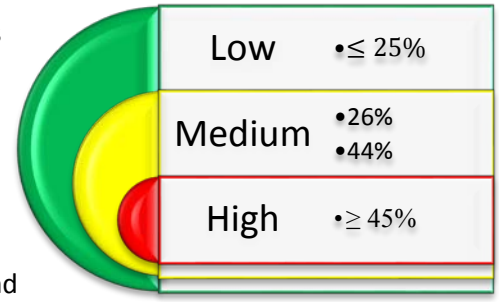
8. Crashes and Risk Factors

This section presents a summary of the potential crashes and risk factors identified along the McCarran corridor. Based on the review and analysis of existing project conditions and the review of related policies, plans, and studies, a list of crashes and risk factors was determined for the corridor. All identified crashes and risk factors were considered in the development of proposed improvement projects. The following list is a summary of crashes and risk factors that have been identified:

- High number of crashes and high number of severe crashes
- Intersections in close proximity of each other
- High number of large trucks
- Existing driveways with some in close proximity of each other
- Lack bicycle and pedestrian facilities
- Shortage of pedestrian crossings
- Sidewalk obstructions such as utility poles and landscaping or substandard sidewalk width
- Sections with no bicycle lanes or shoulders
- Insufficient street lighting along the corridor
- Intersection geometry without proper sight triangles
- Speeding

The crash data along McCarran Boulevard was evaluated and analyzed from 500 feet south of Greg Street to 500 feet west of Probasco Way. The intersection crash analysis includes crashes within 500 feet of an intersection. The intersection crashes included crashes from both the major and minor streets. The crash data is from NDOT's crash warehouse from May 1, 2011 through April 30, 2016.

Table 26 and **Table 27** summarize all the signalized intersections and the non-signalized locations that have a high number of injuries and/or a high number of a specific crash type. Each location is described as having a high, medium, or low number of crashes, this ranking is a percentage, identified as high is greater than or equal to 45%, medium is 26% to 44%, and low is less than or equal to 25%. These percentages are determined by the number of specific characteristics (i.e., injuries) in relation to the overall total number of crashes. The summaries are followed by focus areas and possible risk factors for future solution development.



8.1 Signalized Intersections

Table 26. Summary of Moderate to High Crash Frequencies – Signalized Intersections

Signalized Intersection	Number of Type Crashes and Frequencies						
	Total No. of Crashes	Sideswipe Same Direction		Angle		Rear-End	
		#	%	#	%	#	%
Greg Street	33	5	**15%**	3	**9%**	22	**67%**
Glendale Avenue	53	6	**11%**	7	**13%**	37	**70%**
Nugget Avenue	31	1	**3%**	5	**16%**	21	**68%**
I-80 Eastbound	62	22	**35%**	10	**16%**	25	**40%**
I-80 Westbound and Victorian	67	9	**13%**	9	**13%**	48	**72%**
Nichols Boulevard	109	19	**17%**	31	**28%**	48	**44%**
Lincoln Way	59	10	**17%**	22	**37%**	23	**39%**
Prater Way	112	10	**9%**	33	**29%**	59	**53%**
Greenbrae Drive	31	1	**3%**	5	**16%**	20	**65%**
York Way	37	2	**5%**	11	**30%**	22	**59%**
Baring Boulevard	33	7	**21%**	5	**15%**	13	**39%**
Probasco Way	13	2	**15%**	6	**46%**	4	**31%**

Based on crash data analysis, the following is a list of specific risk factors that have been identified.

Greg Street

- Signal heads
- Intersection signing
- Large sweeping right turn

Glendale Avenue

- Signal heads
- ADA improvements all the way around the intersection
- Large sweeping right turns
- Length of the NB dual left-turn lanes
- NB to EB right-turn lane
- Intersection signing
- Bike lane striping

Nugget Avenue

- ADA ramp SE corner
- Bike lane ends in the NB direction just before Nugget and begins in the SB direction just south of Nugget
- Intersection signing
- Signal heads
- Intersection very close to I-80 EB on- and off-ramp

I-80 Eastbound On and Off-ramps

- Signal heads
- Striping for I-80 EB off-ramp
- New interchange

Victorian Boulevard/I-80 Westbound Off-ramp

- ADA on Victorian Avenue NW and SW corners
- Intersection signing
- Signal heads
- Left turn to Victorian Boulevard
- I-80 WB off-ramp
- Lane widths and median width
- Truck stop

Nichols Boulevard

- Location of bike lane bollards and push button
- SB to WB turning movement
- Truck movements
- Bike lanes
- Striping
- Signal heads
- Intersection signing

Lincoln Way

- ADA all quadrants of intersection
- Signal pole in pedestrian curb ramp
- Truck movements
- Striping
- Modify median islands with snow plowable noses
- Signal heads
- Intersection signing

Prater Way

- Large sweeping right turns
- Utilities
- Access management
- Bike lane
- Signal heads

Greenbrae Drive

- Intersection signing
- ADA compliance
- Striping
- Signal heads

York Way

- Signal pole in pedestrian curb ramp
- ADA Compliance

Baring Boulevard

- Signal heads
- Intersection signing
- Large sweeping right turns
- Lighting

Probasco Way

- Intersection signing
- Sight distance NB and SB sides of intersection
- Lighting
- ADA compliance

8.2 Non-Signalized Intersections

Table 27. Summary of Moderate to High Crash Frequencies – Non-Signalized Intersections

Signalized Intersection	Number of Type Crashes and Frequencies						
	Total No. of Crashes	Sideswipe Same Direction		Angle		Rear-End	
		#	%	#	%	#	%
Stanford Lane	6	0	**0%**	5	**83%**	1	**17%**
Kresge Lane	3	2	**67%**	0	**0%**	0	**0%**
Gleeson Way	5	0	**0%**	3	**60%**	2	**40%**
Mongolo Drive	3	0	**0%**	0	**0%**	3	**100%**

Based on crash data analysis, the following is a list of specific risk factors that have been identified.

Stanford Way

- Construct median island to eliminate left turns
- Right in/right out at Stanford and the commercial approach on the east side

Kresge Lane

- Bike lane striping
- Intersection signing

Gleeson Way

- ADA entire intersection
- Access management

Mongolo Drive

- ADA entire intersection
- Access management

8.3 McCarran Boulevard Corridor

Based on crash data analysis, the following is a list of specific risk factors that have been identified. These risk factors are located along the entire corridor and are defined as being between defined intersections. The location that stands out above the rest of the corridor is the section between Lincoln Way and Prater Way.

- Intersections in close proximity of each other
- High number of large trucks
- Existing driveways with some in close proximity of each other
- Lack of bicycle and pedestrian facilities
- Shortage of pedestrian crossings
- Sidewalk obstructions such as utility poles and landscaping or substandard sidewalk width
- Sections with no bicycle lanes or shoulders
- Insufficient street lighting along the corridor
- Intersection geometry without proper sight triangles
- Speeding

Figure 14 and **Figure 15** display the locations of the Pedestrian Fatal Crashes. **Figure 16** thru **Figure 18** display approximate location of pedestrian and bicycle crashes.

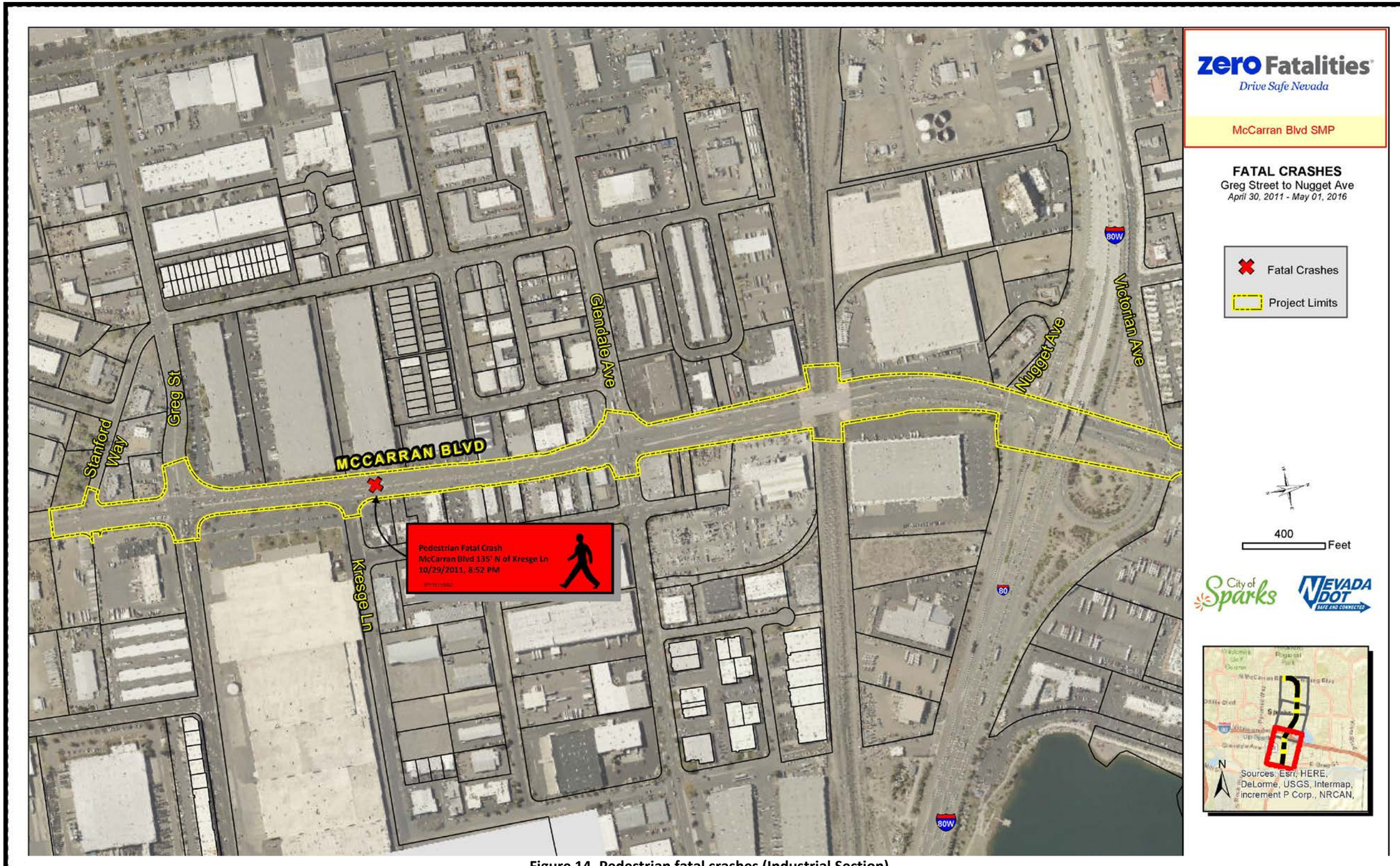


Figure 14. Pedestrian fatal crashes (Industrial Section)

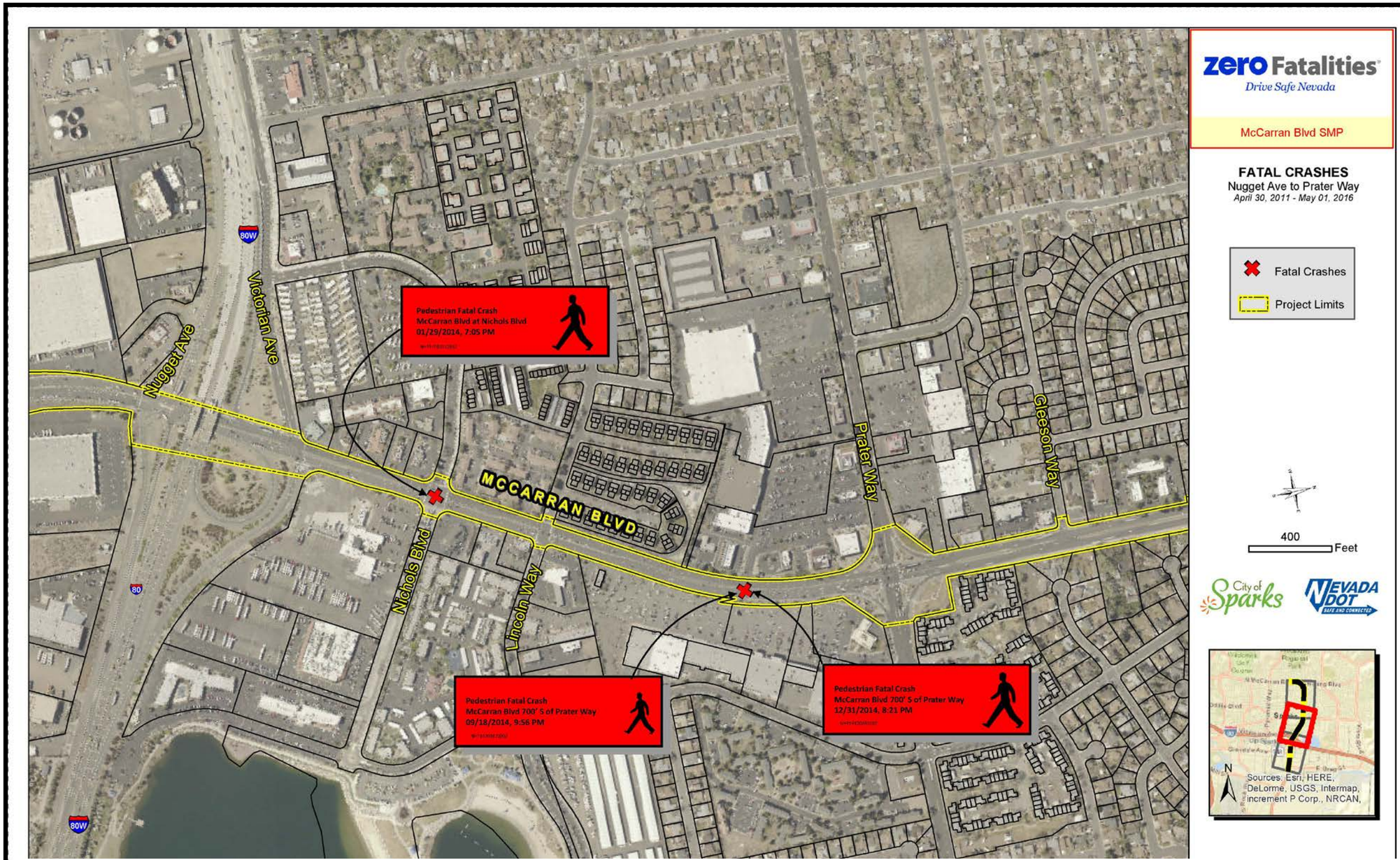


Figure 15. Pedestrian fatal crashes (Commercial Section)

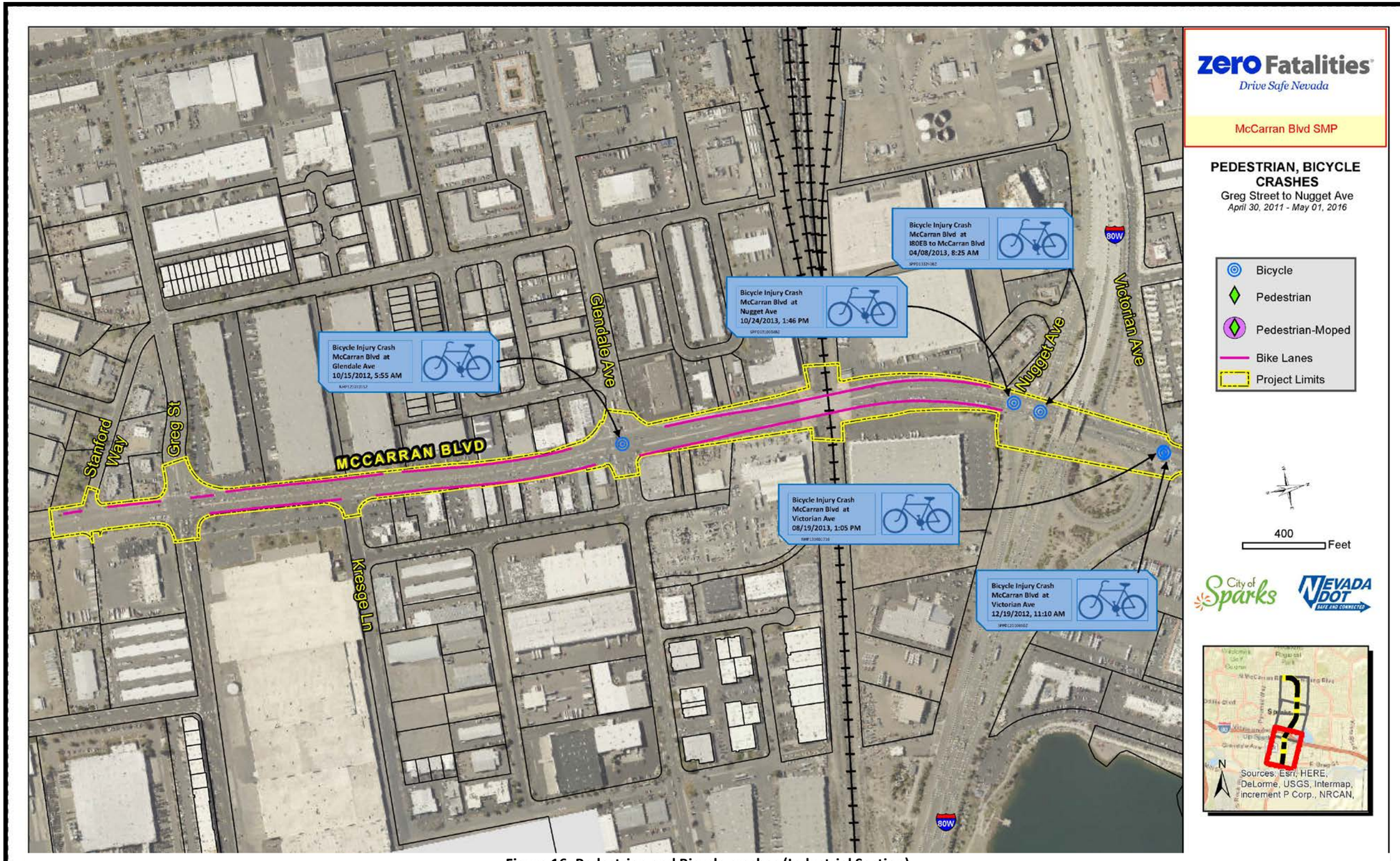


Figure 16. Pedestrian and Bicycle crashes (Industrial Section)

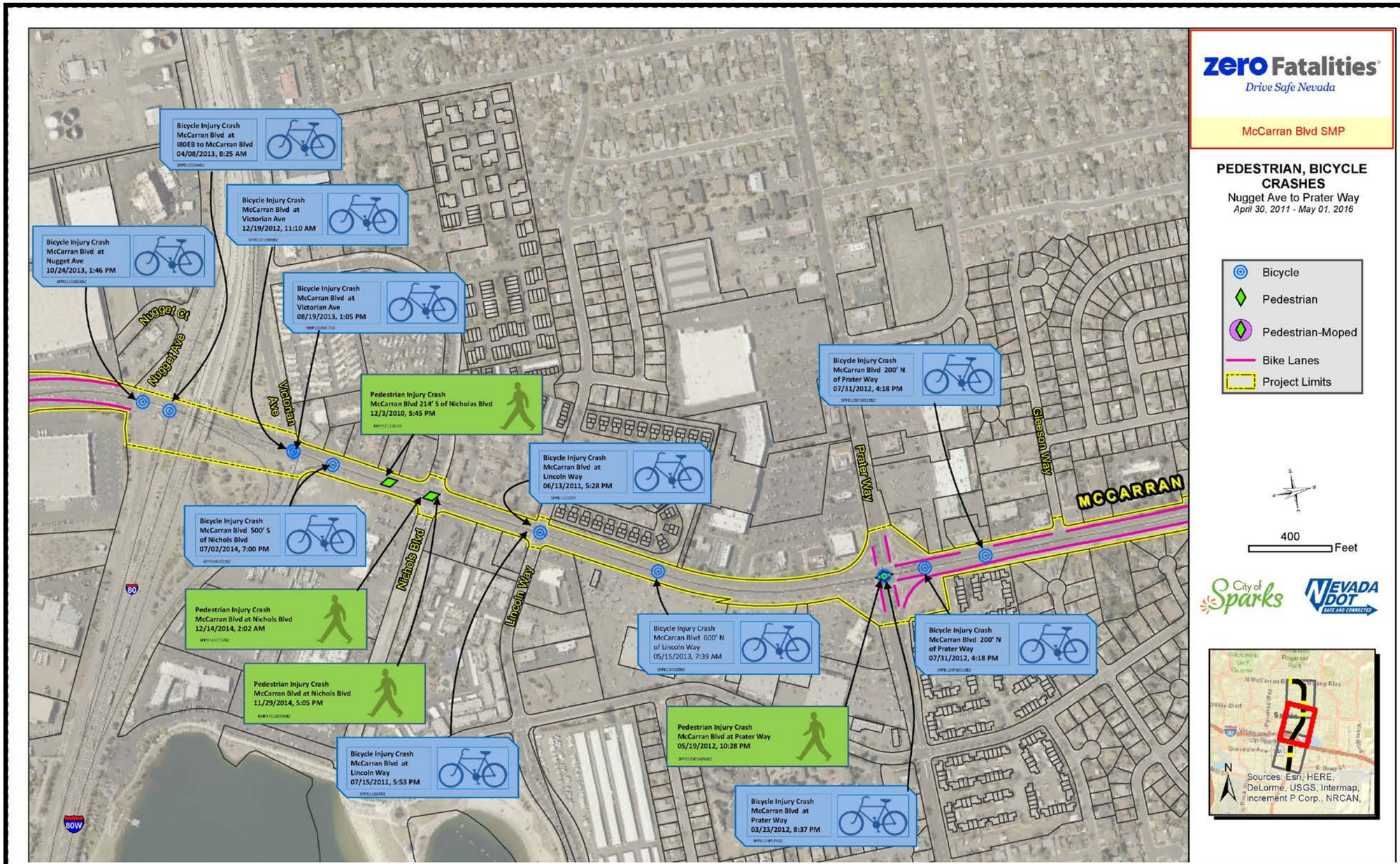


Figure 17. Pedestrian and Bicycle crashes (Commercial Section)

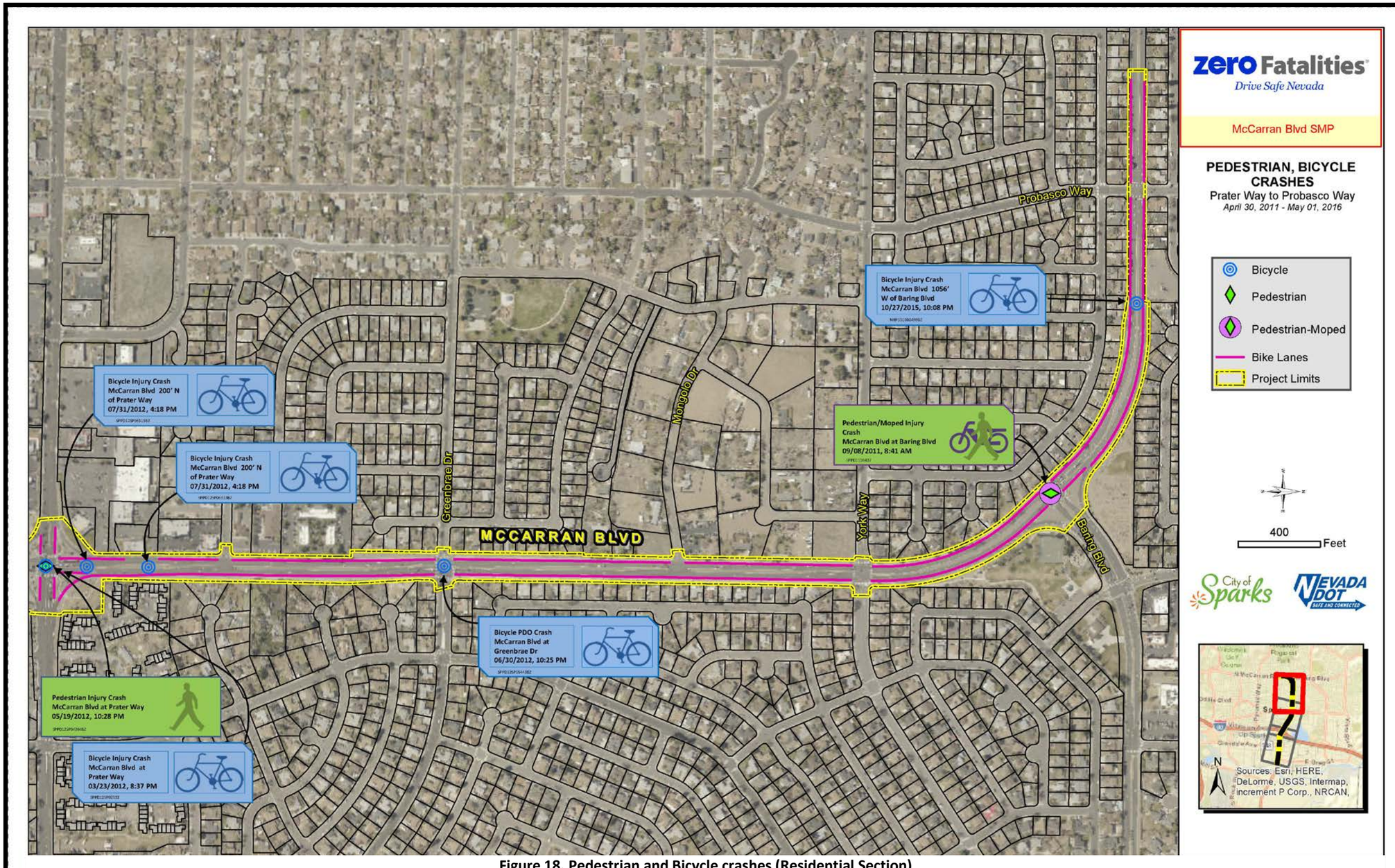


Figure 18. Pedestrian and Bicycle crashes (Residential Section)

9. Safety Improvement Introduction

NDOT has compiled the comments generated by the field review and the TAC to prioritize recommended improvements. These recommendations were evaluated to determine costs, identify right-of-way need, and calculate BCRs in an effort to provide project prioritization.

9.1 Proposed Improvements

The recommended safety improvement projects were prioritized by Short-Term (1-5 years), Mid-Term (5-10 years) and Long-Term (10-15 years). Each improvement was assigned a Reference ID (**Ref Id**), which is used throughout the document to cross-reference improvements with respect to prioritization, improvement costs, right-of-way need, and benefit-cost analysis. Those elements are explained further in this document and outlined accordingly. **Figures 19** through **Figure 27** provide examples of many of the recommended improvements.

A list of Short-Term safety improvements were developed to provide potential projects that could be implemented within a relatively short time period (1 to 5 years) and involving lower costs than Mid-Term or Long-Term improvements. Short-Term projects will not require a long lead-time to obtain right-of-way, perform utility relocations, or obtain environmental clearance compared to Mid-Term or Long-Term projects. The list of Short-Term improvements are listed below and found in **Table 28**.

A list of Mid-Term safety improvements projects were prioritized to provide potential projects that could be implemented over a 5-to 10-year period. Mid-Term projects may require a longer lead-time to obtain additional right-of-way, perform utility relocations, or obtain environmental clearance compared to short-term projects. The following list is an explanation of the proposed improvements, safety benefit, and location of Mid-Term projects. The list of Mid-Term improvements are listed below and found in **Table 29**.

A list of Long-Term safety improvement projects were prioritized to provide projects that could be implemented over a 10- to 15-year period. Long-Term projects will require a longer lead-time to obtain additional right-of-way, perform utility relocations, or obtain environmental clearance compared to Mid-Term or Short-Term projects. The following list is an explanation of the proposed improvements, safety benefit, and location of Long-Term projects. The list of Long-Term improvements are listed below and found in **Table 30**.

9.2 Short-Term Safety Improvements

Install new reflective backplates to enhance the visibility of the illuminated face of the signal by introducing a controlled-contrast background. The retroreflective borders are more visible and noticeable in both daytime and nighttime conditions**. Figure 19.**

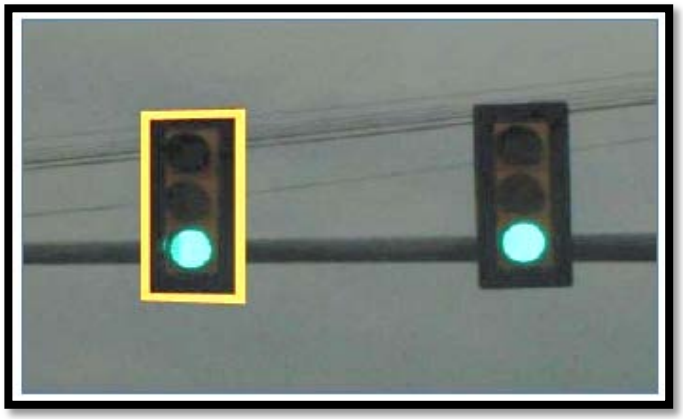


Figure 19. Reflective backplate example

Improve the existing sweeping right turns. This improvement consists of constructing right-turn slip lanes to enhance the line of sight for passenger vehicles attempting to turn right, while also accommodating for tractor-trailer trucks and pedestrians. **Figure 20.**

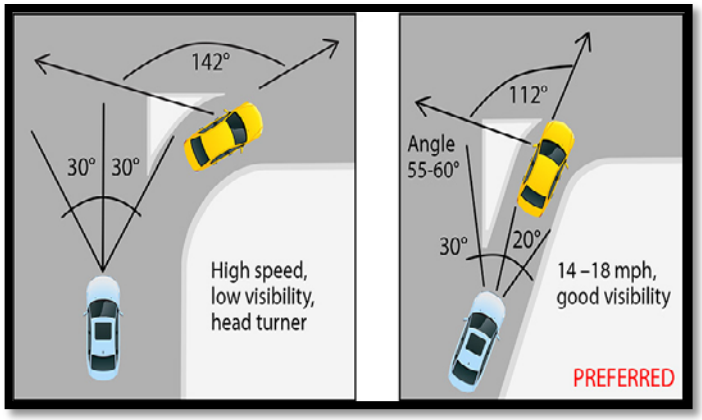


Figure 20. Slip right-turn lane example

Install buffered bike lanes. This improvement consists of striping buffered bike lanes in order to provide greater separation between vehicles and bicycles. The improvement consists of providing two parallel 6-inch striped lines that creates a "buffered" area. New bike symbols will be provided along with green highlighted areas at the identified vehicle/bicycle conflict points. Existing drop inlets will be adjusted to be flush with open-grade. **Figure 21** and **Figure 22.**

Figure 21. Buffered bike lane example

Access management. This improvement consists of addressing access management issues along the corridor. The improvement includes, but not limited to, constructing a raised median island to control vehicle-turning movements. **Figure 23.**

Replace existing sub-standard pedestrian curb ramps at various locations along the corridor to meet current American Disabilities Act (ADA) standards.

All of the recommended Short-Term improvements are as shown in **Appendix D.**

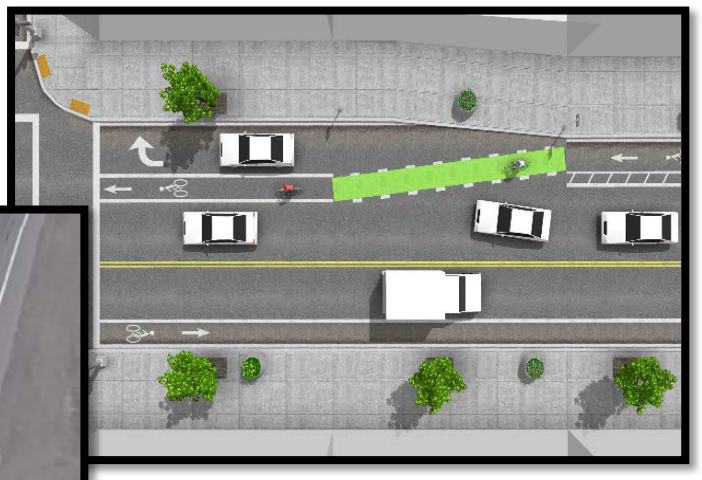


Figure 22. Green highlighted conflict point example

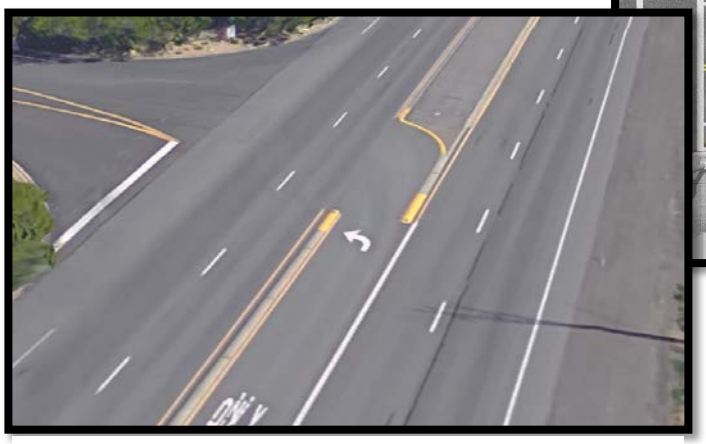


Figure 23. Median access control example

9.3 Mid-Term Safety Improvements

Install midblock pedestrian crossings. The improvement includes the installation of a Danish offset refuge island in the median so pedestrians are oriented facing oncoming traffic. The installation of pedestrian hybrid beacons will alert motorists of pedestrians within the crosswalk. This safety improvement includes the installation of a pedestrian barrier along the center median to prevent illegal pedestrian crossings. **Figure 24.**

Figure 24. Midblock pedestrian example

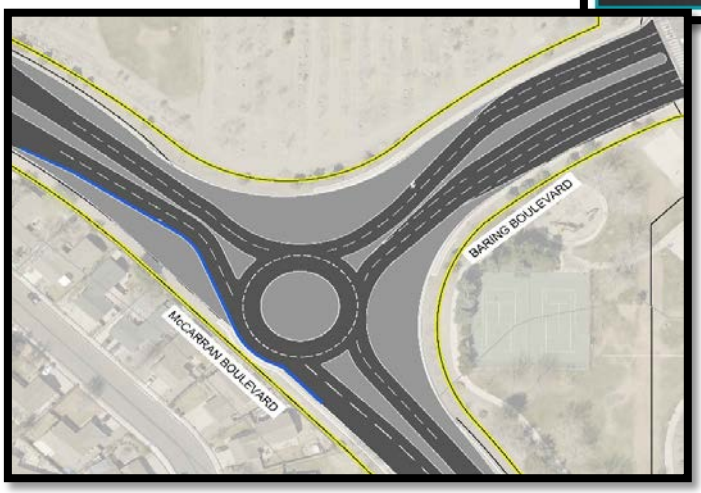


Figure 25. Roundabout at McCarran and Baring example

Access management. This improvement consists of addressing access management issues along the corridor. The improvement includes, but not limited to, converting driveway approaches into right in and right out, consolidating the number of driveways, or moving driveways away from intersections.

Construct a two-lane roundabout. The proposed roundabout enhances vehicular safety, reduces crashes, crash severity, and reduces vehicle speed. **Figure 25.**

Constructing a 10-foot shared use path. This proposed improvement accommodates both bicycles and pedestrians within a narrow right-of-way section.

Construct 5-foot sidewalk with retaining walls along the west side of McCarran Boulevard where no sidewalk currently exists. **Figure 26**

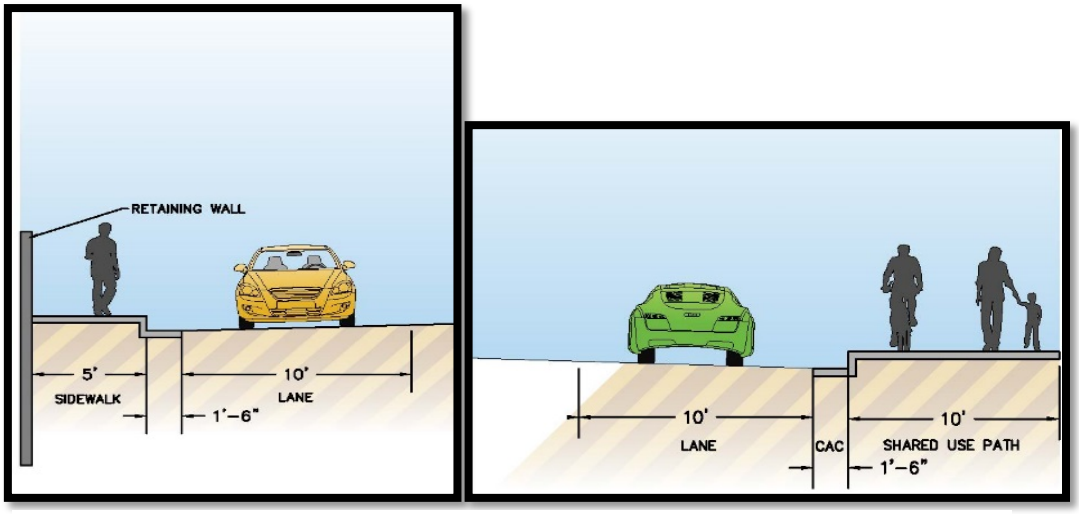


Figure 26. Shared use path and sidewalk example

Improve the existing sweeping right turns. This improvement consists of constructing right-turn slip lanes to enhance the line of sight for passenger vehicles attempting to turn right, while also accommodating for tractor-trailer trucks and pedestrians. **Figure 20** on page 43**.**

All of the recommended Mid-Term improvements are shown in **Appendix D.**

9.4 Long-Term Safety Improvements

Construct a diverging diamond interchange (DDI) along McCarran Boulevard at I-80 and link with the existing interchange at Pyramid Way. This improvement would enhance safety by reducing multiple conflict points with the closely spaced intersections around the existing interchange.

Construct a dedicated right-turn lane along northbound McCarran Boulevard to the westbound I-80 on-ramp to enhance driver expectancy.

Install street lighting along the corridor to improve nighttime visibility. **Figure 27.**

Figure 27. Lighting example

Construct a continuous flow intersection at McCarran Boulevard and Glendale Avenue.

Constructing a 10-foot shared use path along the west side of McCarran Boulevard from Glendale Avenue to Nugget Avenue.

Construct sidewalk along both sides of McCarran from Baring Boulevard to 4th Street. Currently, there is no sidewalk along this section of McCarran Boulevard.

All of the recommended Long-Term improvements are shown in **Appendix D.**

10. Safety Improvement Cost Analysis

A proposed improvement cost analysis was performed on all the developed alternatives. Quantities were summarized in a spreadsheet using calculated quantities of materials for each type of construction per location. Construction items included removals, base and surfacing, concrete structures, striping, and lighting. Unit prices for each of the quantified items were selected in 2017 dollars based on historical bid tabulation data and NDOT cost data. Once compiled, the cost estimates were checked and contingency factors were applied for traffic control, drainage, landscaping, mobilization, preliminary design, utilities, right-of-way, and construction engineering for total improvement costs. **Table 28** through **Table 30** provide cost estimates for the Short-Term, Mid-Term, and Long-Term proposed safety improvement projects. Cost approach for each propose safety improvement is found in **Appendix E**.

10.1 Short-Term Improvement Costs

Short-Term improvements were prioritized by projects under $500,000 and are recommended to be done within the 1-5 year range. **Table 28** shows the recommended Short-Term improvements with costs.

Table 28. Recommended Short-Term Improvements

Ref ID	Location	Proposed Short-Term Improvements (1 to 5-years)	Cost
S1	Corridor	Install new reflective backplates.	$419,000
S2	Corridor	Replace non-compliant pedestrian curb ramps at various locations.	$60,000
S3	Greg Street to Glendale Avenue	Stripe buffered bike lane between Greg Street and Glendale Avenue. Enhance bike lane conflict points with green painted markings. Adjust drop inlets flush with open-grade.	$69,000
S4	Prater Way	Construct right-turn slip lanes at Prater Way to enhance the line of sight for passenger vehicles attempting to turn right, while also accommodating for semi-tractor trailer trucks and pedestrians. Extend median island at the commercial entrance south of Prater Way.	$412,000
S5	Prater Way to Probasco Way	Stripe buffered bike lane between Prater Way and Probasco Way. Enhance bike lane conflict points with green painted markings.	$44,000
S6	Gleeson Way	Construct island channelization to prohibit left turns out of Gleeson Way.	$20,000
S7	Mongolo Drive	Construct island channelization to prohibit left turns out of Mongolo Drive.	$20,000

Legend

- Proposed geometry improvements
- Proposed pedestrian improvements
- Proposed bike improvements
- Proposed access management improvements
- Proposed miscellaneous improvements

10.2 Mid-Term Improvement Costs

Mid-Term improvements were prioritized by projects under $4,000,000 and are likely to be done within 5-10 year range. **Table 29** shows the recommended Mid-Term improvements with costs.

Table 29. Recommended Mid-Term Improvements

Ref ID	Location	Proposed Mid-Term Improvements (5 to 10-years)	Cost
M1	Greg Street	Construct dedicated right-turn slip lane along southbound McCarran at Greg Street (NE & NW quadrants). This will enhance the line of sight for passenger vehicles attempting to turn right, while also accommodating for semi-tractor trailer trucks and pedestrians.	$620,000
M2	Glendale Avenue	Construct dedicated right-turn slip lane along southbound McCarran at Glendale Avenue (NW quadrants). This will enhance the line of sight for passenger vehicles attempting to turn right, while also accommodating for semi-tractor trailer trucks and pedestrians.	$430,000
M3	Kresge Lane	Construct dedicated right-turn lane along northbound McCarran at Kresge Lane.	$309,000[1]
M4	I-80 to Prater Way	Access management Potentially remove, consolidate or convert to right in and right out private or commercial approaches.	$62,000
M5	Nichols Boulevard to Prater Way	Construct median pedestrian barrier from Nichols Boulevard to Prater Way with a midblock crossing. Provide pedestrian hybrid beacon and refuge island.	$361,000
M6	Nichols Boulevard to Prater Way	Construct 10-foot shared use path from Nichols Boulevard to Prater Way along east side. Construct 5-foot sidewalk with retaining wall along the west side of McCarran.	$1,788,000
M7	Baring Boulevard	Construct roundabout at Baring Boulevard.	$3,793,000

1 – Other factors such as right-of-way requirements are factors in this improvement being prioritized with the Mid-Term projects.

Legend

- **Proposed geometry improvements**
- **Proposed pedestrian improvement**
- **Proposed access management improvements**

10.3 Long-Term Improvement Costs

Long-Term improvements were prioritized by projects over $4,000,000 and are likely to be done within the 10-15 year range. **Table 30** shows the recommended Long-Term improvements with costs.

Table 30. Recommended Long-Term Improvements

Ref ID	Location	Proposed Long-Term Improvements (10 to 15 years)	Cost
L1	Corridor	Install LED street lighting.	$6,813,000
L2	Greg Street to Glendale Avenue	Construct 5-foot sidewalk along the east side of McCarran Boulevard.	$1,555,000
L3	Glendale Avenue	Construct a continuous flow intersection at Glendale Avenue.	$9,242,000
L4	Glendale Avenue to Nugget Avenue	Construct a 10-foot shared use path on west side of McCarran from Glendale Avenue to Nugget Avenue. This includes a pedestrian bridge over the UPRR.	$3,399,000[1]
L5	I-80 Interchange	Construct dedicated right-turn lane for WB I-80 on-ramp. This will require new I-80 bridges over McCarran Boulevard for additional lane width.	$9,543,000
L6	I-80 Interchange	Convert interchange at I-80 to Diverging Diamond Interchange.	$37,923,000
L7	Baring Boulevard to 4th Street	Construct sidewalk along both sides of McCarran from Baring Boulevard to 4th street.	$2,887,000[1]

1 – Other factors such as right-of-way requirements are factors in this improvement being prioritized with the Long-Term projects.

Legend

- **Proposed geometry improvements**
- **Proposed pedestrian improvements**
- **Proposed miscellaneous improvements**

11. Right-of-Way Need and Utility Impacts

This section presents the potential need for right-of-way for each specific proposed improvement. Also included in this section is a summary of possible utility impacts that may be effected by the proposed improvements.

11.1 Right-of-Way Need Defined

The recommended improvements were evaluated to determine if any right-of-way easements or acquisitions are needed. A cost estimation of right-of-way and utility relocations were included in the respective improvement to provide an inclusive BCR. The potential need for right-of-way is categorized by need (Low, Medium, and High). Right-of-way need can be the one of the following; Acquisition in Fee (ownership changes to NDOT), permanent easement (use is permanent), temporary easement (use is for a defined period, typically long enough to complete project for identified improvement) or permission to construct (agreement between the owner and department to construct identified improvement.) **Table 31** describes the right-of-way need.

Table 31. Right-of-Way Need Defined

Category	Right-of-Way Description
Low	No right-of-way needed or permission to construct.
Medium	Minor to Moderate amount of right-of-way needed. Small to Medium sized easements that may affect existing landscaping or moderate parking impacts. May require utility relocations. Approximate 1-3 year lead-time to acquire easements. The type of right-of-way need may include Acquisition in Fee, permanent easement (PE), temporary construction easement (TCE) or permission to construct (PC).
High	Moderate to large of amount of right-of-way needed. Large sized easements that may affect utilities, buildings, significant parking or residential property. Includes impacts to the Union Pacific Railroad (UPRR), and requires significant lead time and coordination to obtain environmental clearance. Approximate 3-plus year lead time to acquire easements. This type of right-of-way need may include acquisition in Fee, PE, TE or PC.

11.2 Right-of-Way Need

The individual improvements were analyzed with respect to right-of-way and potential impacts to utilities. **Table 32** demonstrates the need for right-of-way in square feet (sqft) and utility impacts that may be encountered.

Table 32. Right-of-Way and Utility Impacts

Ref ID	Location	Proposed Improvements	Potential R/W Impact	Potential Utility Impact
S1	Corridor	Install new reflective backplates.	None	• None
S2	Corridor	Replace non-compliant pedestrian curb ramps at various locations.	Potential PC	• Overhead power poles • Signal poles • Pull boxes • Landscaping irrigation

Ref ID	Location	Proposed Improvements	Potential R/W Impact	Potential Utility Impact
S3	Greg Street to Glendale Avenue	Stripe buffered bike lane between Greg Street and Glendale Avenue. Enhance bike lane conflict points with green painted markings. Adjust drop inlets flush with open-grade.	None	• Drop inlets
S4	Prater Way	Construct right-turn slip lanes at Prater Way to correct pedestrian sight distance issue. Extend median island at the commercial entrance south of Prater Way.	None	• Pull boxes • Manhole covers • Landscaping irrigation
S5	Prater Way to Probasco Way	Stripe buffered bike lane between Prater Avenue and Probasco Way. Stripe conflict points with green painted markings.	None	• None
S6	Gleeson Way	Construct island channelization to prohibit left turns out of Gleeson Way.	None	• None
S7	Mongolo Drive	Construct island channelization to prohibit left turns out of Mongolo Drive.	None	• None
M1	Greg Street	Construct dedicated right-turn slip lane along southbound McCarran at Greg Street (NE & NW quadrants). This will enhance the line of sight for passenger vehicles attempting to turn right, while also accommodating for semi-tractor trailer trucks and pedestrians.	Potential Acquisition PE, TCE, PC	• Underground utilities • Pull boxes • Landscaping irrigation
M2	Glendale Avenue	Construct dedicated right-turn slip lane along southbound McCarran at Glendale Avenue (NW quadrants). This will enhance the line of sight for passenger vehicles attempting to turn right, while also accommodating for semi-tractor trailer trucks and pedestrians.	Potential Acquisition PE, TCE, PC	• Underground utilities • Pull boxes • Buildings
M3	Kresge Lane	Construct dedicated right-turn lane along NB McCarran at Kresge Lane.	Potential Acquisition PE, TCE, PC	• Underground utilities • Pull boxes • Landscaping irrigation
M4	I-80 to York Way	Access management Potentially remove, consolidate, or convert to right in and right out private or commercial approaches.	Potential PE, TCE, PC	• Pull boxes • Landscape irrigation • Light poles • Fire hydrants
M5	Nichols Boulevard to Prater Way	Construct median pedestrian barrier from Nichols Boulevard to Prater Way with midblock crossings. Provide pedestrian hybrid beacon and refuge island.	Potential Acquisition PE, TCE, PC	• May require line extension agreement • Pull boxes
M6	Nichols Boulevard to Prater Way	Construct 10-foot shared use path from Nichols Boulevard to Prater Way along east side. Construct 5-foot sidewalk with retaining wall along the west side of McCarran.	Potential Acquisition PE, TCE, PC	• Underground utilities • Pull boxes • Landscaping irrigation
M7	Baring Boulevard	Construct 2-lane roundabout at Baring Boulevard.	None	• Pull boxes • Storm drain • Signal system • Valve covers
L1	Corridor	Install street lighting.	Potential PE, TCE, PC	• Require line extension agreement • Overhead power poles • Underground utilities • Pull boxes • Landscaping irrigation

Ref ID	Location	Proposed Improvements	Potential R/W Impact	Potential Utility Impact
L2	Greg Street to Glendale Avenue	Construct 5-foot sidewalk along the east side of McCarran Boulevard.	Potential Acquisition PE, TCE, PC	• Underground utilities
L3	Glendale Avenue	Construct a continuous flow intersection at Glendale Avenue.	TBD preliminary design	• Signal system • Underground utilities • Pull boxes • Landscaping irrigation
L4	Glendale Avenue to Nugget Avenue	Construct a shared use path on west side of McCarran from Glendale Avenue to Nugget Avenue. This includes a pedestrian bridge over the UPRR.	Potential Acquisition PE, TCE, PC	• Underground utilities • Pull boxes • Landscaping irrigation • UPRR
L5	I-80 Interchange	Construct dedicated right-turn lane for westbound I-80 on-ramp. This will require new I-80 bridges over McCarran for additional lane width.	Potential PC	• Signal system • Underground utilities • Pull boxes • Landscaping irrigation
L6	I-80 Interchange	Convert interchange at I-80 to Diverging Diamond Interchange.	TBD preliminary design	• Signal system • Underground utilities • Pull boxes • Landscaping irrigation
L7	Baring Boulevard to 4th Street	Construct sidewalk along both sides of McCarran from Baring Boulevard to 4th street.	Potential Acquisition PE, TCE, PC	• Underground utilities • Pull boxes • Landscaping irrigation • Overhead power • Buildings/structures

12. Benefit-Cost Ratios and Crash Modification Factors

Benefit-Cost Ratios

Benefit-Cost Ratios (BCR) were calculated for all of the recommended improvements. The BCRs were calculated by using NDOT's Benefit-Cost Evaluation spreadsheet, provided in **Appendix G**, and uses information input by the user to calculate the BCR. This information is listed below:

- Identified countermeasure
- Location
- Roadway volume
- Roadway characteristics
- Function classification
- Implementation costs
- Area type – Urban or Rural
- Annual maintenance costs
- Current prime interest rate
- Percentage of growth
- Estimated service life
- Length of study
- Crash data
- 2016 crash societal costs
- Crash Modification Factor (CMF)

BCRs are often used to help prioritize projects since they reflect the project's present value versus project costs. Therefore, a project with a BCR higher than one would indicate that the identified project is viable. The higher the BCR the better the return on the investment. A simple example of a project with a BCR of five would return $5.00 in benefit for every $1.00 spent to implement the improvement.

Table 33 provides crash severity and societal costs per crash that were used in the benefit-cost calculations.

Table 33. Crash Severity and Societal Costs

Crash Severity	Societal Costs per Crash[1]
K – Fatal Crash	$5,839,241.00
A – Incapacitating Injury Crash	$308,595.00
B – Non-Incapacitating Injury Crash	$112,708.00
C – Possible Injury Crash	$63,434.00
PDO – Property Damage Only Crash	$10,221.00

[1] ***2016 Societal Costs***

Crash Modification Factors

The Crash Modification Factors (CMF) from the FHWA-funded Crash Modification Factor Clearinghouse are used to calculate the expected number of crashes after implementing a selected countermeasure on a roadway or intersection. The CMFs are evaluated and chosen based on which countermeasure will have the greatest impact on decreasing crashes at the study site then they are used to calculate the BCR.

Crash Modification Factor — multiplicative factor used to compute the expected number of crashes after implementing a given countermeasure.

The CMFs were pulled from a web-based database that holds the CMFs and the supporting documentation that can be used to help transportation engineers identify the most appropriate countermeasure for their safety needs. See **Figure 28**.

These definitions are related to what is identified in a typical CMF and are from the Crash Modification Factors clearinghouse. Detailed information regarding crash mitigation factors used for this report is in **Appendix F.**

- **Countermeasure**: A countermeasure is a strategy intended to reduce crash frequency or severity on the road. For road safety engineers, a countermeasure is typically a physical change to the infrastructure of a road section or intersection, such as the addition of signs, signals, or markings, or a change in roadway design.
- **Crash Reduction Factor**: Estimate of the percentage reduction in crashes due to a particular countermeasure.
- **Crash Severity**: Severity of crashes which will be affected by the implementation of the particular countermeasure.
- **Crash Type**: Type of crashes which will be affected by the implementation of the particular countermeasure.

Figure 28. The Crash Modification Factors Clearinghouse

Tables 34, **35**, and **36** provide the calculated BCR, identified countermeasure, CMF ID, crash reduction factor, crash reduction type and severity for each proposed improvement.

Table 34. Benefit-Cost Ratio and Crash Reduction Factor (Short-Term improvements)

Ref ID	Short-Term Improvements	B/C Ratio	Countermeasure	CMF ID:	Crash Reduction Factor	Crash Type	Crash Severity
S1	Install new reflective signal backplates (Corridor Improvement).	31.91	Install Reflective Backplates	1410	15.00%	All	Fatal, Serious Injury, Minor Injury
S4	Construct right-turn slip lanes at Prater Way to correct pedestrian sight distance issue. Extend median island at the commercial entrance south of Prater Way.	10.32	Change right-turn lane geometry to increase line of sight (intersection level)	8496	44.00%	All	All
S6	Construct island channelization to prohibit left turns out of Gleeson Way.	2.71	Provide raised median	5148	26.00%	All	Fatal, Serious injury
S7	Construct island channelization to prohibit left turns out of Mongolo Drive.	1.35	Provide raised median	5148	26.00%	All	Fatal, Serious injury

Table 35. Benefit-Cost Ratio and Crash Reduction Factor (Mid-Term Improvements)

Ref ID	Mid-Term Improvements	B/C Ratio	Countermeasure	CMF ID:	Crash Reduction Factor	Crash Type	Crash Severity
M1	Construct dedicated right-turn slip lanes along southbound McCarran at Greg Street (NE & NW quadrants). This will provide lane balance through intersection at Greg Street.	1.76	Change right-turn lane geometry to increase line of sight (intersection level)	8496	44.00%	All	All
M2	Construct dedicated right-turn slip lanes along southbound McCarran at Glendale Avenue (NW quadrant). This will provide lane balance through intersection at Glendale Avenue.	4.22	Change right-turn lane geometry to increase line of sight (intersection level)	8496	44.00%	All	All
M5	Construct median pedestrian barrier from Nichols Boulevard to Prater Way with midblock crossing. Provide pedestrian hybrid beacon and refuge island.	40.37	Install a pedestrian hybrid beacon (pedestrian hybrid beacon or hawk)	2922	69.00%	All	All
M7	Construct two-lane roundabout at Baring Boulevard.	1.10	Convert signalized intersection to single or mulit-lane roundabout	4195	71.00%	All	serious injury, minor injury

Table 36. Benefit-Cost Ratio and Crash Reduction Factor (Long-Term Improvements)

Ref ID	Long-Term Improvements	B/C Ratio	Countermeasure	CMF ID:	Crash Reduction Factor	Crash Type	Crash Severity
L1	Install LED street lighting (Corridor Improvement).	2.87	Install lighting	7783	26.00%	All	All
L6	Convert interchange at I-80 to DDI.	0.12	Convert Diamond Interchange to DDI	8258	33.00%	All	All

13. Public Involvement

A public information meeting was held to solicit input from the community for the McCarran SMP's proposed improvements. The public meeting was held at the Dilworth Middle School, from 4:00 PM to 7:00 PM on Thursday, November 16, 2017. The meeting was advertised in the Reno Gazette Journal two weeks prior and the day before the meeting. Along with the newspaper advertisement, notices were mailed out to property owners and residents within one-quarter mile of the study corridor. Visual displays of the proposed improvements along with an overview of the project was presented by NDOT. **Figure 29** and **Figure 30**.

All comments from the public meeting are in **Appendix H** along with a copy of the presentation boards.

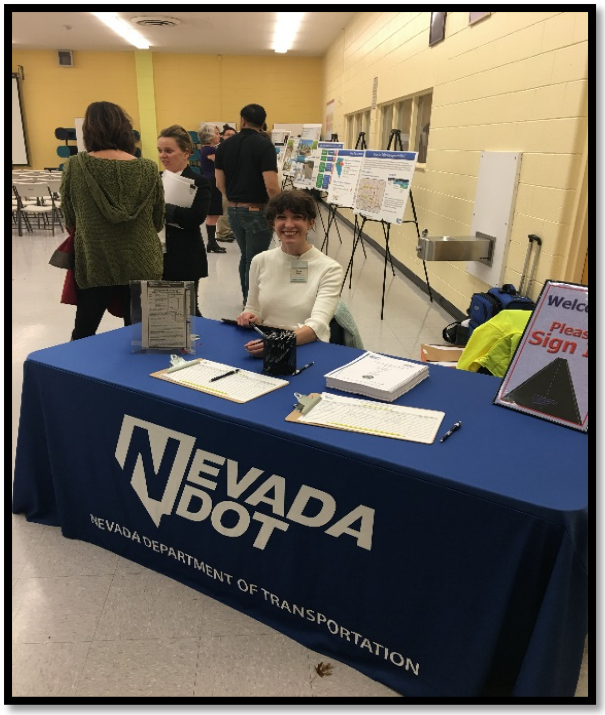


Figure 29. Public Information Meeting

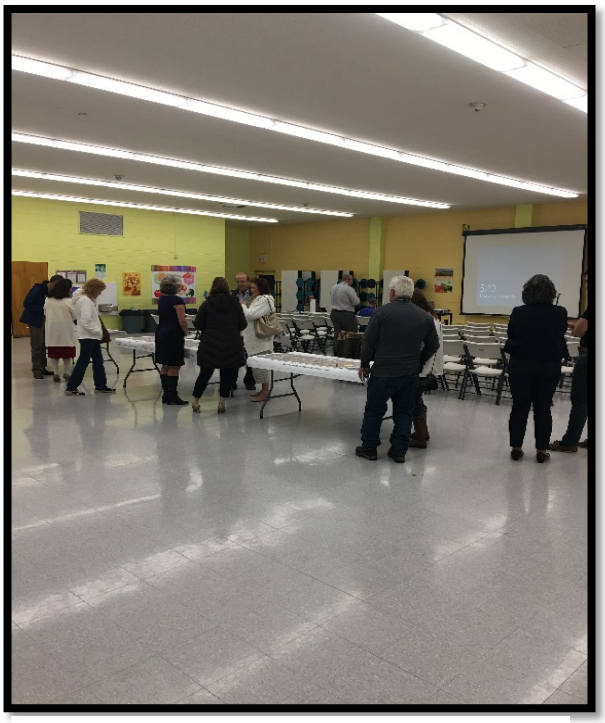


Figure 30. Public Information Meeting

14. Conclusion

The recommendations in the Final Report are to document the decisions and approach used in developing the final Safety Management Plan report. **Table 37** identifies the projects that are recommended for inclusion into the final McCarran Boulevard SMP.

Table 37. Summary of Proposed Safety Improvements

Ref ID	Location	Proposed Short-Term Improvements (1 to 5-years)	Cost	R/W Need	BCR
S1	Corridor	Install new reflective backplates.	$419,000	None	31.91
S2	Corridor	Replace non-compliant pedestrian curb ramps at various locations.	$60,000	Potential PC	0.0
S3	Greg Street to Glendale Avenue	Stripe buffered bike lane between Greg Street and Glendale Avenue. Enhance bike lane conflict points with green painted markings. Adjust drop inlets flush with open-grade.	$69,000	None	0.0
S4	Prater Way	Construct right-turn slip lanes at Prater Way to enhance the line of sight for passenger vehicles attempting to turn right, while also accommodating for semi-tractor trailer trucks and pedestrians. Extend median island at the commercial entrance south of Prater Way.	$412,000	None	10.32
S5	Prater Way to Probasco Way	Stripe buffered bike lane between Prater Way and Probasco Way. Enhance bike lane conflict points with green painted markings.	$44,000	None	0.0
S6	Gleeson Way	Construct island channelization to prohibit left turns out of Gleeson Way.	$20,000	None	2.71
S7	Mongolo Drive	Construct island channelization to prohibit left turns out of Mongolo Drive.	$20,000	None	1.35

Legend

- Proposed geometry improvements
- Proposed pedestrian improvements
- Proposed bike improvements
- Proposed access management improvements
- Proposed miscellaneous improvements

Table 37. Summary of Proposed Safety Improvements Cont.

Ref ID	Location	Proposed Mid-Term Improvements (5 to 10-years)	Cost	R/W Need	BCR
M1	Greg Street	Construct dedicated right-turn slip lane along southbound McCarran at Greg Street (NE & NW quadrants). This will enhance the line of sight for passenger vehicles attempting to turn right, while also accommodating for semi-tractor trailer trucks and pedestrians.	$620,000	Potential Acquisition PE, TCE, PC	1.76
M2	Glendale Avenue	Construct dedicated right-turn slip lane along southbound McCarran at Glendale Avenue (NW quadrants). This will enhance the line of sight for passenger vehicles attempting to turn right, while also accommodating for semi-tractor trailer trucks and pedestrians.	$430,000	Potential Acquisition PE, TCE, PC	4.22
M3	Kresge Lane	Construct dedicated right-turn lane along northbound McCarran at Kresge Lane.	$405,000[1]	Potential Acquisition PE, TCE, PC	0.0
M4	I-80 to Prater Way	Access management Potentially remove, consolidate or convert to right in and right out private or commercial approaches.	$62,000	Potential PE, TCE, PC	0.0
M5	Nichols Boulevard to Prater Way	Construct median pedestrian barrier from Nichols Boulevard to Prater Way with a midblock crossing. Provide pedestrian hybrid beacon and refuge island.	$393,000	Potential Acquisition PE, TCE, PC	40.37
M6	Nichols Boulevard to Prater Way	Construct 10-foot shared use path from Nichols Boulevard to Prater Way along east side. Construct 5-foot sidewalk with retaining wall along the west side of McCarran.	$1,788,000	Potential Acquisition PE, TCE, PC	0.0
M7	Baring Boulevard	Construct roundabout at Baring Boulevard.	$3,793,000	None	1.10

1 – Other factors such as right-of-way requirements are factors in this improvement being prioritized with the Mid-Term projects.

Legend

- Proposed geometry improvements
- Proposed pedestrian improvements
- Proposed access management improvements

Table 37. Summary of Proposed Safety Improvements Cont.

Ref ID	Location	Proposed Long-Term Improvements (10 to 15 years)	Cost	R/W Need	BCR
L1	Corridor	Install LED street lighting.	$6,376,000	Potential PE, TCE, PC	2.87
L2	Greg Street to Glendale Avenue	Construct 5-foot sidewalk along the east side of McCarran Boulevard.	$1,555,000	Potential Acquisition PE, TCE, PC	0.0
L3	Glendale Avenue	Construct a continuous flow intersection at Glendale Avenue.	$9,242,000	TBD preliminary design	0.0
L4	Glendale Avenue to Nugget Avenue	Construct a 10-foot shared use path on west side of McCarran from Glendale Avenue to Nugget Avenue. This includes a pedestrian bridge over the UPRR.	$3,707,000[1]	Potential Acquisition PE, TCE, PC	0.0
L5	I-80 Interchange	Construct dedicated right-turn lane for WB I-80 on-ramp. This will require new I-80 bridges over McCarran Boulevard for additional lane width.	$9,543,000	Potential PC	0.0
L6	I-80 Interchange	Convert interchange at I-80 to DDI.	$37,923,000	TBD preliminary design	0.12
L7	Baring Boulevard to 4th Street	Construct sidewalk along both sides of McCarran from Baring Boulevard to 4th street.	$2,887,000[1]	Potential Acquisition PE, TCE, PC	0.0

1 – Other factors such as right-of-way requirements are factors in this improvement being prioritized with the Long-Term projects.

Legend

- Proposed geometry improvements
- Proposed pedestrian improvements
- Proposed miscellaneous improvements