JONES BOULEVARD/ CHEYENNE AVENUE (SR 574)

SAFETY MANAGEMENT PLAN

Final Report

December 2019

NEVADA DOT SAFE AND CONNECTED

Kimley»Horn

CITY OF LAS VEGAS NEVADA

JONES BOULEVARD/CHEYENNE AVENUE (SR 574) SAFETY MANAGEMENT PLAN

FINAL REPORT

Prepared for:

NEVADA DOT
SAFE AND CONNECTED

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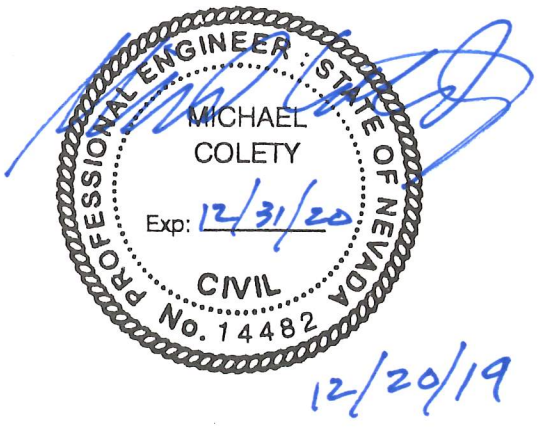

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EXECUTIVE SUMMARY

E.1 Purpose of a Safety Management Plan

The purpose of a Safety Management Plan (SMP) is to conduct a safety focused corridor study aimed at all road users while including collaboration with a diverse group of stakeholders and the public. A SMP includes the development of short and long range transportation safety improvement projects that incorporate relevant studies, access management principles, public to stakeholder input, crash and capacity analyses, benefit-cost analysis, and other impacts to all road users. The SMP process is consistent with the Nevada Strategic Highway Safety Plan's (SHSP) goals of reducing the number of fatalities and serious injuries on Nevada's roadways.

E.2 Project Overview

The Nevada Department of Transportation (NDOT) Safety Engineering Division authorized a SMP for Jones Boulevard from Smoke Ranch Road to Rancho Drive (SR 599) and for Cheyenne Avenue (SR 574) from Torrey Pines Drive to Decatur Boulevard. The project corridors for this SMP are located within the City of Las Vegas, Clark County, and the City of North Las Vegas as shown in **Figure E.1**. Jones Boulevard consists of two (2) travel lanes plus a two-way left turn lane (TWLTL) with a raised median at the signalized intersections for the portion between Smoke Ranch Road and Rancho Drive (SR 599). Cheyenne Avenue (SR 574) consists of three (3) travel lanes in each direction plus a TWLTL with a raised median at the signalized intersections for the portion between Torrey Pines Drive and Decatur Boulevard.

Figure E.1– Vicinity Map of Jones Boulevard/Cheyenne Avenue (SR 574) SMP

A Technical Advisory Committee (TAC) was created to help with the development of the SMP and to ensure that the plan was consistent with the needs of the different stakeholders along the project corridor. The TAC was comprised of individuals from the City of Las Vegas, Clark County, Nevada Highway Patrol (NHP), NDOT, the Regional Transportation Commission of Southern Nevada (RTC), and Las Vegas Metropolitan Police Department (LVMPD).

E.2.1 Review of Policies, Plans, and Studies

A review of known policies, plans, and studies related to the project corridor was conducted to help in the development of proposed improvements. This review focused on identifying suggestions and other relevant information specific to the project corridor that should be incorporated into the development of proposed improvements. Included in this review was an analysis of surrounding land uses and economic development plans for the area. The review of these different documents is found in **Section 2**.

E.2.2 Review and Analysis of Existing Roadway Conditions

A review and analysis of existing project conditions was conducted for the project corridors. The SMP included an analysis of crash data obtained from NDOT for the five-year period from September 1, 2012 to August 31, 2017. A project corridor crash analysis and an intersection crash analysis were performed utilizing the crash data provided. The project corridor crash analysis included all crashes along the corridor for the five-year period while the intersection crash analysis includes crashes within 200 feet of a key intersection. The intersection crashes include crashes from both the major and minor streets for the five-year period. Additionally, crash rates for the project corridors and each key intersection were calculated.

The review also included the identification of the existing lane configuration and traffic control at the key intersections, the existing right-of-way, typical roadway cross sections, bus stop locations, driveways, marked crosswalks, parking lots, bicycle lanes, and on-street parking for the project corridors. A site visit was performed to verify these existing roadway conditions. This information was summarized in a series of project corridor figures.

Lastly, a review of the existing road users was performed along the project corridors. This analysis included the peak hour volume data at key intersections, average daily traffic volume data, and a level of service (LOS) analysis at each key intersection, and an analysis of left-turn storage needs.

E.2.3 Identification of Crash Issues 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 crash issues and risk factors was determined for the project corridors. All identified crash issues and risk factors were considered in the development of the project recommendations. The following list is a summary of crash issues and risk factors that have been identified for the corridors:

Jones Boulevard:

- Above average corridor crash frequency and rates
- Above average intersection crash frequency and rates
- No dedicated bicycle facilities
- Minimal full intersection and mid-block pedestrian crossings
- Vegetation covering traffic signs
- Congestion

- Possible lighting issues such as dim lighting and single mast arms at intersections
- Sidewalks and pedestrian crossings not complying with ADA/ Public Rights-of-Way Accessibility Guidelines (PROWAG) standards
- Limited pedestrian facilities including shade structures, and benches
- Pavement in need of repaving
- Minimal median islands

Cheyenne Avenue (SR 574):

- Above average corridor crash frequency and rates
- Above average intersection crash frequency and rates
- No dedicated bicycle facilities
- Minimal mid-block and full intersection pedestrian crossings and misaligned pedestrian crossings
- Vegetation covering traffic signs
- Congestion
- Possible lighting issues such as dim lighting and single mast arms at intersections
- Sidewalks and pedestrian crossings not complying with ADA/PROWAG standards
- Limited pedestrian facilities including shade structures and benches, and pedestrian fencing
- Channelized/sweeping right turns

E.2.4 Development and Evaluation of Proposed Improvements

Safety improvements for the Jones Boulevard/ Cheyenne Avenue (SR 574) SMP project corridors were developed based on the results of the analysis of existing project conditions and with direction from the TAC. The proposed improvements were divided into two categories: “High Priority” and “Additional Recommendations” after discussion with the TAC. The improvements found in the High Priority category include improvements with proven cost-effective countermeasures that are recommended to move forward with design and construction with available funds. The Additional Recommendations are considered future improvements to be implemented when funding becomes available.

High Priority Improvements

A list of High Priority safety improvements was developed with the intent of providing the different agencies with a list of potential projects that could be implemented within a relatively short time period, involving lower costs than corridor-wide improvements. The lists of projects found in **Table E.1** and **Table E.2** are intended to be implemented along the project corridors and could be constructed independently of each other as funding for projects is available.

Table E.1 – Jones Boulevard High Priority Improvements

Improvements	Description	Improvement Types
Sidewalk Infill	Installation of sidewalk at locations where sidewalk is missing.	Pedestrian and ADA/PROWAG
Street Luminaire Replacement	Upgrading High Pressure Sodium luminaires to Light Emitting Diode (LED).	Vehicular, Motorcycle, Pedestrian, and Cyclists
Pedestrian Crossings ▪ Madre Mesa Drive ▪ Heather Mist Lane ▪ Santa Catalina Avenue ▪ Edward Avenue	Upgrade of the existing pedestrian crossing at Heather Mist Lane and addition of three (3) pedestrian crossings with pedestrian activated RRFBs and pedestrian detection technology.	Pedestrian and ADA/PROWAG
Signalized Intersection Improvements ▪ New Signal Head Placement ▪ Signal Head Realignment ▪ Retroreflective Backplates* ▪ Pedestrian and ADA/PROWAG ▪ Intersection CCTV Cameras Signalized Intersections: ▪ Smoke Ranch Road ▪ Gowan Road ▪ Rancho Drive (SR 599)	Realignment of signal heads so there is one signal head centered on each through lane and installation of new signal heads where they are missing. Installation of CCTV cameras at the signalized intersections.	Vehicular and Motorcycle

**Note that retroreflective plates are recommended but are being installed as part of another NDOT project.*

Table E.2 provides a summary of the High Priority Improvements for Cheyenne Avenue (SR 574).

Table E.2 – Cheyenne Avenue (SR 574) High Priority Improvements

Improvements	Description	Improvement Types
Sidewalk Infill	Installation of sidewalk at locations where sidewalk is missing.	Pedestrian and ADA/PROWAG
Street Luminaire Replacement	Upgrading High Pressure Sodium luminaires to Light Emitting Diode (LED).	Vehicular, Motorcycle, Pedestrian, and Cyclists
Pedestrian Crossings ▪ Mustang Street ▪ Midblock crossing between Maverick Street and Whispering Willow Lane ▪ Midblock crossing between Goleta Drive and Terry Street/Miramar Drive	Install three (3) pedestrian crossings with pedestrian activated RRFBs and pedestrian detection technology.	Pedestrian and ADA/PROWAG
Signalized Intersection Improvements ▪ New Signal Head Placement ▪ Signal Head Realignment ▪ Retroreflective Backplates* ▪ Pedestrian and ADA/PROWAG Signalized Intersections: ▪ Torrey Pines Drive ▪ Jones Boulevard ▪ Michael Way ▪ Rancho Drive (SR 599) ▪ Decatur Boulevard	Realignment of signal heads so there is one signal head centered on each through lane and installation of new signal heads where they are missing.	Vehicular and Motorcycle

Additional Recommendations

A list of Additional Recommendations was developed as part of this project. An in-depth analysis was not performed on all improvements but is meant to provide direction for potential projects to consider when planning for the future of the project corridor. **Table E.3** and **E.4** provide a summary of the Additional Recommendations for the Jones Boulevard/Cheyenne Avenue (SR 574) SMP project corridors.

Table E.3 – Jones Boulevard Additional Recommendations

Improvements	Description	Improvement Types
Sidewalk Widening	Installation of sidewalk at locations where sidewalk is missing and removal of on-street parking to provide space to widen sidewalk to 10 feet.	Pedestrian and ADA/PROWAG
Streetlight Relocation	Relocation of existing streetlights behind back of curb.	Pedestrian and ADA/PROWAG
Speed Management with Speed Feedback Signs	Installation of speed feedback signs and interconnection of devices so current speed is available to be used for speed management.	Vehicular and Motorcycle
Dilemma Zone Detection	Installation of dilemma zone detection at intersections.	Vehicular and Motorcycle

Access Management
▪ S-Islands:
  ▪ Madre Mesa
  ▪ Duncan Drive
▪ Median Closures (Right-in/Right-out):
  ▪ Sheila Avenue
  ▪ Brooks Avenue
  ▪ Heather Mist Lane
  ▪ Foxcroft Avenue
▪ Median Updates (Left-in/Right-in/Right-out):
  ▪ Morro Bay Avenue
  ▪ Sonoma Palms Driveway
  ▪ Edward Avenue
	Installation of S-Island medians, median closures/updates at intersections and access drives to eliminate minor street left-turn movements.	Roadway, Vehicular, and Motorcycle

Table E.4 – Cheyenne Avenue (SR 574) Additional Recommendations

Improvements	Description	Improvement Types
Sidewalk Widening – Alternative 3	Restripe the roadway to reduce the lane widths to provide space for widening the sidewalk to 10 feet on both sides of the corridor.	Pedestrian and ADA/PROWAG
Streetlight Relocation	Relocation of existing streetlights behind back of curb.	Pedestrian and ADA/PROWAG
Speed Management with Speed Feedback Signs	Installation of speed feedback signs and interconnection of devices so current speed is available to be used for speed management.	Vehicular and Motorcycle
Dilemma Zone Detection	Installation of dilemma zone detection at intersections.	Vehicular and Motorcycle
Intersection CCTV Cameras	Installation of CCTV cameras at signalized intersections.	Vehicular and Motorcycle

Access Management
▪ S-Islands:
  ▪ Madre Mesa
  ▪ Duncan Drive
▪ Median Closures (Right-in/Right-out):
  ▪ Sheila Avenue
  ▪ Brooks Avenue
  ▪ Heather Mist Lane
  ▪ Foxcroft Avenue
▪ Median Updates (Left-in/Right-in/Right-out):
  ▪ Morro Bay Avenue
  ▪ Sonoma Palms Driveway
  ▪ Edward Avenue
	Installation of S-Island medians, median closures/updates at intersections and access drives to eliminate minor street left-turn movements.	Roadway, Vehicular, and Motorcycle

Lane Reduction – Alternative 1	Reduce travel lanes from three (3) lanes each direction to two (2) lanes each direction and restripe roadway to provide a dedicated bike lane with 3-foot buffer in each direction of travel.	

Safety Performance Analysis

A safety performance analysis was performed in an effort to quantify the effects of the proposed safety improvements along each of the project corridors. Principles found in the Highway Safety Manual (HSM) 1st Edition were used to perform this analysis along the project corridors based on the existing and proposed roadway conditions. The two methods of analysis used were the Crash Modification Factor (CMF) Method (HSM – Part D) and the Predictive Method (HSM – Part C) as outlined in the Nevada Project Safety Process (PSP). The access management crash prediction results are shown in **Table E.5** through **Table E.9**.

Table E.5 – Jones Boulevard Intersection Median Modifications Crash Prediction Results

Intersection	Existing Condition Predicted Crashes	Proposed Condition Predicted Crashes	20-Year Crash Reduction
Madre Mesa Drive	26	17	9
Sheila Avenue	17	4	13
Brooks Avenue	16	4	12
Heather Mist Lane	17	4	13
Morro Bay Avenue	9	5	3
Duncan Drive	14	9	5
Edward Avenue/ Gilmore Avenue	16	9	7
Foxcroft Avenue	6	2	5
Total	**121**	**55**	**66**

Due to rounding the crash prediction values may not add up to the "Total" value.

Table E.6 – Cheyenne Avenue (SR 574) Intersection Median Modifications Crash Prediction Results (4 Lane Divided)

Intersection	Existing Condition Predicted Crashes	Proposed Condition Predicted Crashes (4 Lane Divided)	20-Year Crash Reduction
Mustang Street	42	14	28
Maverick Street	42	22	20
Whispering Willow Lane	74	65	9
Bronco Street	57	42	15
Rowland Street	39	13	26
Goleta Drive	39	13	26
Miramar Street/Terry Street	39	37	3
Joanne Way	57	33	24
Total	**391**	**238**	**153**

Due to rounding the crash prediction values may not add up to the "Total" value.

Table E.7 – Cheyenne Avenue (SR 574) Intersection Median Modifications Crash Prediction Results (6 Lane Divided)

Intersection	Existing Condition Predicted Crashes	Proposed Condition Predicted Crashes (6 Lane Divided)	20-Year Crash Reduction
Mustang Street	42	14	28
Maverick Street	42	28	14
Whispering Willow Lane	74	74	0
Bronco Street	57	42	15
Rowland Street	39	13	26
Goleta Drive	39	13	26
Miramar Street/Terry Street	39	37	3
Joanne Way	57	38	19
Total	**391**	**258**	**132**

Due to rounding the crash prediction values may not add up to the "Total" value.

Table E.8– Jones Boulevard Applied IHSDM Crash Modification Factors

Improvement	CMF Value	Crash Reduction Percentage
Access Management – Corridor Median Installation	0.367	63.3%

Table E.9 – Cheyenne Avenue (SR 574) Applied IHSDM Crash Modification Factors

Improvement	CMF Value	Crash Reduction Percentage
Access Management – Corridor Median Installation	0.977	2.3%
Lane Reduction & Access Management – Corridor Median Installation	0.479	52.1%

Benefit Cost Analysis

A benefit cost analysis was conducted for the proposed safety improvements based on the safety analysis. This information was used to determine the potential benefit of the proposed improvements in terms of a crash reduction using both the CMF and Predictive Method to calculate a safety benefit cost ratio (BCR). **Table E.10** and **Table E.11** show the calculated annual benefit, annualized cost, BCR, and the average annual net return for each of the project corridors.

Table E.10 – Jones Boulevard Annual Benefit, Annual Cost, and Benefit-Cost Ratio

Improvement	Annual Benefit	Annual Cost	BCR	Annual Net Return
Dilemma Zone Detection	$49,725	$25,003	1.99	$24,722
New Signal Head Placement	$42,448	$1,926	22.04	$40,522
Retroreflective Backplates	$90,960	$1,857	48.98	$89,103
Traffic Signal Modifications - Combined	$133,408	$32,809	4.07	$100,599
Access Management – Corridor Median Installation	$419,863	$189,759	2.21	$230,104

Note: Analysis completed based on 2018 dollars for benefit and cost numbers

Table E.11 – Cheyenne Avenue (SR 574) Annual Benefit, Annual Cost, and Benefit-Cost Ratio

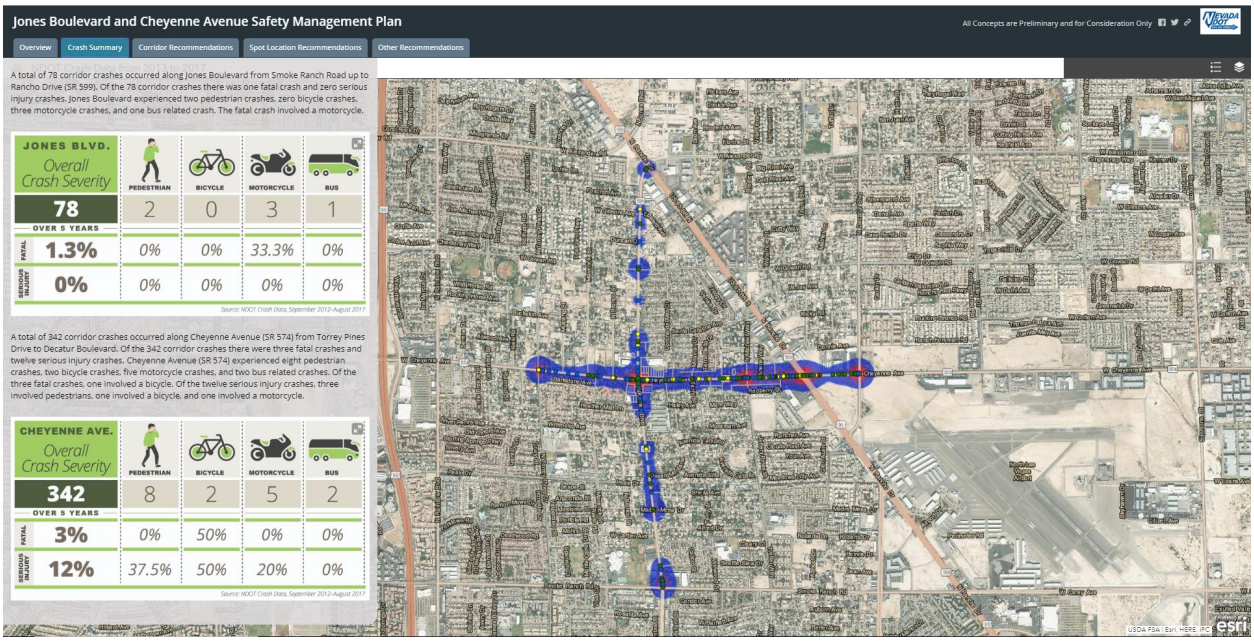
Improvement	Annual Benefit	Annual Cost	BCR	Annual Net Return
Dilemma Zone Detection	$685,750	$33,377	20.55	$652,373
New Signal Head Placement	$585,396	$3,852	151.99	$581,545
Retroreflective Backplates	$1,254,420	$2,751	455.96	$1,251,669
Traffic Signal Modifications - Combined	$1,839,817	$46,032	39.97	$1,793,784
Access Management – Corridor Median Installation	$811,858	$113,324	7.16	$698,534
Lane Reduction & Access Management – Corridor Median Installation	$938,129	$336,432	2.79	$601,698

Note: Analysis completed based on 2018 dollars for benefit and cost numbers

E.2.5 Public Involvement

A public information meeting was held to solicit input from the community for the Jones Boulevard/Cheyenne Avenue (SR 574) SMP corridors proposed improvements. An interactive story map displaying crash data and other visual representations of the proposed improvements were displayed along with an overview of the project corridor. Comments from the meeting attendees were recorded and incorporated into the proposed improvements where appropriate. **Figure E.2** shows a screenshot of the interactive story map created for the Jones Boulevard/Cheyenne Avenue (SR 574) SMP.

Figure E.2 – Jones Boulevard/Cheyenne Avenue (SR 574) SMP Story Map



Story Map Website: https://maps.kimley-horn.com/portal/apps/MapSeries/index.html?appid=d2d83ce8bbaf49cd8b9bff3e4b211e71

E.3 Recommendations

Based on the analyses and information presented in this report, along with input from the TAC, the following recommendations are provided for implementation.

E.3.1 High Priority Improvements

The following High Priority Improvements are recommended as a first priority when trying to improve safety of all road users along the project corridor as summarized in **Table E.12**.

Table E.12 – High Priority Improvements with Cost Summary with Cost Summary

Improvements	Description	Estimated Project Costs
Sidewalk Infill	Installation of sidewalk at locations where sidewalk is missing.	**$350,000-$400,000**
Street Luminaire Replacement	Upgrading High Pressure Sodium luminaires to Light Emitting Diode (LED).	**$55,000-$100,000**
Pedestrian Crossings ▪ Madre Mesa Drive ▪ Heather Mist Lane ▪ Santa Catalina Avenue ▪ Edward Avenue	Upgrade of the existing pedestrian crossing at Heather Mist Lane and addition of three (3) pedestrian crossings with pedestrian activated RRFBs and pedestrian detection technology.	**$1.2 - $1.6 Million**

**Note that retroreflective plates are recommended but are being installed as part of another NDOT project.*

Table E.12 (Continued) – High Priority Improvements with Cost Summary with Cost Summary

Improvements	Description	Estimated Project Costs
Signalized Intersection Improvements ▪ New Signal Head Placement ▪ Signal Head Realignment ▪ Retroreflective Backplates* ▪ Pedestrian and ADA/PROWAG ▪ Intersection CCTV Cameras Signalized Intersections: ▪ Smoke Ranch Road ▪ Gowan Road ▪ Rancho Drive (SR 599)	Realignment of signal heads so there is one signal head centered on each through lane and installation of new signal heads where they are missing. Installation of CCTV cameras at the signalized intersections.	**$324,000**

**Note that retroreflective plates are recommended but are being installed as part of another NDOT project.*

A hybrid of the three (3) alternatives for Jones Boulevard can be implemented during the design and construction phases of the projects. Buses are able to use the available parking area and bike lane to pick up passengers if Alternative 1 is implemented, this is similar to what is currently being done along the corridor where buses pull over on the available shoulder. **Table E.13** shows a summary of the High Priority Recommendations for Cheyenne Avenue (SR 574).

Table E.13 – Cheyenne Avenue (SR 574) High Priority Recommendations with Cost Summary

Improvements	Description	Estimated Project Costs
Sidewalk Infill	Installation of sidewalk at locations where sidewalk is missing.	**$100,000**
Street Luminaire Replacement	Upgrading High Pressure Sodium luminaires to Light Emitting Diode (LED).	**$100,000**
Pedestrian Crossings ▪ Mustang Street ▪ Midblock crossing between Maverick Street and Whispering Willow Lane ▪ Midblock crossing between Goleta Drive and Terry Street/Miramar Drive	Install three (3) pedestrian crossings with pedestrian activated RRFBs and pedestrian detection technology.	**$1.2 - $1.5 Million**

**Note that retroreflective plates are recommended but are being installed as part of another NDOT project.*

Table E.13 (Continued) – Cheyenne Avenue (SR 574) High Priority Recommendations with Cost Summary

Improvements	Description	Estimated Project Costs
Signalized Intersection Improvements ▪ New Signal Head Placement ▪ Signal Head Realignment ▪ Retroreflective Backplates* ▪ Pedestrian and ADA/PROWAG Signalized Intersections: ▪ Torrey Pines Drive ▪ Jones Boulevard ▪ Michael Way ▪ Rancho Drive (SR 599) ▪ Decatur Boulevard	Realignment of signal heads so there is one signal head centered on each through lane and installation of new signal heads where they are missing.	**$500,000**

**Note that retroreflective plates are recommended but are being installed as part of another NDOT project.*

The preferred alternative for Cheyenne Avenue is Alternative 2 based on the City of Las Vegas recommendation.

E.3.2 Additional Recommendations

The Additional Recommendations are summarized in **Table E.14** and **Table E.15,** these recommendations can be implemented individually or grouped together as funding and other considerations allow.

Table E.14 – Jones Boulevard Additional Recommendations with Cost Summary

Improvements	Description	Estimated Project Costs
Lane Reduction		
Alternative 1 – Buffered Bike Lane	Reduce travel lanes from two (2) lanes each direction to one (1) lane each direction and restripe roadway to provide a dedicated bike lane with 3-foot buffer in each direction of travel.	**$2,008,000**
Alternative 3 – Shared Bus/Bike Lane	Reduce travel lanes from two (2) lanes each direction to one (1) lane each direction and restripe roadway to provide a shared bus/bike lane in each direction of travel.	**$1,372,000**

Table E.14 (Continued) – Jones Boulevard Additional Recommendations with Cost Summary

Improvements	Description	Estimated Project Costs
Sidewalk Widening	Installation of sidewalk at locations where sidewalk is missing and removal of on-street parking to provide space to widen sidewalk to 10 feet.	**$2,266,000**
Streetlight Relocation	Relocation of existing streetlights behind back of curb.	**$200,000**
Speed Management with Speed Feedback Signs	Installation of speed feedback signs and interconnection of devices so current speed is available to be used for speed management.	**$500,000 to $2,106,000**
Fiber Optic Interconnect System: New Trench	Installation of new fiber optic interconnect system with new trench and speed feedback signs to help with speeding.	$2,106,000 ($1,053,000 per mile)
Fiber Optic Interconnect System: Existing Conduit	Replacement of copper with fiber and speed feedback signs to help with speeding.	$1,229,000 ($614,500 per mile)
Speed Feedback Signs (Cellular Modem)	Installation of cellular modems and speed feedback signs to help with speeding.	$500,000 ($250,000 per mile)
Dilemma Zone Detection	Installation of dilemma zone detection at intersections.	**$211,000**

Access Management
▪ S-Islands:
  ▪ Madre Mesa
  ▪ Duncan Drive
▪ Median Closures (Right-in/Right-out):
  ▪ Sheila Avenue
  ▪ Brooks Avenue
  ▪ Heather Mist Lane
  ▪ Foxcroft Avenue
▪ Median Updates (Left-in/Right-in/Right-out):
  ▪ Morro Bay Avenue
  ▪ Sonoma Palms Driveway
  ▪ Edward Avenue
	Installation of S-Island medians, median closures/updates at intersections and access drives to eliminate minor street left-turn movements.	**$2,572,000**

Table E.15 – Cheyenne Avenue (SR 574) Additional Recommendations with Cost Summary

Improvements	Description	Estimated Project Costs
Sidewalk Widening – Alternative 3	Restripe the roadway to reduce the lane widths to provide space for widening the sidewalk to 10 feet on both sides of the corridor.	**$2,780,000**
Streetlight Relocation	Relocation of existing streetlights behind back of curb.	**$250,000**
Speed Management with Speed Feedback Signs	Installation of speed feedback signs and interconnection of devices so current speed is available to be used for speed management.	**$667,000 to $1,579,500**
Dilemma Zone Detection	Installation of dilemma zone detection at intersections.	**$300,000**
Intersection CCTV Cameras	Installation of CCTV cameras at signalized intersections.	**$70,000**
Access Management ▪ S-Islands: ▪ Madre Mesa ▪ Duncan Drive ▪ Median Closures (Right-in/Right-out): ▪ Sheila Avenue ▪ Brooks Avenue ▪ Heather Mist Lane ▪ Foxcroft Avenue ▪ Median Updates (Left-in/Right-in/Right-out): ▪ Morro Bay Avenue ▪ Sonoma Palms Driveway Edward Avenue	Installation of S-Island medians, median closures/updates at intersections and access drives to eliminate minor street left-turn movements. **This accounts for access management while maintaining three (3) lanes in each direction.*	**$1,738,000**
Lane Reduction – Alternative 1	Reduce travel lanes from three (3) lanes each direction to two (2) lanes each direction and restripe roadway to provide a dedicated bike lane with 3-foot buffer in each direction of travel.	**$2,822,000**

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A	Incapacitating Injury
AADT	Annual Average Daily Traffic
ADA	Americans with Disabilities Act 2010
AMSS	Access Management System and Standards
BCR	Benefit Cost Ratio
BPP	RTC Bicycle and Pedestrian Plan
Bike Gap Analysis	Regional Bicycle Network Gap Analysis
CS Design Guide	Complete Streets Design Guidelines for Livable Communities
CS Study	Regional Complete Streets Study
FAST	Freeway and Arterial System of Transportation
HCM 6	Highway Capacity Manual 6th Edition
K	Fatal Crash
LOS	Level of Service
LV Master Plan	City of Las Vegas 2020 Master Plan
LVMPD	Las Vegas Metropolitan Police Department
LV Mobility Plan	City of Las Vegas Mobility Master Plan
MEV	Million Entering Vehicles
MVMT	Million Vehicle Miles Traveled
NDOT	Nevada Department of Transportation
NHP	Nevada Highway Patrol
PDO	Property Damage Only
PHF	Peak Hour Factor
RSA	Road Safety Assessment
RTC	Regional Transportation Commission of Southern Nevada
RTP	Regional Transportation Plan 2017-2040
RBPP	Regional Bicycle & Pedestrian Plan for Southern Nevada
SHSP	Strategic Highway Safety Plan
SMP	Safety Management Plan
SR	State Route
STIP	Statewide Transportation Improvement Program

TAC	Technical Advisory Committee
TWLTL	Two-Way Left Turn Lane

1 INTRODUCTION

The Nevada Department of Transportation (NDOT) Safety Engineering Division authorized a Safety Management Plan (SMP) for Jones Boulevard from Smoke Ranch Road to Rancho Drive (SR 599) and for Cheyenne Avenue (SR 574) from Torrey Pines Drive to Decatur Boulevard. The purpose of the SMP is to conduct a safety focused corridor study aimed at all road users in collaboration with stakeholders and the public. The SMP developed a list of short- to long-range transportation safety improvement projects that incorporate a review of relevant studies, access management, public and stakeholder input, crash and capacity analyses, and other impacts to all road users. The SMP process is consistent with the Nevada Strategic Highway Safety Plan's (SHSP) goals of reducing the number of fatalities and serious injuries on Nevada's roadways.

The project corridors for this SMP are located within the City of Las Vegas, Clark County, and the City of North Las Vegas as shown in **Figure 1**. The Jones Boulevard and Cheyenne Avenue (SR 574) road ownership map is included in **Appendix A.** Jones Boulevard consists of two (2) travel lanes plus a two-way left turn lane (TWLTL) with a raised median at the signalized intersections for the portion between Smoke Ranch Road and Rancho Drive (SR 599). Cheyenne Avenue (SR 574) consists of three (3) travel lanes in each direction plus a TWLTL with a raised median at the signalized intersections for the portion between Torrey Pines Drive and Decatur Boulevard.

Figure 1 – Vicinity Map of Jones Boulevard/Cheyenne Avenue (SR 574) SMP

A Technical Advisory Committee (TAC) was created to help with the development of the SMP and to ensure that the plan was consistent with the needs of the many different stakeholders along the project corridor. The TAC was comprised of individuals from the City of Las Vegas, Clark County, Nevada Highway Patrol (NHP), NDOT, the Regional Transportation Commission of Southern Nevada (RTC), and Las Vegas Metropolitan Police Department (LVMPD).

The purpose of the Jones Boulevard/Cheyenne Avenue (SR 574) SMP Final Report is to identify and summarize the existing conditions, develop a list of potential safety improvements projects, evaluate the safety impacts of the proposed safety improvements, develop safety Benefit-Cost Ratios (BCR), and make recommendations. This document is intended to be used by the different jurisdictions associated with the project corridor, as a tool for selecting and implementing safety focused improvement projects with known safety benefits. The Jones Boulevard/Cheyenne Avenue (SR 574) SMP Final Report is organized into the following sections:

- **Section 1. Introduction:** introduces the SMP and an overview of the project corridor.
- **Section 2. Policies Plans and Studies:** presents a brief overview of known policies, plans, and studies related to the project corridor.
- **Section 3. Land Use Analysis:** presents the existing and proposed future land use analysis for the areas surrounding the project corridor.
- **Section 4. Economic Development:** evaluates the economic development within the project corridor.
- **Section 5. Existing Roadway Conditions:** presents the existing conditions currently found along the project corridor.
- **Section 6. Traffic Analysis:** covers the road user data in relation to peak hour volumes, average daily traffic, crash rates, level of service (LOS) analysis, left turn storage bay analysis, and speed study.
- **Section 7. Crash Analysis:** provides a detailed crash analysis for the project corridor and key intersections.
- **Section 8. Crash Issues and Risk Factors:** provides a summary of the identified crash issues and risk factors for the project corridor.
- **Section 9. Traffic Volume Growth:** provides a description of the methodology used to determine traffic volume growth rates along the project corridor.
- **Section 10. Public Involvement:** provides an overview of the public information meeting and public comments.
- **Section 11. Lane Reduction Feasibility:** discusses the feasibility and benefits of lane reduction alternatives.
- **Section 12: Proposed Improvements:** presents the proposed improvements along the project corridor along with LOS analyses, and left turn storage analysis.
- **Section 13: Safety Performance Analysis:** evaluates the safety impacts of the proposed improvements by conducting a safety performance analysis based on principals found in the Highway Safety Manual (HSM).
- **Section 14: Proposed Improvement Costs:** presents the cost of each proposed improvement.
- **Section 15: Benefit-Cost Analysis:** provides a summary of the annual safety benefit and annualized cost for each applicable improvement along with a Benefit-Cost Ratio (BCR) based on the safety performance analysis.
- **Section 16: Recommendations:** presents a list of recommendations for implementation of the proposed improvements.

2 POLICIES, PLANS AND STUDIES

A review of relevant policies, plans, and studies related to the project corridors was completed. The following subsections provide a summary of the items reviewed and are organized by the following governing agencies:

- City of Las Vegas
- RTC
- NDOT

2.1 City of Las Vegas Plans

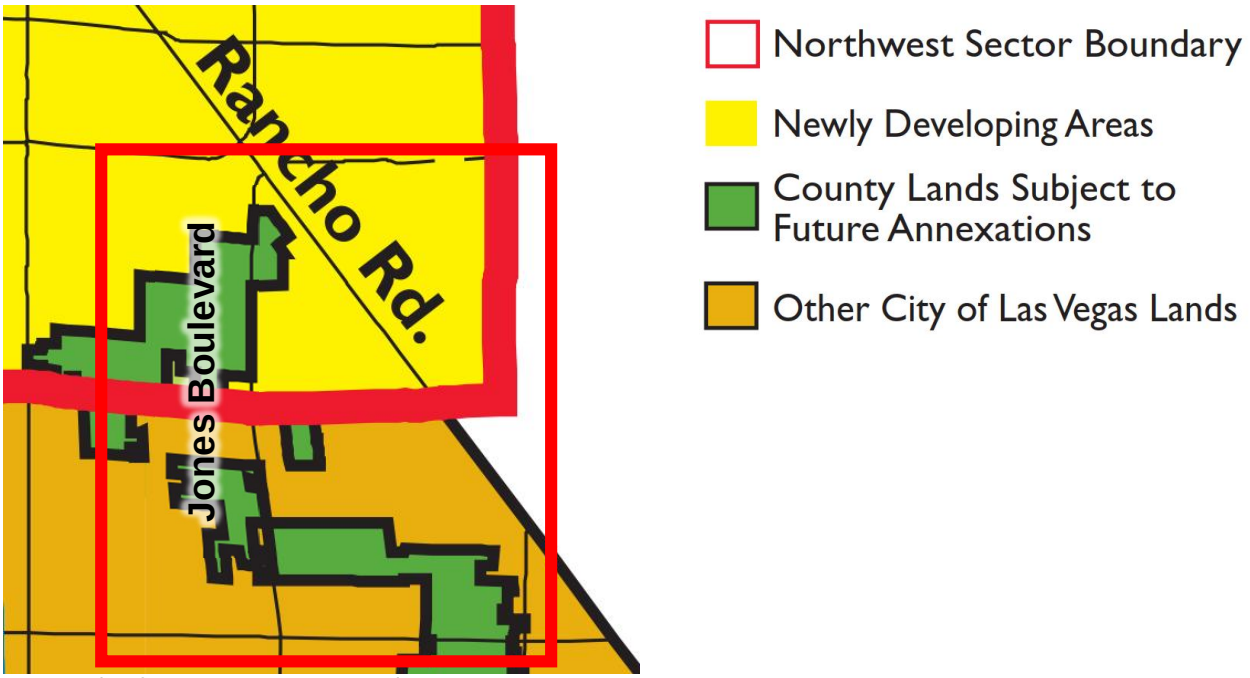
The following plans from the City of Las Vegas were reviewed for this study:

- City of Las Vegas 2020 Master Plan (2000)
- City of Las Vegas Mobility Master Plan (2016)

2.1.1 City of Las Vegas 2020 Master Plan (2000)

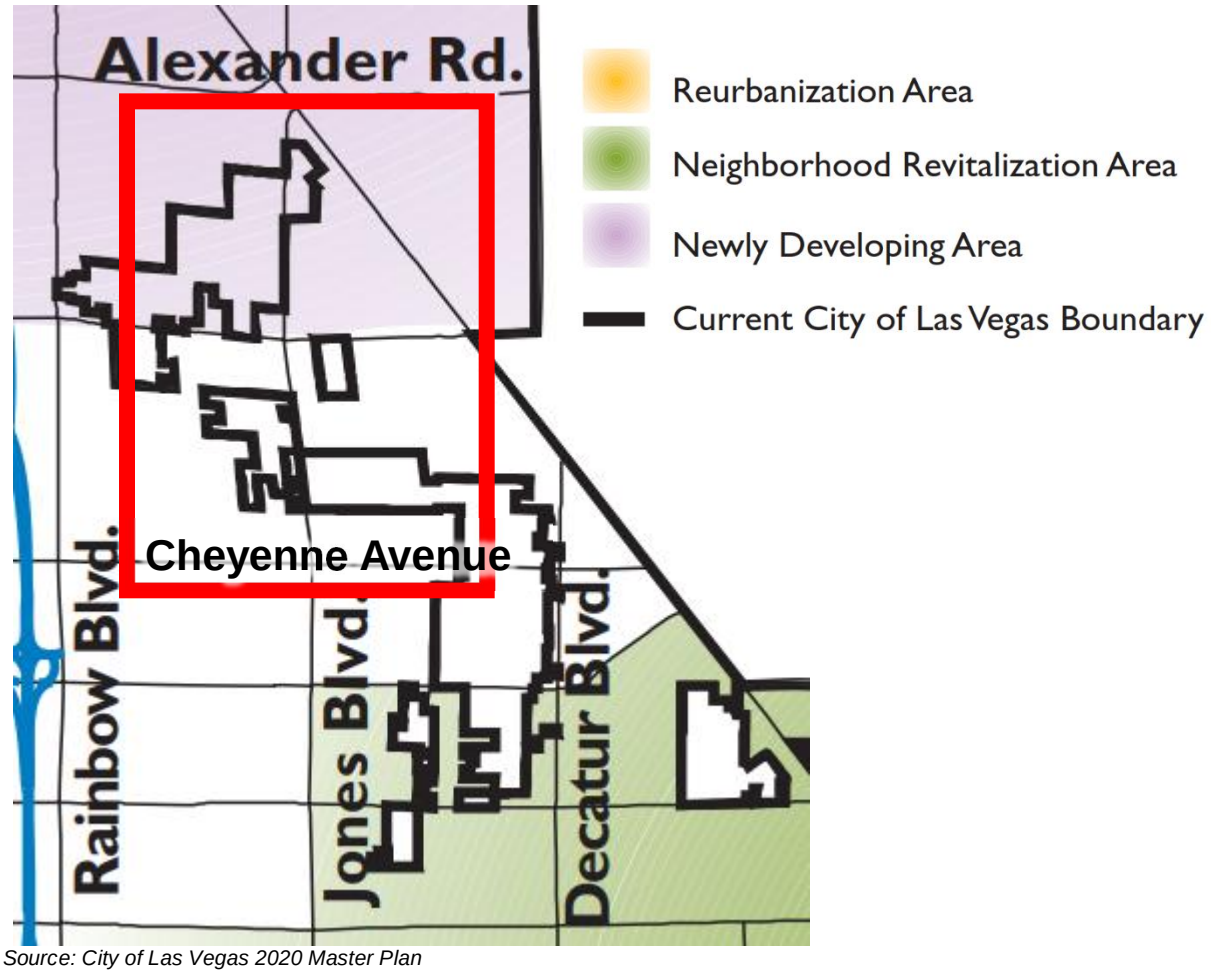
The *City of Las Vegas 2020 Master Plan* (LV Master Plan) was published in 2000, providing a broad and comprehensive planning level policy. The LV Master Plan outlines the direction that should be taken by the City of Las Vegas regarding future land use and other planning decisions. The theme of the LV Master Plan includes: reurbanization, neighborhood revitalization, newly developing areas, economic diversity, cultural enhancement, fiscal management, and regional cooperation. The LV Master Plan relates to the SMP project corridors particularly in a newly developing area along Jones Boulevard and Cheyenne Avenue (SR 574) as shown in **Figure 2** and **Figure 3**. The study also shows potential future transit-oriented development and mixed-use urban hubs along the Jones Boulevard and Cheyenne Avenue (SR 574) corridors.

Figure 2 – Newly Developing Areas



Source: City of Las Vegas 2020 Master Plan

Figure 3 – Master Plan 2020 Geographic Strategy Areas



Source: City of Las Vegas 2020 Master Plan

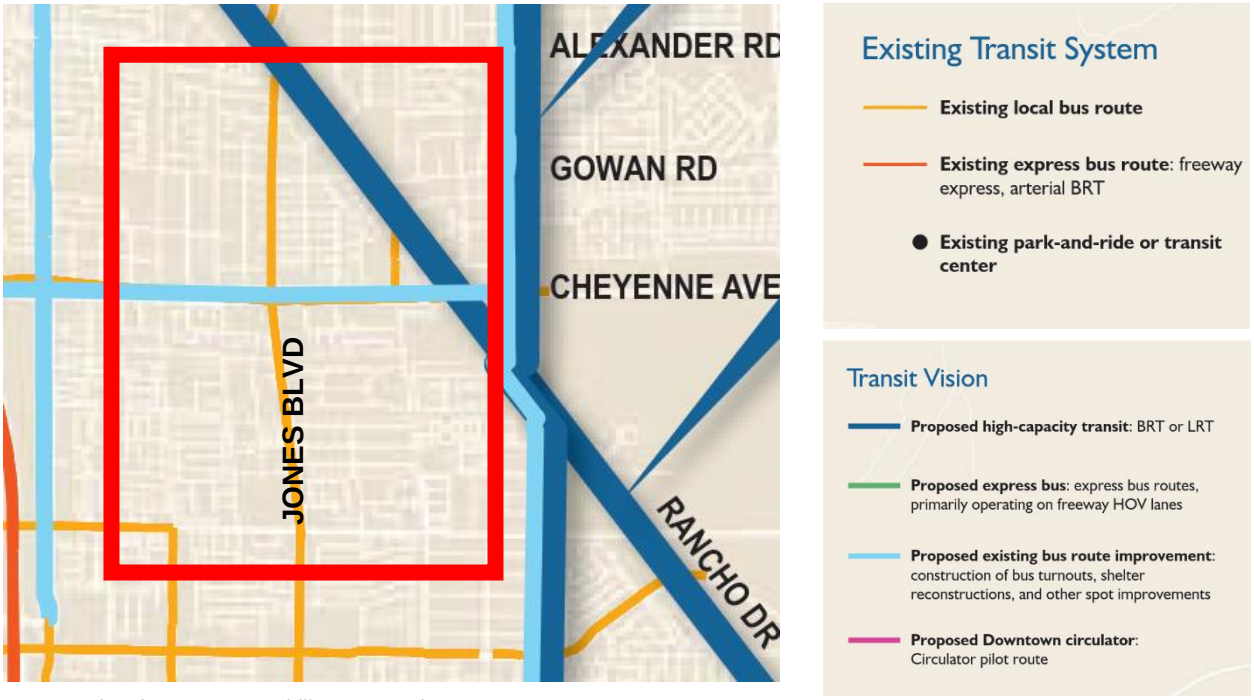
2.1.2 City of Las Vegas Mobility Master Plan (2016)

The *City of Las Vegas Mobility Master Plan* (LV Mobility Plan) was published in 2016 and is one (1) of four (4) strategic imperatives in the *Las Vegas' City by Design* initiative. The LV Mobility Plan identifies the corridor of Jones Boulevard and Cheyenne Avenue (SR 574) for improvement projects such as bike lanes/paths, street rehabilitation projects, pedestrian facility improvements, bus facility improvements, and vehicular mobility improvements. **Figure 4** shows that there are existing bus routes along Jones Boulevard and that improvements, such as, construction of bus turnouts, shelter reconstruction, and various other improvements will be completed in 2022 along Cheyenne Avenue (SR 574). **Figure 5** shows that there is a proposed bicycle lane or bike boulevard on Jones Boulevard. The plan also identifies the study corridor as having moderate to heavy congestion which is projected to increase over time. The LV Mobility Plan outlines six key goals for 2020:

- Developing transportation connectivity
- Ensuring high-quality, safe roadways
- Engaging in the effort to develop the I-11 corridor
- Providing safe and convenient mobility choices

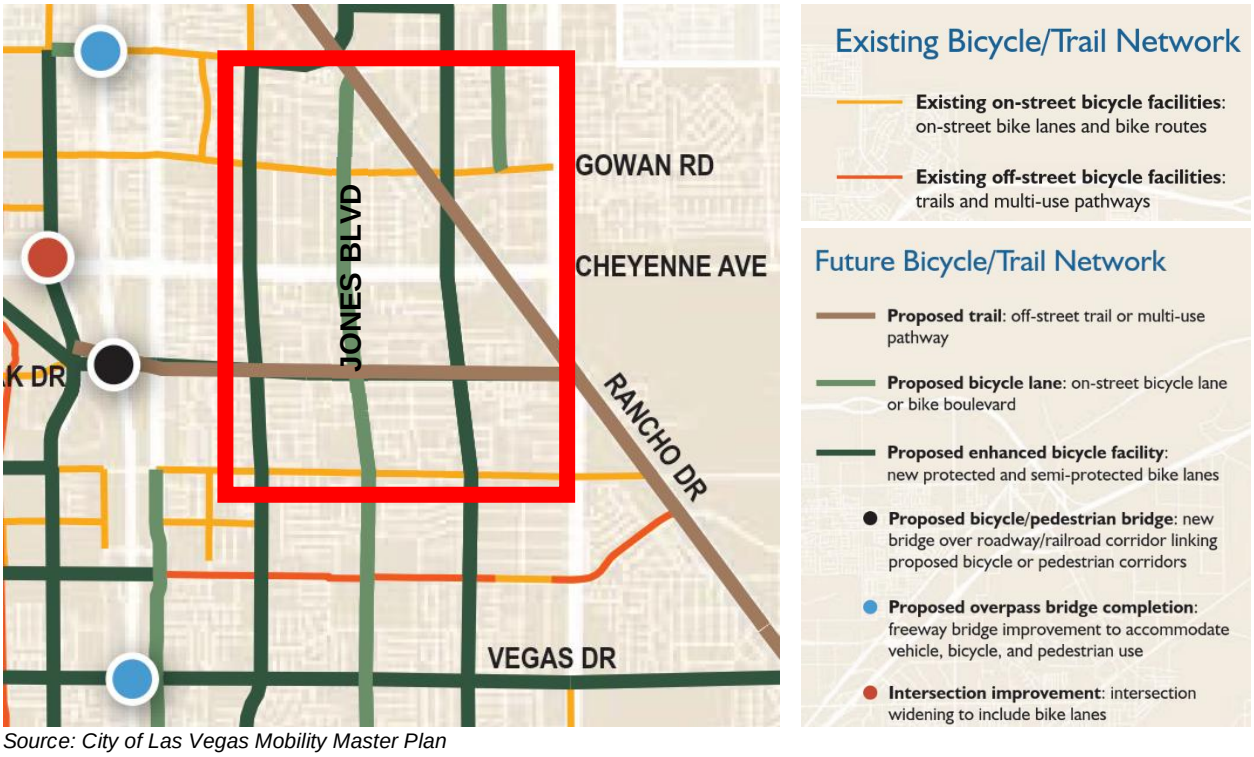
- Creating a “smart city”
- Fully funding the operations, maintenance, renewal, and expansion of the City’s transportation system

Figure 4 – Transit System Vision



Source: City of Las Vegas Mobility Master Plan

Figure 5 – Bicycle System Vision



Source: City of Las Vegas Mobility Master Plan

2.2 Regional Transportation Commission of Southern Nevada Plans

The following RTC plans were reviewed for this study:

- Clark County Area Access Management Plan (2011)
- Complete Streets Design Guidelines for Livable Communities (2013)
- Policy for Complete Streets (2012)
- Regional Bicycle Network Gap Analysis Plan (2014)
- Regional Bicycle & Pedestrian Plan for Southern Nevada (2017)
- Regional Complete Streets Study (2012)
- Regional Transportation Plan for Southern Nevada 2017-2040 (2017)

2.2.1 Clark County Area Access Management Plan (2011)

The *Clark County Area Access Management document*, completed in 2011 provides the standards and policies for consistent access management measures to be followed in Clark County. Access management is important for balancing roadway efficiency with the population's ability to access and use roadways. This is accomplished by identifying the roadway functional classification; considering the functional area of intersections along the roadway; and understanding roadway users (vehicles, pedestrians, bicyclists, and transit) and how they interact with each other on the road. The standards in this report can help to improve safety, traffic operations, economics, and land use. Implementing proper access management on the Jones Boulevard/Cheyenne Avenue (SR 574) corridors can have beneficial results for the residents of the Las Vegas Valley.

2.2.2 Complete Streets Design Guidelines for Livable Communities (2013)

The *Complete Streets Design Guidelines for Livable Communities* (CS Design Guide) was completed in 2013 as a way of providing guidelines on complete streets projects in order to design streets with all road users in mind. The CS Design Guide discusses the impacts of complete streets on economic, equity, environmental, and other issues. The CS Design Guide is aimed at providing more livable communities with the health of the residents in mind. The information found in the CS Design Guide was beneficial in the design of potential complete streets improvements for the SMP project corridors. The policies found in the document incorporate the following elements for complete streets as outlined by the National Complete Streets Coalition:

- Vision
- All users and all modes
- Connectivity
- Jurisdiction
- Phases
- Exceptions
- Design
- Context sensitivity
- Performance measures
- Implementation plan

2.2.3 Policy for Complete Streets (2012)

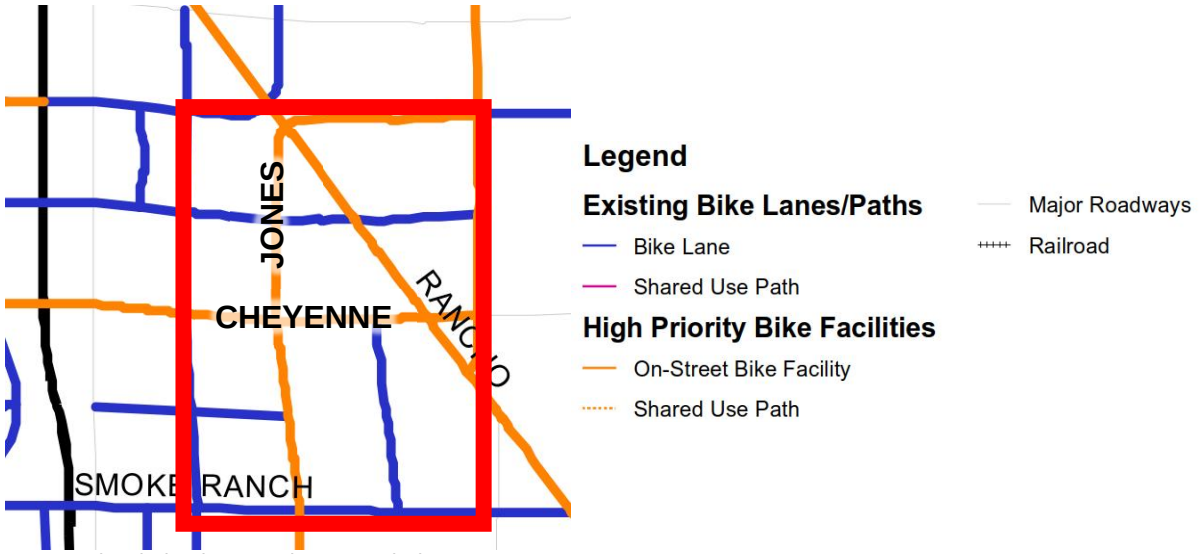
The RTC's *Policy for Complete Streets* supports projects within the community that enhance pedestrian and bicycle facilities in addition to providing improved access to public transportation while complying with the Americans with Disabilities Act 2010 (ADA) to provide accessibility to all users. Pedestrian and bicycle enhancements should be designed with safety in mind. The policies outlined in this document were useful when making recommendations for the SMP project corridors. The policies included in the document are outlined as follows:

- RTC will promote the incorporation of complete streets concepts and design standards in all appropriate public streets (except freeways) throughout the region
- RTC will seek every opportunity to provide guidance and funding for the planning, design, and implementation of complete streets
- RTC will provide policy and technical support to local entities in the incorporation of complete streets elements into their development code and comprehensive plans
- RTC will provide technical support to local entities in the development of a process for evaluating, ranking, and prioritizing complete streets projects in their area
- RTC will encourage local entities to consider complete streets elements as an integral part of the planning and design of roadway projects, whether new construction, reconstruction, or rehabilitation
- RTC will consider modifications to the Master Plan of Streets and Highways or the Roadway Functional Classification that may be necessary to configure a street as a complete street
- Public streets excluded from this policy include those where complete streets concepts are in conflict with existing laws, codes, or ordinances, or where compliance with this policy would conflict with the goals or physical conditions related to the unique aspects of the location

2.2.4 Regional Bicycle Network Gap Analysis (2014)

The Regional Bicycle Network Gap Analysis (Bike Gap Analysis) report, completed in 2014, analyzed the bicycle networks to determine where critical gaps are located and determine the specific locations that need bicycle facility connections to provide a continuous ridership for bicycles throughout the Las Vegas Valley. Locations with high priority include those areas with high bicycle demand and high connectivity potential. Key connections identified within the regional bicycle network included airports, parks, schools, and regional malls. The network inventory was analyzed with the key connections to determine the gaps for the existing and proposed network. Based on the demand-connectivity analysis it was determined that Jones Boulevard and Cheyenne Avenue (SR 574) both have a high priority for on-street bike facilities as seen in **Figure 6**.

Figure 6 – High Priority Recommendations Map



Source: Regional Bicycle Network Gap Analysis

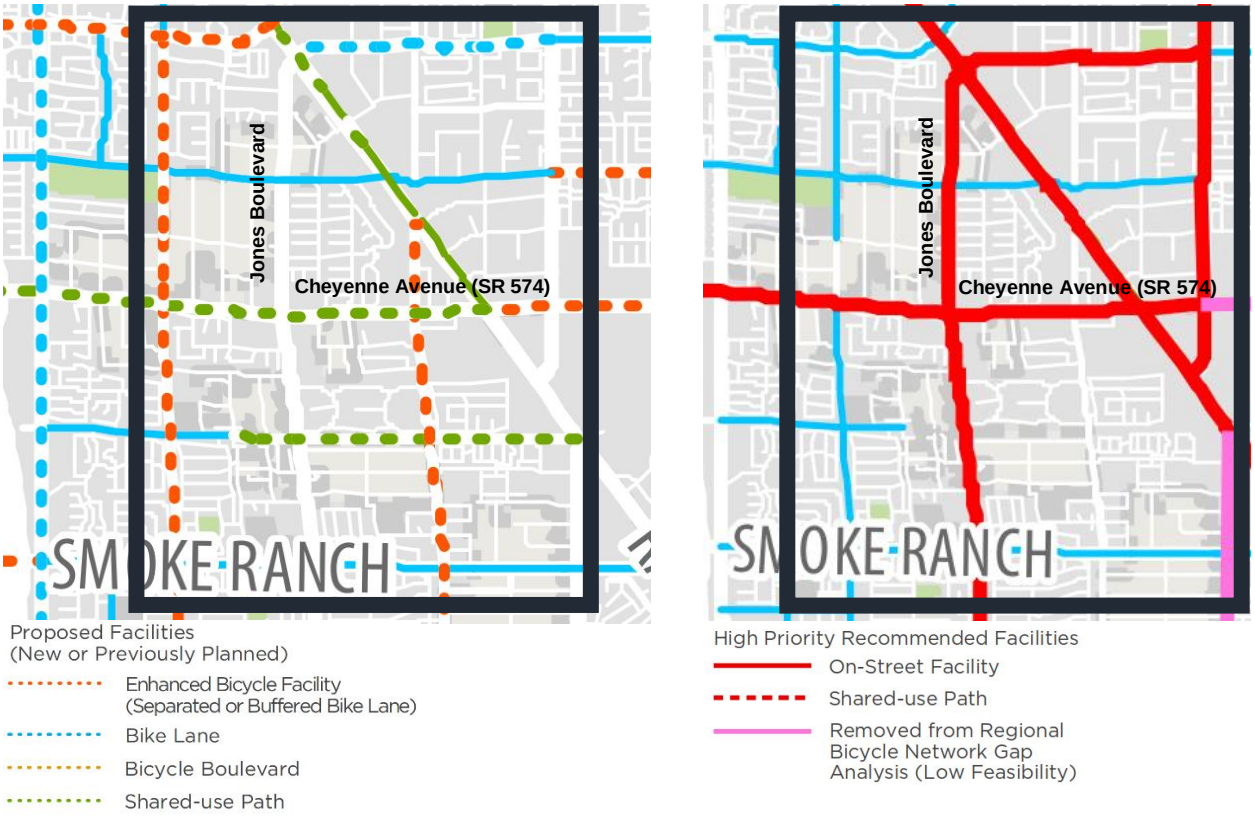
2.2.5 Regional Bicycle & Pedestrian Plan for Southern Nevada (2017)

The Regional Bicycle & Pedestrian Plan for Southern Nevada (RBPP) was complete in 2017 with the aim of providing a basis for improved bicycle and pedestrian environments throughout Clark County. This plan focuses on urbanized areas by identifying and prioritizing bicycle and pedestrian projects with regional significance. The criteria used in the RBPP is as follows:

- Identify bicycling and walking facilities that link communities
- Identify bicycling and walking facilities that serve regional hubs or destinations
- Establish policies and guidelines to support the continued improvement of the biking and walking environment
- Establish regional programs and provide best-practice examples of programs for local implementation

With the implementation of the plan, Southern Nevada will see health/wellness, safety, environmental, economic development, and equity benefits. Overall the RBPP supports the priorities set forth in the Southern Nevada Strong Regional Plan. The plan recommends a shared use path along Cheyenne Avenue (SR 574) from Lone Mountain Trail to Rancho Drive (SR 599) and enhanced bicycle facilities along Cheyenne Avenue (SR 574) from Rancho Drive (SR 599) to Allen Lane. Both Jones Boulevard and Cheyenne Avenue (SR 574) are also listed as high priority on-street bicycle facilities in the RBPP as seen in **Figure 7**. Additionally, Jones Boulevard and Cheyenne Avenue are identified as potential candidates for road diets in the RBPP. It is important to note that the Cheyenne Avenue (SR 574) corridor does not currently have available right-of-way for the recommended shared use path. A road diet on Cheyenne Avenue (SR 574) was considered as part of this SMP, however, it was determined that reducing the number of lanes on the corridor was not feasible due to existing traffic volumes. The road diet option along Cheyenne Avenue (SR 574) can be explored if a reduction in traffic volumes occurs in the future.

Figure 7 – Proposed Bicycle and Pedestrian Projects



Source: Regional Bicycle & Pedestrian Plan for Southern Nevada

2.2.6 Regional Complete Streets Study (2012)

Completed in 2012, the *Regional Complete Streets Study* (CS Study) was conducted for the development of a Regional Complete Streets policy statement to create guidelines for the Southern Nevada jurisdiction and to recommend the implementation of strategies for developing and funding complete streets projects. The goals presented in the CS Study include: provide a variety of feasible transportation choices throughout the Southern Nevada transportation network; enhance the livability of neighborhoods; provide a safe and inviting environment for pedestrians; design multi-modal roadway facilities that will not compromise the needs of larger vehicles; design flexibility for complete streets on different roadway types; and integrate land use with the implementation of complete streets design elements. Benefits that the SMP project corridors can expect if elements of CS Study were implemented include:

- Improvement of pedestrian safety
- Increased transportation choices
- Economic revitalization
- Environmental benefits
- Improved public health

2.2.7 Regional Transportation Plan for Southern Nevada 2017-2040 (2017)

The *Regional Transportation Plan 2017-2040* (RTP) is a comprehensive and long-range plan detailing the transportation investments that are needed now and in the future. The purpose of the plan is to determine how to best utilize federal funds throughout the region. The RTP is updated every four years. The four (4) primary strategies of the plan are to improve safety, manage congestion, enhance multimodal connectivity, and to maintain the current infrastructure. There are currently no projects in the plan that are specific to the SMP corridors.

2.3 Nevada Department of Transportation Documents

The following NDOT documents were reviewed:

- Nevada SHSP (2016)
- Statewide Transportation Improvement Program (2018)
- Access Management Systems and Standards (2017)

2.3.1 Nevada Strategic Highway Safety Plan (2016)

Adopted in 2006, updated in 2011 and in 2016, the Nevada SHSP provides a coordinated framework in which fatal and serious injury crashes are to be reduced within the State. Nevada's goal is Zero Fatalities, as such the interim goals are to reduce both fatalities and serious injuries from the five-year (2004-2008) baseline. The seven (7) critical emphasis areas of the plan were determined based on analysis of the crash data. These emphasis areas are: impaired driving, intersections, lane departures, motorcycles, occupant protection, pedestrians and young drivers. The SHSP's emphasis areas were considered in the development of the Jones Boulevard/Cheyenne Avenue (SR 574) SMP recommendations.

2.3.2 Statewide Transportation Improvement Program (2018)

The Statewide Transportation Improvement Program (STIP) is a planning process in which projects are proposed throughout the state for federal funding over the next four (4) years. The program provides a fiscally constrained planning document. NDOT, in collaboration with the Metropolitan Planning Organizations, develops the plan each year. Nothing specific to the SMP project corridor could be found in the current STIP.

2.3.3 Access Management Systems and Standards (2017)

The Access Management Systems and Standards (AMSS) is a report on the systems and standards used by NDOT for access management on NDOT maintained roadways. Cheyenne Avenue (SR 574) is an NDOT maintained roadway and therefore any changes need to be in line with the AMSS. These standards are used to regulate access onto state roadways in order to protect the health, safety, and welfare of the public. It is also used to improve traffic operations for the movement of people and goods, and to preserve the planned function of state roadways.

2.4 Summary of Recommendations from Review of Policies, Plans, and Studies

The following list of recommendations and findings was prepared based on the review of known policies, plans, and studies related to the SMP project corridors. The recommendations and findings in these studies were considered during the SMP process:

- Improvement of transit facilities
  - Construct full shelter transit stops where right-of-way allows

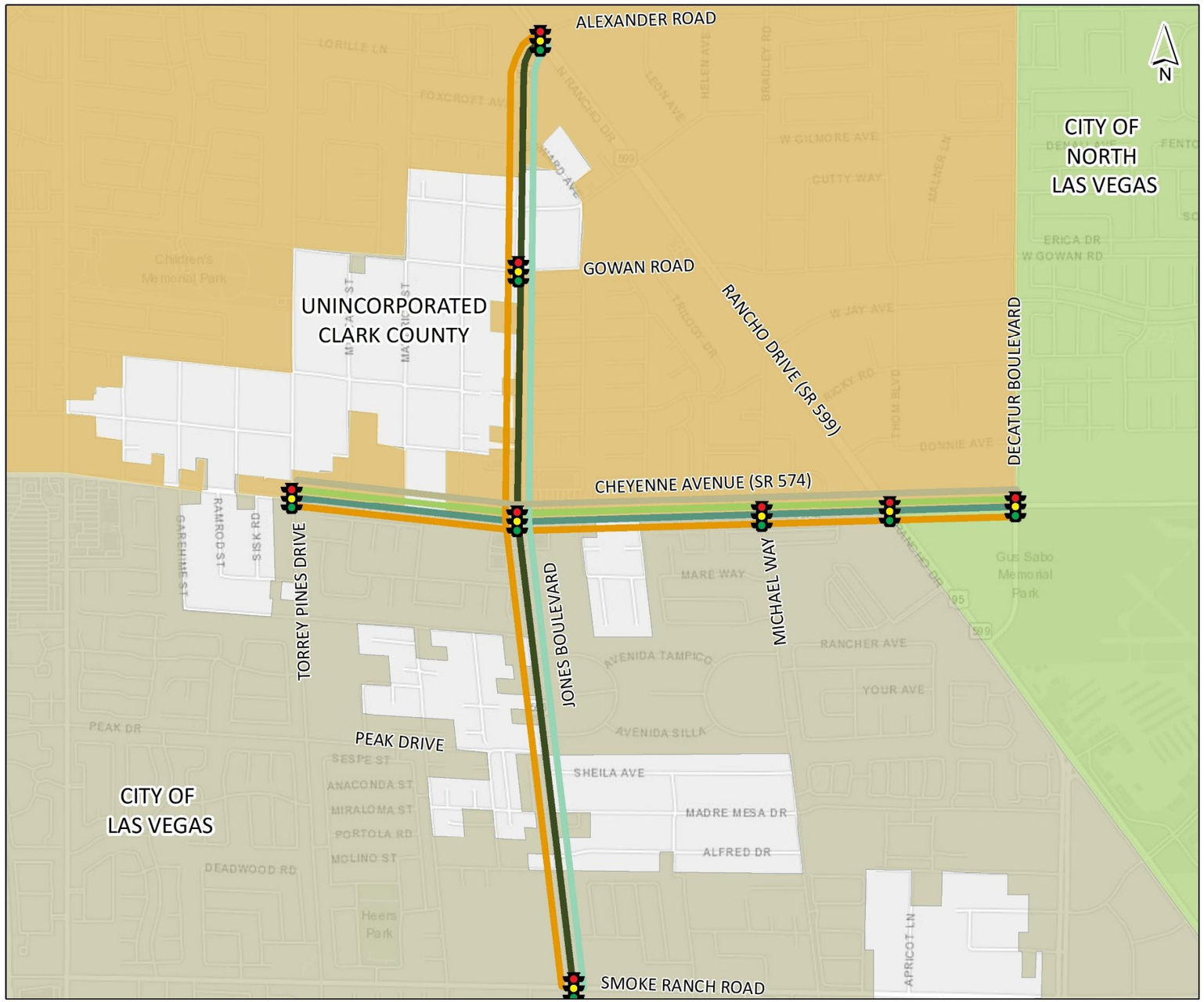
- Upgrade and enhance current transit stops
- Provide dedicated transit lanes
- Construct bus turnouts

- Improve corridor lighting
  - Conduct a lighting study and increase lighting at appropriate locations
- Improved pedestrian facilities
  - Restripe crosswalks
  - Install and rehabilitate curb ramps and tactile pads
  - Install sidewalk at missing locations
  - Evaluate facilities and upgrade to be ADA compliant
- Improve bicycle facilities
  - Provide a bicycle route along the entire corridor
  - Provide bicycle parking
- Roadway Capacity
  - Provide adequate left-turn storage bay lengths along the corridor

2.5 Location of Policies, Plans and Studies

Figure 8 shows the location of each of the policies, plans, and studies summarized in this section of the report in relation to the SMP project corridors.

Figure 8 – Location of Policies, Plans and Studies



Regional and Statewide Plans:

Regional Transportation Commission of Southern Nevada

- Regional Transportation Plan for Southern Nevada
- Clark County Area Access Management Plan
- RTC Bicycle and Pedestrian Plan
- Policy for Complete Streets
- Complete Streets Design Guidelines for Livable Communities
- Regional Complete Streets Study
- Regional Transportation Plan 2017-2040

Nevada Department of Transportation

- Statewide Transportation Improvement Program

3 LAND USE ANALYSIS

This section presents the existing and proposed land use analysis for the areas surrounding the Jones Boulevard/Cheyenne Avenue (SR 574) project corridors.

3.1 Existing Land Uses

The existing land uses surrounding the project corridors of Jones Boulevard from Torrey Pines Drive to Decatur Boulevard and Cheyenne Avenue (SR 574) from Smoke Ranch Road to Rancho Drive (SR 599) are presented in **Figure 9** through **Figure 15,** these figures also identify vacant buildings or lots. The existing land use figures are labeled as follows:

- **Figure 9** – 2018 Existing Land Use from Torrey Pines Drive to Bronco Street
- **Figure 10** – 2018 Existing Land Use from Jones Boulevard to Michael Way
- **Figure 11** – 2018 Existing Land Use from Arlene Way to Decatur Boulevard
- **Figure 12** – 2018 Existing Land Use from Smoke Ranch Road to Sheila Avenue
- **Figure 13** – 2018 Existing Land Use from Peak Drive to Cheyenne Avenue (SR 574)
- **Figure 14** – 2018 Existing Land Use from Miracosta Avenue to Gowan Road
- **Figure 15** – 2018 Existing Land Use from Duncan Drive to Rancho Drive (SR 599)

Figure 9 – 2018 Existing Land Use from Torrey Pines to Bronco Street

Figure 10 – 2018 Existing Land Use from Jones Boulevard to Michael Way

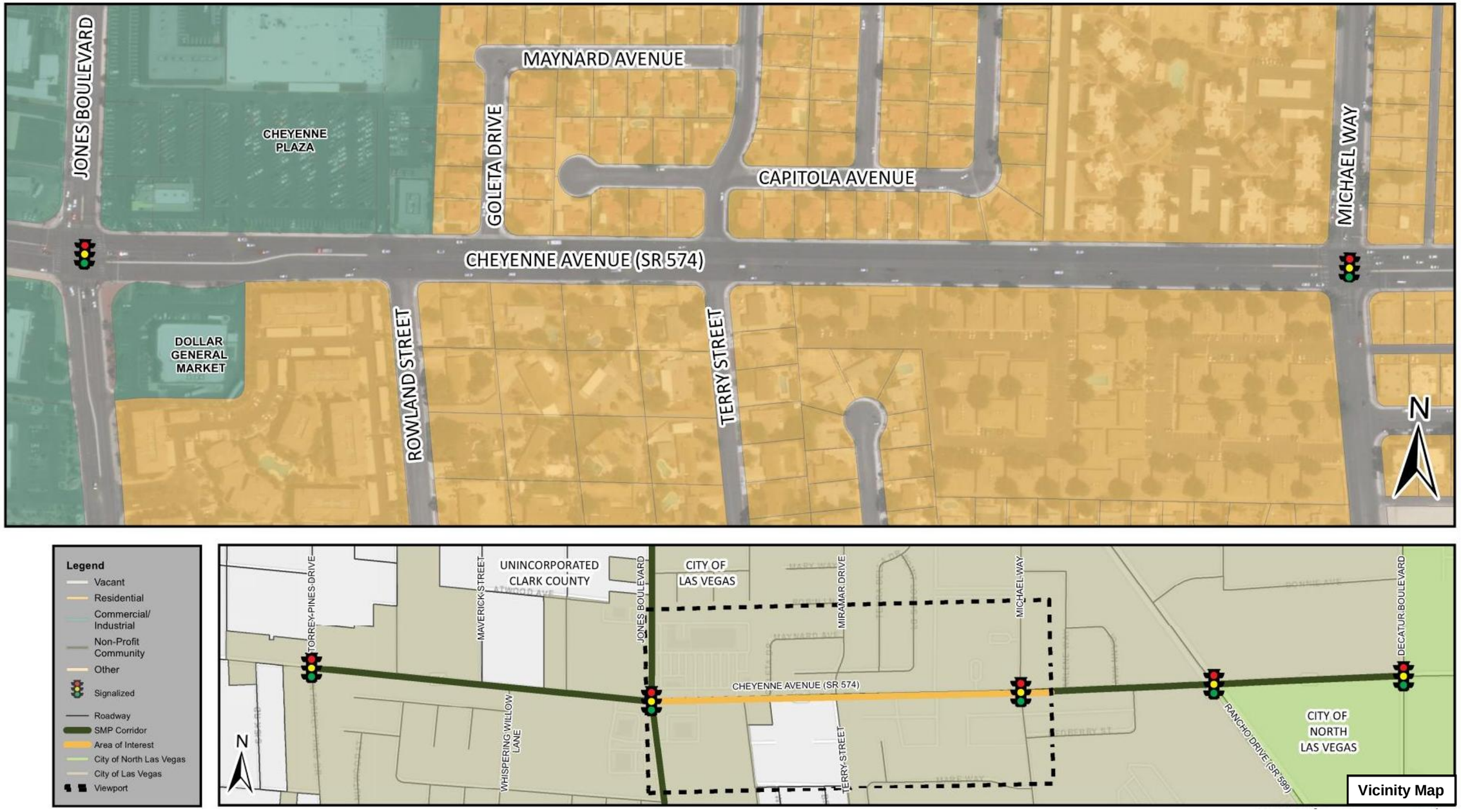


Figure 11 – 2018 Existing Land Use from Arlene Way to Decatur Boulevard

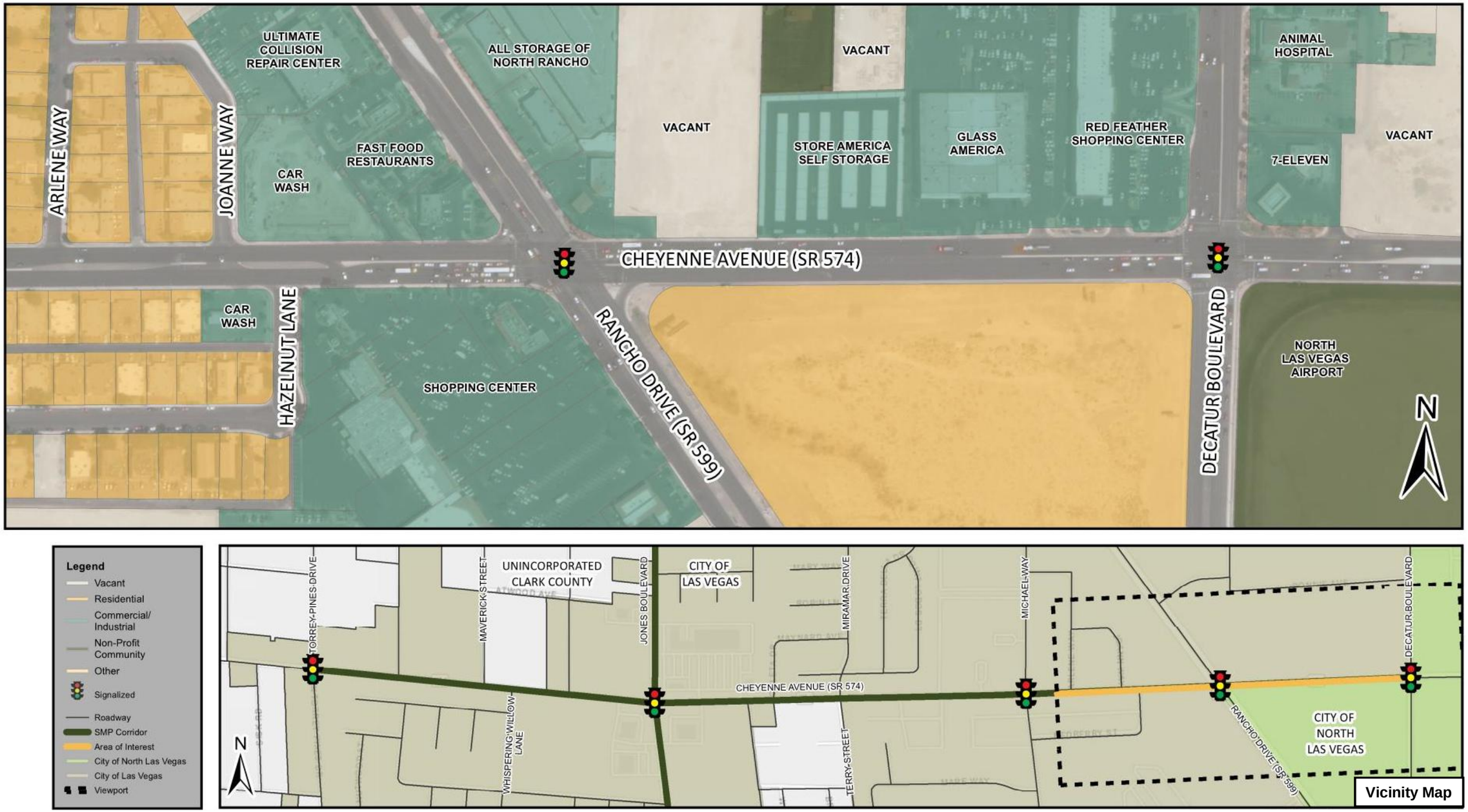


Figure 12 – 2018 Existing Land Use from Smoke Ranch Road to Sheila Avenue

Figure 13 – 2018 Existing Land Use from Peak Drive to Cheyenne Avenue (SR 574)

Figure 14 – 2018 Existing Land Use from Miracosta Avenue to Gowan Road

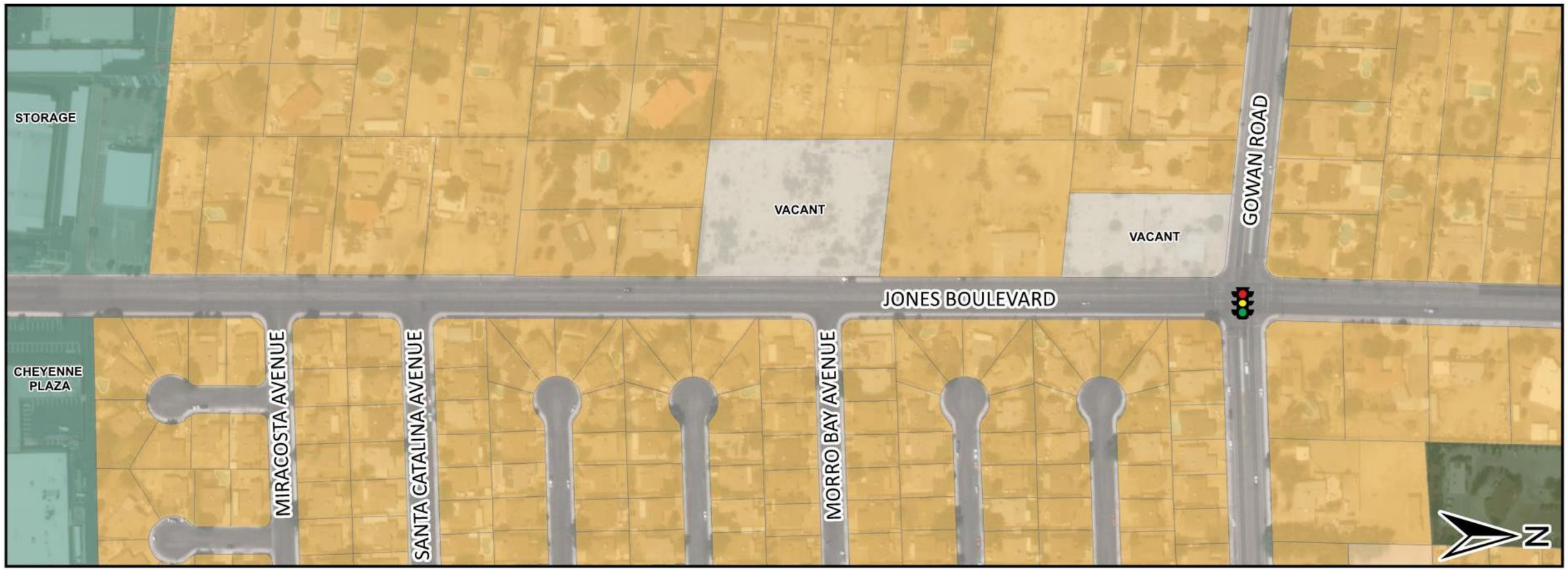
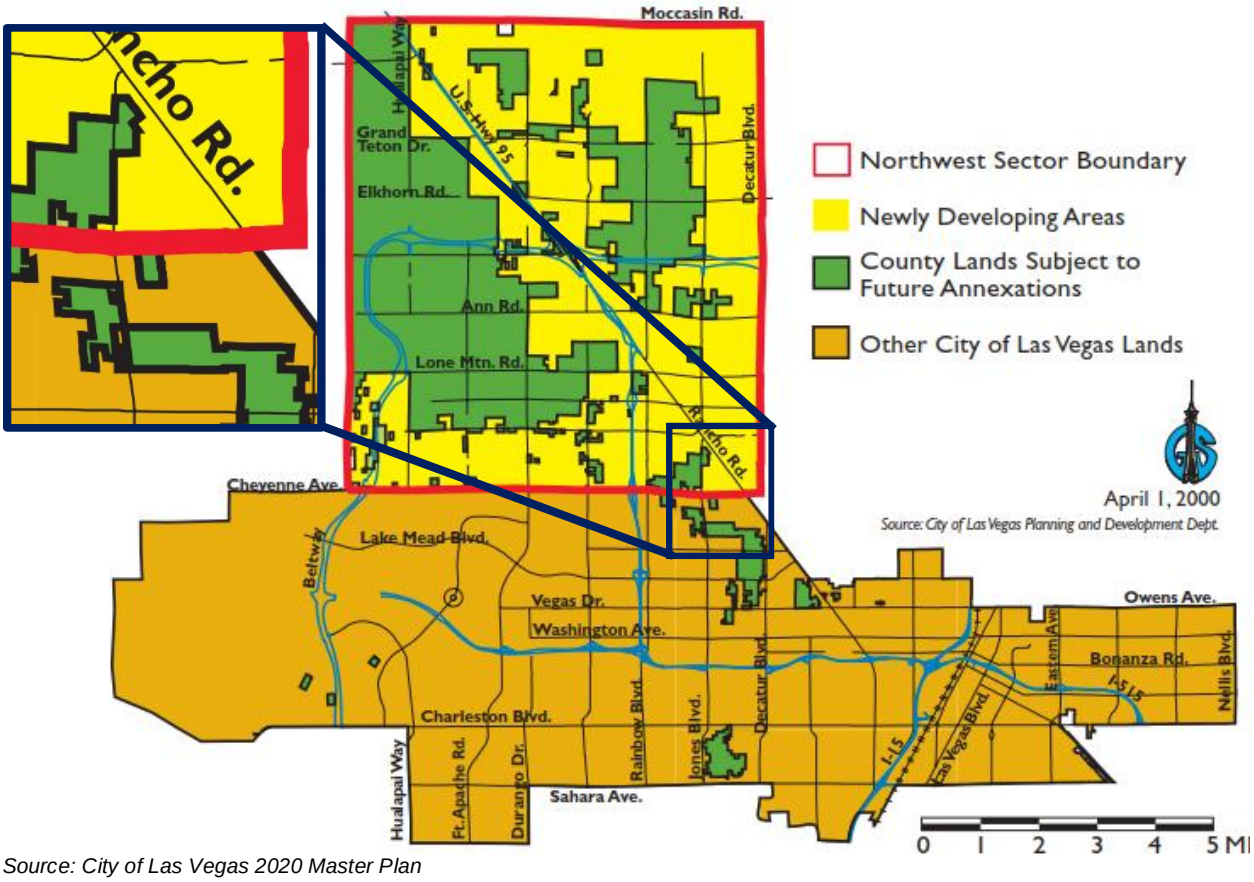


Figure 15 – 2018 Existing Land Use from Duncan Drive to Rancho Drive (SR 599)

3.2 Proposed Land Uses

Proposed land uses surrounding the SMP project corridors are summarized for the City of Las Vegas in this subsection of the report. Proposed land uses for the project corridor are taken from the City's master plan. The LV Master Plan shows that the portion of the project corridor on the north side of Cheyenne Avenue (SR 574) and both sides of Jones Boulevard north of Cheyenne Avenue (SR 574) are part of the City's newly developing area strategy as seen in **Figure 16**. The plan focuses on creating neighborhoods that are walkable and sustainable. The plan involves setting aside land to be developed into parks and trails connecting the parks as well as connecting residential areas to commercial shopping and schools. Commercial land use areas are also encouraged and (to be within walking distance of residential areas) to implement traffic calming measures. At major intersections areas of mixed land use including high density residential, commercial, and office uses should be supported and linked to residential only areas by pedestrian paths. Additionally, rural residential areas should be preserved and buffered from surrounding higher density development in accordance with the Nevada Revised Statutes.

Figure 16 – Newly Developing Areas



Source: City of Las Vegas 2020 Master Plan

4 ECONOMIC DEVELOPMENT

This section presents the evaluation of economic development within the study area corridor. Various plans and studies were reviewed to determine existing and future economic development plans along the corridor. The following reports are summarized in this section:

- LV Master Plan
- SNV Strong Plan
- RBPP

4.1 City of Las Vegas 2020 Master Plan

Developed in 2000, the *LV Master Plan* provides a broad and comprehensive direction the City of Las Vegas needs to implement to address various planning decisions. As stated in **Section 2.1** of this report, the area surrounding the north side of Jones Boulevard and Cheyenne Avenue (SR 574) project corridors is classified as a newly developing area. The newly developing area plans will focus on creating neighborhoods that are walkable, sustainable, and foster a sense of community. The Master Plan states that newly developing areas for the city will contain adequate educational facilities, recreational and open space, and be linked to major employment centers by mass transit, including buses, and trails. This initiative will help the economy by promoting mobility for all residents and providing opportunities to foster community investment.

4.2 Southern Nevada Strong: Regional Plan

The SNV Strong Plan, published in January 2015, lists the vision Southern Nevada residents have for the future of the community. The SNV Strong Plan initiative funded by the U.S. Department of Housing and Urban Development set out to identify key areas throughout Southern Nevada having potential for establishment of long-term economic success. The SNV Strong Plan identified four (4) major areas in the region for economic growth. The ideas and recommendations found in this plan can be applied to the areas surrounding the Jones Boulevard/Cheyenne Avenue (SR 574) project corridors, specifically:

- Providing a variety of well-paying jobs
- Alignment of land use and transportation plans with local regional economic development plans
- Great public education
- Offer a variety of attractions to attract and retain residents and businesses
- Enhance the role of small businesses
- Support education hand in hand with land use and transportation planning
- Provide mixed-use development
- Improve multi-modal transportation opportunities especially in low-income communities

4.3 RTC Bicycle and Pedestrian Plan

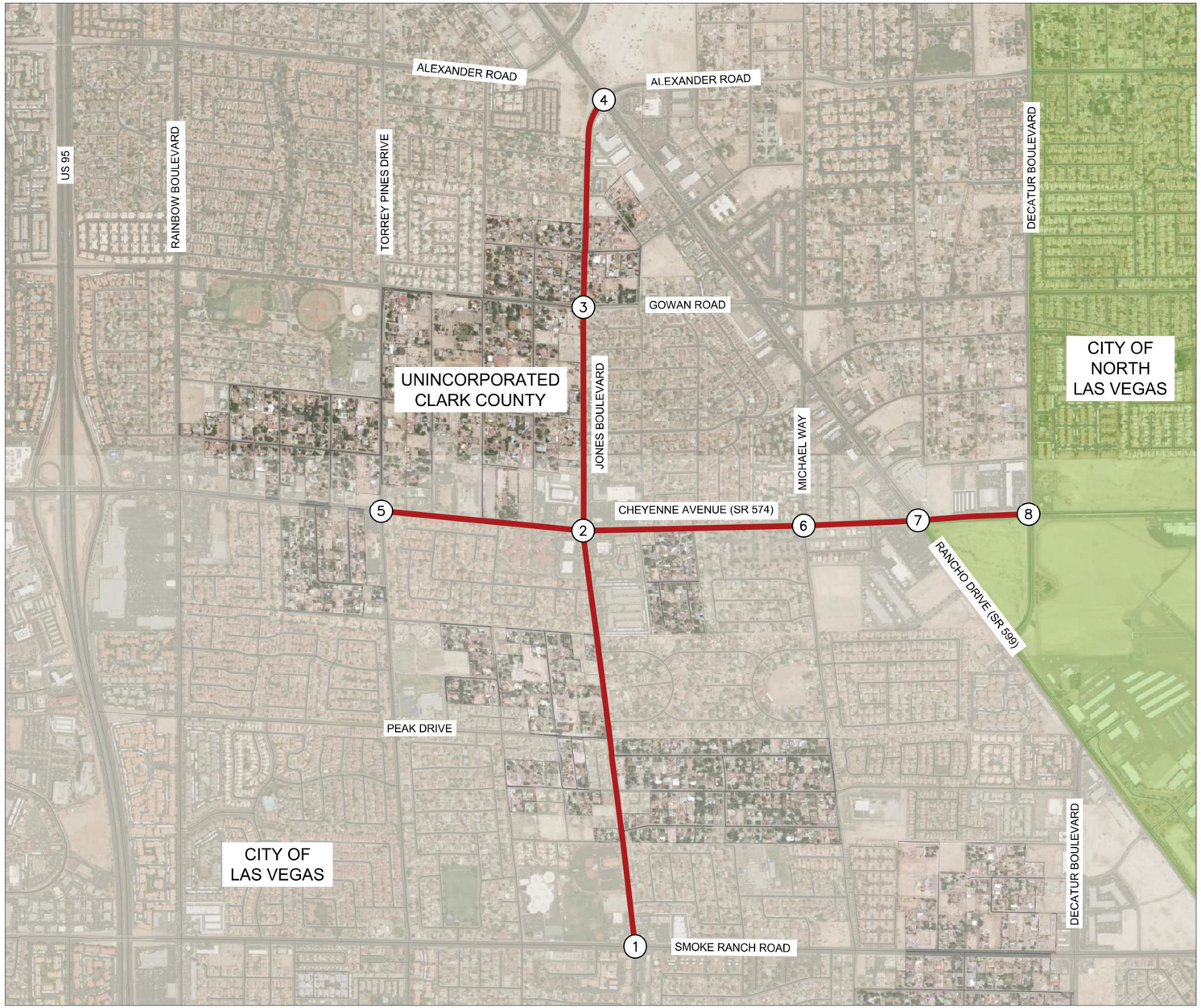
The RTC RBPP identified the existing and planned bicycle and pedestrian facilities within the region. RTC's vision of the Bike and Pedestrian Plan is to "provide for a regional alternative mode network consisting of paths, enhanced sidewalks, bicycle lanes and routes that form an interconnected, non-motorized transportation system for the Las Vegas Valley." The ideas and recommendations found in this plan can be applied to the areas surrounding the project corridors, resulting in future opportunities for economic development such as increased employment levels, business starts, and increased property value.

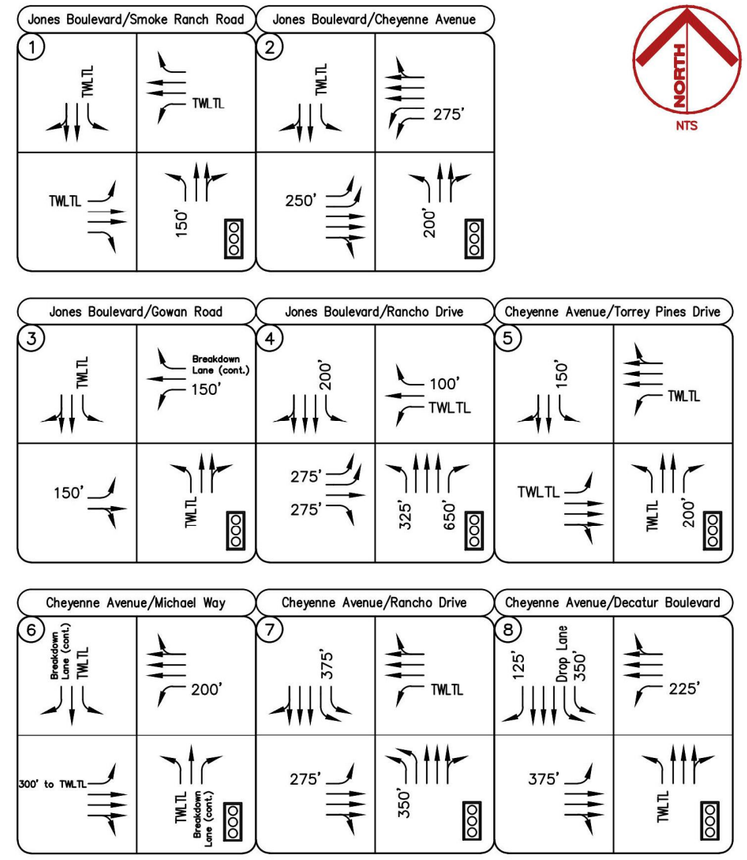
5 EXISTING ROADWAY CONDITIONS

The following section presents the existing roadway conditions along Jones Boulevard from Smoke Ranch Road to Rancho Drive (SR 599) and along Cheyenne Avenue (SR 574) from Torrey Pines Drive to Decatur Boulevard. The Jones Boulevard corridor consists of two (2) travel lanes in each direction with a TWLTL and the Cheyenne Avenue (SR 574) corridor consists of three (3) travel lanes in each direction with a TWLTL. **Figure 17** illustrates the existing lane configuration and control at each of the key intersections. **Figure 18** and **Figure 19** show the existing cross sections for each segment along both project corridors. **Figure 20** through **Figure 26** illustrate the existing conditions along each corridor. A site visit was conducted to verify existing roadway conditions along the project corridor. The existing roadway conditions figures are labeled as follows:

- **Figure 17** – 2018 Existing Lane Configuration and Control on Jones Boulevard and Cheyenne Avenue (SR 574)
- **Figure 18** – 2018 Existing Conditions Cross Sections for Jones Boulevard from Smoke Ranch Road to Rancho Drive (SR 599)
- **Figure 19** – 2018 Existing Conditions Cross Sections for Cheyenne Avenue (SR 574) from Torrey Pines Drive to Decatur Boulevard
- **Figure 20** – 2018 Existing Conditions of Cheyenne Avenue (SR 574) from West of Torrey Pines to West of Jones Boulevard
- **Figure 21** – 2018 Existing Conditions of Cheyenne Avenue (SR 574) from West of Jones Boulevard to East of Michael Way
- **Figure 22** – 2018 Existing Conditions of Cheyenne Avenue (SR 574) from East of Michael Way to East of Decatur Boulevard
- **Figure 23**– 2018 Existing Conditions of Jones Boulevard from South of Smoke Ranch Road to North of Sheila Avenue
- **Figure 24** – 2018 Existing Conditions of Jones Boulevard from South of Peak Drive to North of Cheyenne Avenue (SR 574)
- **Figure 25** – 2018 Existing Conditions of Jones Boulevard from North of Cheyenne Avenue (SR 574) to North of Gowan Road
- **Figure 26** – 2018 Existing Conditions of Jones Boulevard from South of Duncan Drive to North of Rancho Drive (SR 599)

Figure 17 – 2018 Existing Lane Configuration and Control on Jones Boulevard and Cheyenne Avenue (SR 574)

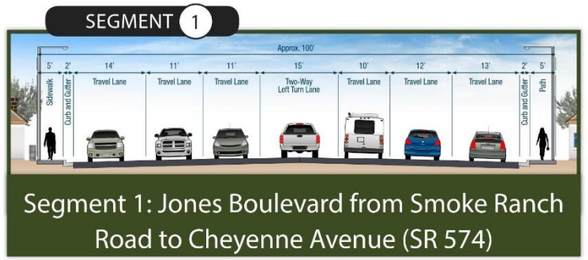


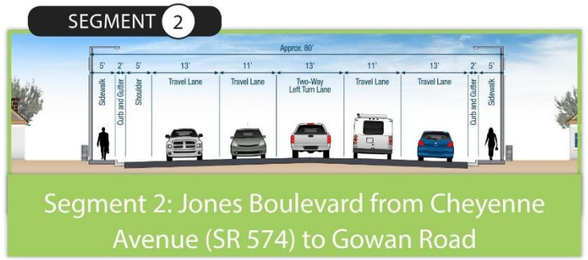


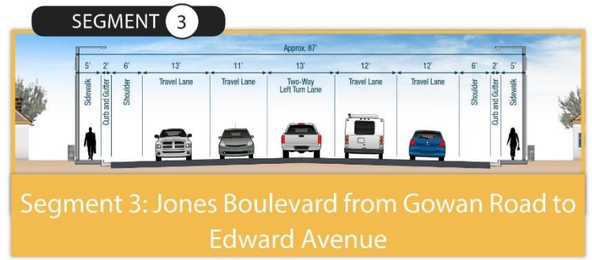
LEGEND:

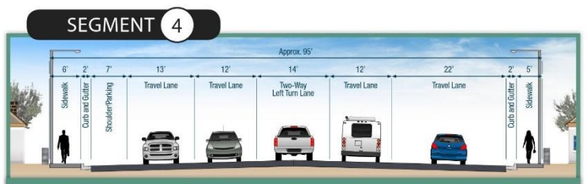
- (1) Study Area Key Intersection
- Study Area Corridor
- City of North Las Vegas
- City of Las Vegas
- Major Roads
- Signalized Intersection

Figure 18 – 2018 Existing Conditions Cross Sections for Jones Boulevard from Smoke Ranch Road to Rancho Drive (SR 599)









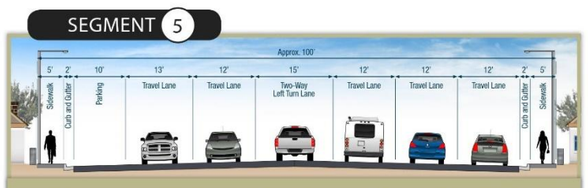
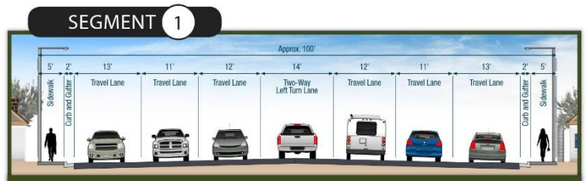
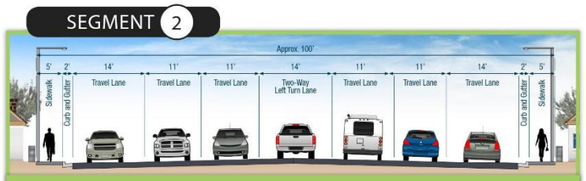


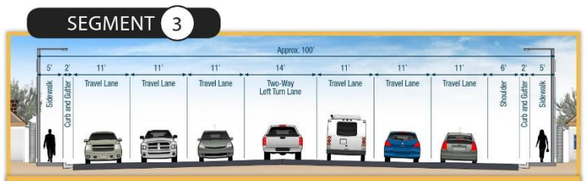
Figure 19 – 2018 Existing Conditions Cross Sections for Cheyenne Avenue (SR 574) from Torrey Pines Drive to Decatur Boulevard



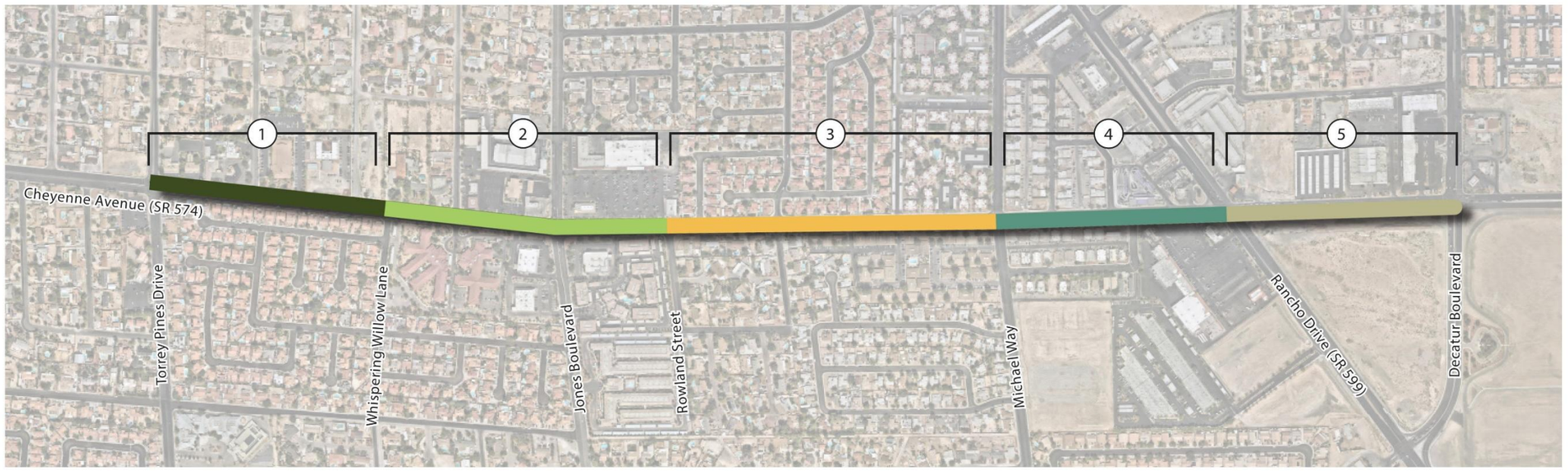
Segment 1: Cheyenne Avenue (SR 574) from Torrey Pines Drive to Whispering Willow Lane

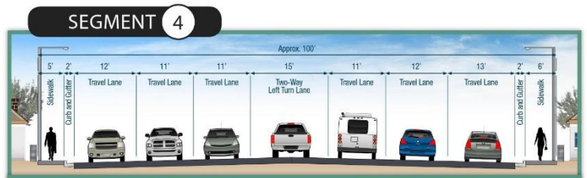


Segment 2: Cheyenne Avenue (SR 574) from Whispering Willow Lane to Rowland Street

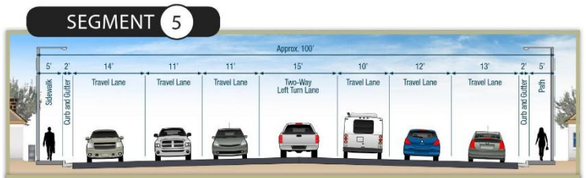


Segment 3: Cheyenne Avenue (SR 574) from Rowland Street to Michael Way





Segment 4: Cheyenne Avenue (SR 574) from Michael Way to Rancho Drive (SR 599)



Segment 5: Cheyenne Avenue (SR 574) from Rancho Drive (SR 599) to Decatur Boulevard

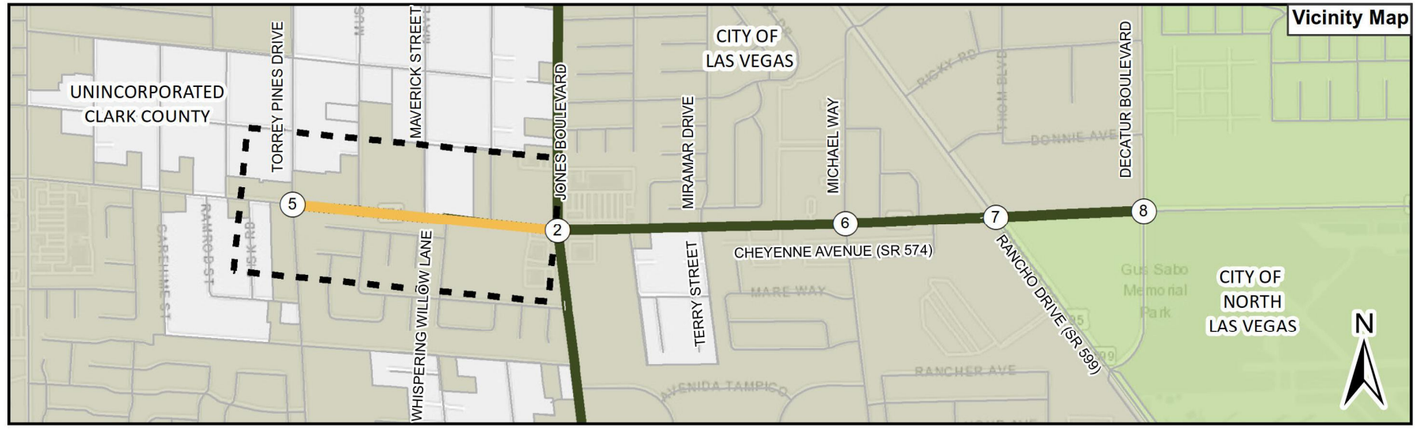
Figure 20 – 2018 Existing Conditions of Cheyenne Avenue (SR 574) from West of Torrey Pines to West of Jones Boulevard

Legend

- Bus Stop
- Driveway
- Signalized Intersection
- Stop-Controlled Intersection
- Roadways
- Bicycle Lane
- Marked Crosswalk

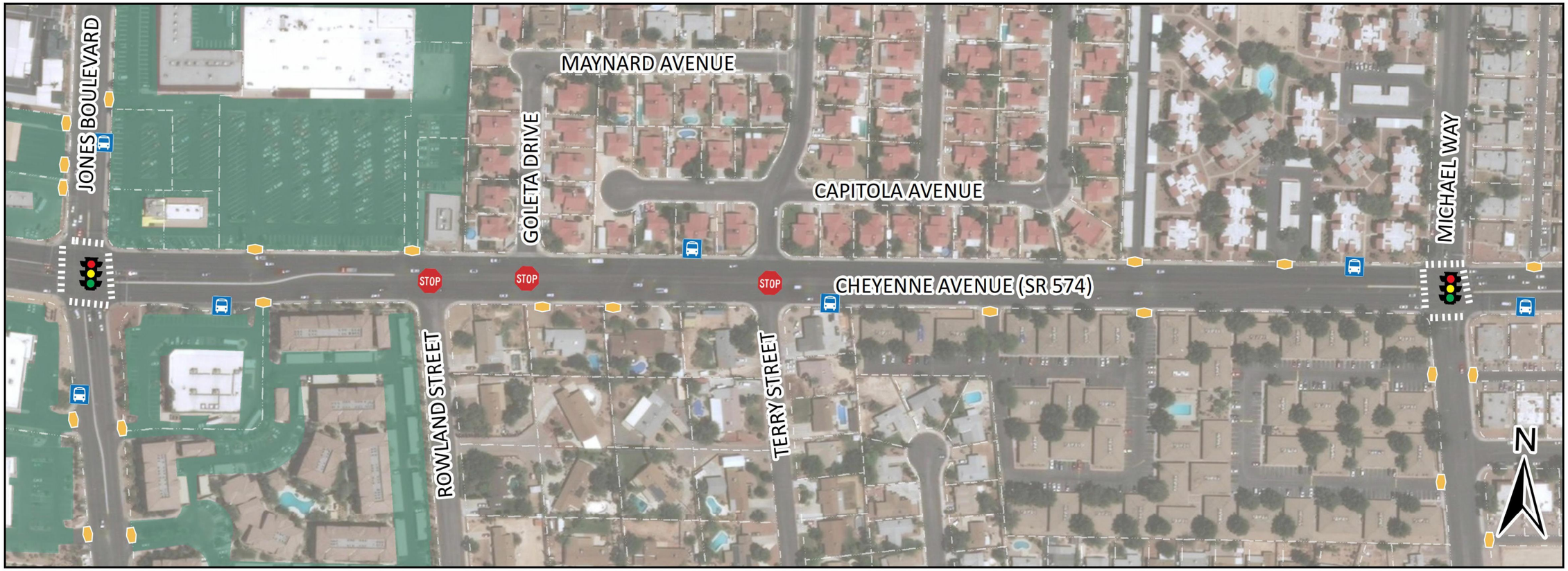
Vicinity Map Legend

- SMP Corridor
- Area of Interest
- City of North Las Vegas
- City of Las Vegas
- Viewport
- Property Line
- Parking



Posted Speed Limit: 45 MPH

Figure 21 – 2018 Existing Conditions of Cheyenne Avenue (SR 574) from West of Jones Boulevard to East of Michael Way

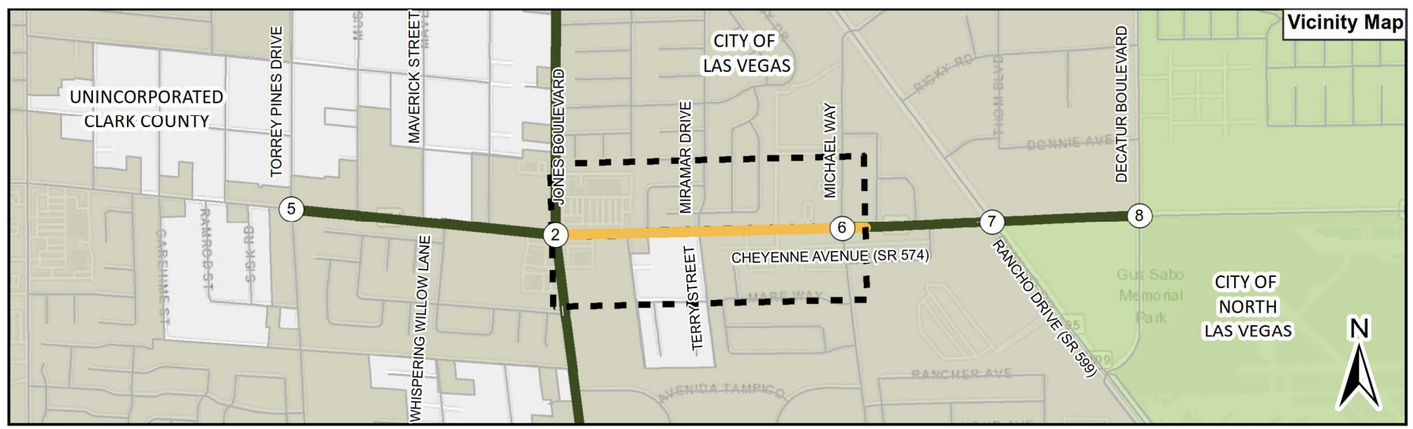


Legend

- Bus Stop
- Driveway
- Signalized Intersection
- Stop-Controlled Intersection
- Roadways
- Bicycle Lane
- Marked Crosswalk

Vicinity Map Legend

- SMP Corridor
- Area of Interest
- City of North Las Vegas
- City of Las Vegas
- Viewport
- Property Line
- Parking



Posted Speed Limit: 45 MPH

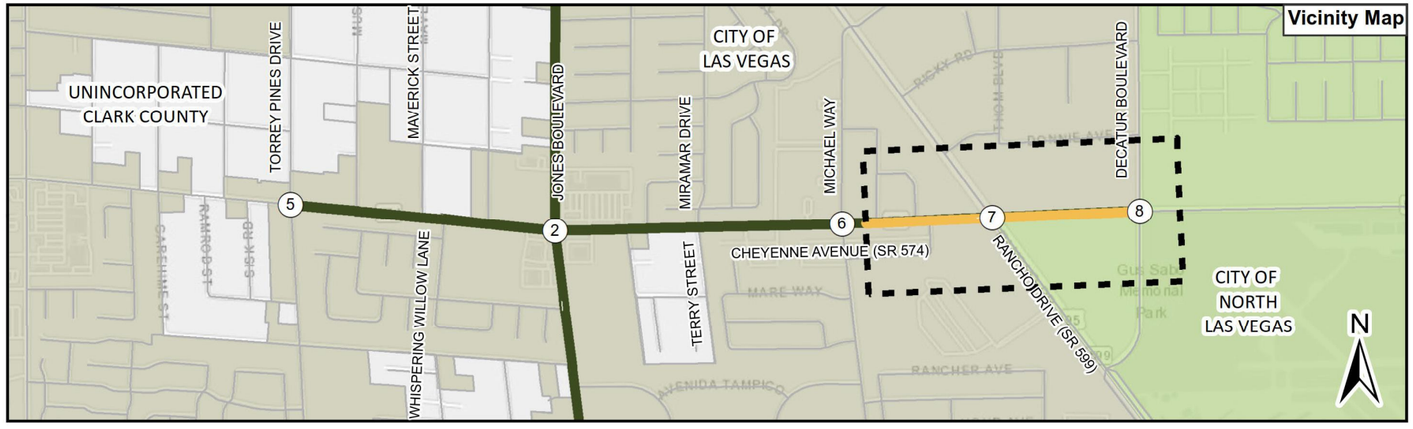
Figure 22 – 2018 Existing Conditions of Cheyenne Avenue (SR 574) from East of Michael Way to East of Decatur Boulevard

Legend

- Bus Stop
- Driveway
- Signalized Intersection
- Stop-Controlled Intersection
- Roadways
- Bicycle Lane
- Marked Crosswalk

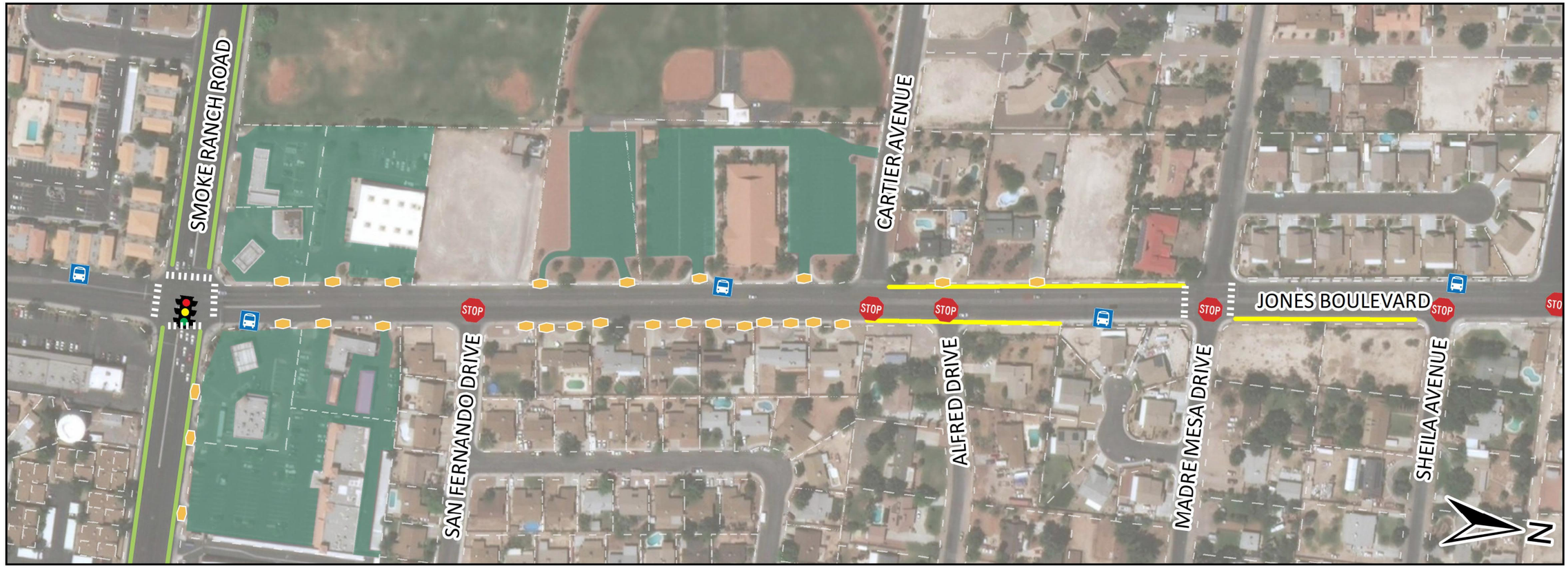
Vicinity Map Legend

- SMP Corridor
- Area of Interest
- City of North Las Vegas
- City of Las Vegas
- Viewport
- Property Line
- Parking



Posted Speed Limit: 45 MPH

Figure 23 – 2018 Existing Conditions of Jones Boulevard from South of Smoke Ranch Road to North of Sheila Avenue

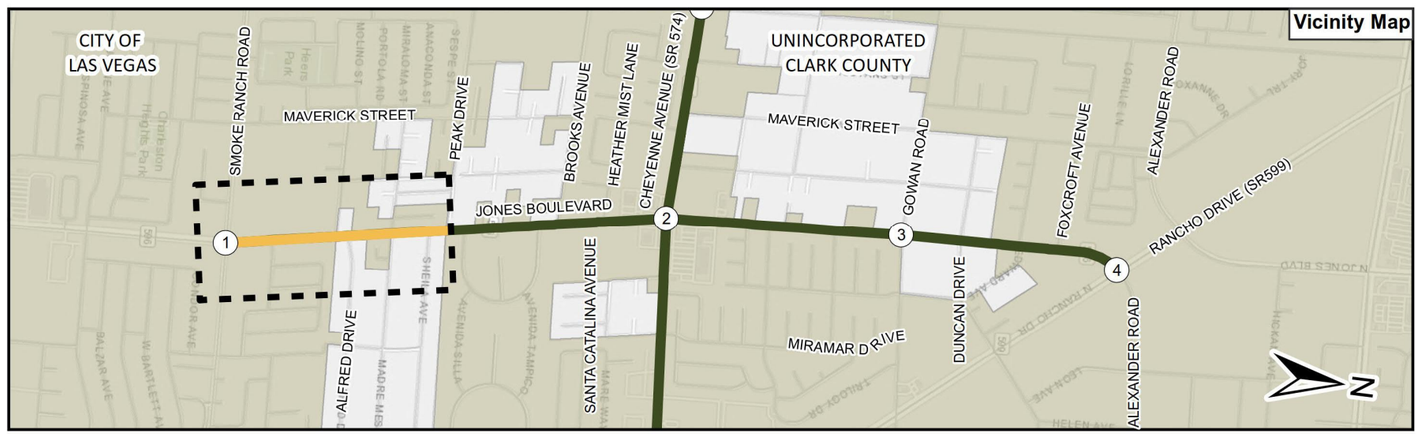


Legend

- Bus Stop
- Driveway
- Signalized Intersection
- Stop-Controlled Intersection
- Roadways
- Bicycle Lane
- Marked Crosswalk

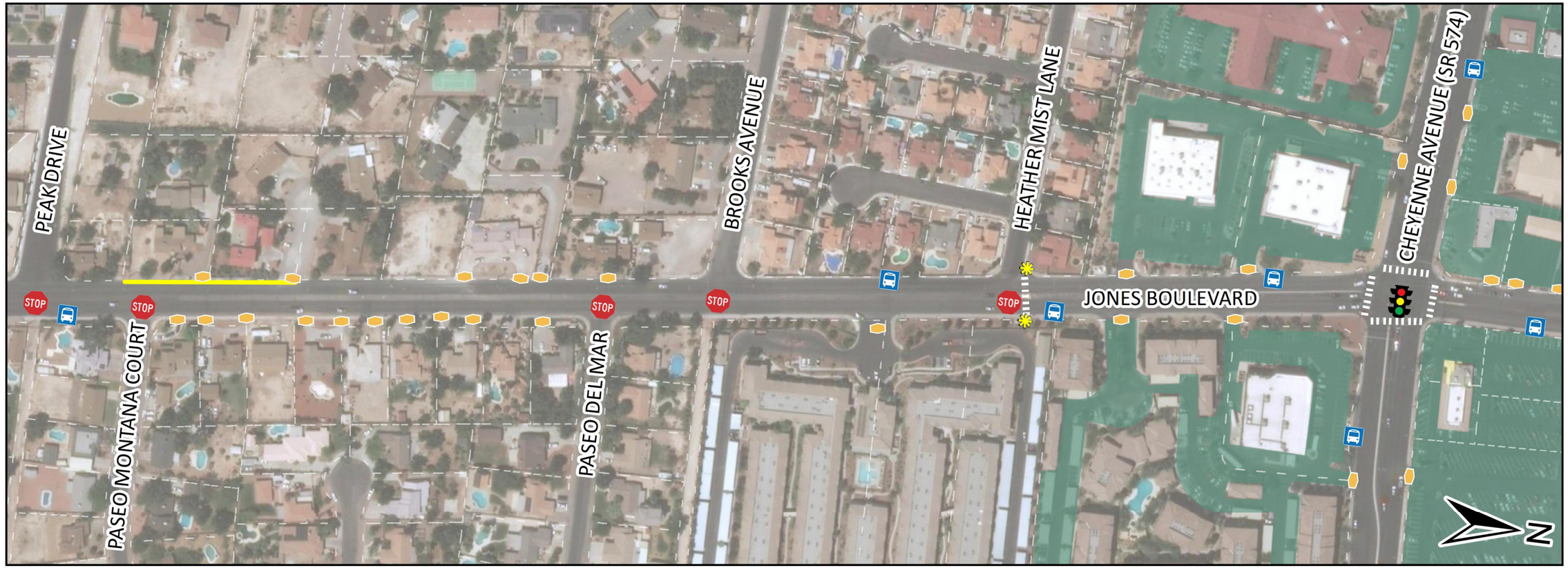
Vicinity Map Legend

- SMP Corridor
- Area of Interest
- City of North Las Vegas
- City of Las Vegas
- Viewport
- No Sidewalk
- Property Line
- Parking



Posted Speed Limit: 35 MPH

Figure 24 – 2018 Existing Conditions of Jones Boulevard from South of Peak Drive to North of Cheyenne Avenue (SR 574)

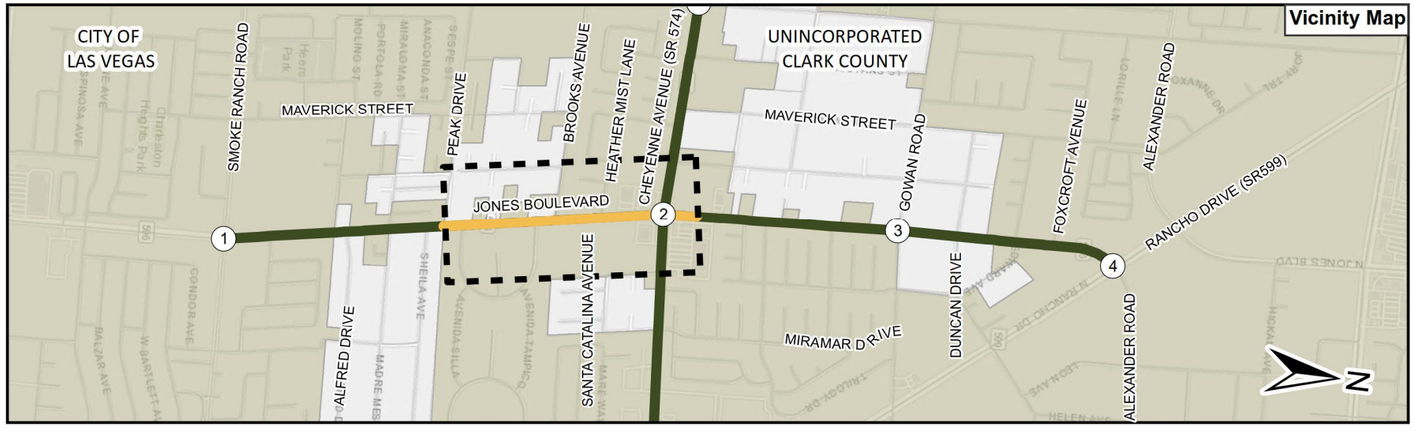


Legend

- Flasher
- Bus Stop
- Driveway
- Signalized Intersection
- Stop-Controlled Intersection
- Roadways
- Bicycle Lane
- Marked Crosswalk

Vicinity Map Legend

- SMP Corridor
- Area of Interest
- City of North Las Vegas
- City of Las Vegas
- Viewport
- No Sidewalk
- Property Line
- Parking



Posted Speed Limit: 35 MPH

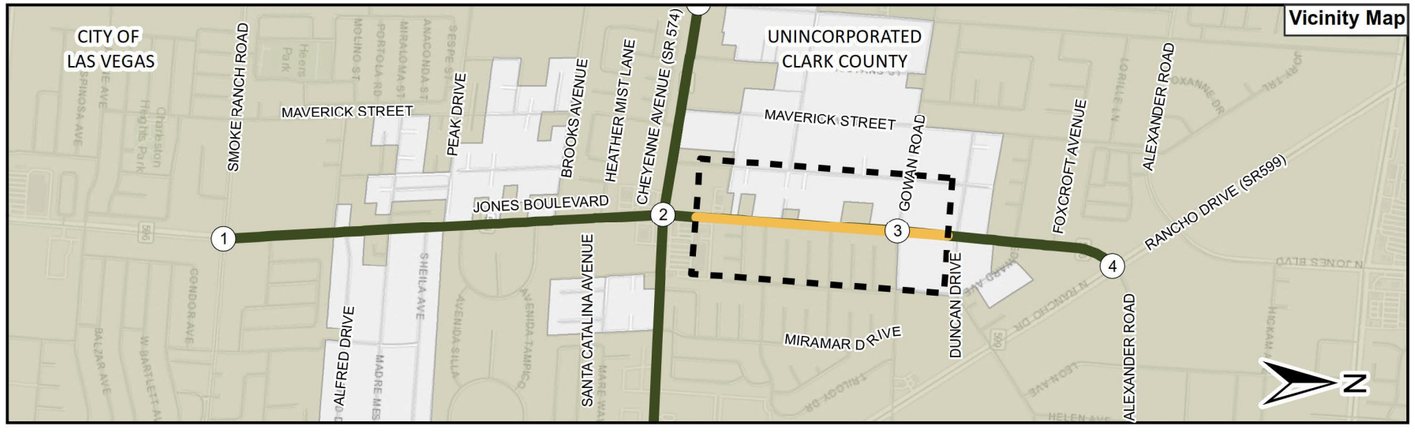
Figure 25 – 2018 Existing Conditions of Jones Boulevard from North of Cheyenne Avenue (SR 574) to North of Gowan Road

Legend

- Bus Stop
- Driveway
- Signalized Intersection
- Stop-Controlled Intersection
- Roadways
- Bicycle Lane
- Marked Crosswalk

Vicinity Map Legend

- SMP Corridor
- Area of Interest
- City of North Las Vegas
- City of Las Vegas
- Viewport
- No Sidewalk
- Property Line
- Parking



Posted Speed Limit: 35 MPH

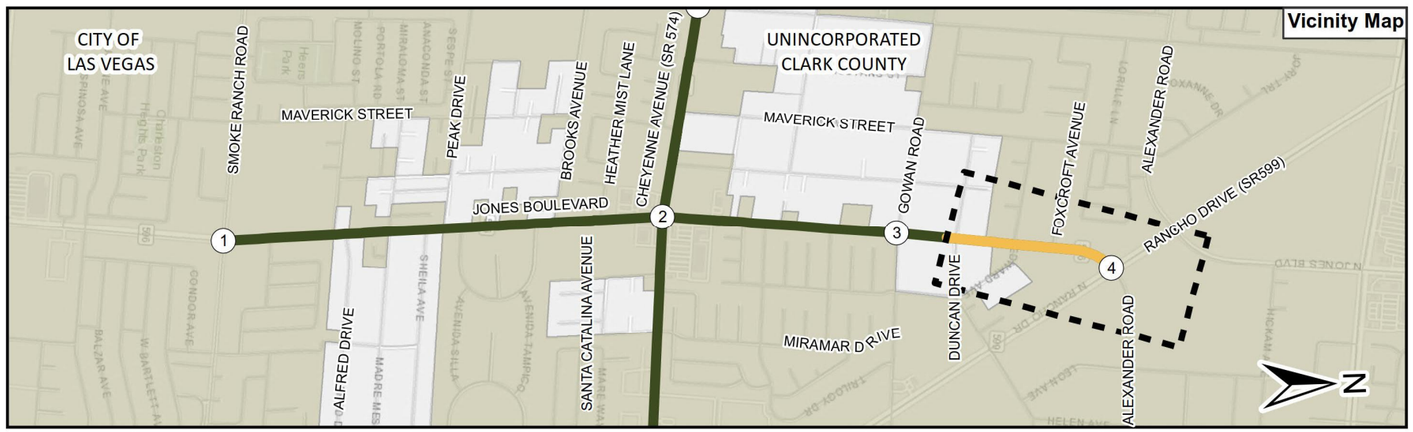
Figure 26 – 2018 Existing Conditions of Jones Boulevard from South of Duncan Drive to North of Rancho Drive (SR 599)

Legend

- Bus Stop
- Driveway
- Signalized Intersection
- Stop-Controlled Intersection
- Roadways
- Bicycle Lane
- Marked Crosswalk

Vicinity Map Legend

- SMP Corridor
- Area of Interest
- City of North Las Vegas
- City of Las Vegas
- Viewport
- Property Line
- Parking



Posted Speed Limit: 35 MPH

5.1 Schools

There are ten (10) schools along the Jones Boulevard and Cheyenne Avenue (SR 574) SMP project corridors: five (5) elementary schools, three (3) middle/junior high schools, and two (2) high schools as shown in **Table 1**. There are no designated school zones along the corridor, however, the attendance boundary for Doris M Reed Elementary School (Reed Elementary School) crosses Cheyenne Avenue (SR 574) in the vicinity of Michael Way, and the attendance boundary for R. E. Tobler Elementary School is on both sides of Jones Boulevard north of Cheyenne Avenue (SR 574). According to the Public School Review website 94% of students at Reed Elementary School are eligible for free lunch which correlates to a higher use of walking and biking for students[1]. Clark County also conducted a School Walk Audit for Reed Elementary School in 2016, the walk audit indicated that only 12 bicycles were on campus on the day the audit was conducted. The walk audit report also states that no crossing guards were assigned to Reed Elementary School as of May 2016.

Table 1 – Schools Along Study Corridors

School	High School	Middle School	Elementary School
Berkeley L Bunker Elementary School			X
Cheyenne High School	X		
Cimarron-Memorial High School	X		
Claude & Stella Parson Elementary School			X
Doris M Reed Elementary School			X
J. Harold Brinley Middle School		X	
Molasky Junior High School		X	
Ollie Detwiler Elementary School			X
R.E. Tobler Elementary School			X
Swainston Middle School		X	

5.2 Speed Limit Sign Inventory

One of the safety concerns along the two (2) corridors is speeding. Through discussions with the TAC, a speed limit sign inventory was recommended to determine if existing speed limit signs are in compliance with current standards. The location and size of speed limit signs along the two study corridors of Jones Boulevard and Cheyenne Avenue (SR 574) were reviewed and recorded in the field to determine if size, spacing and location are in compliance with the current Manual on Uniform Traffic Control Devices (MUTCD).

Out of the eight (8) speed limit signs along the Jones Boulevard corridor, seven (7) do not meet the current MUTCD standards for size along a multi-lane road, however, they are still in compliance with MUTCD standards for "Option" as described in Section 2B.03.04:

> *Where the posted speed limit is 35 mph or less on a multi-lane highway or street, other than for a STOP sign, the minimum size shown in the Single Lane column in Table 2B-1 may be used.*

[1] *Public Elementary School Eligible for Free Lunch in Nevada https://www.publicschoolreview.com/free-lunch-stats/nevada/elementary accessed December 20, 2019 for this report).*

All of the eight (8) speed limit signs along Cheyenne Avenue do not meet the current MUTCD standards for size along a multi-lane road. A full review of the speed limit sign memorandum can be found in **Appendix B.**

6 TRAFFIC ANALYSIS

This section presents the traffic analysis data conducted for the SMP. The following subsections include the peak hour volume data at the key intersections, the Annual Average Daily Traffic (AADT) volume data, and a LOS analysis at each of the key intersections.

6.1 Peak Hour Volumes

Peak hour turning movement volumes were collected at the key intersections from 7:00 AM to 9:00 AM and 4:00 PM to 6:00 PM on the dates shown in **Table 2**. Peak hour data was collected for vehicle turning movement volumes, as well as motorcycles, pedestrians, and bicyclists.

Table 2 – Peak Hour Turning Movement Volume Collection Dates

Intersection Number	Intersection	Count Date
1	Jones Boulevard and Smoke Ranch Road	Thursday, October 18, 2018
2	Jones Boulevard and Cheyenne Avenue (SR 574)	Tuesday, October 16, 2018
3	Jones Boulevard and Gowan Road	Thursday, October 11, 2018
4	Jones Boulevard and Rancho Drive (SR 599)	Thursday, October 11, 2018
5	Cheyenne Avenue (SR 574) and Torrey Pines Drive	Tuesday, October 16, 2018
6	Cheyenne Avenue (SR 574) and Michael Way	Wednesday, October 17, 2018
7	Cheyenne Avenue (SR 574) and Rancho Drive (SR 599)	Wednesday, October 17, 2018
8	Cheyenne Avenue (SR 574) and Decatur Boulevard	Wednesday, October 17, 2018

A summary of the 2018 existing peak hour traffic, motorcycle, pedestrian/bicyclist volumes at the key intersections for Jones Boulevard and Cheyenne Avenue (SR 574) are shown in **Figure 27** through **Figure 29**. The peak hour turning movement volume data sheets are provided in **Appendix C**. The peak hour turning movement volume figures are labeled as follows:

- **Figure 27** – 2018 Existing 72-Hour Bidirectional Counts and Peak Hour Turning Movement Volumes on Jones Boulevard/Cheyenne Avenue (SR 574)
- **Figure 28** – 2018 Existing Peak Hour Motorcycle Volumes on Jones Boulevard/Cheyenne Avenue (SR 574)
- **Figure 29** – 2018 Existing Peak Hour Bicycle/Pedestrian Volumes on Jones Boulevard/Cheyenne Avenue (SR 574)

Bus volumes were not collected along the corridor. The project area is served by two (2) routes, the 218 Cheyenne Route and the 102 Jones Route. Both the 218 Cheyenne and the 102 Jones routes run seven days a week from 4:00 AM to 1:30 AM along Cheyenne Avenue (SR 574) and Jones Boulevard. During weekdays both routes run every half hour. The 218 Cheyenne Route conducts 37 eastbound trips, and 37 westbound trips each day. The 102 Jones Route conducts 36 northbound trips and 35 southbound trips each day. The most recent On Board report by the RTC and the On Board transit planning group reported that in September of 2016, approximately 2,500 and approximately 2,000 riders/day were reported for the 218 Cheyenne and the 102 Jones routes, respectively.

6.2 Annual Average Daily Traffic

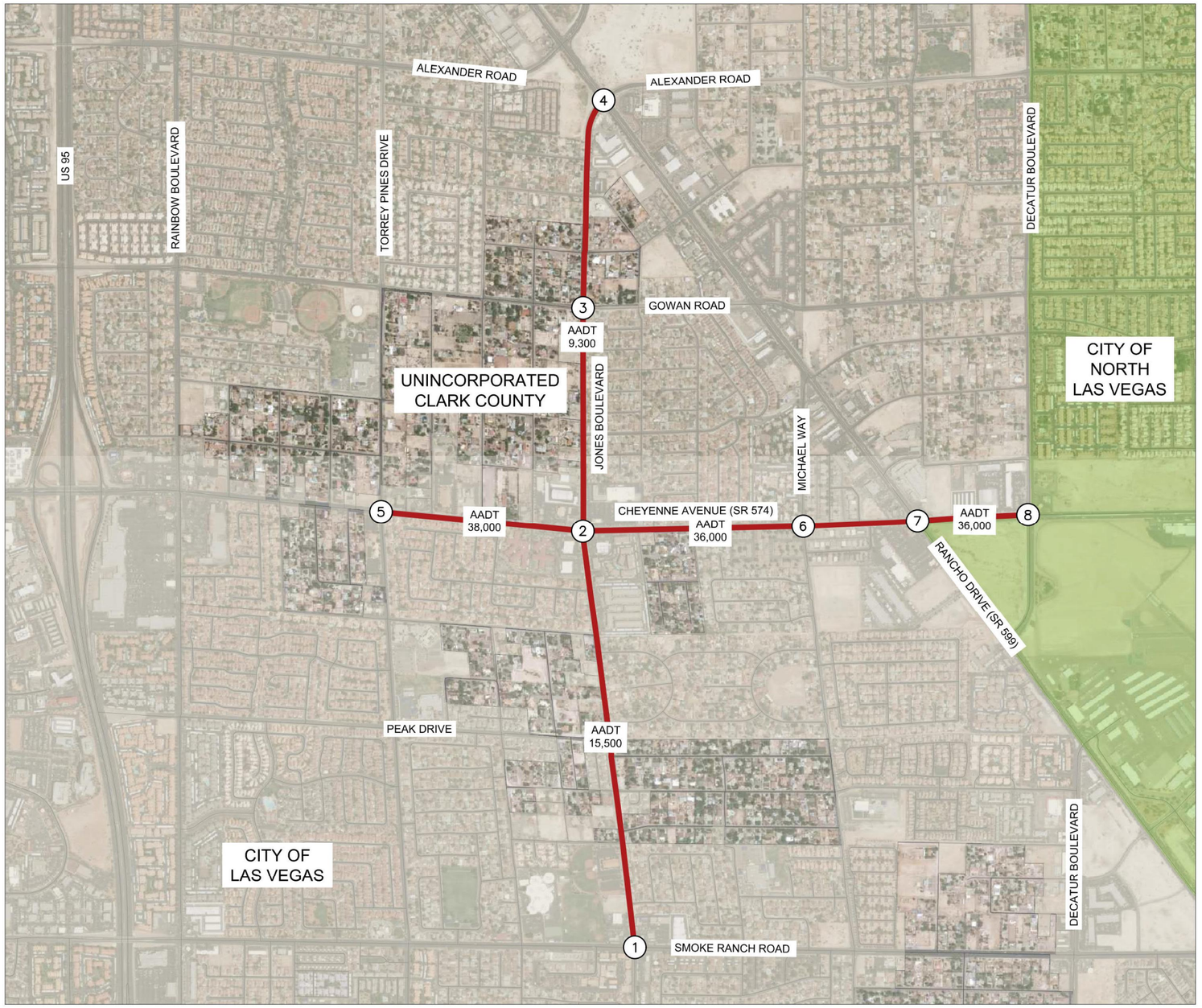
To determine 2018 AADT for segments along the corridor, 72-hour bidirectional traffic counts were collected at seven (7) locations along the corridors. These volumes were used to determine the AADT along the project corridors by taking the average over the three (3) days the counts were conducted and then applying a weekday and monthly adjustment factor to account for the day of week and time of year when the 72-hour counts were collected. These adjustment factors were taken from the data summary at permanent count station 0035240 located on Jones Boulevard just north of Smoke Ranch Road. The AADT volumes at the count locations and the count start dates are summarized in **Table 3**. The 72-hour bidirectional traffic count volumes are presented in **Figure 27**. The 72-hour count data sheets and AADT calculations are provided in **Appendix D**.

Table 3 – 2018 Existing AADT

Count Location	Count Start Date	Average 72-Hour Counts	2018 AADT*
Jones Boulevard, between Smoke Ranch Road and Cheyenne Avenue (SR 574)	Tuesday, October 30, 2018 to Thursday, November 1, 2018	16,446	15,500
Jones Boulevard, between Cheyenne Avenue (SR 574) and Gowan Road	Tuesday, October 30, 2018 to Thursday, November 1, 2018	9,915	9,300
Jones Boulevard, between Gowan Road and Rancho Drive (SR 599)	Tuesday, October 30, 2018 to Thursday, November 1, 2018	8,597	8,100
Cheyenne Avenue (SR 574), between Torrey Pines Drive and Jones Boulevard	Tuesday, November 6, 2018 to Thursday, November 8, 2018	39,299	38,000
Cheyenne Avenue (SR 574), between Jones Boulevard and Michael Way	Tuesday, November 6, 2018 to Thursday, November 8, 2018	37,589	36,000
Cheyenne Avenue (SR 574), between Michael Way and Rancho Drive (Sr 599)	Tuesday, November 6, 2018 to Thursday, November 8, 2018	38,766	37,000
Cheyenne Avenue (SR 574), between Rancho Drive (SR 599) and Decatur Boulevard	Tuesday, November 6, 2018 to Thursday, November 8, 2018	37,631	36,000

**Adjusted from 72-hour bi-directional road tube counts using a weekday and monthly adjustment factor and NDOT rounding methodology.*

Figure 27 – 2018 Existing 72-Hour Bidirectional Counts and Peak Hour Turning Movement Volumes on Jones Boulevard/Cheyenne Avenue (SR 574)



Jones Boulevard/Smoke Ranch Road
Thursday, October 18, 2018
7:15–8:15 AM, 5:00–6:00 PM

1	
44(65) ↙ 578(404) ↓ 78(56) ↘	↖ 61(90) ← 393(462) ↙ 57(103)
35(67) ↗ 296(392) → 79(103) ↘	↑ 93(108) ↑ 343(656) ↗ 75(78)

Jones Boulevard/Cheyenne Avenue
Tuesday, October 16, 2018
7:15–8:15 AM, 4:45–5:45 PM

2	
120(107) ↙ 331(258) ↓ 28(53) ↘	↖ 15(48) ← 1229(1310) ↙ 151(198)
99(163) ↗ 1161(1274) → 102(95) ↘	↑ 113(125) ↑ 238(428) ↗ 149(184)

Jones Boulevard/Gowan Road
Thursday, October 11, 2018
7:00–8:00 AM, 5:00–6:00 PM

3	
49(30) ↙ 344(271) ↓ 7(3) ↘	↖ 2(8) ← 111(122) ↙ 43(49)
14(28) ↗ 113(138) → 51(34) ↘	↑ 42(61) ↑ 201(366) ↗ 41(51)

Jones Boulevard/Rancho Drive
Thursday, October 11, 2018
7:00–8:00 AM, 4:30–5:30 PM

4	
210(132) ↙ 1276(757) ↓ 181(86) ↘	↖ 173(139) ← 138(83) ↙ 73(14)
120(284) ↗ 93(112) → 8(8) ↘	↑ 21(38) ↑ 514(1300) ↗ 37(28)

Cheyenne Avenue/Torrey Pines Drive
Tuesday, October 16, 2018
7:15–8:15 AM, 4:45–5:45 PM

5	
31(39) ↙ 68(58) ↓ 16(26) ↘	↖ 8(19) ← 1375(1407) ↙ 111(111)
11(40) ↗ 1212(1407) → 79(92) ↘	↑ 73(46) ↑ 44(122) ↗ 106(139)

Cheyenne Avenue/Michael Way
Wednesday, October 17, 2018
7:15–8:15 AM, 4:30–5:30 PM

6	
56(49) ↙ 41(33) ↓ 12(26) ↘	↖ 10(17) ← 1261(1449) ↙ 78(88)
39(54) ↗ 1128(1378) → 54(89) ↘	↑ 65(54) ↑ 29(38) ↗ 87(99)

Cheyenne Avenue/Rancho Drive
Wednesday, October 17, 2018
7:00–8:00 AM, 4:45–5:45 PM

7	
18(51) ↙ 1122(639) ↓ 276(171) ↘	↖ 92(252) ← 1201(1230) ↙ 129(82)
40(82) ↗ 1026(1235) → 193(180) ↘	↑ 129(282) ↑ 421(977) ↗ 22(20)

Cheyenne Avenue/Decatur Boulevard
Wednesday, October 17, 2018
7:15–8:15 AM, 4:45–5:45 PM

8	
225(171) ↙ 1301(581) ↓ 219(155) ↘	↖ 63(201) ← 1189(1383) ↙ 183(190)
104(153) ↗ 1191(1306) → 1(7) ↘	↑ 7(15) ↑ 418(1095) ↗ 176(255)

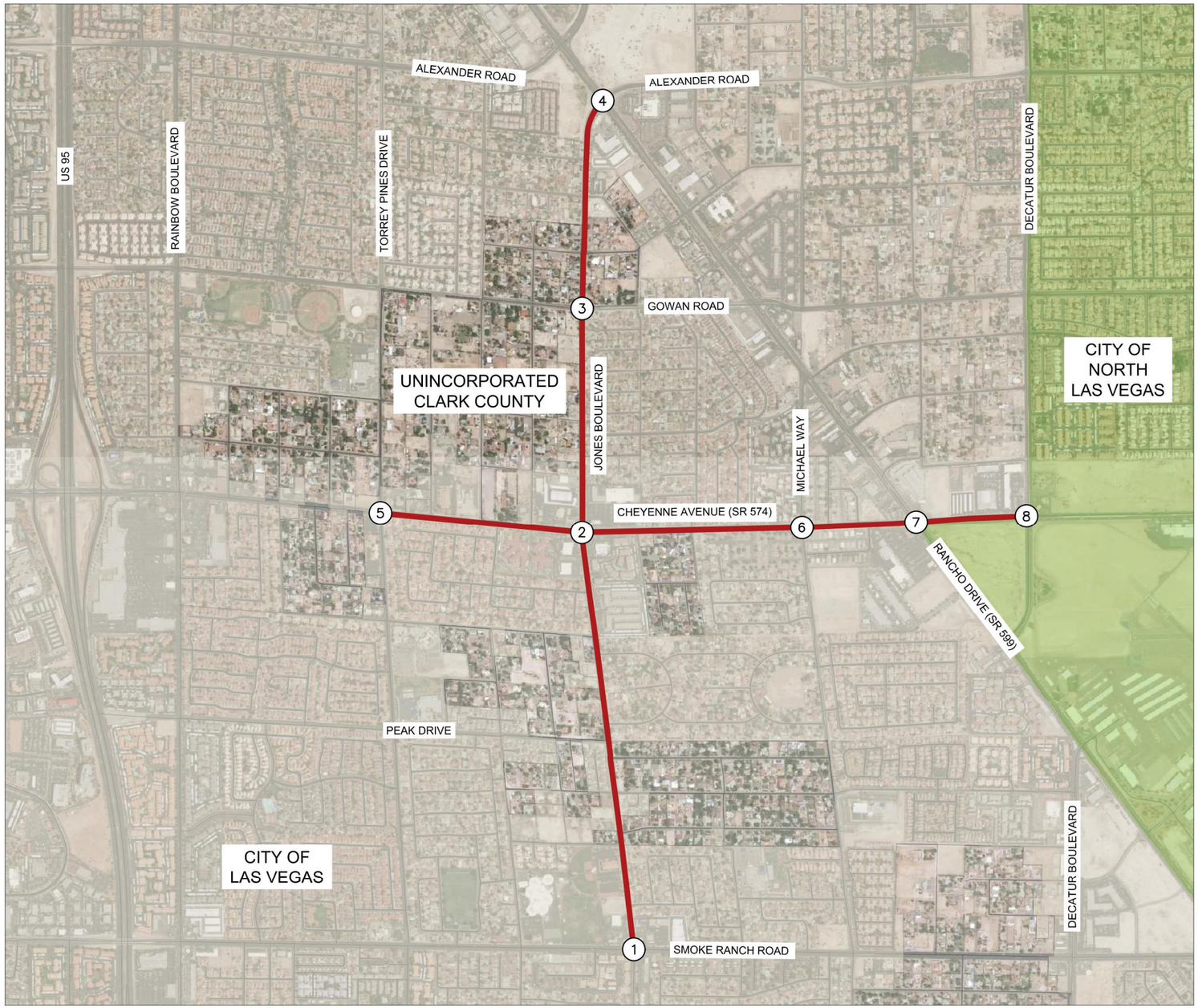
*Intersections #4 and #7 include northbound u-turn movements, these u-turn movements have been incorporated into the northbound left turn movements shown above.

LEGEND:

- (1) Study Area Key Intersection
- Study Area Corridor
- City of North Las Vegas
- City of Las Vegas
- Major Roads
- ← XX (XX) AM(PM) Peak Hour Traffic Volumes

NORTH
NTS

Figure 28 – 2018 Existing Peak Hour Motorcycle Volumes on Jones Boulevard/Cheyenne Avenue (SR 574)



Jones Boulevard/Smoke Ranch Road
Thursday, October 18, 2018
7:00–8:00 AM, 4:00–5:00 PM

1
- 0(1) ↙, 2(5) ↓
- ↖ 0(3), ← 0(3)
- 0(1) ↱, 4(0) →, 1(0) ↘
- ↑ 4(3), ↑ 0(1)

Jones Boulevard/Cheyenne Avenue
Tuesday, October 16, 2018
7:15–8:15 AM, 5:00–6:00 PM

2
- ↙ 1(1)
- ↖ 1(2), ← 2(6), ↖ 0(3)
- 0(1) ↱, 3(6) →
- ↑ 2(9)

NORTH
NTS

Jones Boulevard/Gowan Road
Thursday, October 11, 2018
7:15–8:15 AM, 4:45–5:45 PM

3
- ↙ 0(1), ↓ 1(3), ↘ 0(1)
- ← 1(0)
- ↑ 1(1), ↑ 1(1)

Jones Boulevard/Rancho Drive
Thursday, October 11, 2018
7:00–8:00 AM, 4:15–5:15 PM

4
- ↙ 0(3), ↓ 10(8)
- ← 1(0)
- 1(0) ↱, 0(1) →
- ↖ 0(1)

Cheyenne Avenue/Torrey Pines Drive
Tuesday, October 16, 2018
7:30–8:30 AM, 4:00–5:00 PM

5
- ↙ 0(1), ↓ 1(0), ↘ 0(1)
- ↖ 2(0), ← 1(1)
- 8(11) →, 0(1) ↘
- ↑ 1(0), ↑ 1(0)

Cheyenne Avenue/Michael Way
Wednesday, October 17, 2018
7:15–8:15 AM, 5:00–6:00 PM

6
- ↓ 0(2)
- ← 2(1)
- 11(9) →
- ↑ 0(1)

Cheyenne Avenue/Rancho Drive
Wednesday, October 17, 2018
7:15–8:15 AM, 4:30–5:30 PM

7
- ← 6(5), ↘ 1(4)
- ↖ 1(2), ← 2(4), ↖ 2(0)
- 0(2) ↱, 7(2) →
- ↑ 1(1), ↑ 2(9)

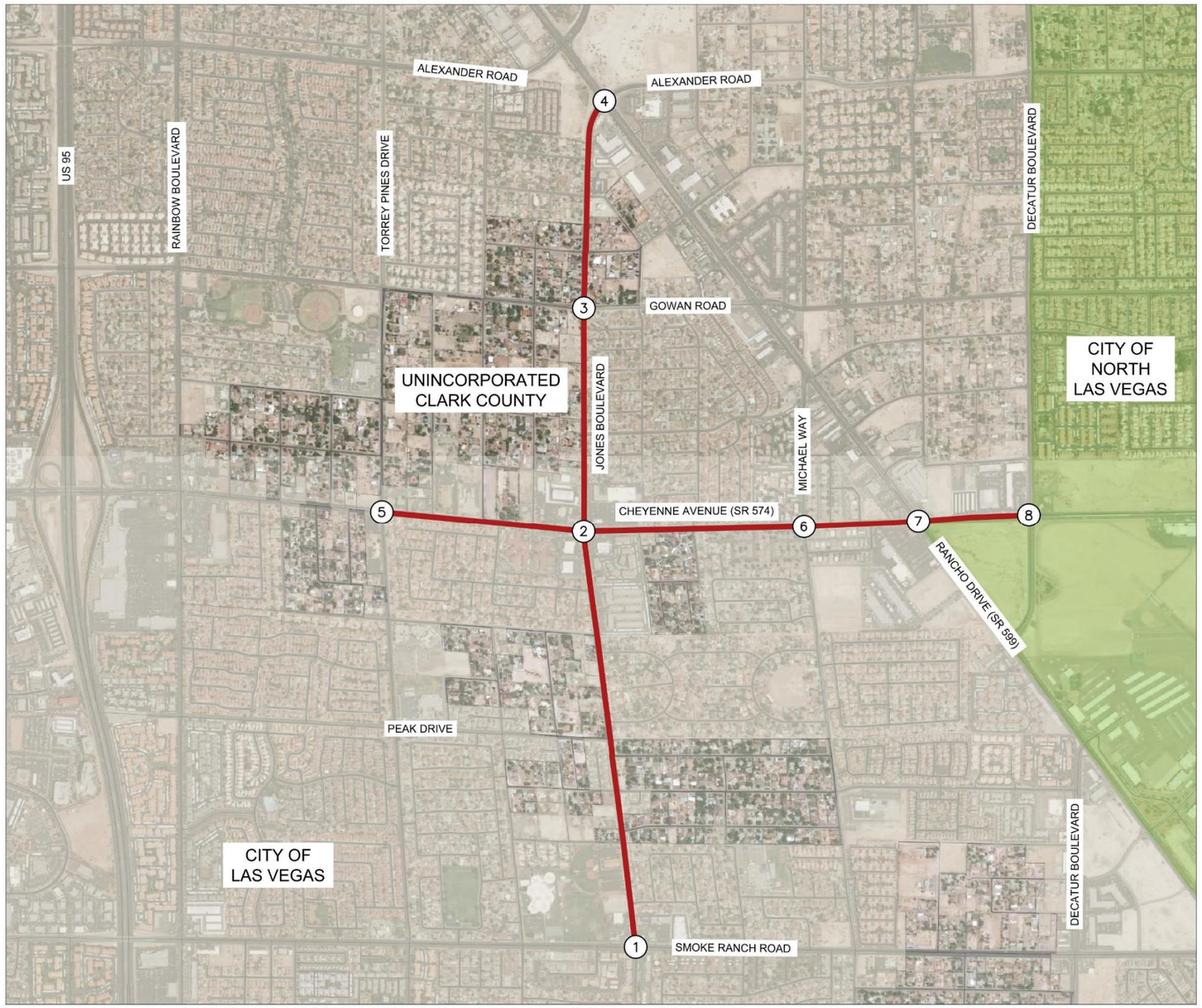
Cheyenne Avenue/Decatur Boulevard
Wednesday, October 17, 2018
7:15–8:15 AM, 4:00–5:00 PM

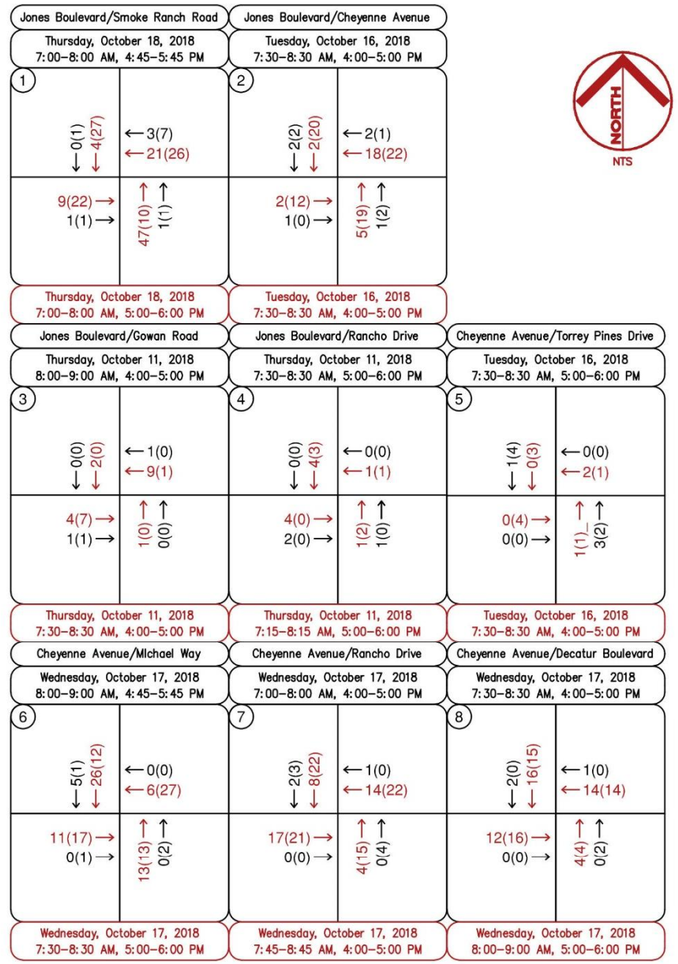
8
- ↙ 3(0), ↓ 7(1), ↘ 1(1)
- ← 3(10), ↖ 3(2)
- 0(1) ↱, 7(6) →
- ↑ 1(7), ↑ 1(1)

LEGEND:

(1)	Study Area Key Intersection
▬	Study Area Corridor
▬	City of North Las Vegas
▬	City of Las Vegas
▬	Major Roads
← XX (XX)	AM(PM) Peak Hour Traffic Volumes

Figure 29 – 2018 Existing Peak Hour Bicycle/Pedestrian Volumes on Jones Boulevard/Cheyenne Avenue (SR 574)





6.3 Level of Service Analysis

The key intersections were analyzed based on average total delay analysis for signalized and unsignalized intersections as presented in the Transportation Research Board's "Highway Capacity Manual 6th Edition" (HCM 6). LOS for a signalized intersection is defined for the intersection as a whole and for each approach. **Table 4** shows the definition of LOS for signalized intersections.

Table 4 – Level of Service Definitions

Level of Service	Signalized Intersection Average Total Delay (sec/veh)	Unsignalized Intersection Average Total Delay (sec/veh)
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

Definitions provided from the Highway Capacity Manual 6th Edition, Special Report 209, Transportation Research Board, 2010.

Synchro 10 Analysis and Optimization Software was used to analyze the key intersections for LOS. Synchro is an interactive computer program that enables planners and engineers to: forecast the traffic impacts of new developments; conduct area-wide traffic forecasting studies; test different mitigation measures and compare different traffic scenarios. Synchro 10 utilizes the HCM 6 methodology to analyze intersection delay and LOS. The Peak Hour Factor (PHF) was determined based on the traffic count data collected. The average PHF for each intersection was used for all movements of an intersection. Additionally, a 2% truck percentage was used, which is standard practice in Southern Nevada.

Signal timing data sheets for all the key intersections were provided by the RTC Freeway and Arterial System of Transportation (FAST). Intersection phasing and cycle lengths were obtained from the timing sheets and used in the creation of the Synchro files. The signalized intersections were analyzed using the preferred FAST cycle length of 140-seconds. The only exception is Gowan Road which FAST reported a reduced cycle length of 70-seconds, likely due to lower side street traffic volumes.

The LOS analysis is based on the lane geometry and intersection control shown in **Figure 17**. **Table 5** provides a summary of the calculated LOS for the key intersections during the AM and PM peak hour. The methodology used for the LOS analysis and the existing 2018 LOS analysis summary sheets were approved by NDOT and are provided in **Appendix E**. The intersections anticipated to experience long delays during AM and/or PM peak hours are highlighted **red**.

Table 5 – 2018 Existing Conditions LOS Results

Intersection Number	Intersection	AM Peak Hour		PM Peak Hour	
		Delay (s)	LOS	Delay (s)	LOS
1	**Jones Boulevard and Smoke Ranch Road**	**57.8**	**E**	**40.0**	**D**
	▪ Northbound	55.5	E	23.7	C
	▪ Southbound	54.7	D	23.4	C
	▪ Eastbound	59.1	E	58.5	E
	▪ Westbound	63.2	E	58.3	E
2	**Jones Boulevard and Cheyenne Avenue (SR 574)**	**28.0**	**C**	**49.6**	**D**
	▪ Northbound	55.4	E	68.5	E
	▪ Southbound	68.4	E	47.2	D
	▪ Eastbound	5.9	A	36.1	D
	▪ Westbound	25.9	C	54.7	D
3	**Jones Boulevard and Gowan Road**	**15.9**	**B**	**15.8**	**B**
	▪ Northbound	8.3	A	8.4	A
	▪ Southbound	10.7	B	10.3	B
	▪ Eastbound	29.3	C	30.0	C
	▪ Westbound	27.8	C	28.8	C
4	**Jones Boulevard and Rancho Drive (SR 599)**	**24.9**	**C**	**33.4**	**C**
	▪ Northbound	61.9	E	126.0	F
	▪ Southbound	62.6	E	62.5	E
	▪ Eastbound	15.2	B	13.3	B
	▪ Westbound	13.6	B	15.3	B
5	**Cheyenne Avenue (SR 574) and Torrey Pines Drive**	**12.5**	**B**	**11.3**	**B**
	▪ Northbound	62.5	E	62.2	E
	▪ Southbound	57.6	E	57.4	E
	▪ Eastbound	7.4	A	8.3	A
	▪ Westbound	6.0	A	0.6	A
6	**Cheyenne Avenue (SR 574) and Michael Way**	**13.7**	**B**	**12.7**	**B**
	▪ Northbound	53.6	D	56.0	E
	▪ Southbound	51.5	D	54.3	D
	▪ Eastbound	9.6	A	8.9	A
	▪ Westbound	9.0	A	8.1	A
7	**Cheyenne Avenue (SR 574) and Rancho Dr (SR 599)**	**60.8**	**E**	**54.4**	**D**
	▪ Northbound	57.9	E	43.4	D
	▪ Southbound	51.7	D	40.2	D
	▪ Eastbound	78.7	E	70.3	E
	▪ Westbound	51.4	D	56.2	E
8	**Cheyenne Avenue (SR 574) and Decatur Boulevard**	**53.1**	**D**	**56.2**	**E**
	▪ Northbound	56.7	E	96.3	F
	▪ Southbound	82.0	F	42.7	D
	▪ Eastbound	30.8	C	41.1	D
	▪ Westbound	36.7	D	44.6	D

6.4 Left Turn Storage Analysis

Left turn storage analysis was conducted for the existing 2018 left turn movements. The analysis was conducted using the Poisson method with a 95% confidence interval and a 140-second cycle length for signalized intersections. The only exception was for Gowan Road which used a 70-second cycle length per the signal timing data provided by FAST. Results of the analysis for the key intersections are provided in **Table 6**. Storage lengths noted in **red** text indicate the desired storage length exceeds the provided storage length.

Table 6 – 2018 Existing Left Turn Storage Analysis Results

Intersection Number	Intersection Left Turn Movement	Provided Storage Length	Desired Storage Length
1	**Jones Boulevard and Smoke Ranch Road**		
	▪ Northbound to Westbound Left*	150'	**189'**
	▪ Southbound to Eastbound Left	450'	147'
	▪ Eastbound to Northbound Left	400'	132'
	▪ Westbound to Southbound Left	450'	182'
2	**Jones Boulevard and Cheyenne Avenue (SR 574)**		
	▪ Northbound to Westbound Left*	200'	**212'**
	▪ Southbound to Eastbound Left	250'	111'
	▪ Eastbound to Northbound Left*	DUAL 250'	DUAL 131'
	▪ Westbound to Southbound Left*	DUAL 275'	DUAL 153'
3	**Jones Boulevard and Gowan Road**		
	▪ Northbound to Westbound Left	500'	74'
	▪ Southbound to Eastbound Left	500'	19'
	▪ Eastbound to Northbound Left	150'	44'
	▪ Westbound to Southbound Left	150'	64'
4	**Jones Boulevard and Rancho Drive (SR 599)**		
	▪ Northbound to Westbound Left	325'	87'
	▪ Southbound to Eastbound Left*	200'	**285'**
	▪ Eastbound to Northbound Left	DUAL 300'	DUAL 206'
	▪ Westbound to Southbound Left	500'	70'
5	**Cheyenne Avenue (SR 574) and Torrey Pines Drive**		
	▪ Northbound to Westbound Left*	125'	140'
	▪ Southbound to Eastbound Left	150'	67'
	▪ Eastbound to Northbound Left	275'	90'
	▪ Westbound to Southbound Left	500'	193'
6	**Cheyenne Avenue (SR 574) and Michael Way**		
	▪ Northbound to Westbound Left*	100'	129'
	▪ Southbound to Eastbound Left	275'	67'
	▪ Eastbound to Northbound Left	300'	112'
	▪ Westbound to Southbound Left	200'	162'

Table 6 (Continued) – 2018 Existing Left Turn Storage Bay Analysis Results

Intersection Number	Intersection Left Turn Movement	Provided Storage Length	Desired Storage Length
7	**Cheyenne Avenue (SR 574) and Rancho Drive (SR 599)**		
	▪ Northbound to Westbound Left	DUAL 350'	DUAL 205'
	▪ Southbound to Eastbound Left	DUAL 375'	DUAL 202'
	▪ Eastbound to Northbound Left	275'	153'
	▪ Westbound to Southbound Left	575'	218'
8	**Cheyenne Avenue (SR 574) and Decatur Boulevard**		
	▪ Northbound to Westbound Left	500'	46'
	▪ Southbound to Eastbound Left	DUAL 350'	DUAL 166'
	▪ Eastbound to Northbound Left	375'	249'
	▪ Westbound to Southbound Left*	225'	297'

Note: 25' minimum for one (1) vehicle.

The left turn storage bay calculations include AM and PM peak volumes. The length of the desired storage length per lane was taken to be the maximum of the two peak hours. Six (6) of the eight (8) intersections analyzed did not meet the desired storage lengths, for at least one left turn movement. The existing 2018 left turn storage bay analysis summary sheets are provided in **Appendix F**.

6.5 Speed Study

NDOT's Traffic Information Division conducted a speed study along Jones Boulevard. The corridor was split into two (2) segments as shown in **Figure 30**. Segment 1 is a 4-lane "Urban Minor Arterial" beginning at Smoke Ranch Road to Cheyenne Avenue (SR 574) for 0.9 miles. Segment 2 is also a 4-lane urban minor arterial extending from Cheyenne Avenue (SR 574) to Rancho Drive (SR 599) and is 1-mile long. **Table 7** summarizes the speed study results. The following provides definitions for each of the items collected during the speed study:

- **85th Percentile Speed**: speed at which 85 percent of free-flowing traffic is traveling at or below.
- **Pace**: The 10-mph range of speed in which the highest number of observations is recorded.
- **% in Pace**: Percent of vehicles in the pace.
- **50th Percentile Speed**: median speed of observed data.

The speed study memorandum is provided in **Appendix G**.

Figure 30 – Speed Study Segments

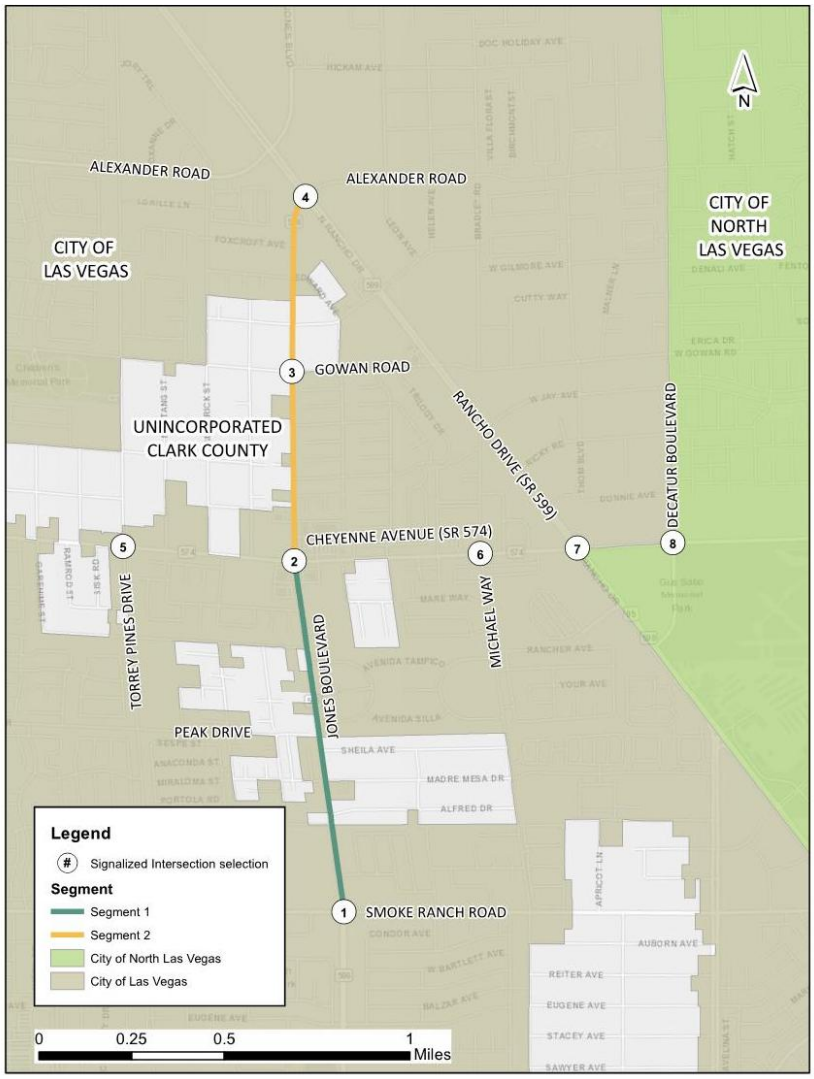


Table 7 – Jones Boulevard Speed Study Results

Segment	Posted Speed	85th Percentile Speed	Pace	% In Pace	50th Percentile Speed
1 - Smoke Ranch Road to Cheyenne Avenue (SR 574)	35 MPH	47 MPH	35 - 45 MPH	66%	41 MPH
2 - Cheyenne Avenue (SR 574) to Rancho Drive (SR 599)	35 MPH	45 MPH	35 - 45 MPH	68%	40 MPH

Source: NDOT Memorandum December 20, 2018

Due to a construction project a speed study was not conducted for the Cheyenne Avenue (SR 574) project corridor.

7 CRASH ANALYSIS

The following section presents the crash analysis conducted for each project corridor. Crash data was obtained from NDOT for the five-year period from September 1, 2012 to August 31, 2017. A project corridor crash analysis and an intersection crash analysis were conducted with the crash data provided. The project corridor crash analysis includes all crashes along the corridor for the five-year period, while the intersection crash analysis only includes those crashes within 200 feet of a key intersection. The intersection crashes include those crashes on both the major and minor streets along the project corridors in the five-year period.

7.1 Project Corridor Crash Data Analysis

7.1.1 Jones Boulevard

A total of 78 corridor crashes occurred along Jones Boulevard from Smoke Ranch Road up to Rancho Drive (SR 599). Of the 78 corridor crashes there was one (1) fatal crash (K) and zero (0) serious injury crashes (A). Jones Boulevard experienced two (2) pedestrian crashes, zero (0) bicycle crashes, three (3) motorcycle crashes, and one (1) bus related crash. The fatal crash involved a motorcycle. **Table 8** through **Table 11** and **Figure 31** through **Figure 33** contain a summary of the crashes along the corridor by crash severity, type, weather conditions, and lighting conditions, respectively. Additional crash data tables are located in **Appendix H** and crash data figures are located in **Appendix I**.

Table 8 – Jones Boulevard Crashes by Severity

Crash Severity	Overall		Pedestrian		Bicycle		Motorcycle		Bus	
Fatal	1	1.3%	0	0.0%	0	0.0%	1	33.3%	0	0.0%
Injury A	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Injury B	8	10.3%	0	0.0%	0	0.0%	1	33.3%	0	0.0%
Injury C	32	41.0%	2	100%	0	0.0%	0	0.0%	0	0.0%
Property Damage Only (PDO)	37	47.4%	0	0.0%	0	0.0%	1	33.3%	1	100.0%
Total (5 Years)	**78 (100.0%)**		**2 (2.6%)**		**0 (0.0%)**		**3 (3.8%)**		**1 (1.3%)**	

Source: NDOT Crash Data, September 2012- August 2017

The crash narrative from the police report was provided for the two fatal crashes. One (1) of the fatal crashes occurred at the signalized intersection of Jones Boulevard and Cheyenne Avenue (SR 574), and one (1) of the fatal crashes was recorded at the unsignalized intersection of Jones Boulevard and Shelia Avenue.

- The fatal crash at Jones Boulevard and Shelia Avenue involved three (3) vehicles and took place during clear weather and dark with continuous lighting conditions. Vehicle 2, a motorcycle, was headed northbound on Jones Boulevard. Vehicle 1 was headed westbound on Shelia Avenue and turning right onto Jones Boulevard. Vehicle 1 failed to yield right-of-way striking Vehicle 2. Driver 2 was ejected from the motorcycle from the force of the crash and skid into the southbound lanes of Jones Boulevard. Vehicle 3, traveling southbound struck Driver 2 causing the fatality.
- According to the Las Vegas Review Journal, the fatal crash at Jones Boulevard and Cheyenne Avenue (SR 574) involved nine (9) vehicles and took place during clear weather and daylight lighting conditions. Drugs were a factor in this crash. Vehicle 1

made a U-turn on Cheyenne Avenue (SR 574) heading eastbound traveling at a speed of approximately 95 mph attempting to flee police officers. Vehicle 1 disregarding a stop traffic signal hitting multiple vehicles causing one (1) fatality and two (2) serious injuries.
Source: Las Vegas Review Journal, Man to serve up to 40 year after fatal 9-car wreck, 2015. Accessed October 21, 2019 for this report

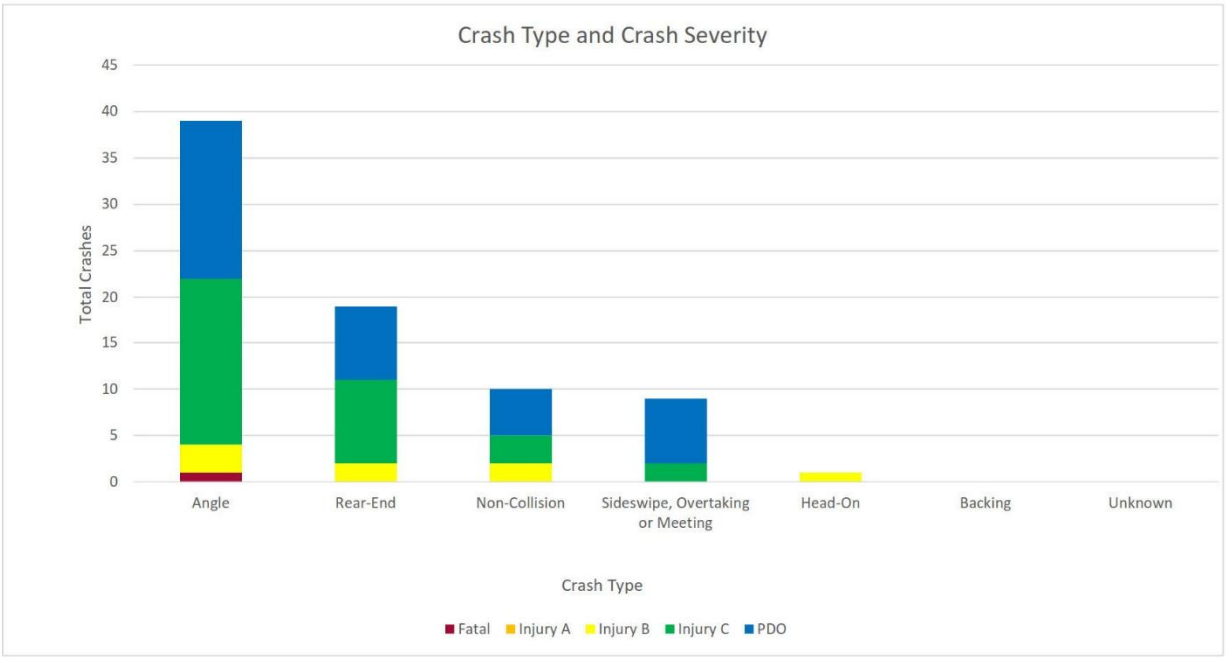
Table 9 summarizes Jones Boulevard crashes by crash type and breaks them down by pedestrian, bicycle, motorcycle and bus. **Figure 31** summarizes crashes by crash type and severity. The majority of crashes along the corridor were angle followed by rear-end.

Table 9 – Jones Boulevard Crashes by Crash Type

Crash Type	Overall		Pedestrian		Bicycle		Motorcycles		Bus	
Angle	39	50.0%	1	50.0%	0	0.0%	2	66.7%	1	100.0 %
Rear-End	19	24.4%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Non-Collision	10	12.8%	1	50.0%	0	0.0%	1	33.3%	0	0.0%
Sideswipe, Overtaking or Meeting	9	11.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Head-On	1	1.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total (5 Years)	**78 (100%)**		**2 (2.6%)**		**0 (0.0%)**		**3 (3.8%)**		**1 (1.3%)**	

Source: NDOT Crash Data, September 2012- August 2017

Figure 31 – Jones Boulevard Crashes by Crash Type



Source: NDOT Crash Data, September 2012- August 2017

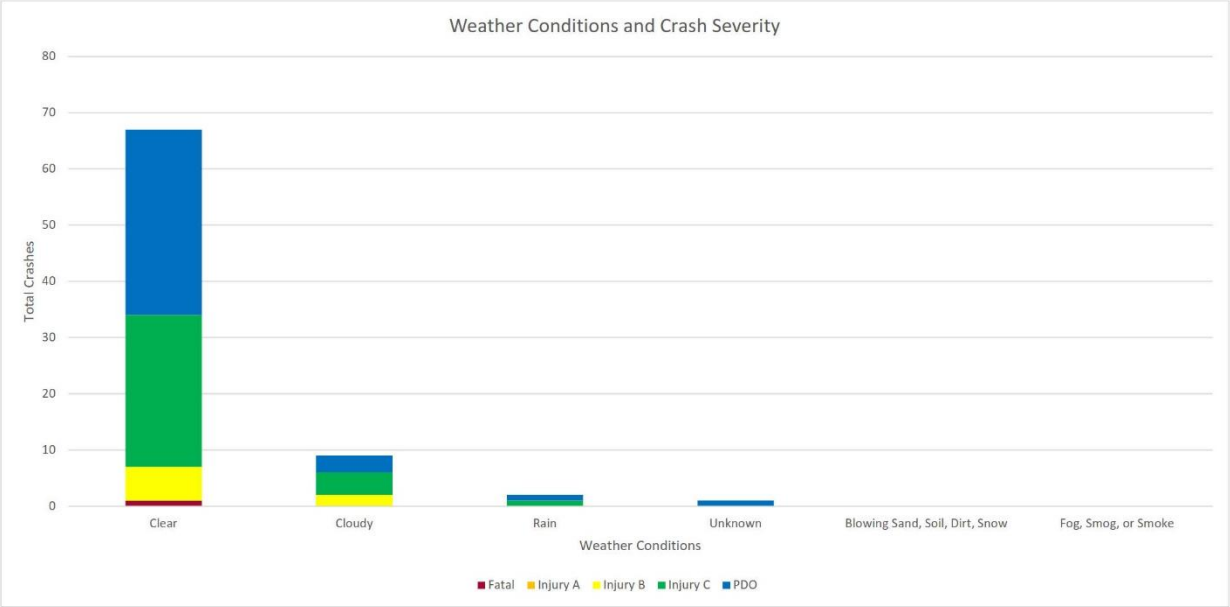
Table 10 summarizes Jones Boulevard crashes by weather conditions and breaks them down by pedestrian, bicycle, motorcycle and bus. **Figure 32** summarizes crashes by weather conditions and severity. The majority of crashes along the corridor were during clear conditions.

Table 10 – Jones Boulevard Crashes by Weather Conditions

Weather	Overall		Pedestrian		Bicycle		Motorcycle		Bus	
Clear	67	85.9%	2	100.0%	0	0.0%	2	66.7%	1	100.0%
Cloudy	9	11.5%	0	0.0%	0	0.0%	1	33.3%	0	0.0%
Rain	2	2.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Unknown	1	1.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total (5 Years)	**79* (100%)**		**2 (2.6%)**		**0 (0.0%)**		**3 (3.8%)**		**1 (1.3%)**	

Source: NDOT Crash Data, September 2012- August 2017
**It is possible to have multiple weather factors lister per crash. Thus, the sum of the "Overall" column may be more than the total number of crashes.*

Figure 32 – Jones Boulevard Crashes by Weather Conditions



Source: NDOT Crash Data, September 2012- August 2017

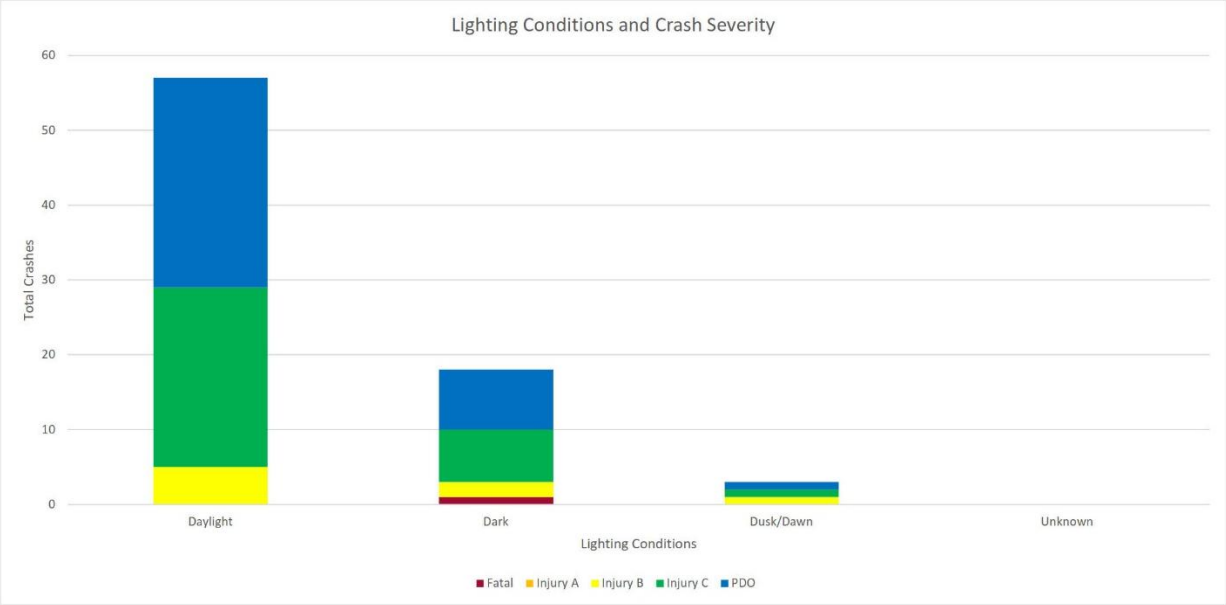
Table 11 summarizes Jones Boulevard crashes by lighting conditions and breaks them down by pedestrian, bicycle, motorcycle and bus. **Figure 33** summarizes crashes by lighting conditions and severity. The majority of crashes along the corridor were during daylight.

Table 11 – Jones Boulevard Crashes by Lighting Conditions

Lighting	Overall		Pedestrian		Bicycle		Motorcycle		Bus	
Daylight	57	73.1%	2	100.0%	0	0.0%	1	33.3%	0	0.0%
Dark	18	23.1%	0	0.0%	0	0.0%	1	33.3%	1	100.0%
Dawn/Dusk	3	3.8%	0	0.0%	0	0.0%	1	33.3%	0	0.0%
Total (5 Years)	**78 (100%)**		**2 (2.6%)**		**0 (0.0%)**		**3 (3.8%)**		**1 (1.3%)**	

Source: NDOT Crash Data, September 2012- August 2017

Figure 33 – Jones Boulevard Crashes by Lighting Conditions



Source: NDOT Crash Data, September 2012- August 2017

7.1.2 Cheyenne Avenue (SR 574)

A total of 342 corridor crashes occurred along Cheyenne Avenue (SR 574) from Torrey Pines Drive to Decatur Boulevard. Of the 342 corridor crashes there were three (3) fatal crashes (K) and twelve (12) serious injury crashes (A). Cheyenne Avenue (SR 574) experienced eight (8) pedestrian crashes, two (2) bicycle crashes, five (5) motorcycle crashes, and two (2) bus related crashes. Of the three (3) fatal crashes, one (1) involved a bicycle. Of the twelve (12) serious injury crashes (A), three (3) involved pedestrians, one (1) involved a bicycle, and one (1) involved a motorcycle. **Table 12** through **Table 15** and **Figure 34** through **Figure 36** contain a summary of the crashes along the corridor by severity, crash type, weather conditions, and lighting conditions, respectively. Additional crash data tables are located in **Appendix H** and crash data figures are located in **Appendix I**.

Table 12 – Cheyenne Avenue (SR 574) Crashes by Severity

Crash Severity	Overall		Pedestrian		Bicycle		Motorcycle		Bus	
Fatal	3	0.9%	0	0.0%	1	50.0%	0	0.0%	0	0.0%
Injury A	12	3.5%	3	37.5%	1	50.0%	1	20.0%	0	0.0%
Injury B	69	20.2%	4	50.0%	0	0.0%	1	20.0%	2	100.0%
Injury C	142	41.5%	1	12.5%	0	0.0%	2	40.0%	0	0.0%
PDO	116	33.9%	0	0.0%	0	0.0%	1	20.0%	0	0.0%
Total (5 Years)	**342 (100.0%)**		**8 (2.3%)**		**2 (0.6%)**		**5 (1.5%)**		**2 (0.6%)**	

Source: NDOT Crash Data, September 2012- August 2017

Narratives for one (1) of the 3 fatal crashes and ten (10) of the 12 serious injury crashes along the corridor were provided. The one (1) fatal crash occurred at the signalized intersection of Cheyenne Avenue (SR 574) and Jones Boulevard. The remaining two (2) fatal crashes occurred along Cheyenne Avenue (SR 574). Four (4) of the serious injury crashes occurred at the

signalized intersections of Michael Way and Decatur Boulevard. Additionally, a serious injury crash was recorded at the unsignalized intersection of Cheyenne Avenue (SR 574) and Arlene Way. The remaining five (5) serious injury crashes occurred along Cheyenne Avenue (SR 574).

- According to the Las Vegas Review Journal, the fatal crash at Cheyenne Avenue (SR 574) and Jones Boulevard involved nine (9) vehicles and took place during clear weather and daylight lighting conditions. Drugs were a factor in this crash. Vehicle 1 made a U-turn on Cheyenne Avenue (SR 574) heading eastbound traveling at a speed of approximately 95 mph attempting to flee police officers. Vehicle 1 disregarded a stop traffic signal hitting other vehicles causing one (1) fatal injury and two (2) serious injuries.
  Source: Las Vegas Review Journal, Man to serve up to 40 year after fatal 9-car wreck, 2015. Accessed October 21, 2019 for this report
- The serious injury crash at Cheyenne Avenue (SR 574) and Jones Boulevard involved one (1) vehicle and one (1) pedestrian and took place during clear weather and daylight lighting conditions. Pedestrian 1 was approaching a private access drive when Vehicle 1 was exiting the same private access drive to make a right turn on Cheyenne Avenue (SR 574). Vehicle 1 failed to yield the right of way and struck Pedestrian 1.
- The serious injury crash at Michael Way involved two (2) vehicles and took place during clear weather and daylighting conditions. Vehicle 2 was headed eastbound on Cheyenne Avenue (SR 574) and entered the intersection on a green light. Vehicle 1 proceeded to make a left turn onto Michael Way and failed to yield right of way when it struck Vehicle 2.
- The serious injury crash at Michael Way involved one (1) vehicle and one (1) pedestrian and took place during clear weather and daylight lighting conditions. Vehicle 1 was traveling westbound on Cheyenne Avenue (SR 574) and struck Pedestrian 1 who was heading southbound to cross Cheyenne Avenue (SR 574). It is unclear whether the westbound light was green.
- The serious injury crash near Torrey Pines Drive involved two (2) vehicles and took place during clear weather and dark with continuous lighting conditions. Vehicle 1 was headed eastbound driving too fast for conditions. Vehicle 1 started braking and skidding prior to the intersection then lost control of vehicle and crossed left of center. Vehicle 1 struck Vehicle 2 and continued eastbound proceeding to collide with a sign and landscaping.
- The serious injury crash at Cheyenne Avenue (SR 574) and Terry Street involved a single vehicle and took place during clear weather and daylight lighting conditions. Vehicle 1 was traveling eastbound on Cheyenne Avenue (SR 574) when it crossed the median striking multiple power poles on the opposite side of the street.
- The serious injury crash at Arlene Way involved one (1) vehicle and one (1) pedestrian and took place during cloudy weather and dark with continuous lighting conditions. Vehicle 1 was traveling westbound on Cheyenne Avenue (SR 574) when the pedestrian darted into the street in front of Vehicle 1. Vehicle 1 struck the pedestrian.
- The serious injury crash near Rancho Drive (SR 599) involved one (1) vehicle and one (1) pedestrian and took place during rainy weather and dark with continuous lighting conditions. Vehicle 1 was traveling eastbound on Cheyenne Avenue (SR 574) when just past the Rancho Drive (SR 599) intersection Pedestrian 1 entered the roadway and was struck by Vehicle 1. Pedestrian 1 failed to yield right of way and to cross in a marked crosswalk.
- The serious injury crash at Decatur Boulevard involved one (1) vehicle and one (1) pedal cycle and took place during clear weather and dark with continuous lighting conditions. Vehicle 1 made a left turn and failed to yield right of way when it struck the pedal cycle.
- The serious injury crash at Decatur Boulevard involved five (5) vehicles and took place during clear weather and daylight lighting conditions. Vehicle 2 and 3 were traveling northbound on Decatur Boulevard and entered the intersection when the light turned

green. Vehicle 1 was traveling eastbound on Cheyenne Avenue (SR 574) and failed to stop for the red signal, striking Vehicle 2. Vehicle 1 still failed to stop, pushing Vehicle 2 into Vehicle 3. Vehicles 4 and 5 were traveling westbound on Cheyenne Avenue (SR 574) and waiting at the red light. Being pushed north east, Vehicle 3 impacted Vehicle 4 and Vehicle 5.

- The serious injury crash at Decatur Boulevard involved four (4) vehicles and took place during clear weather and daylight lighting conditions. Vehicle 2 was traveling northbound on Decatur Boulevard when Vehicle 1, traveling east on Cheyenne Avenue (SR 574) failed to stop at a red traffic signal. Vehicle 2 struck Vehicle 1 causing it to spin clockwise striking Vehicle 3. From the impact with Vehicle 3, Vehicle 1 changed direction to spin counterclockwise then striking Vehicle 4. Vehicle 3 and 4 were heading westbound on Cheyenne Avenue (SR 574) but were stopped at the red traffic signal.

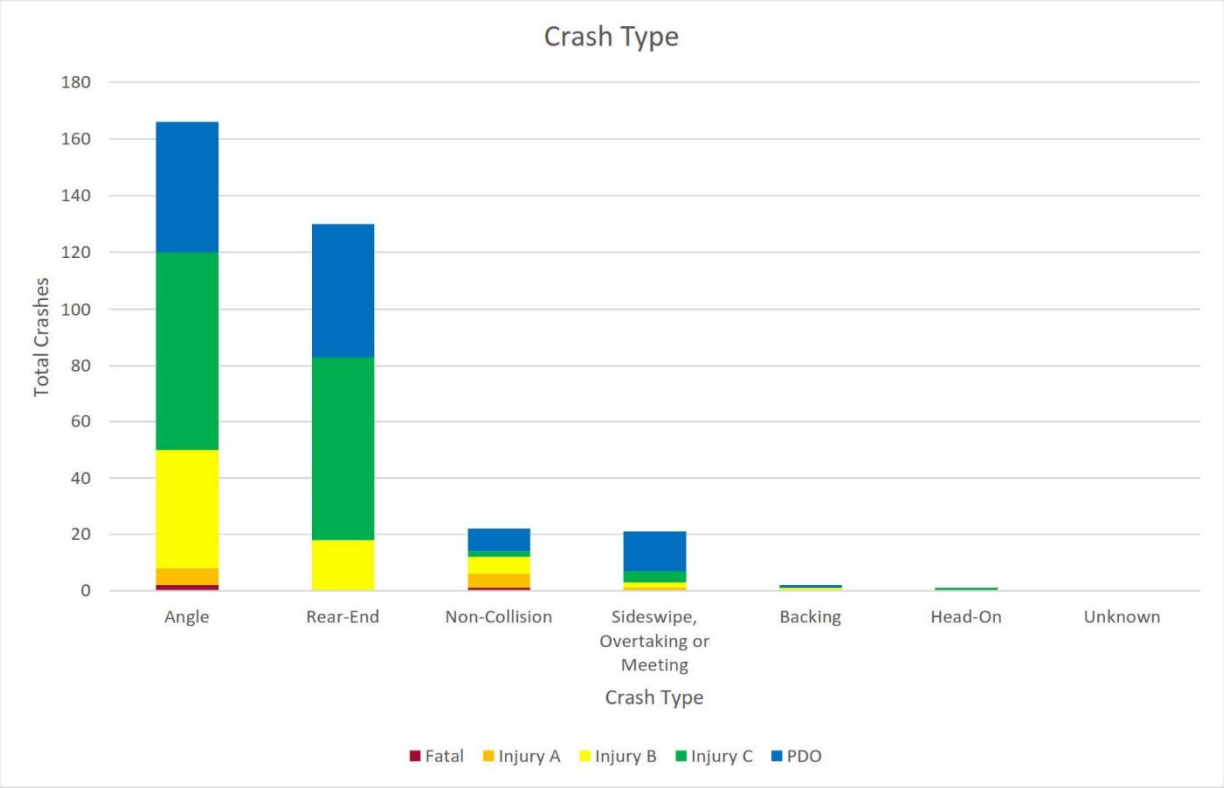
Table 13 summarizes Cheyenne Avenue (SR 574) crashes by crash type and breaks them down by pedestrian, bicycle, motorcycle and bus. **Figure 34** summarizes crashes by crash type and severity. The majority of crashes along the corridor were angle followed closely by rear-end.

Table 13 – Cheyenne Avenue (SR 574) Crashes by Crash Type

Crash Type	Overall		Pedestrian		Bicycle		Motorcycles		Bus	
Angle	166	48.5%	2	25.0%	0	0.0%	4	75.0%	0	0.0%
Rear-End	130	38.0%	0	0.0%	0	0.0%	1	25.0%	1	50.0%
Non-Collision	22	6.4%	5	62.5%	2	100.0%	0	0.0%	1	50.0%
Sideswipe, Overtaking or Meeting	21	6.1%	1	12.5%	0	0.0%	0	0.0%	0	0.0%
Backing	2	0.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Head-On	1	0.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total (5 Years)	**342 (100%)**		**8 (2.3%)**		**2 (0.6%)**		**5 (1.5%)**		**2 (0.6%)**	

Source: NDOT Crash Data, September 2012- August 2017

Figure 34 – Cheyenne Avenue (SR 574) Crashes by Crash Type



Source: NDOT Crash Data, September 2012- August 2017

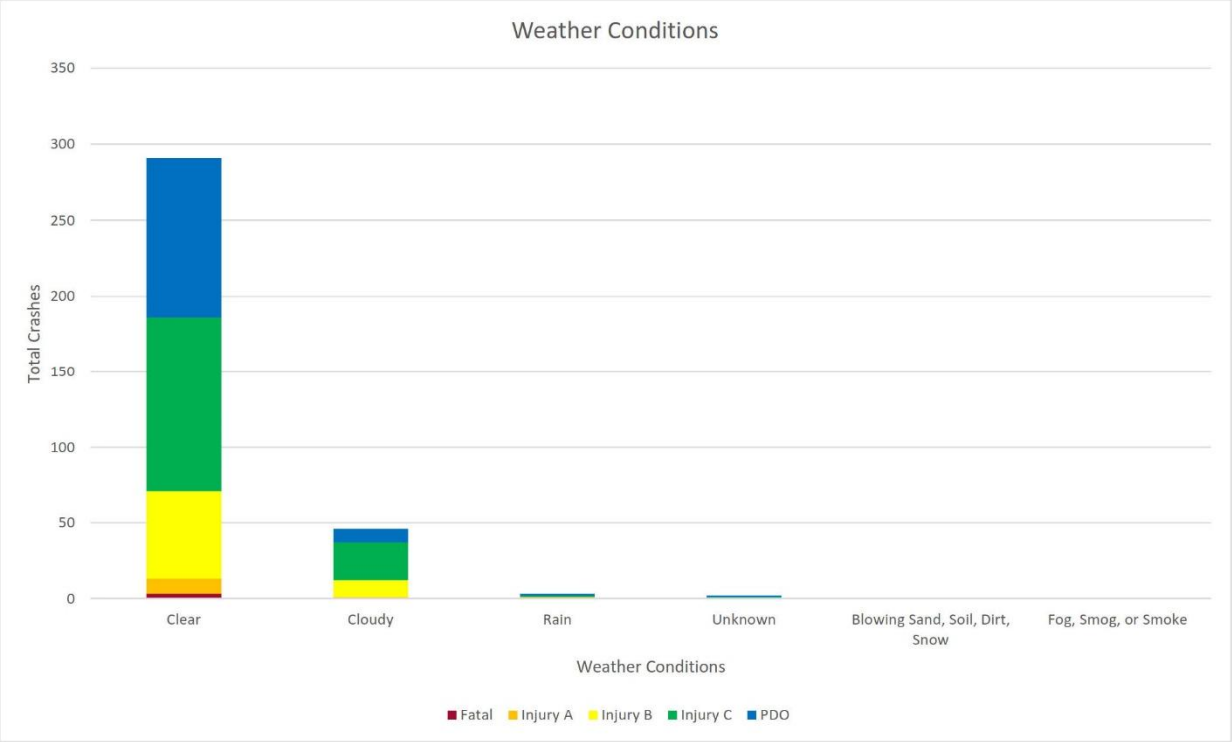
Table 14 summarizes Cheyenne Avenue (SR 574) crashes by weather conditions and breaks them down by pedestrian, bicycle, motorcycle and bus. **Figure 35** summarizes crashes by weather conditions and severity. The majority of crashes along the corridor were during clear conditions.

Table 14 – Cheyenne Avenue (SR 574) Crashes by Weather Conditions

Weather	Overall		Pedestrian		Bicycle		Motorcycle		Bus	
Clear	291	85.1%	5	62.5%	2	100.0%	3	60.0%	2	100.0%
Cloudy	46	13.5%	2	25.0%	0	0.0%	2	40.0%	0	0.0%
Rain	3	0.9%	1	12.5%	0	0.0%	0	0.0%	0	0.0%
Unknown	2	0.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total (5 Years)	**342 (100%)**		**8 (2.3%)**		**2 (0.6%)**		**5 (1.5%)**		**2 (0.6%)**	

Source: NDOT Crash Data, September 2012- August 2017

Figure 35 – Cheyenne Avenue (SR 574) Crashes by Weather Conditions



Source: NDOT Crash Data, September 2012- August 2017

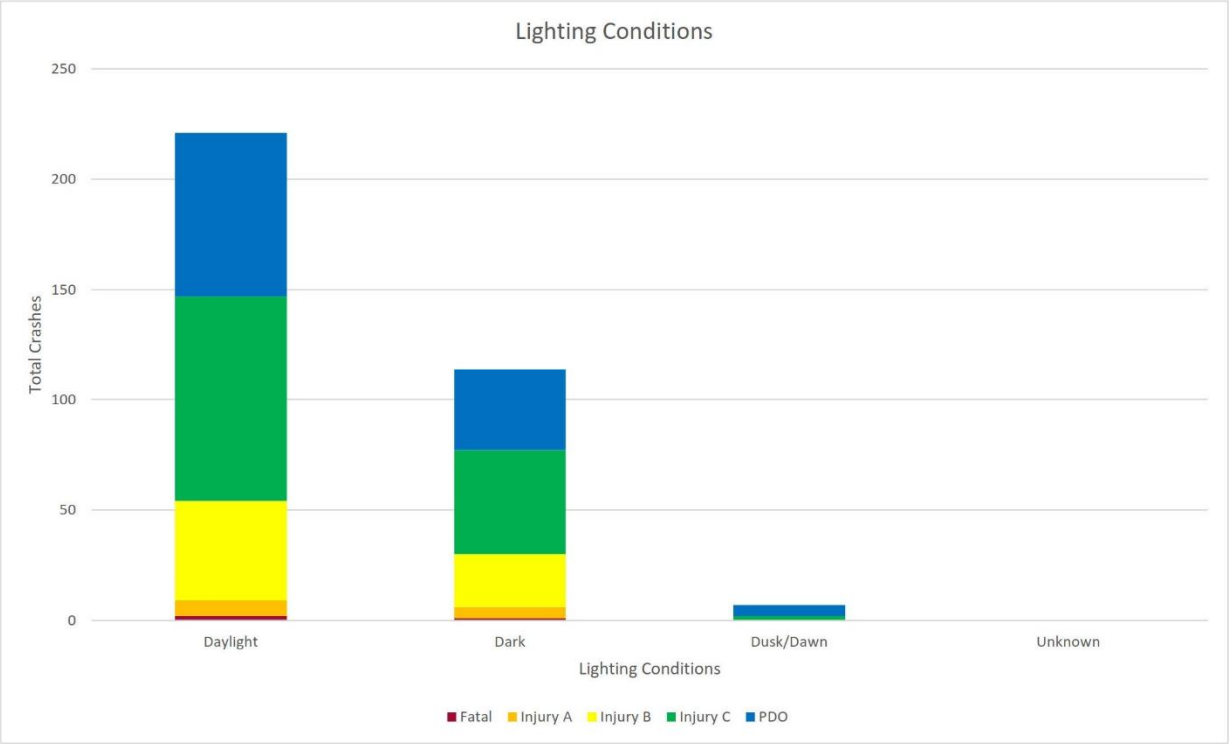
Table 15 summarizes Cheyenne Avenue (SR 574) crashes by lighting conditions and breaks them down by pedestrian, bicycle, motorcycle and bus. **Figure 36** summarizes crashes by lighting conditions and severity. The majority of crashes along the corridor were during daylight conditions.

Table 15 – Cheyenne Avenue (SR 574) Crashes by Lighting Conditions

Lighting	Overall		Pedestrian		Bicycle		Motorcycle		Bus	
Daylight	221	59.4%	5*	62.5%	0	0.0%	1	20.0%	2*	100.0%
Dark	109	31.9%	3	37.5%	2	100.0%	4	80.0%	0	0.0%
Dawn/Dusk	7	2.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total (5 Years)	**342 (100%)**		**8 (2.3%)**		**2 (0.6%)**		**5 (1.5%)**		**2 (0.6%)**	

*Source: NDOT Crash Data, September 2012- August 2017 *One crash involved a pedestrian and bus.*

Figure 36 – Cheyenne Avenue (SR 574) Crashes by Lighting Conditions



Source: NDOT Crash Data, September 2012- August 2017

7.2 Crash Rates

Using the AADT volumes calculated from the 72-hour counts, injury, fatal, and PDO crash rates for both Jones Boulevard and Cheyenne Avenue (SR 574), were calculated for the entire project corridor as well as smaller segments along the project corridor. The functional classification for both Jones Boulevard and Cheyenne Avenue (SR 574) is "Urban Minor Arterial." The fatal crash rates for both Jones Boulevard and Cheyenne Avenue (SR 574) were higher than the state average for the same functional classification, 0.0256 crashes per Million Vehicle Miles Traveled (MVMT) and 0.0298 crashes per MVMT, respectively versus the state fatal crash rate of 0.0168 crashes per MVMT. A summary of the crash rates along the project corridor is provided in **Table 16.** A summary of the crash rates along the project corridors individualized by segments is shown in **Table 17.** Higher crash rates than the statewide average are written in red text.

Table 16 – Project Corridor Crash Rates

Segment	Fatal Crash Rate	Injury Crash Rate	PDO Crash Rate	Total Crash Rate
Project Corridor – Jones Boulevard	0.0256	1.0249	0.9480	1.9986
Project Corridor – Cheyenne Avenue (574)	0.0298	2.2166	1.1530	3.3995
Statewide – Urban Minor Arterial*	0.0168	2.5246	1.6237	3.2124
Jones Boulevard comparison to statewide rates	**+0.0088**	**-1.4997**	**-0.6757**	**-1.2138**
Cheyenne Avenue (SR 574) comparison to statewide rates	**+0.013**	**-0.308**	**-0.4707**	**+0.1871**

Note: Corridor crash rates are expressed in crashes per MVMT.
*Analysis is based on the AADT volume located in **Table 3**.*
** Statewide crash rates by functional classification are for 2017 from the "2017 Functional Classification Crash Rates", NDOT.*

Table 17 – Project Corridor Segment Crash Rates

Segment	Fatal Crash Rate	Injury Crash Rate	PDO Crash Rate	Total Crash Rate
Jones Boulevard, between Smoke Ranch Road and Cheyenne Avenue (SR 574)	0.0368	1.0679	1.1047	2.2095
Jones Boulevard, between Cheyenne Avenue (SR 574) and Gowan Road	0.0000	0.6932	0.5776	1.2708
Jones Boulevard, between Gowan Road and Rancho Drive (SR 599)	0.0000	0.7047	0.2819	0.9865
Cheyenne Avenue (SR 574), between Torrey Pines Drive and Jones Boulevard	0.0300	1.6522	1.2617	2.9440
Cheyenne Avenue (SR 574), between Jones Boulevard and Michael Way	0.0304	1.6134	0.7002	2.3440
Cheyenne Avenue (SR 574), between Michael Way and Rancho Drive (SR 599)	0.0570	4.6137	1.7657	6.4364
Cheyenne Avenue (SR 574), between Rancho Drive (SR 599) and Decatur Boulevard	0.0000	1.9904	1.1708	3.1612
Statewide – Urban Minor Arterial*	**0.0168**	**2.5246**	**1.6237**	**3.2124**

Note: Corridor crash rates are expressed in crashes per MVMT.
*Analysis is based on the AADT volume located in **Table 3.***
** Statewide crash rates by functional classification are for 2017 from the "2017 Functional Classification Crash Rates", NDOT.*

The project corridor segment on Cheyenne Avenue (SR 574) from between Michael Way and Rancho Drive (SR 599) had the highest crash of any segment along the two project corridors, which is over two (2) times the statewide average.

7.3 Intersection Crash Data Analysis

Intersection crashes include all crashes within 200 feet of the intersection, due to the parameters of the data provided by NDOT, including crashes on side streets that are not included in the project corridor analysis. Eight (8) key intersections were selected for analysis along the project corridor. The key intersections include all signalized intersections along the project corridors.

A summary of the key intersection crash analysis is provided in **Table 18.** The key intersection crash data analysis tables and figures are available in **Appendix J**. Using the collected 72-hour counts and peak hour turning movement volumes, crash rates for the key intersections along the project corridor were also calculated. The intersection of Jones Boulevard and Cheyenne Avenue (SR 574) had the highest total intersection crash rate and the intersection of Cheyenne Avenue (SR 574) and Michael Way had both the highest fatal and injury crash rates. **Table 19** provides a summary of the intersection crash rates along the corridor per Million Entering Vehicles (MEV) along the corridors.

Table 18 – Key Intersection Crash Analysis Summary

Intersection Number	Intersection	Control Type	Total Crashes (5 Years)
1	Jones Boulevard and Smoke Ranch Road	Signalized	35
2	Jones Boulevard and Cheyenne Avenue (SR 574)	Signalized	67
3	Jones Boulevard and Gowan Road	Signalized	12
4	Jones Boulevard and Rancho Drive (SR 599)	Signalized	26
5	Cheyenne Avenue (SR 574) and Torrey Pines Drive	Signalized	30
6	Cheyenne Avenue (SR 574) and Michael Way	Signalized	54
7	Cheyenne Avenue (SR 574) and Rancho Drive (SR 599)	Signalized	110
8	Cheyenne Avenue (SR 574) and Decatur Boulevard	Signalized	112

Table 19 – Key Intersection Crash Rates

Intersection Number	Intersection	Fatal Crash Rate	Injury Crash Rate	PDO Crash Rate	Total Crash Rate
1	Jones Boulevard and Smoke Ranch Road	0.0000	0.1551	0.1465	**0.3016**
2	Jones Boulevard and Cheyenne Avenue (SR 574)	0.0106	0.4121	0.2853	**0.7080**
3	Jones Boulevard and Gowan Road	0.0000	0.1407	0.1970	**0.3378**
4	Jones Boulevard and Rancho Drive (SR 599)	0.0000	0.1591	0.1363	**0.2954**
5	Cheyenne Avenue (SR 574) and Torrey Pines Drive	0.0000	0.1502	0.0870	**0.2372**
6	Cheyenne Avenue (SR 574) and Michael Way	0.0120	0.4437	0.1919	**0.6476**
7	Cheyenne Avenue (SR 574) and Rancho Drive (SR 599)	0.0000	0.4257	0.2247	**0.6504**
8	Cheyenne Avenue (SR 574) and Decatur Boulevard	0.0045	0.2535	0.2489	**0.5069**

Note: Intersection crash rates are expressed in crashes per MEV.

7.4 Crash Diagrams

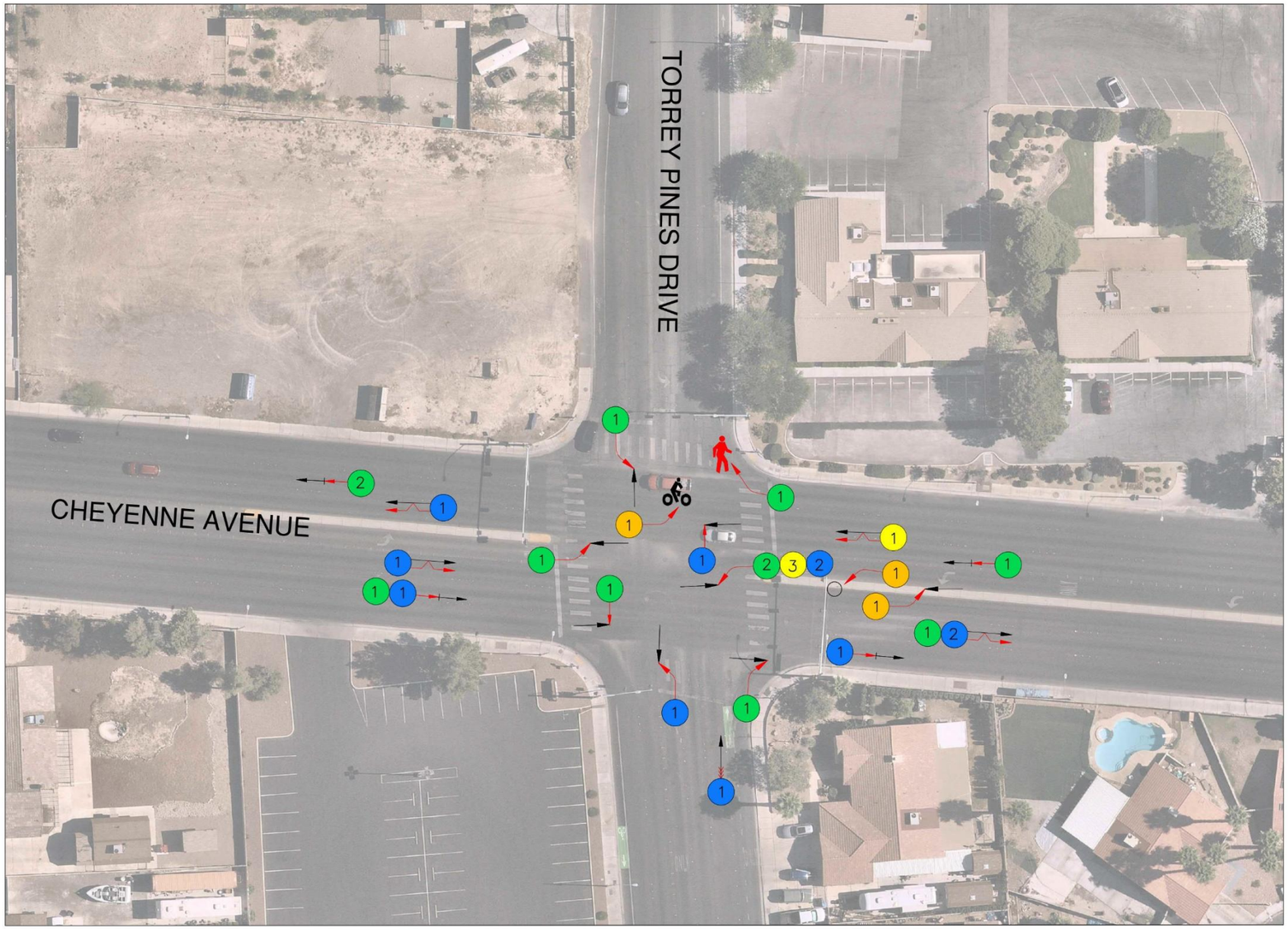
The crash data obtained from NDOT was further reviewed to create crash diagrams for each of the key intersections as well as areas where median modifications as part of access management were to be proposed. The data from NDOT was updated in some instances to make sure the

crash direction and crash type were realistic, therefore some of the values summarized in the crash diagrams will be different than the crash analysis completed from the original NDOT data. Assumptions made to update the crash type from the original NDOT crash data included:

- Angle crashes where vehicles were observed traveling in the same direction and noted changing lanes as a factor were recoded as sideswipe crashes.
- Several bicycle crashes had been recorded as angle crashes, these crashes were recoded as non-collision when only one vehicle and a bicycle were involved.

Figure 37 shows a sample of a crash diagram, the complete set of crash diagrams created for both project corridors are located in **Appendix K**.

Figure 37 – Jones Boulevard and Rancho Drive (SR 599) Crash Diagram



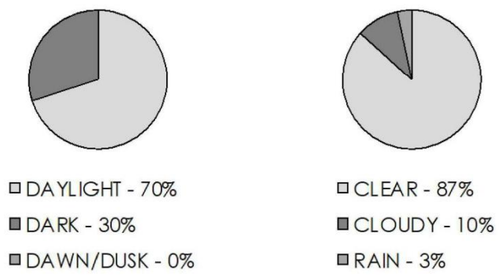
NORTH
NTS

CRASH TYPE SUMMARY						
CRASH TYPE	**FATAL**	**INJURY A**	**INJURY B**	**INJURY C**	**PDO**	**TOTAL**
REAR END	0	0	0	4	2	**6**
ANGLE	0	1	3	6	4	**14**
SIDESWIPE	0	0	1	1	4	**6**
NON-COLLISION	0	2	0	1	0	**3**
BACKING	0	0	0	0	1	**1**
HEAD-ON	0	0	0	0	0	**0**
ALL CRASHES	**0**	**3**	**4**	**12**	**11**	**30**

CRASHES BY MODE SUMMARY						
CRASH MODE	**FATAL**	**INJURY A**	**INJURY B**	**INJURY C**	**PDO**	**TOTAL**
PEDESTRIAN	0	0	0	1	0	**1**
BICYCLE	0	1	0	0	0	**1**
MOTORCYCLE	0	0	0	0	0	**0**
BUS	0	0	0	0	0	**0**

NOTE: Crashes where limited information was available are not shown on the crash diagram figures, therefore differences in the number of crashes presented in the crash type summary table and the figure are possible.

CRASH CONDITIONS*



*It is possible to have multiple weather factors listed per crash. Thus the sum of the percentages may be more than 100%.

LEGEND:

BACKING VEHICLE
SIDESWIPE
REAR-END COLLISION
OUT OF CONTROL
HEAD-ON COLLISION
LEFT-TURN COLLISION
RIGHT-TURN COLLISION
FIXED OBJECT
PARKED VEHICLE
BICYCLE COLLISION (RED: AT FAULT) (BLACK: NOT AT FAULT)
LEFT-TURN COLLISION
RIGHT-TURN COLLISION
ANGLE COLLISION
U-TURN INVOLVED COLLISION
PEDESTRIAN COLLISION (RED: AT FAULT) (BLACK: NOT AT FAULT)
NUMBER OF TOTAL CRASHES AT IDENTIFIED LOCATION (TYP.)
VEHICLE INVOLVED (BLACK)
VEHICLE AT FAULT (RED)

DATA SOURCE: NDOT CRASH DATA FROM 09/01/12-08/31/17

CRASH SEVERITY

K – FATAL
A – SERIOUS INJURY
B – NON-INCAPACITATING INJURY
C – POSSIBLE/CLAIMED
PDO – PROPERTY DAMAGE ONLY

CRASH DIAGRAM
CHEYENNE AVENUE (SR 574)/ TORREY PINES DRIVE
CHEYENNE AVENUE (SR 574)/JONES BOULEVARD SAFETY MANAGEMENT PLAN

8 CRASH ISSUES AND RISK FACTORS

A Road Safety Assessment (RSA) was conducted on the project corridor. The purpose of the RSA was to identify potential road safety issues along Jones Boulevard and Cheyenne Avenue (SR 574) and suggest potential countermeasures to mitigate those safety issues for inclusion in future projects along the corridor, as well as identifying specific short, mid-term, or long-term suggestions for the corridor. The following list of crash issues and risk factors were identified through the review of the crash data, existing project conditions, road users, and the RSA field review:

Jones Boulevard:

- Above average corridor crash frequency and rates
- Above average intersection crash frequency and rates
- No dedicated bicycle facilities
- Minimal full intersection and mid-block pedestrian crossings
- Vegetation covering traffic signs
- Congestion
- Possible lighting issues such as dim lighting and single mast arms at intersections
- Sidewalks and pedestrian crossings not complying with ADA/ Public Rights-of-Way Accessibility Guidelines (PROWAG) standards
- Limited pedestrian facilities including shade structures, and benches
- Pavement in need of repaving
- Minimal median islands

Cheyenne Avenue (SR 574):

- Above average corridor crash frequency and rates
- Above average intersection crash frequency and rates
- No dedicated bicycle facilities
- Minimal mid-block and full intersection pedestrian crossings and misaligned pedestrian crossings
- Vegetation covering traffic signs
- Congestion
- Possible lighting issues such as dim lighting and single mast arms at intersections
- Sidewalks and pedestrian crossings not complying with ADA/PROWAG standards
- Limited pedestrian facilities including shade structures and benches, and pedestrian fencing
- Channelized/sweeping right turns

A copy of both RSA summary reports is located in **Appendix L**.

9 TRAFFIC VOLUME GROWTH

This section provides a summary of the historical and existing traffic volume analysis completed to predict future traffic volumes for the analysis of future conditions. The growth rate analysis was submitted to NDOT Traffic Information Division for review and approval. The submitted Growth Rate Memorandum and approval letter can be found in **Appendix M**.

9.1 2018 Existing Traffic Volumes

To calculate the 2018 existing annual average daily traffic (AADT), 72-hour road tube counts were conducted to collect bi-directional traffic volumes at seven (7) locations along the corridors in October and November of 2018. The collected 72-hour count data information are provided in **Appendix D**. Of those seven (7) locations, five (5) align with the NDOT count stations displayed in **Table 20**. A weekday and a monthly adjustment factor were then applied to the counts collected on Jones Boulevard and Cheyenne Avenue (SR 574) to account for the day of week and time of year when the 72-hour counts were collected. These adjustment factors were taken from the data summary at permanent count station 0035240 located on Jones Boulevard north of Smoke Ranch Road.

Table 20 – 2018 Existing AADT Volume

72-Hour Count Location	Corresponding NDOT Station Number	Collection Date	72-Hour Count ADT	2018 AADT*
Jones Boulevard, between Smoke Ranch Road and Cheyenne Avenue	0035240	Tuesday, October 30, 2018 through Thursday, November 1, 2018	16,446	15,500
Jones Boulevard, between Cheyenne Avenue and Gowan Road	0030595	Tuesday, October 30, 2018 through Thursday, November 1, 2018	9,915	9,300
Cheyenne Avenue, between Torrey Pines Drive and Jones Boulevard	0030751	Tuesday, November 6, 2018 through Thursday, November 8, 2018	39,299	38,000
Cheyenne Avenue, between Jones Boulevard and Michael Way	0030752	Tuesday, November 6, 2018 through Thursday, November 8, 2018	37,589	36,000
Cheyenne Avenue, between Rancho Drive and Decatur Boulevard	0030491	Tuesday, November 6, 2018 through Thursday, November 8, 2018	37,631	36,000

**Adjusted from 72-hour bi-directional road tube counts using a weekday and monthly adjustment factor and NDOT rounding methodology.*

9.2 2040 Horizon Traffic Volumes

AADT volumes for the most recent 5-year period (2013-2017) from the five (5) corresponding NDOT count stations (0035240, 0030595, 0030751, 0030752, and 0030491) were used to calculate a growth rate for each corridor. Two (2) of the counts stations are located on Jones Boulevard with the other three (3) locations on Cheyenne Avenue (SR 574). It was deemed appropriate to use the most recent five (5) years of data as compared to the NDOT Traffic Forecasting Guidelines of ten (10) years to avoid impacts to traffic volume during the recession

in 2008. NDOT count station data for the most recent 5-year period and the resulting average growth rates are shown in **Table 21** and **Table 22.** The calculations resulted in an average corridor growth rate of 3.53% for Jones Boulevard and an average corridor growth rate of 2.85% for Cheyenne Avenue (SR 574). The NDOT count data and the detailed growth rate calculations are included in **Appendix M**.

Table 21 – 2013-2017 NDOT Count Station AADT for Jones Boulevard

NDOT Station	2013	2014	2015	2016	2017	Annual Growth Rate
0035240	13,400	13,900	14,600	14,000	15,100*	3.03%
0030595	7,600	7,800*	7,200	7,800	8,900	4.03%
					Average	3.53%

**Indicates Data Adjusted or Estimated*

Table 22 – 2013-2017 NDOT Count Station AADT for Cheyenne Avenue (SR 574)

NDOT Station	2013	2014	2015	2016	2017	Annual Growth Rate
0030751	36,000	39,500	42,000	42,000	43,000	4.54%
0030752	30,500	29,500	31,000	32,000	34,000*	2.75%
0030491	29,000	29,500*	29,500	29,000	30,500*	1.27%
					Average	2.85%

**Indicates Data Adjusted or Estimated*

The RTC's Travel Demand Model (TDM) was reviewed and it was observed that the 2020 and 2040 forecast AADT volumes in the model are generally lower than the estimated 2018 AADT volumes that were calculated and adjusted from the 72-hour counts collected in October and November 2018. To provide a conservative analysis and to show a growth in traffic from existing to 2040, the volumes from the RTC TDM were not used to estimate future traffic volumes. **Table 23** shows the 2018 AADT volumes calculated from the 72-hour counts along with the corresponding 2020 and 2040 forecast volumes from the RTC TDM for reference.

Table 23 – 2018 AADT Volumes and RTC Travel Demand Model Volumes

72-Hour Count Location	Corresponding NDOT Station Number	2018 AADT *	2020 AADT (TDM)**	2040 AADT (TDM)**
Jones Boulevard, between Smoke Ranch Road and Cheyenne Avenue	0035240	15,500	10,502	12,403
Jones Boulevard, between Cheyenne Avenue and Gowan Road	0030595	9,300	5,313	7,646

**Adjusted from 72-hour bi-directional road tube counts using a weekday and monthly adjustment factor and NDOT rounding methodology.*
*** AADT values have been averaged from the TDM segments.*

Table 23 (cont.) – 2018 AADT Volumes and RTC Travel Demand Model Volumes

72-Hour Count Location	Corresponding NDOT Station Number	2018 AADT *	2020 AADT (TDM)**	2040 AADT (TDM)**
Cheyenne Avenue, between Torrey Pines Drive and Jones Boulevard	0030751	38,000	33,578	38,430
Cheyenne Avenue, between Jones Boulevard and Michael Way	0030752	36,000	33,913	39,504
Cheyenne Avenue, between Rancho Drive and Decatur Boulevard	0030491	36,000	37,441	48,034

**Adjusted from 72-hour bi-directional road tube counts using a weekday and monthly adjustment factor and NDOT rounding methodology.*
*** AADT values have been averaged from the TDM segments.*

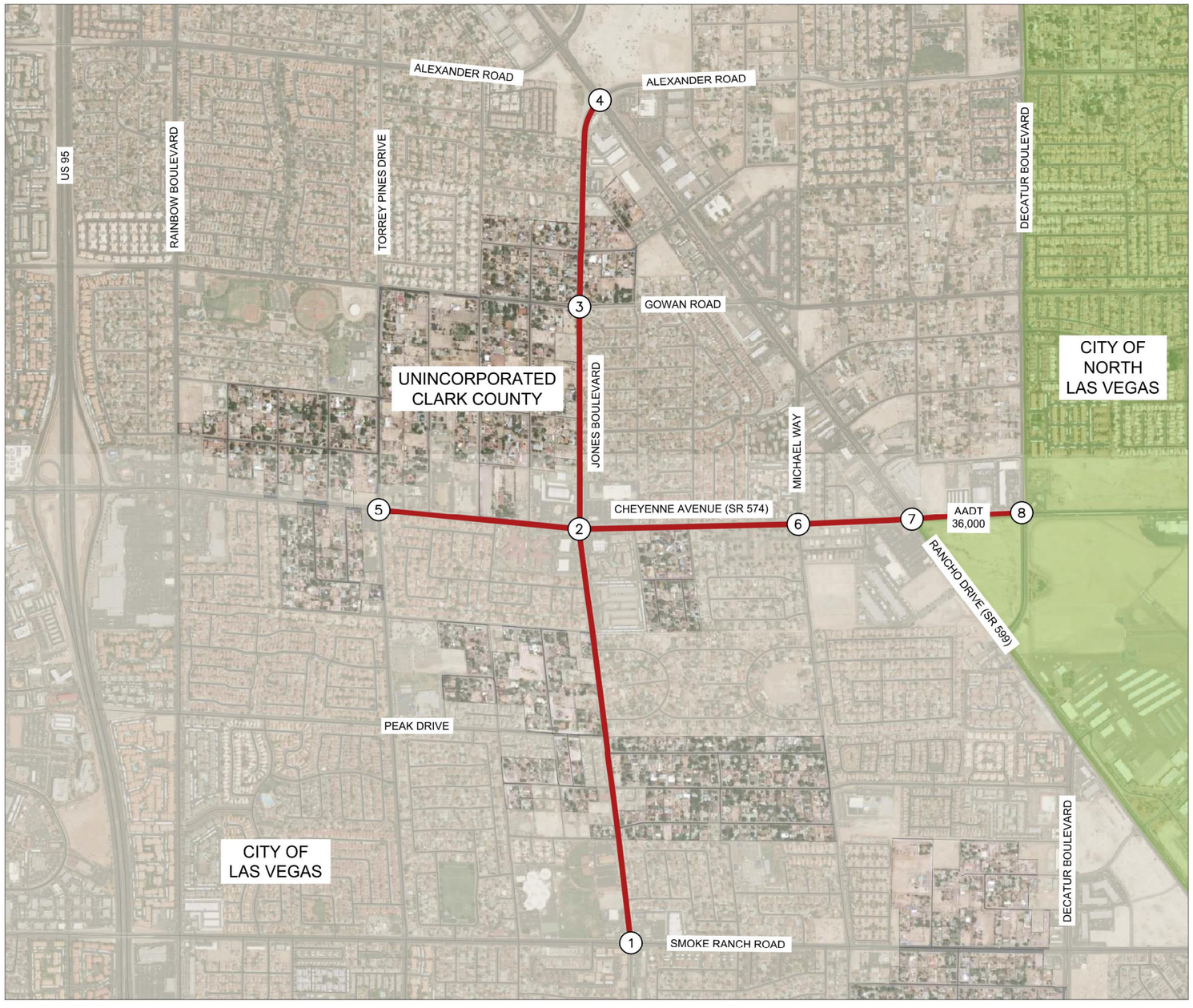
9.3 Predict 2020 and 2040 Horizon Turning Movement Volumes

To forecast future turning movement traffic volumes along the corridor, the calculated average growth rates from **Table 21** and **Table 22** were applied to the 2018 existing turning movement traffic volumes to determine the anticipated 2020 construction year traffic volumes for each of the corridor's study area intersections. Since the calculated growth rates from **Table 21** and **Table 22** are higher than could be expected to be maintained over a 20-year period, the newly calculated 2020 construction year volumes were grown at half the calculated growth rate to determine the 2040 horizon year traffic volumes. This reduced growth rate from 2020 to 2040 was applied to take into account the natural traffic growth fluctuations due to variations in the economy and future changes in traffic patterns. This approach used the current growth rate of 3.53% and 2.85% to calculate the 2020 volumes of Jones Boulevard and Cheyenne Avenue (SR 574) respectively, then a reduced growth rate of 1.77% (Jones Boulevard) and 1.43% (Cheyenne Avenue (SR 574)) to the projected 2020 volumes to obtain the 2040 horizon year volumes for the key study area intersections and AADTs along the corridor as summarized in **Table 24**. **Figure 38** shows the 2040 horizon year turning movement counts calculated for each key intersection.

Table 24 – Horizon Year Growth Rates

Years	Growth Rate	
	Jones Boulevard	Cheyenne Avenue (SR 574)
2019-2020	3.53%	2.85%
2021-2040	1.77%	1.43%

Figure 38 – 2040 Traffic Volumes for the Jones Boulevard and Cheyenne Avenue (SR 574) SMP Project Corridors



Jones Boulevard/Smoke Ranch Road		Jones Boulevard/Cheyenne Avenue	
1		2	
↙ 69(100) ↓ 881(617) ↘ 120(87)	↱ 94(138) ← 600(705) ↰ 89(158)	↙ 184(164) ↓ 505(394) ↘ 45(81)	↱ 22(68) ← 1729(1842) ↰ 213(279)
54(103) ↱ 452(598) → 121(158) ↘	↰ 143(165) ↑ 523(1000) ↱ 116(120)	140(230) ↱ 1633(1791) → 144(135) ↘	↰ 174(191) ↑ 364(652) ↱ 228(282)

Jones Boulevard/Gowan Road		Jones Boulevard/Rancho Drive		Cheyenne Avenue/Torrey Pines Drive	
3		4		5	
↙ 76(47) ↓ 525(414) ↘ 12(6)	↱ 5(13) ← 170(187) ↰ 67(76)	↙ 321(202) ↓ 1944(1154) ↘ 277(133)	↱ 265(212) ← 211(127) ↰ 113(23)	↙ 44(56) ↓ 96(83) ↘ 23(38)	↱ 12(28) ← 1933(1978) ↰ 157(157)
23(45) ↱ 174(211) → 79(53) ↘	↰ 66(94) ↑ 307(559) ↱ 63(79)	184(434) ↱ 143(172) → 13(13) ↘	↰ 33(59) ↑ 783(1980) ↱ 57(45)	16(58) ↱ 1705(1978) → 112(131) ↘	↰ 104(66) ↑ 63(173) ↱ 151(197)

Cheyenne Avenue/Michael Way		Cheyenne Avenue/Rancho Drive		Cheyenne Avenue/Decatur Boulevard	
6		7		8	
↙ 80(70) ↓ 59(47) ↘ 18(38)	↱ 15(24) ← 1773(2037) ↰ 111(125)	↙ 27(72) ↓ 1577(898) ↘ 388(241)	↱ 131(355) ← 1689(1730) ↰ 182(116)	↙ 318(241) ↓ 1830(817) ↘ 309(218)	↱ 90(283) ← 1672(1944) ↰ 258(268)
56(78) ↱ 1587(1937) → 78(127) ↘	↰ 92(78) ↑ 42(55) ↱ 124(140)	58(116) ↱ 1443(1737) → 273(254) ↘	↰ 182(398) ↑ 593(1374) ↱ 32(30)	148(216) ↱ 1674(1836) → 3(11) ↘	↰ 11(22) ↑ 589(1540) ↱ 249(359)

*Intersections #4 and #7 include northbound u-turn movements, these u-turn movements have been incorporated into the northbound left turn movements shown above.

LEGEND:

- (1) Study Area Key Intersection
- Study Area Corridor
- City of North Las Vegas
- City of Las Vegas
- Major Roads
- ← XX (XX) AM(PM) Peak Hour Traffic Volumes

9.4 Left Turn Storage Analysis

Left turn storage analysis was conducted for left turn movements for the 2040 traffic volumes. The analysis was conducted using the Poisson method with a 95% confidence interval and a 140-second cycle length for signalized intersections. The only exception was for Gowan Road which used a 70-second cycle length per the signal timing data provided by FAST. Results of the analysis for the key intersections are provided in **Table 25.** Left turn storage analysis results for 2040 are found in **Appendix F.** The approaches anticipated to exceed available left turn storage are highlighted in **red**.

Table 25 – 2040 Left Turn Storage Analysis Results

Intersection Number	Intersection Left Turn Movement	Provided Storage Length	Desired Storage Length
1	**Jones Boulevard and Smoke Ranch Road**		
	▪ Northbound to Westbound Left	150’	**265’**
	▪ Southbound to Eastbound Left	450’	206’
	▪ Eastbound to Northbound Left	400’	182’
	▪ Westbound to Southbound Left	450’	256’
2	**Jones Boulevard and Cheyenne Avenue (SR 574)**		
	▪ Northbound to Westbound Left	200’	**298’**
	▪ Southbound to Eastbound Left	250’	152’
	▪ Eastbound to Northbound Left	DUAL 250’	DUAL 173’
	▪ Westbound to Southbound Left	DUAL 275’	DUAL 203’
3	**Jones Boulevard and Gowan Road**		
	▪ Northbound to Westbound Left	200’	101’
	▪ Southbound to Eastbound Left	200’	26’
	▪ Eastbound to Northbound Left	125’	60’
	▪ Westbound to Southbound Left	150’	87’
4	**Jones Boulevard and Rancho Drive (SR 599)**		
	▪ Northbound to Westbound Left	325’	120’
	▪ Southbound to Eastbound Left	200’	**404’**
	▪ Eastbound to Northbound Left	DUAL 300'	DUAL 295’
	▪ Westbound to Southbound Left	500’	DUAL 98’
5	**Cheyenne Avenue (SR 574) and Torrey Pines Drive**		
	▪ Northbound to Westbound Left	125’	**184’**
	▪ Southbound to Eastbound Left	150'	87’
	▪ Eastbound to Northbound Left	275'	118’
	▪ Westbound to Southbound Left	500’	254’

Table 25 (Continued) - 2040 Left Turn Storage Analysis Results

Intersection Number	Intersection Left Turn Movement	Provided Storage Length	Desired Storage Length
6	**Cheyenne Avenue (SR 574) and Michael Way**		
	Northbound to Westbound Left	100’	**167’**
	Southbound to Eastbound Left	275'	87'
	Eastbound to Northbound Left	300'	147'
	Westbound to Southbound Left	200'	**212'**
7	**Cheyenne Avenue (SR 574) and Rancho Drive (SR 599)**		
	▪ Northbound to Westbound Left	DUAL 350'	DUAL 274’
	▪ Southbound to Eastbound Left	DUAL 375'	DUAL 268'
	▪ Eastbound to Northbound Left	275’	200'
	▪ Westbound to Southbound Left	575’	286'
8	**Cheyenne Avenue (SR 574) and Decatur Boulevard**		
	▪ Northbound to Westbound Left	500’	59’
	▪ Southbound to Eastbound Left	DUAL 350’	DUAL 221’
	▪ Eastbound to Northbound Left	375'	329’
	▪ Westbound to Southbound Left	225'	**393’**

10 PUBLIC INVOLVEMENT

A public information meeting was held to solicit input from the community for the Jones Boulevard/ Cheyenne Avenue (SR 574) SMP proposed improvements. The public meeting was held at the Children's Memorial Park on Gowan Road during two time periods from 11:30 AM – 1:00 PM, as well as from 4:30 – 6:00 PM, on Tuesday, June 4, 2019. Visual representations of the proposed improvements were displayed along with an overview of the project corridor. A total of 23 individuals attended the public meetings, including representatives from NDOT, RTC, the City of Las Vegas, the City of North Las Vegas, Kimley-Horn, and the community at large. An interactive story map was created and presented at the public meeting. This map includes the following information:

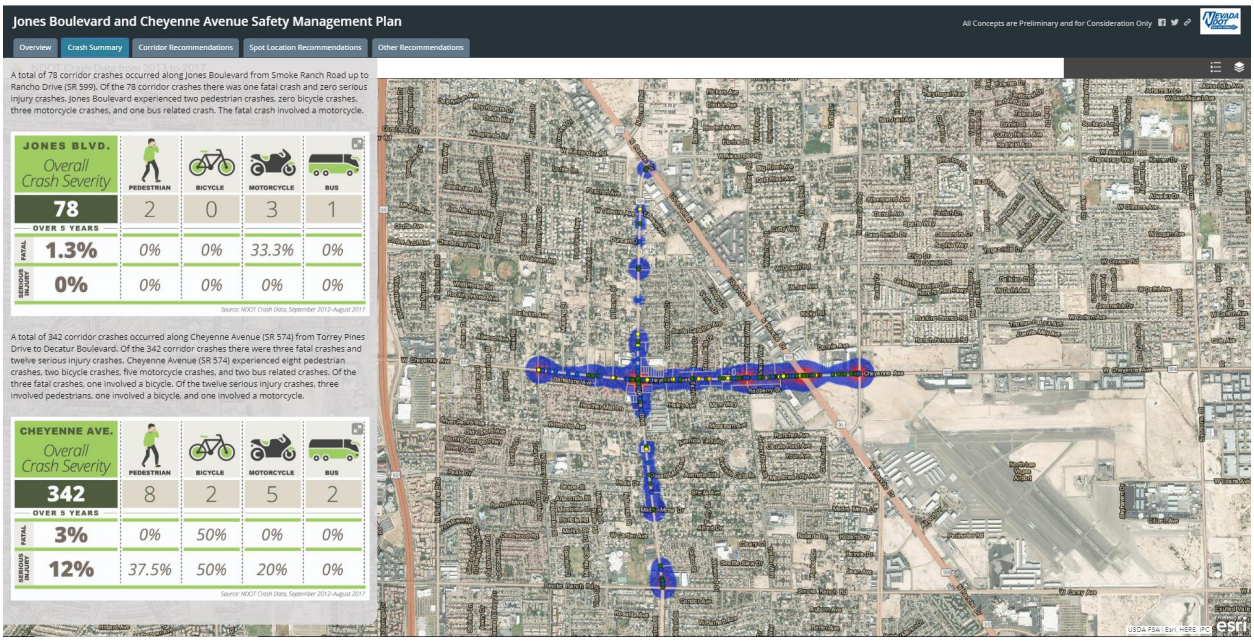
- Project Overview and Video
- Crash Summary Layers
  - Corridor Crashes
  - Heat Map
  - Pedestrian Crashes
  - Bicycle Crashes
  - Motorcycle Crashes
  - Bus Crashes
- Corridor Wide Recommendations
- Spot Location Recommendations
- Other Recommendations

The story map allowed the public to see the crashes affecting their focus areas and how each recommendation would help to mitigate the crashes happening at a given location. A total of 64 views were recorded for the story map. Comments were recorded during the public meeting, comments received were incorporated into the proposed improvement as appropriate.

- Discourage the use of residential streets as a "short-cut" or "cut through" to avoid traffic signals throughout the SMP corridor
- Trim/maintain landscape along corridor to ensure proper visibility
- Ensure school bus drivers avoid using Alfred Drive
- Transition permissive left turn into protected arrow at Torrey Pines Drive and Cheyenne Avenue
- Increase law enforcement along the corridors
- Concern about reducing Cheyenne Avenue (SR 574) to 2 lanes each way
- Concern with proposed medians restricting movements from side streets

Appendix N includes a copy of the public meeting flyer, story map screenshots, and the comments received from the public.

Figure 39 – Jones Boulevard and Cheyenne Avenue (SR 574) Story Map



Story Map Website: https://maps.kimley-horn.com/portal/apps/MapSeries/index.html?appid=d2d83ce8bbaf49cd8b9bff3e4b211e71

11 LANE REDUCTION FEASIBILITY

Lane reductions reduce the number of potential vehicular conflict points on a roadway. This section summarizes the feasibility of reducing the number of lanes for the Jones Boulevard and Cheyenne Avenue (SR 574) corridors.

There are many benefits to applying lane reduction to a corridor. Some advantages include:

- Improved safety
- Reduced speeds
- Improved pedestrian environment
- Improved bicyclist accessibility
- Enhanced transit stops
- Reduce potential for sideswipe crashes
- Reduction in conflict points
- Improved sight distance
- Reduced weaving

Pursuant to Title 19.04.190[2], a reduction to four (4) lanes with a left turn lane is consistent with the City of Las Vegas Complete Street Standards for major collector streets. Jones Boulevard is proposed to be converted from a four-lane roadway with a TWLT to a two-lane roadway with a TWLTL and raised medians. TWLTL configurations were kept at locations where residences front Jones Boulevard. According to the Federal Highway Administration (FHWA)[3] a location going from four (4) lanes to three (3) with less than 10,000 ADT makes a great candidate for lane reduction in most cases. Between 10,000 and 15,000 a location makes a good candidate for lane reduction in many instances. The 2040 AADT values for Jones Boulevard range from 7,646 to 12,403 which falls within the threshold of being a good candidate (**Table 23** of **Section 9**). The AADT factor was used because the values were adjusted based on a weekday and monthly adjustment factor, making it more indicative of traffic numbers for the whole year.

Cheyenne Avenue (SR 574) Alternative 1 proposes the corridor to be converted from a seven-lane roadway to a five-lane roadway. The AADT for Cheyenne Avenue (SR 574) is between 38,430 to 48,034. Many projects in mid-size to large cities have been successful at performing a lane reduction on a five lane or larger roadway[4]. For example, Pennsylvania Avenue in Washington DC has an AADT of about 35,000 and reduced their roadway from nine (9) lanes to seven (7). This was completed in 2011 and in 2012 a follow-up study was conducted to determine the level of success. The follow up study on Pennsylvania Avenue determined the LOS was not significantly affected. In addition, motor vehicle volumes decreased and bicycle ridership numbers increased. Another example with a more similar AADT is Venice Boulevard in Los Angeles, California which had an AADT of 45,000 and was reduced from seven (7) lanes to five (5) lanes. Supporting documents mentioned below can be found in **Appendix O**.

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[2] *City of Las Vegas Complete Street Standards http://online.encodeplus.com/regs/lasvegas-nv/doc-viewer.aspx?secid=2145#secid-2145 (accessed October 9, 2019 for this report)*
[3] *FHWA, "Road Diet FAQ" U.S. Department of Transportation Federal Highway Administration. https://safety.fhwa.dot.gov/road_diets/resources/pdf/fhwasa17021.pdf (accessed October 9, 2019 for this report)*
[4] *An Evaluation of "Road Diet" Projects on Five Lane and Larger Roadways offers different examples of other cities having success reducing lanes on busy streets with larger than 5 lanes. https://planning-org-uploaded-media.s3.amazonaws.com/document/An-Evaluation-of-Road-Diet-Projects-on-Five-Lane-and-Larger-Roadways.pdf (accessed October 9, 2019 for this report)*

12 PROPOSED IMPROVEMENTS

The following section presents the proposed safety improvements for the Jones Boulevard/Cheyenne Avenue (SR 574) SMP. These improvements were developed based on the results of the analysis of existing project conditions, as found in **Section 2** through **Section 8** of this report and with direction from the TAC. All proposed improvements are within the existing right-of-way.

12.1 Jones Boulevard Recommended Improvements

The goal for developing alternatives for the Jones Boulevard corridor was to focus on improving mobility and safety for all modes, including vehicles, pedestrians, bicyclists, and buses. Through the SMP process, three alternatives were developed for the corridor. Recommendations also include upgrading pedestrian curb ramps and pedestrian access paths to comply with ADA and PROWAG. Please note a self-evaluation of all pedestrian facilities along the corridor should be completed to verify compliance with ADA/PROWAG, these recommendations only include those facilities specifically called out during the RSA field review. The following subsections describe the proposed improvements for each segment of the corridor. In general, the alternatives are as follows:

- **Alternative 1**
  - Install raised medians throughout corridor to limit left turn access.
  - Reduce travel lanes from two (2) lanes each direction to one (1) lane each direction and restripe roadway to provide a dedicated bike lane with 3-foot buffer in each direction of travel
  - Maintain on-street parking where residential property fronts Jones Boulevard.
- **Alternative 2**
  - Install raised medians throughout corridor to limit left turn access
  - Reduce travel lanes from two (2) lanes each direction to one (1) lane each direction and restripe roadway to provide a dedicated bike lane with 3-foot buffer in each direction of travel
  - Remove all on-street parking and widen sidewalk to 10 feet along both sides of the corridor
- **Alternative 3**
  - Install raised medians throughout corridor to limit left turn access
  - Reduce travel lanes from two (2) lanes each direction to one (1) lane each direction and restripe roadway to provide a shared bus/bike lane in each direction of travel

Note that it is TWLTL is recommended where residences front Jones Boulevard for all alternatives. The following subsections provide additional details for each segment along Jones Boulevard.

12.1.1 Jones Boulevard Alternative 1 Conceptual Design

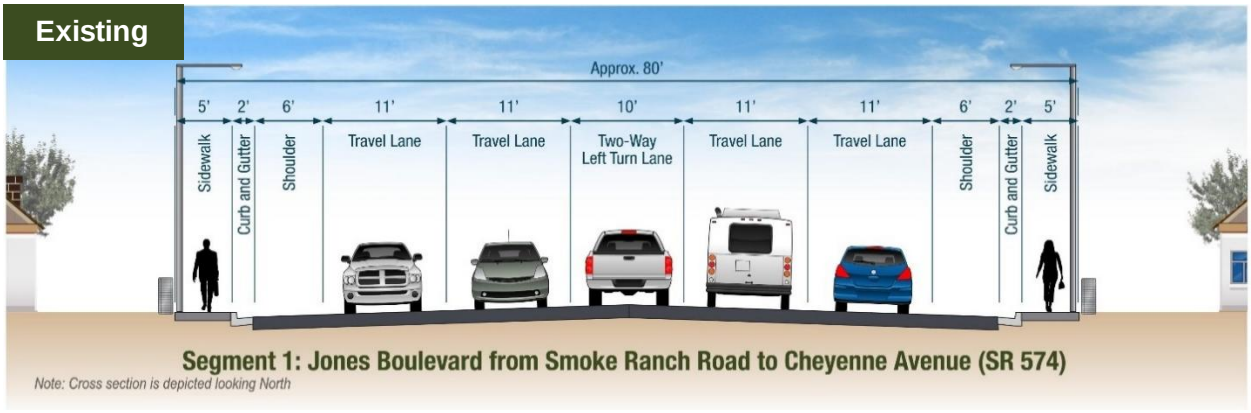
The following subsections provide details on the Alternative 1 recommendations for each segment along the Jones Boulevard corridor. As previously stated, Alternative 1 improvement include the installation of raised medians throughout corridor to limit left turn access, the reduction of travel lanes from two (2) lanes each direction to one each direction and restriping the roadway to provide a dedicated bike lane with 3-foot buffer. Note that a TWLTL is proposed where residences front

Jones Boulevard. Alternative 1 will maintain on-street parking where residential property fronts Jones Boulevard.

12.1.1.1 Jones Boulevard Segment 1: Smoke Ranch Road to Cheyenne Avenue (SR 574)

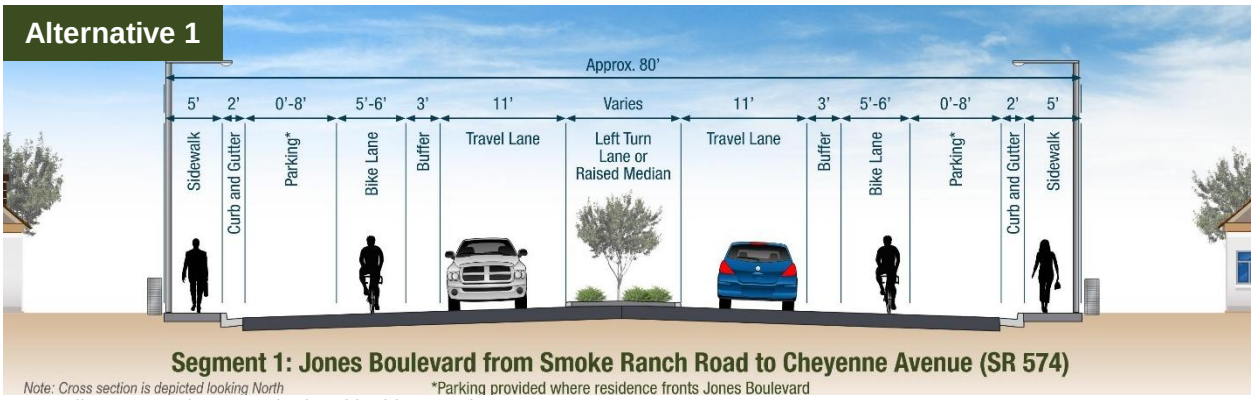
Alternative 1 improvement for Segment 1 from Smoke Ranch Road to Cheyenne Avenue (SR 574) include the items described in **Section 12.1**. **Figure 40** and **Figure 41** illustrate the existing and proposed cross sections for Alternative 1 along Segment 1 of Jones Boulevard. **Figure 42** through **Figure 44** show photo renderings of the proposed Alternative 1 improvements.

Figure 40 – Jones Boulevard Segment 1 Existing Cross Section



Note: All cross sections are depicted looking North.

Figure 41 – Jones Boulevard Segment 1 Cross Section for Alternative 1



Note: All cross sections are depicted looking North.

Figure 42 – Jones Boulevard Segment 1 Proposed Improvements (Looking North)

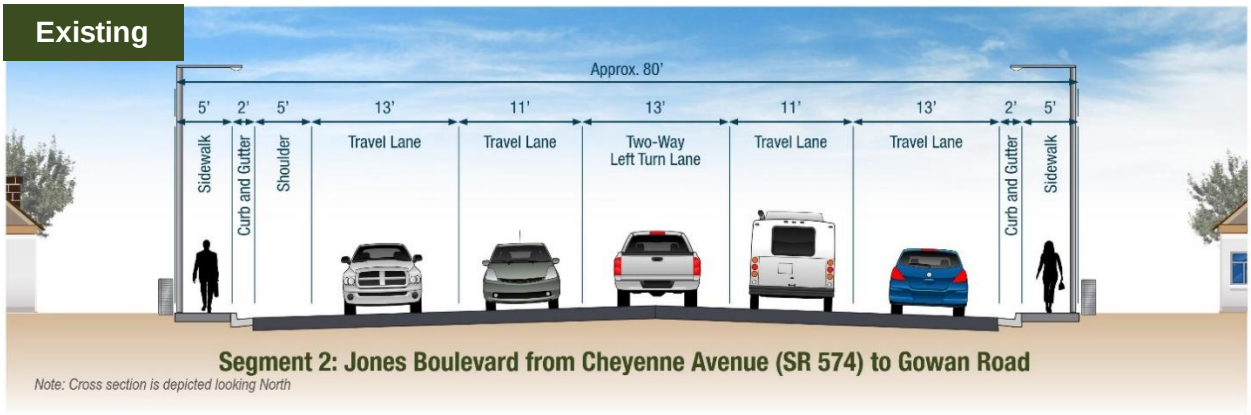
Figure 43 – Jones Boulevard Segment 1 Proposed Improvements (Looking North)

Figure 44 – Jones Boulevard Segment 1 Proposed Improvements (Looking North)

12.1.1.2 Jones Boulevard Segment 2: Cheyenne Avenue (SR 574) to Gowan Road

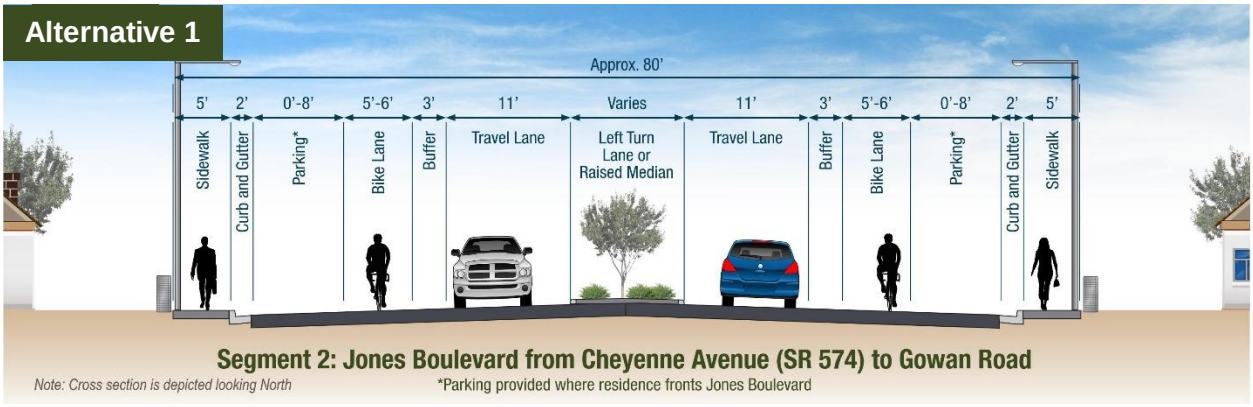
Alternative 1 improvements for Segment 2 from Cheyenne Avenue (SR 574) to Gowan Road include the items described in **Section 12.1**. **Figure 45** and **Figure 46** illustrate the existing and the proposed cross sections for Alternative 1 and **Figure 47** shows a photo rendering of the proposed Alternative 1 improvements for the segment.

Figure 45 – Jones Boulevard Segment 2 Existing Cross Section



Note: All cross sections are depicted looking North.

Figure 46 – Jones Boulevard Segment 2 Cross Section for Alternative 1



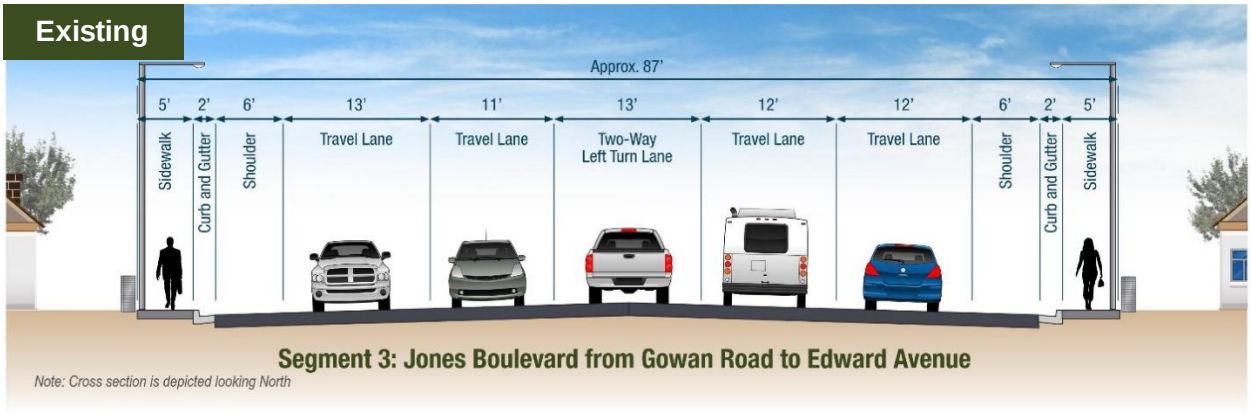
Note: All cross sections are depicted looking North.

Figure 47 – Jones Boulevard Segment 2 Proposed Improvements (Looking North)

12.1.1.3 Jones Boulevard Segment 3: Gowan Road to Edward Avenue

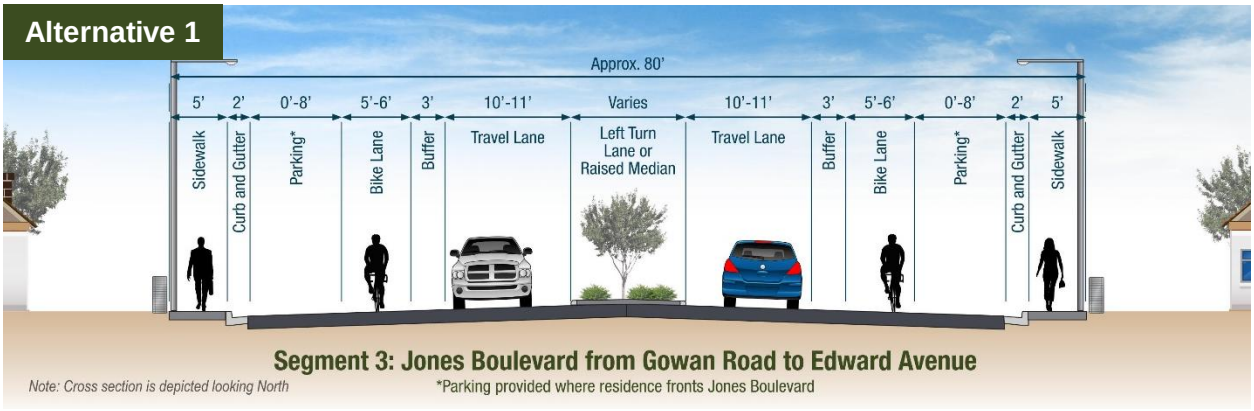
Alternative 1 improvements for Segment 3 from Gowan Road to Edward Avenue include the items described in **Section 12.1**. **Figure 48** and **Figure 49** illustrate the existing and proposed cross sections for Alternative 1 along Segment 3.

Figure 48 – Jones Boulevard Segment 3 Existing Cross Section



Note: All cross sections are depicted looking North.

Figure 49 – Jones Boulevard Segment 3 Cross Section for Alternative 1

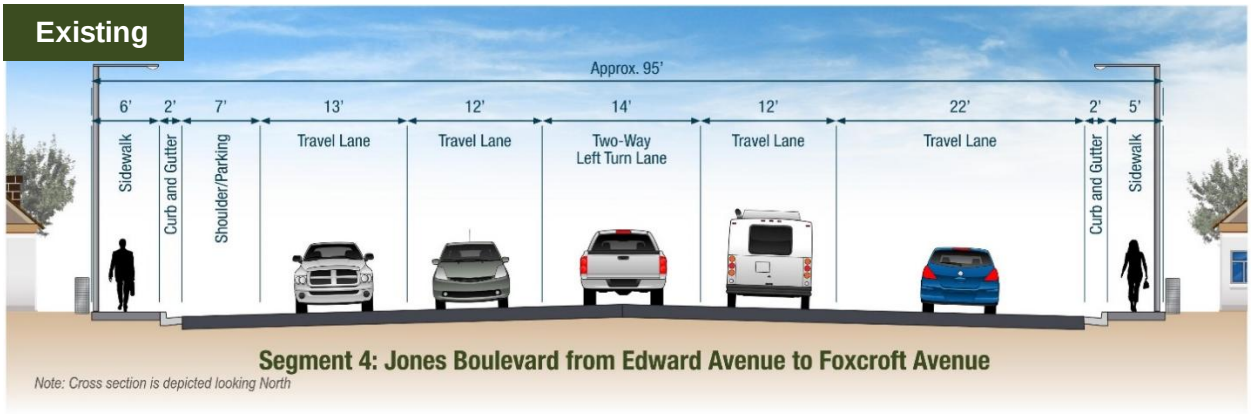


Note: All cross sections are depicted looking North.

12.1.1.4 Jones Boulevard Segment 4: Edward Avenue to Foxcroft Avenue

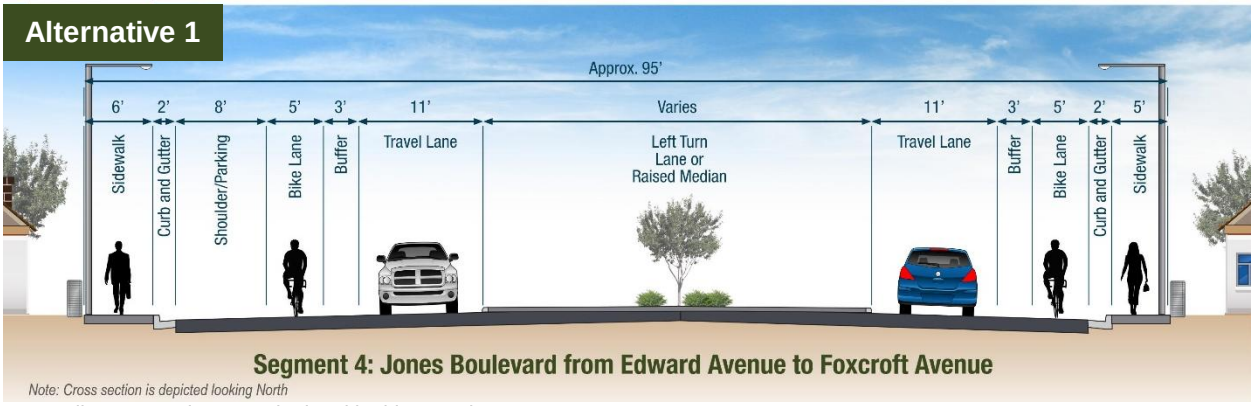
Alternative 1 improvements for Segment 4 from Edward Avenue to Foxcroft Avenue include the items described in **Section 12.1**. **Figure 50** and **Figure 51** illustrate the existing and proposed cross sections for Alternative 1 along Segment 4.

Figure 50 – Jones Boulevard Segment 4 Existing Cross Section



Note: All cross sections are depicted looking North.

Figure 51 – Jones Boulevard Segment 4 Cross Section for Alternative 1

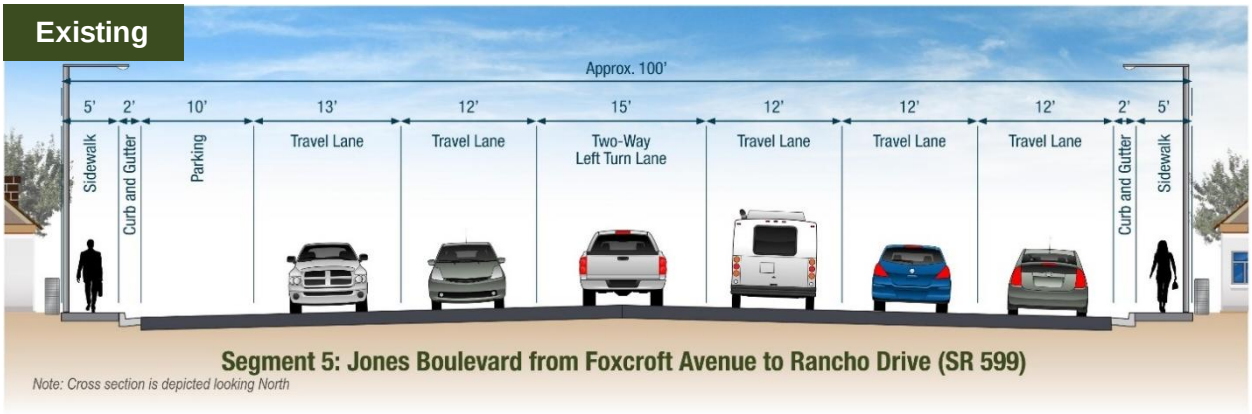


Note: All cross sections are depicted looking North.

12.1.1.5 Jones Boulevard Segment 5: Foxcroft Avenue to Rancho Drive (SR 599)

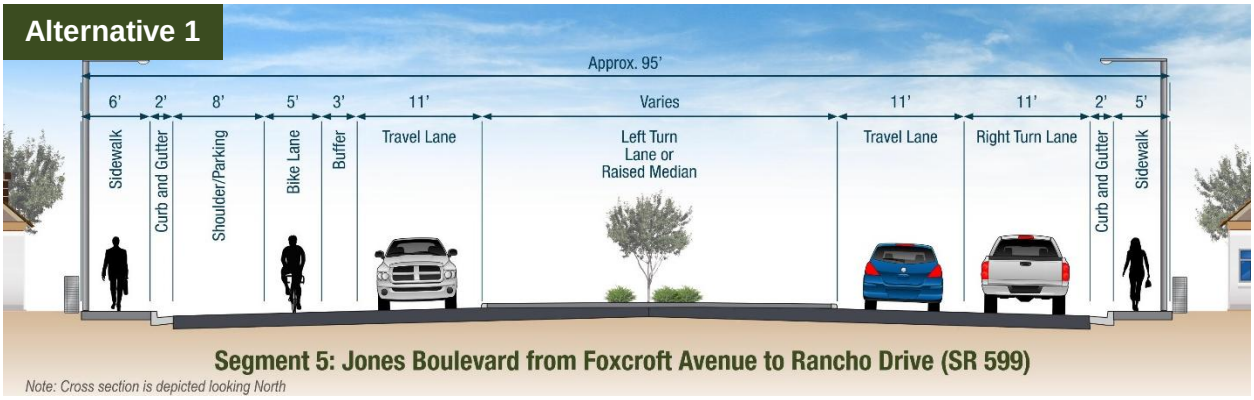
Alternative 5 improvements for Segment 5 from Foxcroft Avenue to Rancho Drive (SR 599) include the items described in Section **12.1**. **Figure 52** and **Figure 53** illustrate the existing and proposed cross sections for Alternative 1 along Segment 5.

Figure 52 – Jones Boulevard Segment 5 Existing Cross Section



Note: All cross sections are depicted looking North.

Figure 53 – Jones Boulevard Segment 5 Cross Section for Alternative 1



Note: All cross sections are depicted looking North.

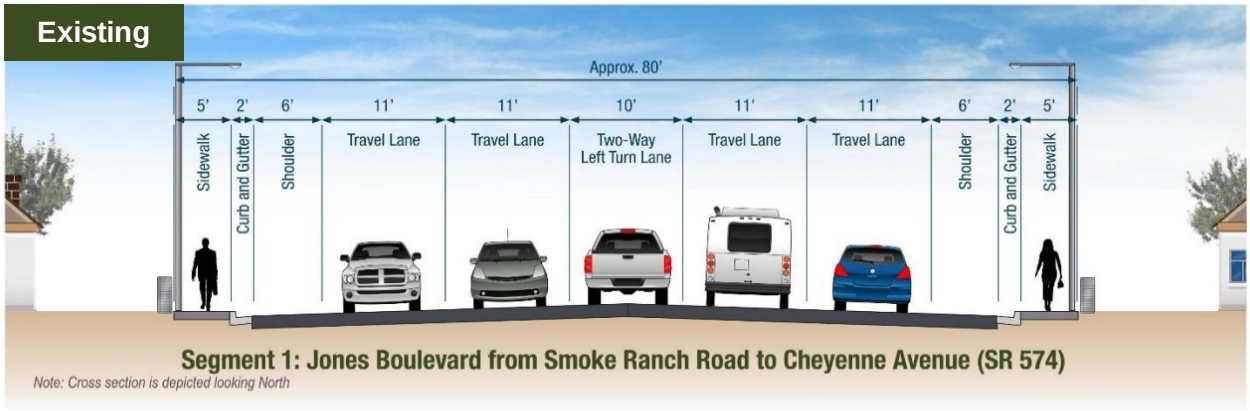
12.1.2 Jones Boulevard Alternative 2 Conceptual Design

The following subsections provide details on the Alternative 2 recommendations for each segment along the Jones Boulevard corridor. As previously stated, Alternative 2 improvement include the installation of raised medians throughout corridor to limit left turn access, the reduction of travel lanes from two (2) lanes each direction to one (1) lane each direction and restriping the roadway to provide a dedicated bike lane with 3-foot buffer in each direction of travel. Note that a TWLTL is proposed where residences front Jones Boulevard. Removal of all on-street parking and widening of the sidewalk to 10 feet along both sides of the corridor is also proposed in this alternative.

12.1.2.1 Jones Boulevard Segment 1: Smoke Ranch Road to Cheyenne Avenue (SR 574)

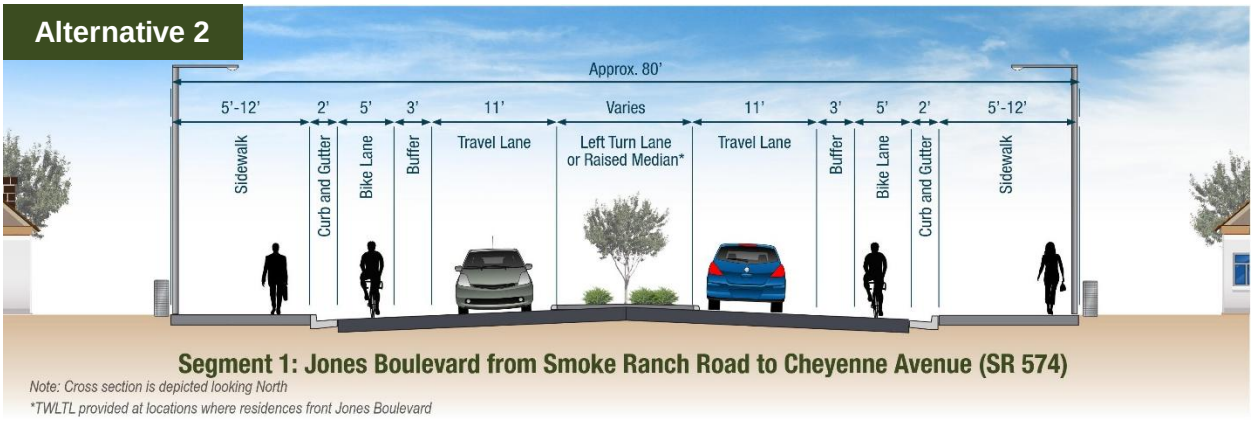
Alternative 2 improvements for Segment 1 from Smoke Ranch Road to Cheyenne Avenue (SR 574) include the items described in Section **12.1**. **Figure 54** and **Figure 55** illustrate the existing and proposed cross sections for Alternative 2. **Figure 56** through **Figure 58** show photo renderings of the proposed Alternative 2 improvements along Segment 1.

Figure 54 – Jones Boulevard Segment 1 Existing Cross Section



Note: All cross sections are depicted looking North.

Figure 55 – Jones Boulevard Segment 1 Cross Section for Alternative 2



Note: All cross sections are depicted looking North.

Figure 56 – Jones Boulevard Segment 1 Proposed Improvements (Looking North)

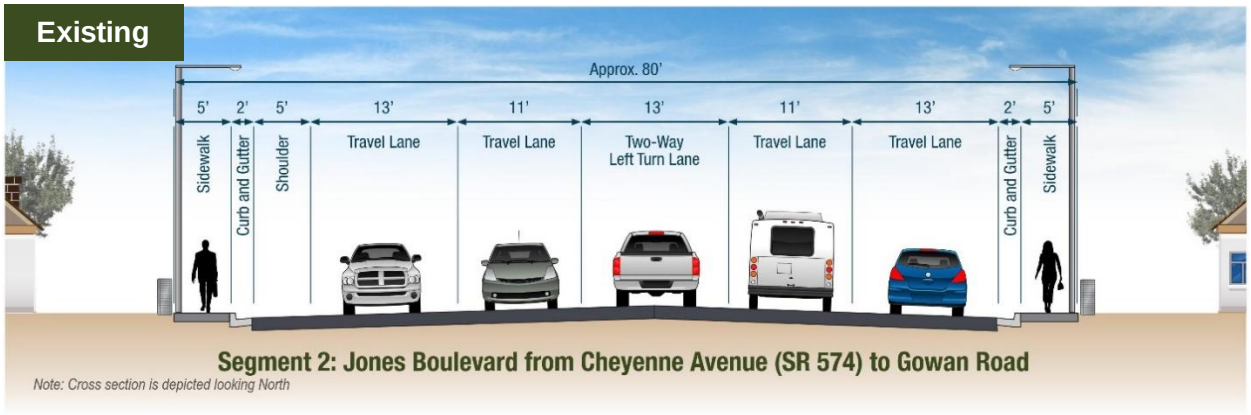
Figure 57 – Jones Boulevard Segment 1 Proposed Improvements (Looking North)

Figure 58 – Jones Boulevard Segment 1 Proposed Improvements (Looking North)

12.1.2.2 Jones Boulevard Segment 2: Cheyenne Avenue (SR 574) to Gowan Road

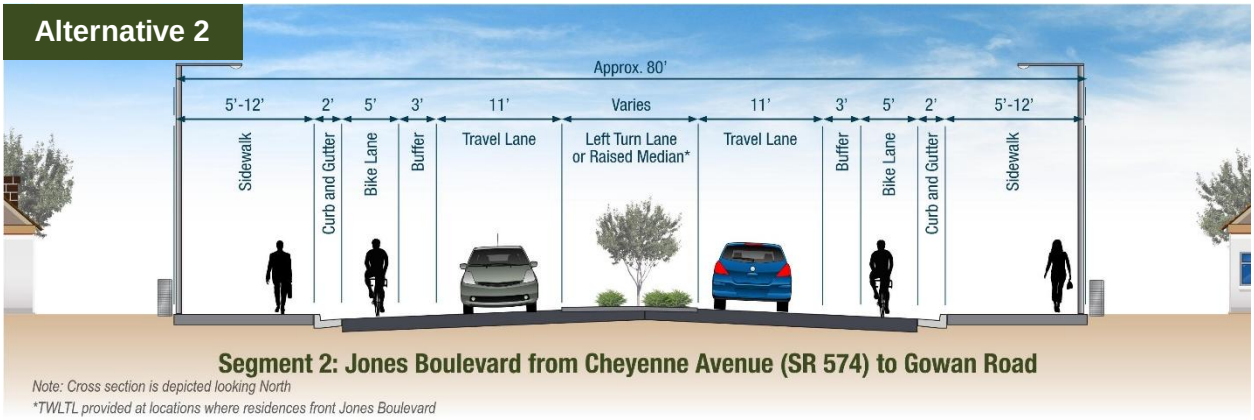
Alternative 2 improvements for Segment 2 from Cheyenne Avenue (SR 574) to Gowan Road include the items described in **Section 12.1**. **Figure 59** and **Figure 60** illustrate the existing and proposed cross sections for Alternative 2 along Segment 2. **Figure 61** shows a photo rendering of the proposed improvements for Segment 2.

Figure 59 – Jones Boulevard Segment 2 Existing Cross Section



Note: All cross sections are depicted looking North.

Figure 60 – Jones Boulevard Segment 2 Cross Section for Alternative 2



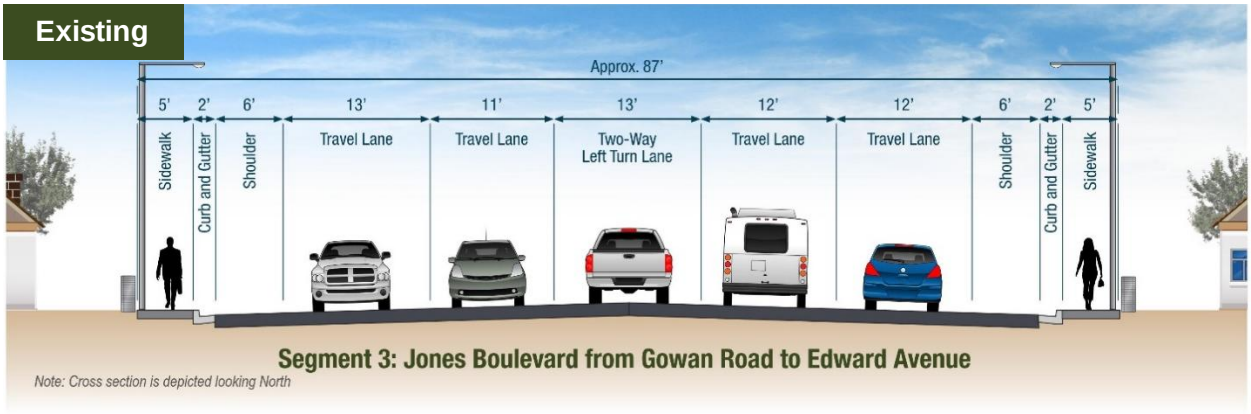
Note: All cross sections are depicted looking North.

Figure 61 – Jones Boulevard Segment 2 Proposed Improvements (Looking North)

12.1.2.3 Jones Boulevard Segment 3: Gowan Road to Edward Avenue

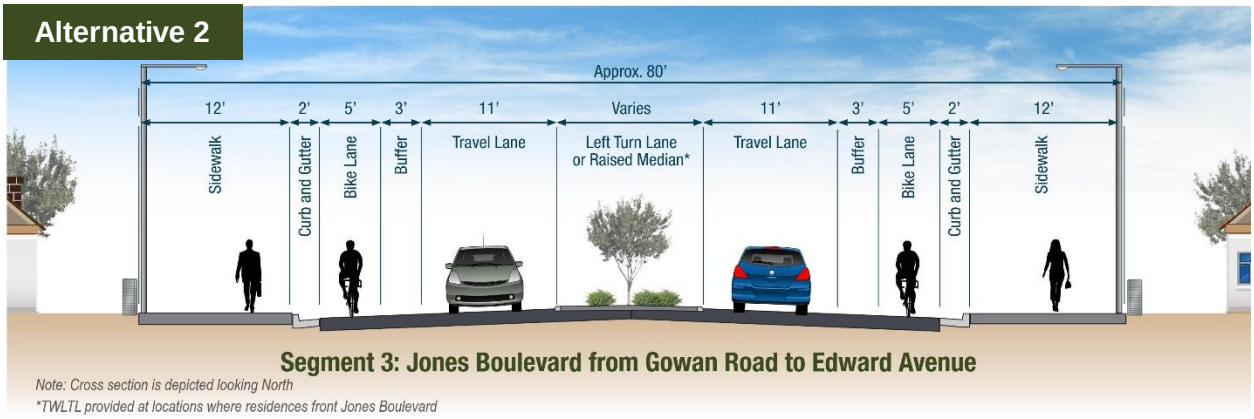
Alternative 2 improvements for Segment 3 from Gowan Road to Edward Avenue include the details mentioned in Section **12.1**. **Figure 62** and **Figure 63** illustrate the existing and proposed cross sections for Alternative 2 along Segment 3.

Figure 62 – Jones Boulevard Segment 3 Existing Cross Section



Note: All cross sections are depicted looking North.

Figure 63 – Jones Boulevard Segment 3 Cross Section for Alternative 2

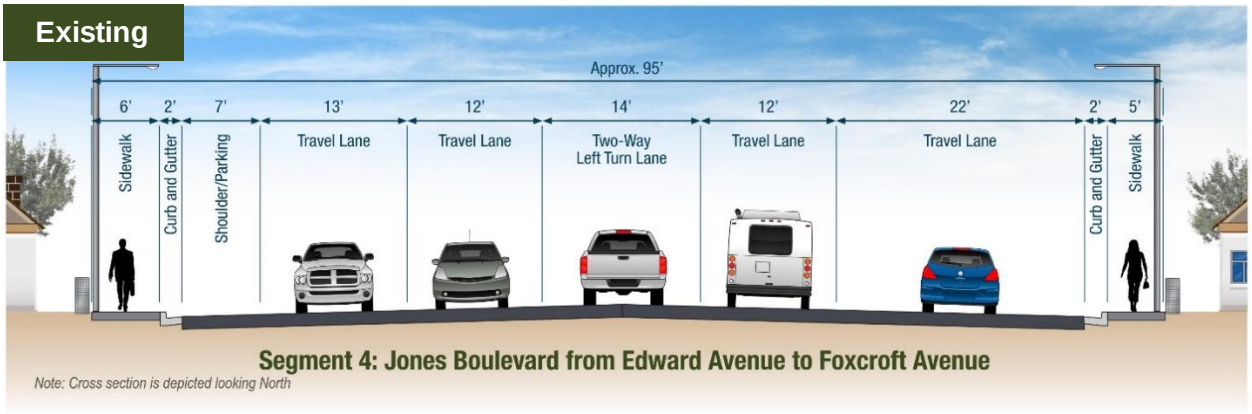


Note: All cross sections are depicted looking North.

12.1.2.4 Jones Boulevard Segment 4: Edward Avenue to Foxcroft Avenue

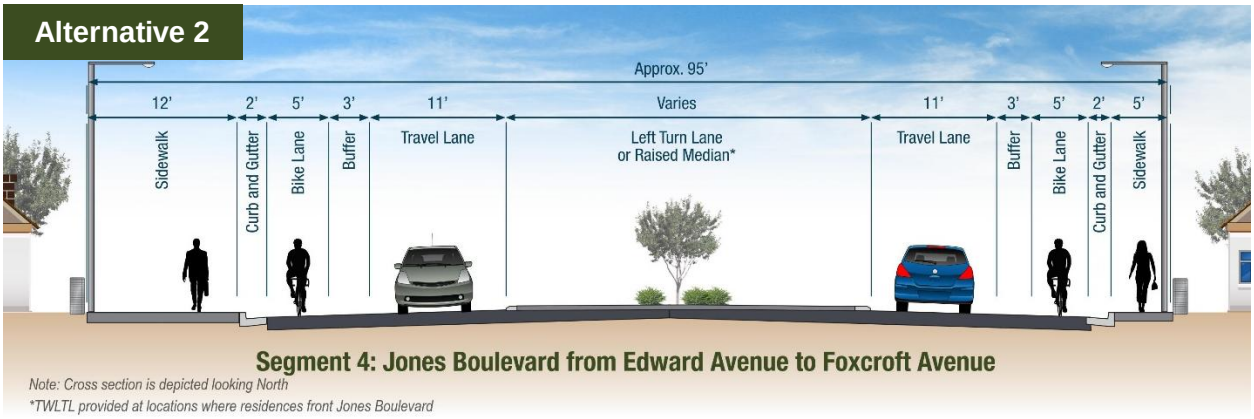
Alternative 2 improvements for Segment 4 from Edward Avenue to Foxcroft Avenue include the items mentioned in **Section 12.1**. **Figure 64** and **Figure 65** illustrate the existing and proposed cross sections for Alternative 2 along Segment 4.

Figure 64 – Jones Boulevard Segment 4 Existing Cross Section



Note: All cross sections are depicted looking North.

Figure 65 – Jones Boulevard Segment 4 Cross Section for Alternative 2

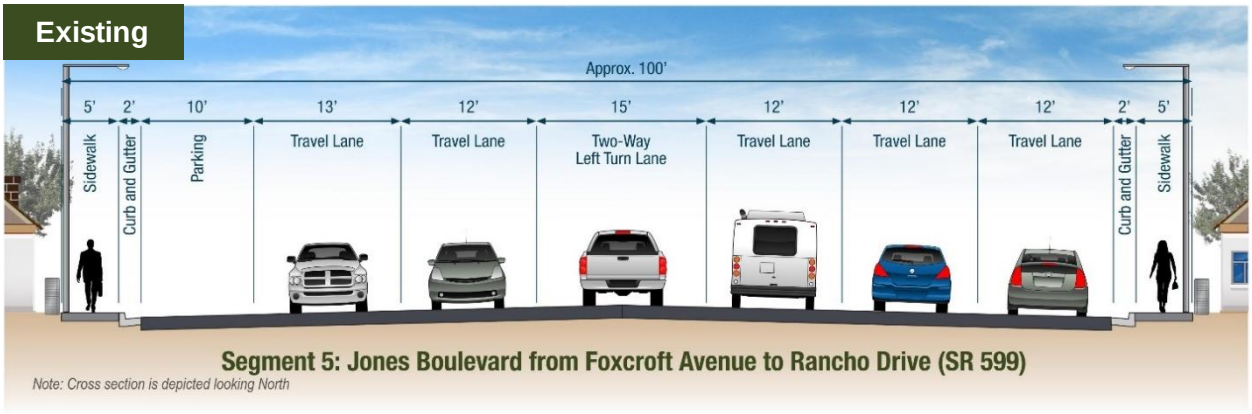


Note: All cross sections are depicted looking North.

12.1.2.5 Jones Boulevard Segment 5: Foxcroft Avenue to Rancho Drive (SR 599)

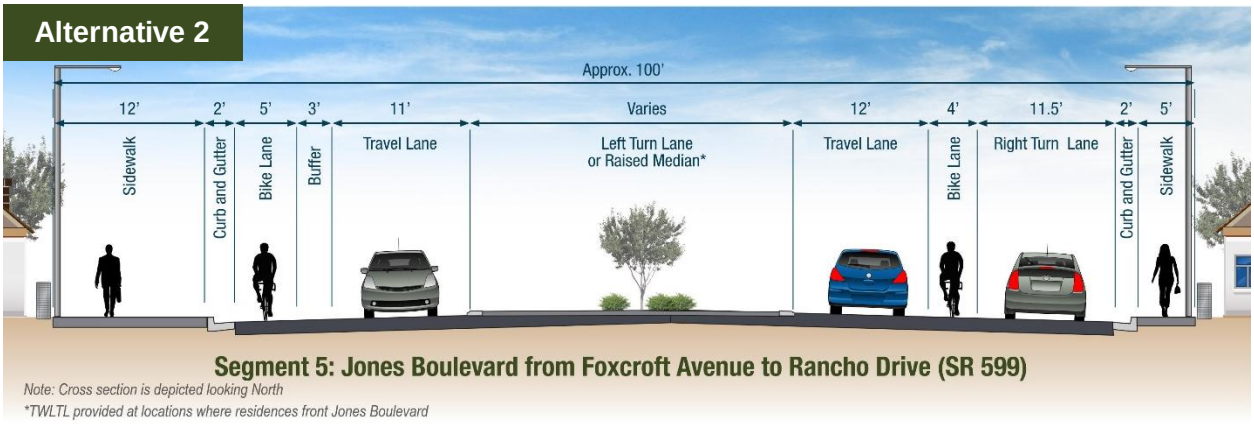
Alternative 2 improvements for Segment 5 from Foxcroft Avenue to Rancho Drive (SR 599) include the items described in Section **12.1**. **Figure 66** and **Figure 67** illustrate the existing and proposed cross sections for Alternative 2 along Segment 5.

Figure 66 – Jones Boulevard Segment 5 Existing Cross Section



Note: All cross sections are depicted looking North.

Figure 67 – Jones Boulevard Segment 5 Cross Section for Alternative 2



Note: All cross sections are depicted looking North.

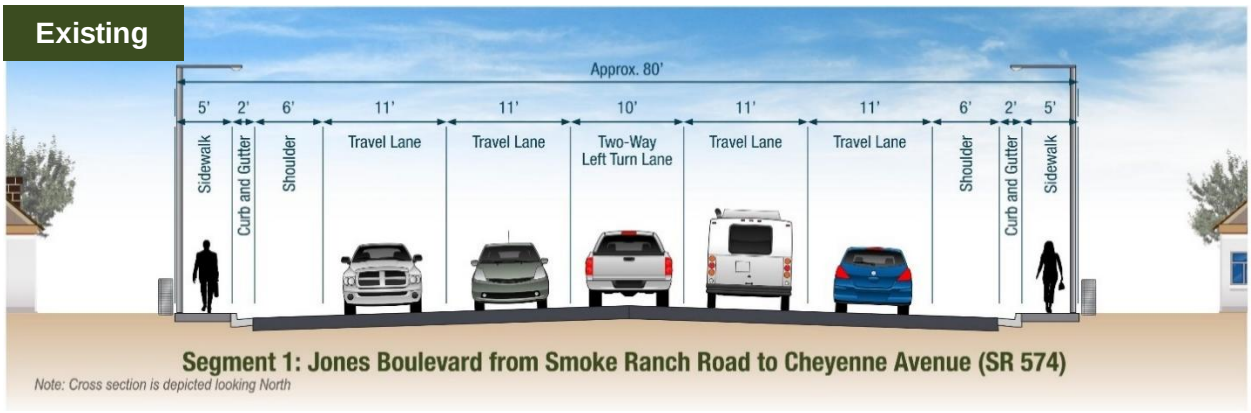
12.1.3 Jones Boulevard Alternative 3 Conceptual Design

The following subsections provide details on the Alternative 3 recommendations for each segment along the Jones Boulevard corridor. As previously stated, Alternative 3 improvement include the installation of raised medians throughout corridor to limit left turn access, the reduction of travel lanes from two (2) lanes each direction to one each direction and restriping the roadway to provide a shared bus/bike lane. Note that a TWLTL is proposed where residences front Jones Boulevard.

12.1.3.1 Jones Boulevard Segment 1: Smoke Ranch to Cheyenne Avenue (SR 574)

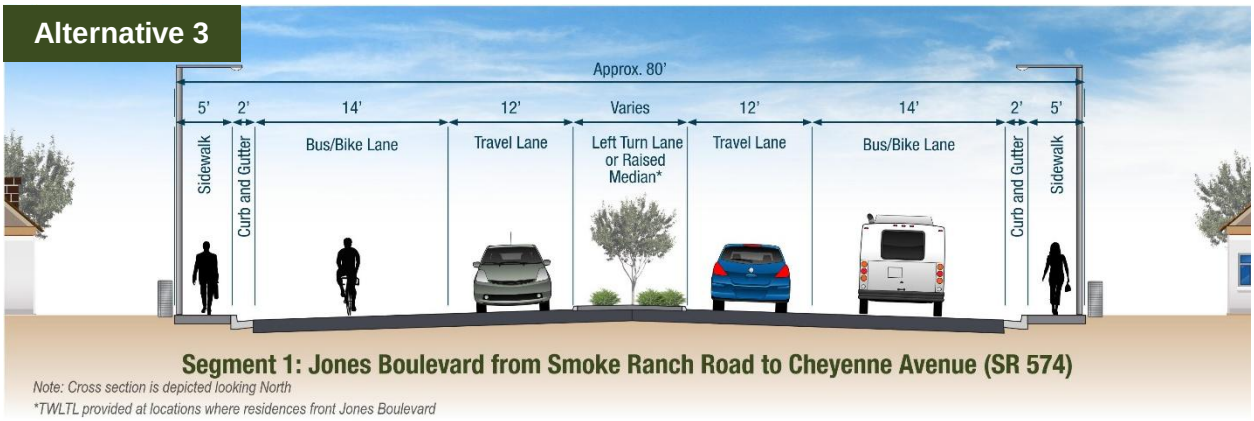
Alternative 3 improvements for Segment 1 from Smoke Ranch to Cheyenne Avenue (SR 574) include the items described in Section **12.1**. **Figure 68** and **Figure 69** illustrate the existing and proposed cross sections for Alternative 3 along Segment 1. **Figure 70** through **Figure 72** show photo renderings of the proposed improvements along Segment 1.

Figure 68 – Jones Boulevard Segment 1 Existing Cross Section



Note: All cross sections are depicted looking North.

Figure 69 – Jones Boulevard Segment 1 Cross Section for Alternative 3



Note: All cross sections are depicted looking North.

Figure 70 – Jones Boulevard Segment 1 Proposed Improvements (Looking North)

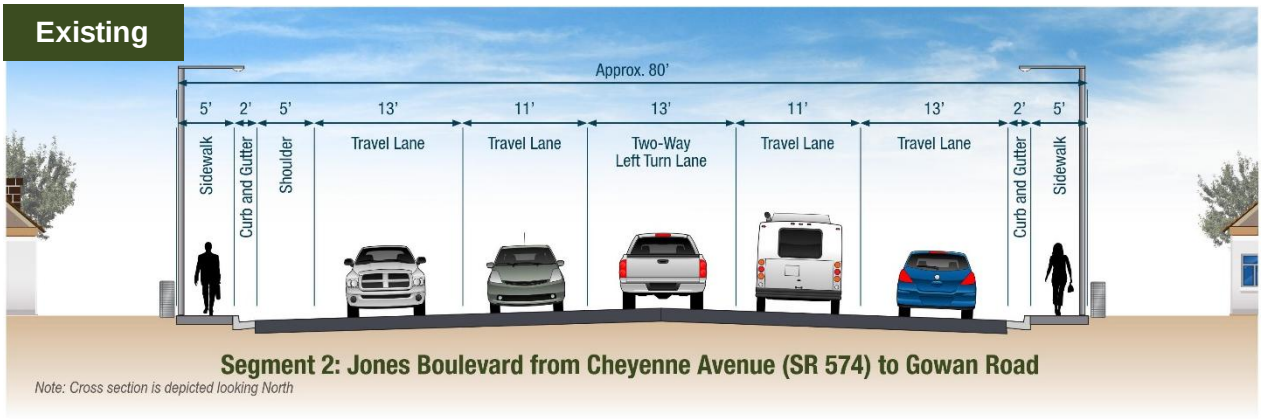
Figure 71 – Jones Boulevard Segment 1 Proposed Improvements (Looking North)

Figure 72 – Jones Boulevard Segment 1 Proposed Improvements (Looking North)

12.1.3.2 Jones Boulevard Segment 2: Cheyenne Avenue (SR 574) to Gowan Road

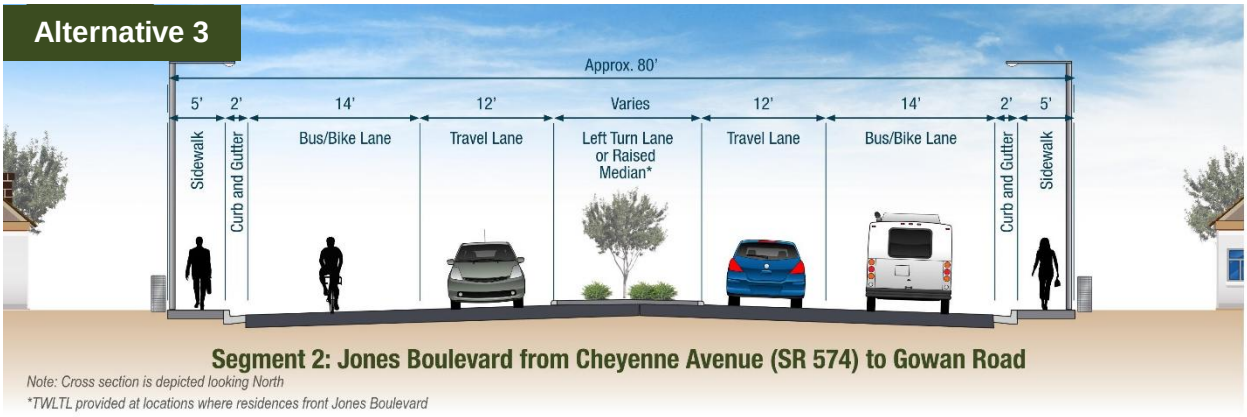
Alternative 3 improvements for Segment 2 from Cheyenne Avenue (SR 574) to Gowan Road include the items mentioned in Section **12.1**. **Figure 73** and **Figure 74** illustrate the existing and proposed cross sections for Segment 2. **Figure 75** shows a photo rendering of the proposed Alternative 3 improvements.

Figure 73 – Jones Boulevard Segment 2 Existing Cross Section



Note: All cross sections are depicted looking North.

Figure 74 – Jones Boulevard Segment 2 Cross Section for Alternative 3



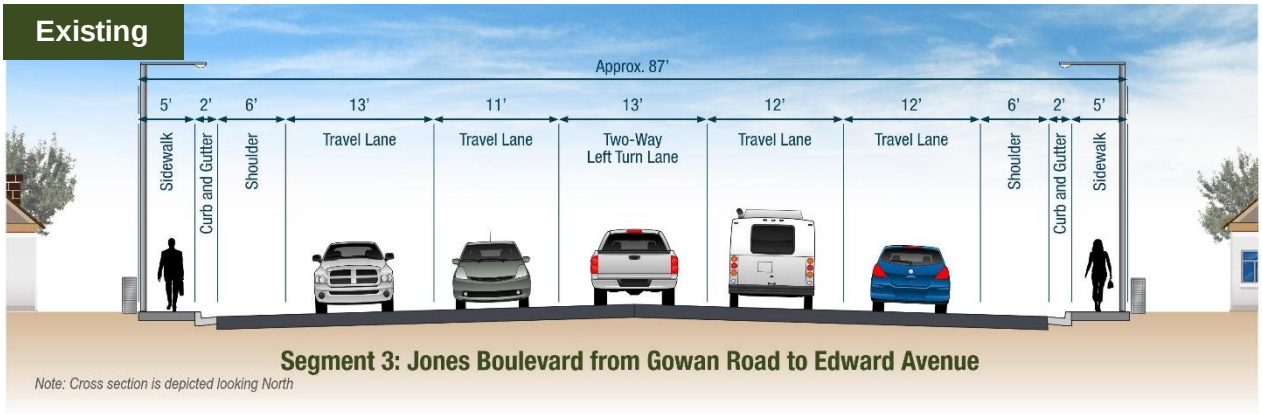
Note: All cross sections are depicted looking North.

Figure 75 – Jones Boulevard Segment 2 Proposed Improvements (Looking North)

12.1.3.3 Jones Boulevard Segment 3: Gowan Road to Edward Avenue

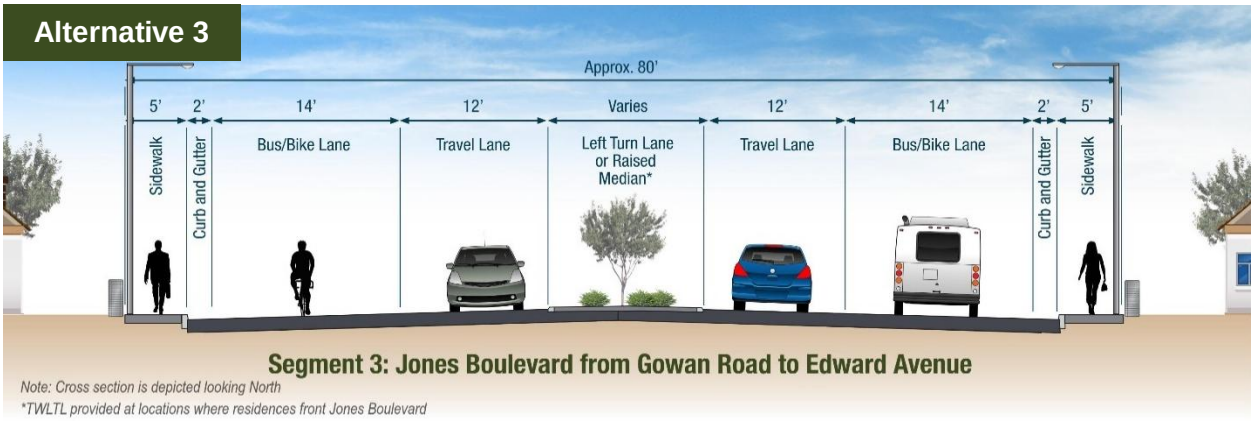
Alternative 3 recommendations for Segment 3 from Gowan Road to Edward Avenue are described in Section **12.1**. **Figure 76** and **Figure 77** illustrate the existing and proposed cross sections for Segment 3.

Figure 76 – Jones Boulevard Segment 3 Existing Cross Section



Note: All cross sections are depicted looking North.

Figure 77 – Jones Boulevard Segment 3 Cross Section for Alternative 3

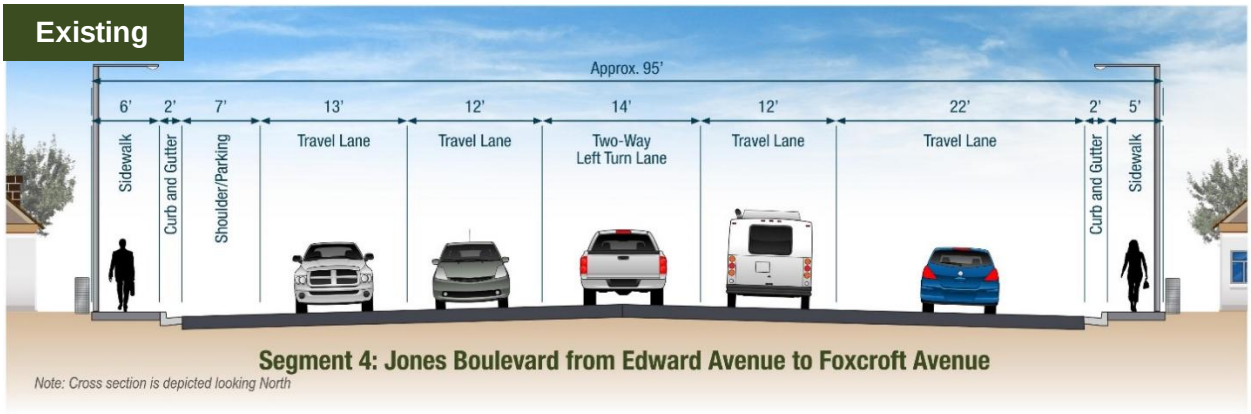


Note: All cross sections are depicted looking North.

12.1.3.4 Jones Boulevard Segment 4: Edward Avenue to Foxcroft Avenue

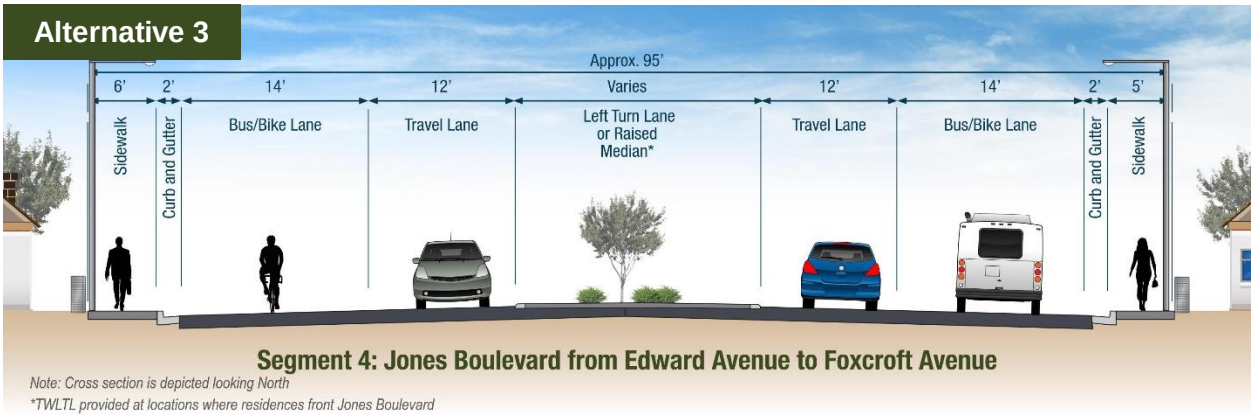
Alternative 3 improvements for Segment 4 from Edward Avenue to Foxcroft Avenue are described in Section **12.1**. **Figure 78** and **Figure 79** illustrate the existing and proposed cross sections for Segment 4.

Figure 78 – Jones Boulevard Segment 4 Existing Cross Section



Note: All cross sections are depicted looking North.

Figure 79 – Jones Boulevard Segment 4 Cross Section for Alternative 3

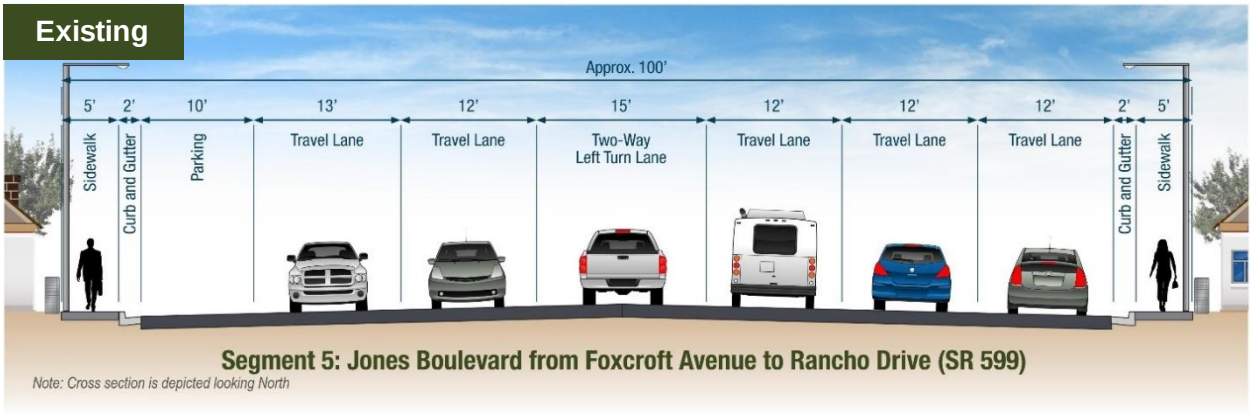


Note: All cross sections are depicted looking North.

12.1.3.5 Jones Boulevard Segment 5: Foxcroft Avenue to Rancho Drive (SR 599)

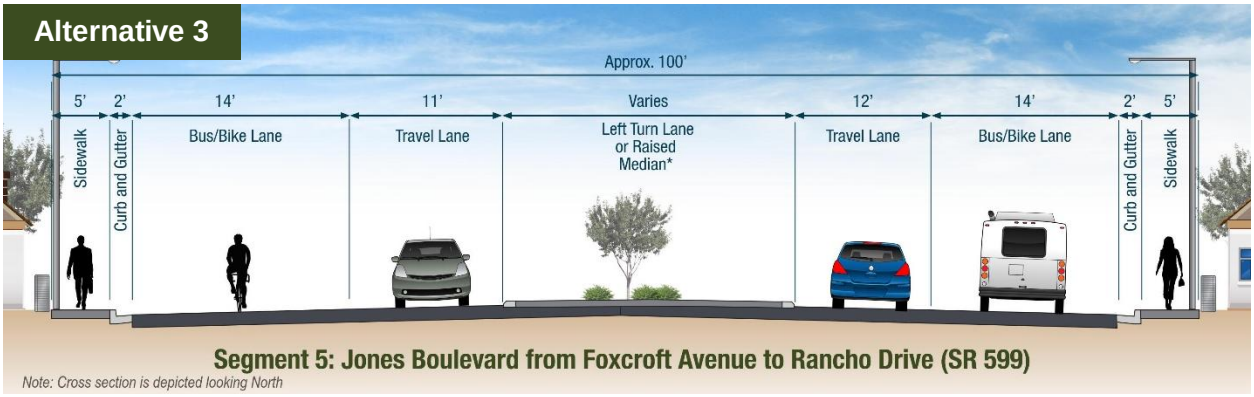
Alternative 3 improvements for Segment 5 from Foxcroft Avenue to Rancho Drive (SR 599) are described in **Section 12.1**. **Figure 80** and **Figure 81** illustrate the existing and proposed cross sections for Segment 5.

Figure 80 – Jones Boulevard Segment 5 Existing Cross Section



Note: All cross sections are depicted looking North.

Figure 81 – Jones Boulevard Segment 5 Cross Section for Alternative 3



Note: All cross sections are depicted looking North.

The proposed improvements were divided into two categories: "High Priority" and "Additional Recommendations" after discussion with the TAC. The improvements found in the High Priority category include improvements with proven cost-effective countermeasures that are recommended to move forward with design and construction with available funds. The Additional Recommendations are considered future improvements to be implemented when funding becomes available.

12.1.4 Jones Boulevard High Priority Improvements

High Priority Improvements providing proven cost-effective countermeasures for Jones Boulevard are summarized in **Table 26** below.

Table 26 – Jones Boulevard High Priority Improvements

Improvements	Description	Improvement Types
Sidewalk Infill	Installation of sidewalk at locations where sidewalk is missing.	Pedestrian and ADA/PROWAG
Street Luminaire Replacement	Upgrading High Pressure Sodium luminaires to Light Emitting Diode (LED).	Vehicular, Motorcycle, Pedestrian, and Cyclists
Pedestrian Crossings ▪ Madre Mesa Drive ▪ Heather Mist Lane ▪ Santa Catalina Avenue ▪ Edward Avenue	Upgrade of the existing pedestrian crossing at Heather Mist Lane and addition of three (3) pedestrian crossings with pedestrian activated RRFBs and pedestrian detection technology.	Pedestrian and ADA/PROWAG
Signalized Intersection Improvements ▪ New Signal Head Placement ▪ Signal Head Realignment ▪ Retroreflective Backplates* ▪ Pedestrian and ADA/PROWAG ▪ Intersection CCTV Cameras Signalized Intersections: ▪ Smoke Ranch Road ▪ Gowan Road ▪ Rancho Drive (SR 599)	Realignment of signal heads so there is one signal head centered on each through lane and installation of new signal heads where they are missing. Installation of CCTV cameras at the signalized intersections.	Vehicular and Motorcycle

**Note that retroreflective plates are recommended but are being installed as part of another NDOT project.*

As mentioned previously, all of the proposed improvements are within the existing right-of-way for Jones Boulevard. Figures showing the conceptual design for all alternatives of the Jones Boulevard project corridor are included in **Appendix P**.

12.1.5 Jones Boulevard Additional Recommendations

The Additional Recommendations for the Jones Boulevard project corridor are summarized in **Table 27**, these recommendations can be implemented individually or grouped together as funding and other considerations allow. The three (3) alternatives for Jones Boulevard differ as follows:

- **Alternative 1**
  - Install raised medians throughout corridor to limit left turn access.
  - Reduce travel lanes from two (2) lanes each direction to one (1) lane each direction and restripe roadway to provide a dedicated bike lane with 3-foot buffer in each direction of travel
  - Maintain on-street parking where residential property fronts Jones Boulevard

- **Alternative 2**
  - Install raised medians throughout corridor to limit left turn access
  - Reduce travel lanes from two (2) lanes each direction to one (1) lane each direction and restripe roadway to provide a dedicated bike lane with 3-foot buffer in each direction of travel
  - Remove all on-street parking and widen sidewalk to 10 feet along both sides of the corridor
- **Alternative 3**
  - Install raised medians throughout corridor to limit left turn access
  - Reduce travel lanes from two (2) lanes each direction to one (1) lane each direction and restripe roadway to provide a shared bus/bike lane in each direction of travel

Table 27 – Jones Boulevard Additional Recommendations

Improvements	Description	Improvement Types
Sidewalk Widening	Installation of sidewalk at locations where sidewalk is missing and removal of on-street parking to provide space to widen sidewalk to 10 feet.	Pedestrian and ADA/PROWAG
Streetlight Relocation	Relocation of existing streetlights behind back of curb.	Pedestrian and ADA/PROWAG
Speed Management with Speed Feedback Signs	Installation of speed feedback signs and interconnection of devices so current speed is available to be used for speed management.	Vehicular and Motorcycle
Dilemma Zone Detection	Installation of dilemma zone detection at intersections.	Vehicular and Motorcycle

Access Management
▪ S-Islands:
  ▪ Madre Mesa
  ▪ Duncan Drive
▪ Median Closures (Right-in/Right-out):
  ▪ Sheila Avenue
  ▪ Brooks Avenue
  ▪ Heather Mist Lane
  ▪ Foxcroft Avenue
▪ Median Updates (Left-in/Right-in/Right-out):
  ▪ Morro Bay Avenue
  ▪ Sonoma Palms Driveway
  ▪ Edward Avenue
	Installation of S-Island medians, median closures/updates at intersections and access drives to eliminate minor street left-turn movements.	Roadway, Vehicular, and Motorcycle

Table 27 (Continued) – Jones Boulevard Additional Recommendations

Improvements	Description	Improvement Types
Lane Reduction		
Alternative 1 – Buffered Bike Lane	Reduce travel lanes from two (2) lanes each direction to one (1) lane each direction and restripe roadway to provide a dedicated bike lane with 3-foot buffer in each direction of travel	Roadway, Vehicular, Motorcycle, and Bicycle
Alternative 3 – Shared Bus/Bike Lane	Reduce travel lanes from two (2) lanes each direction to one (1) lane each direction and restripe roadway to provide a shared bus/bike lane in each direction of travel	Roadway, Vehicular, Motorcycle, Bicycle, and Transit

It is important to note that all of the alternatives currently show median updates at the Sonoma Palms driveway and Morrow Bay Avenue to provide left-in/right-in/right-out access, however the City of Las Vegas recommends consideration for full access at these two locations be further explored.

12.2 Cheyenne Avenue (SR 574) Corridor Improvements

The goal for developing alternatives for the Cheyenne Avenue (SR 574) corridor was to focus on improving mobility and safety for all modes, including vehicles, pedestrians, bicyclists and buses. Through the SMP process, three alternatives were developed for the corridor. Recommendations also include upgrading pedestrian curb ramps and pedestrian access paths to comply with ADA and PROWAG guidelines. Please note a self-evaluation of all pedestrian facilities along the corridor should be completed to verify compliance with ADA/PROWAG, these recommendations only include those facilities specifically called out during the RSA field review. The following subsections describe the proposed improvements for each segment of the Cheyenne Avenue (SR 574) corridor. In general, the alternatives are as follows:

- **Alternative 1**
  - Install raised medians throughout corridor to limit left turn access
  - Reduce travel lanes from three (3) lanes each direction to two (2) lanes each direction and restripe roadway to provide a dedicated bike lane with 3-foot buffer in each direction of travel
- **Alternative 2**
  - Install raised medians throughout corridor to limit left turn access
  - Maintain three (3) travel lanes each direction and restripe roadway to provide a dedicated bike lane in each direction of travel
- **Alternative 3**
  - Install raised medians throughout corridor to limit left turn access
  - Maintain three (3) travel lanes in each direction and restripe the roadway to reduce the lane widths to provide space for widening the sidewalk to 10 feet on both sides of the corridor

Alternative 1 which would provide a lane reduction on Cheyenne Avenue (SR 574) was considered as part of this SMP due to the recommendation made in the RBPP, however, it was determined that reducing the number of lanes on the corridor was not feasible due to existing traffic volumes. The lane reduction option along Cheyenne Avenue (SR 574) can be explored if a reduction in traffic volumes occurs in the future. The following subsections provide additional details for each segment along Cheyenne Avenue (SR 574).

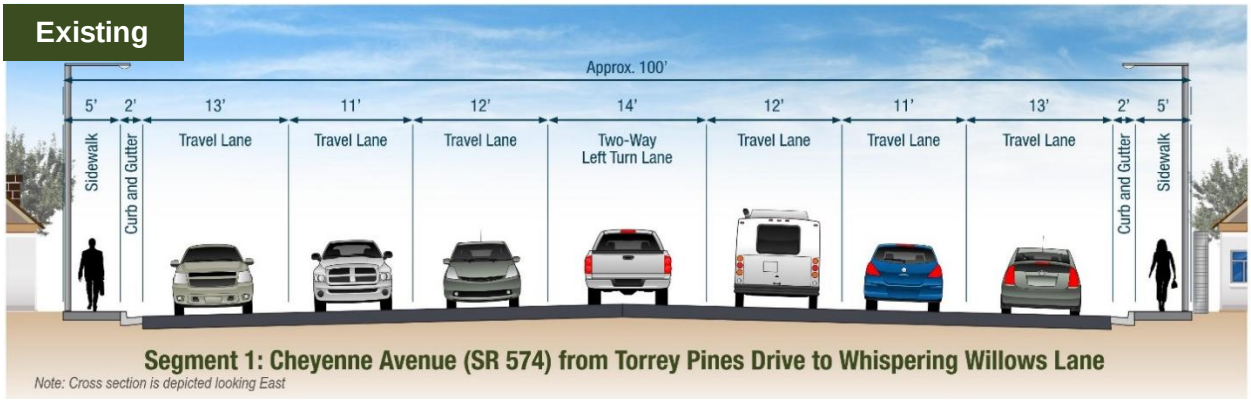
12.2.1 Cheyenne Avenue (SR 574) Alternative 1 Conceptual Design

The following subsections provide details on the Alternative 1 recommendation for each segment along the Cheyenne Avenue (SR 574) project corridor. As previously stated, Alternative 1 improvement include the installation of raised medians throughout corridor to limit left turn access, the reduction of travel lanes from three (3) lanes each direction to two (2) each direction and restriping the roadway to provide a dedicated bike lane with 3-foot buffer.

12.2.1.1 Cheyenne Avenue (SR 574) Segment 1: Torrey Pines Drive to Whispering Willow Lane

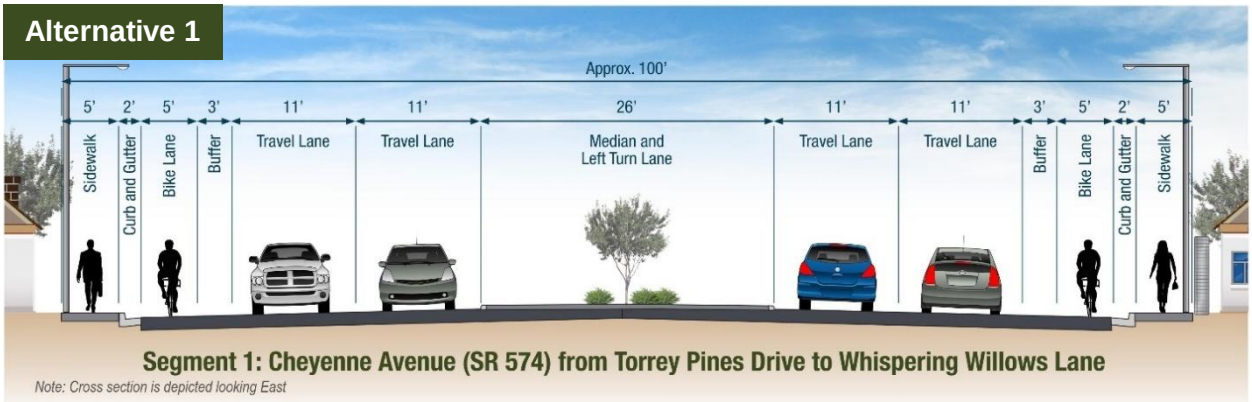
Alternative 1 improvements for Segment 1 from Torrey Pines Drive to Whispering Willow Lane include the items described in Section **12.2**. **Figure 82** and **Figure 83** illustrate the existing and proposed cross sections for Segment 1. **Figure 84** shows a photo rendering of the proposed improvements along Segment 1.

Figure 82 – Cheyenne Avenue (SR 574) Segment 1 Existing Cross Section



Note: All cross sections are depicted looking East.

Figure 83 – Cheyenne Avenue (SR 574) Segment 1 Cross Section for Alternative 1



Note: All cross sections are depicted looking East.

Figure 84 – Cheyenne Avenue (SR 574) Segment 1 Proposed Improvements (Looking North)

12.2.1.2 Cheyenne Avenue (SR 574) Segment 2: Whispering Willow Lane through Rowland Street

Alternative 1 improvements for Segment 2 from Whispering Willow Lane to Rowland Street include the items described in Section **12.2**. **Figure 85** and **Figure 86** illustrate the existing and proposed cross sections for Segment 2.

Figure 85 – Cheyenne Avenue (SR 574) Segment 2 Existing Cross Section

Note: All cross sections are depicted looking East.

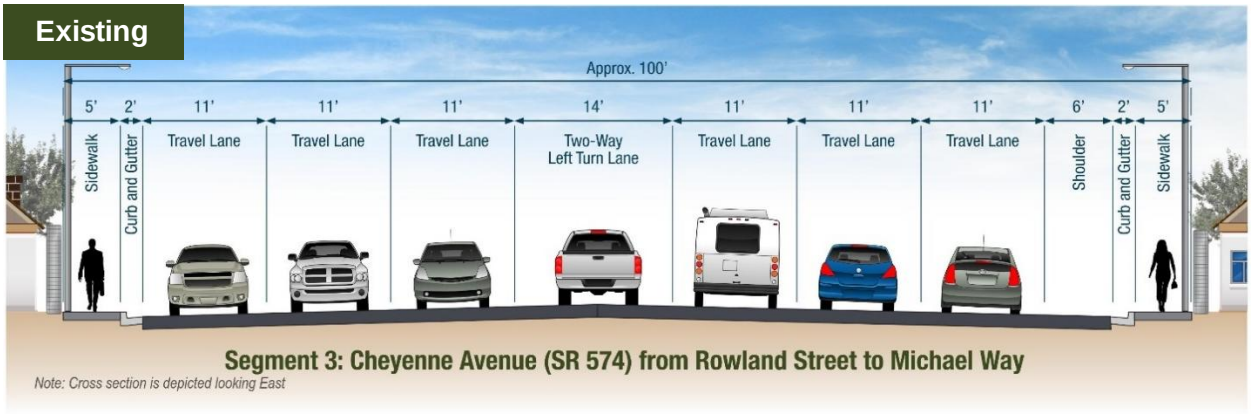
Figure 86 – Cheyenne Avenue (SR 574) Segment 2 Cross Section for Alternative 1

Note: All cross sections are depicted looking East.

12.2.1.3 Cheyenne Avenue (SR 574) Segment 3: Rowland Street to Michael Way

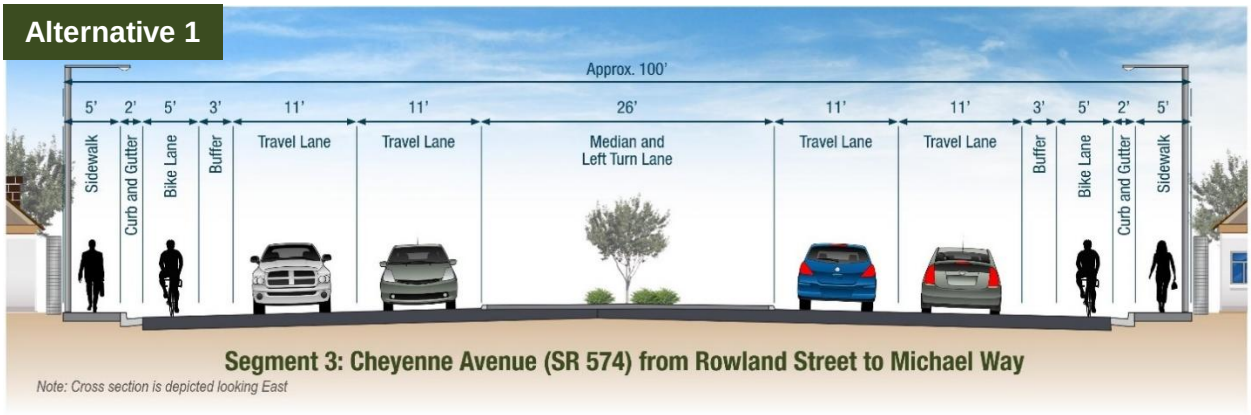
Alternative 1 improvements for Segment 3 from Rowland Street to Michael Way include the items described in Section **12.2**. **Figure 87** and **Figure 88** illustrate the existing and proposed cross sections for Segment 3.

Figure 87 – Cheyenne Avenue (SR 574) Segment 3 Existing Cross Section



Note: All cross sections are depicted looking East.

Figure 88 – Cheyenne Avenue (SR 574) Segment 3 Cross Section for Alternative 1



Note: All cross sections are depicted looking East.

12.2.1.4 Cheyenne Avenue (SR 574) Segment 4: Michael Way to Rancho Drive (SR 599)

Alternative 1 improvements for Segment 4 from Michael Way to Rancho Drive (SR 599) include the items described in Section **12.2**. **Figure 89** and **Figure 90** illustrate the existing and proposed cross sections for Segment 4.

Figure 89 – Cheyenne Avenue (SR 574) Segment 4 Existing Cross Section

Note: All cross sections are depicted looking East.

Figure 90 – Cheyenne Avenue (SR 574) Segment 4 Cross Section for Alternative 1

Note: All cross sections are depicted looking East.

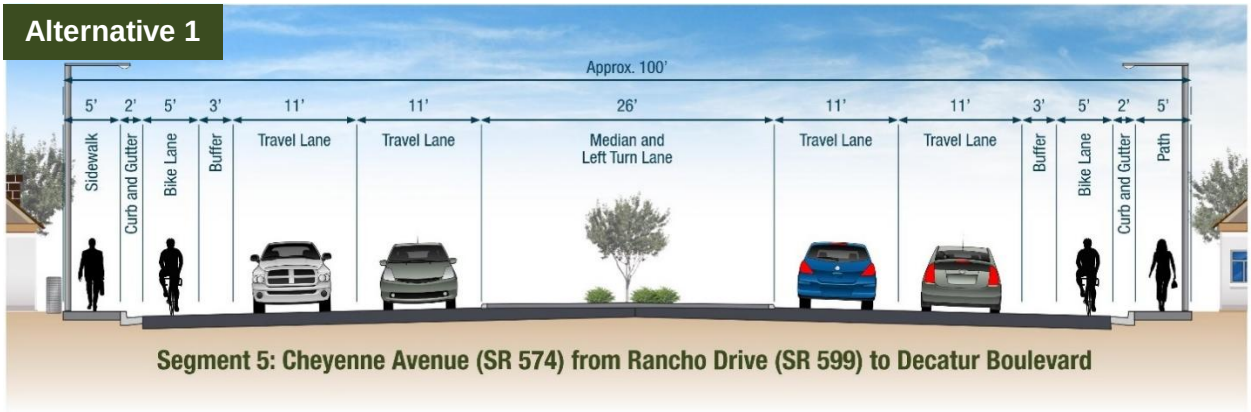
12.2.1.5 Cheyenne Avenue (SR 574) Segment 5: Rancho Drive (SR 599) to Decatur Boulevard

Alternative 1 improvements for Segment 5 from Rancho Drive (SR 599) to Decatur Boulevard include the items described in **Section 12.2**. **Figure 91** and **Figure 92** illustrate the existing and proposed cross sections for Segment 5.

Figure 91 – Cheyenne Avenue (SR 574) Segment 5 Existing Cross Section

Note: All cross sections are depicted looking East.

Figure 92 – Cheyenne Avenue (SR 574) Segment 5 Cross Section for Alternative 1



Note: All cross sections are depicted looking East.

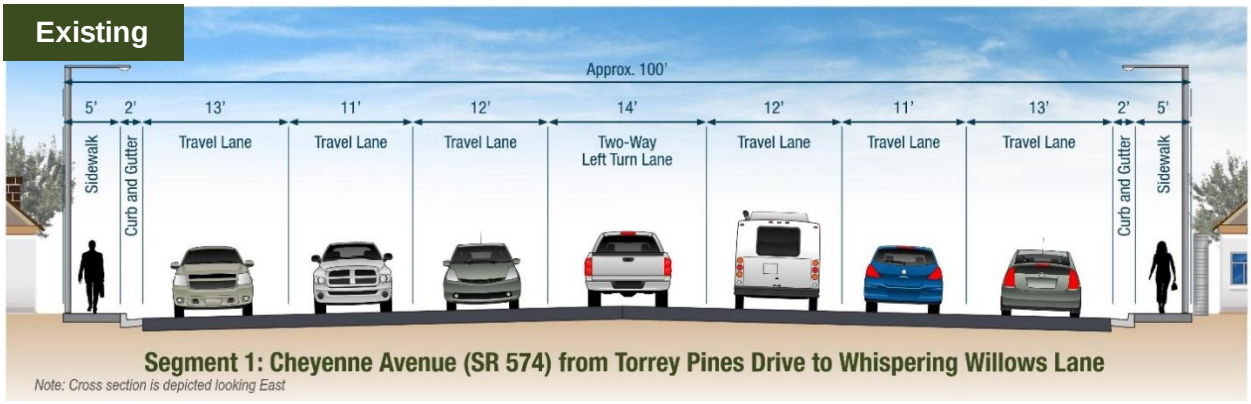
12.2.2 Cheyenne Avenue (SR 574) Alternative 2 Conceptual Design

The following subsections provide details on the Alternative 2 recommendations for each segment along the Cheyenne Avenue (SR 574) project corridor. As previously stated, Alternative 2 improvement include the installation of raised medians throughout corridor to limit left turn access and maintaining three (3) lanes of travel in each direction while adding a dedicated bike lane in each direction.

12.2.2.1 Cheyenne Avenue (SR 574) Segment 1: Torrey Pines Drive to Whispering Willow Lane

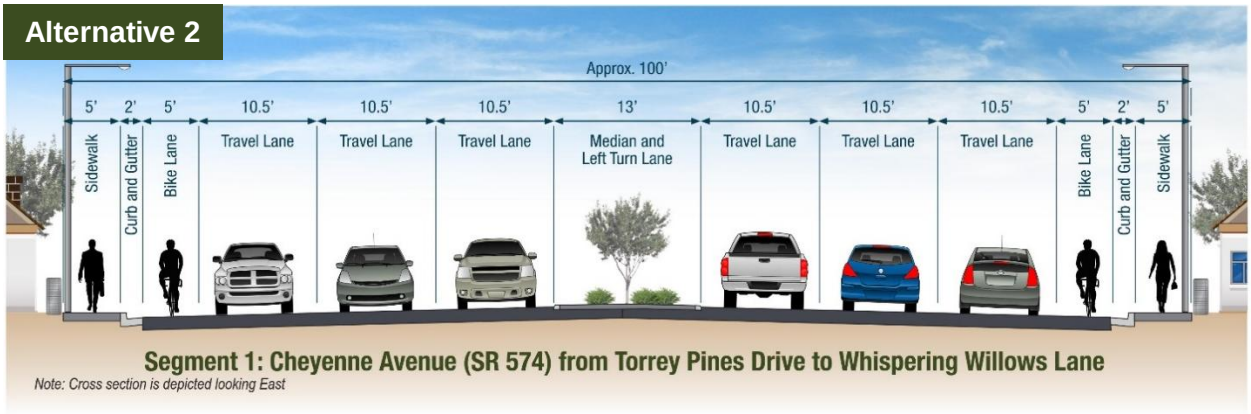
Alternative 2 improvements for Segment 1 from Torrey Pines to Whispering Willow Lane include the items described in **Section 12.2**. **Figure 93** and **Figure 94** illustrate the existing and proposed cross sections for Segment 1. **Figure 95** shows a photo rendering of the proposed improvements.

Figure 93 – Cheyenne Avenue (SR 574) Segment 1 Existing Cross Section



Note: All cross sections are depicted looking East.

Figure 94 – Cheyenne Avenue (SR 574) Segment 1 Cross Section for Alternative 2



Note: All cross sections are depicted looking East.

Figure 95 – Cheyenne Avenue (SR 574) Segment 1 Proposed Improvements (Looking North)

12.2.2.2 Cheyenne Avenue (SR 574) Segment 2: Whispering Willow Lane to Rowland Street

Alternative 2 improvements for Segment 2 from Whispering Willow Lane to Rowland Street include the details described in Section **12.2**. **Figure 96** and **Figure 97** illustrate the existing and proposed cross sections for Segment 2.

Figure 96 – Cheyenne Avenue (SR 574) Segment 2 Existing Cross Section

Note: All cross sections are depicted looking East.

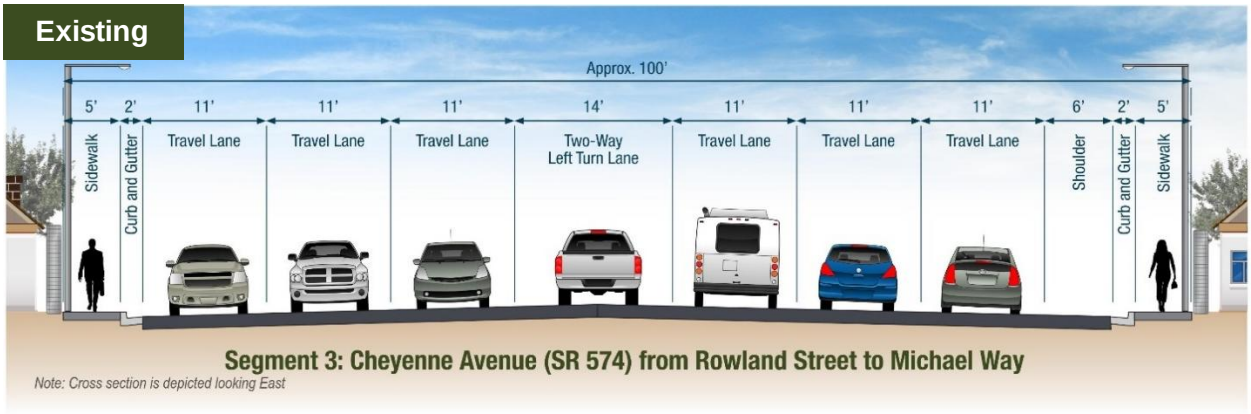
Figure 97 – Cheyenne Avenue (SR 574) Segment 2 Cross Section for Alternative 2

Note: All cross sections are depicted looking East.

12.2.2.3 Cheyenne Avenue (SR 574) Segment 3: Rowland Street to Michael Way

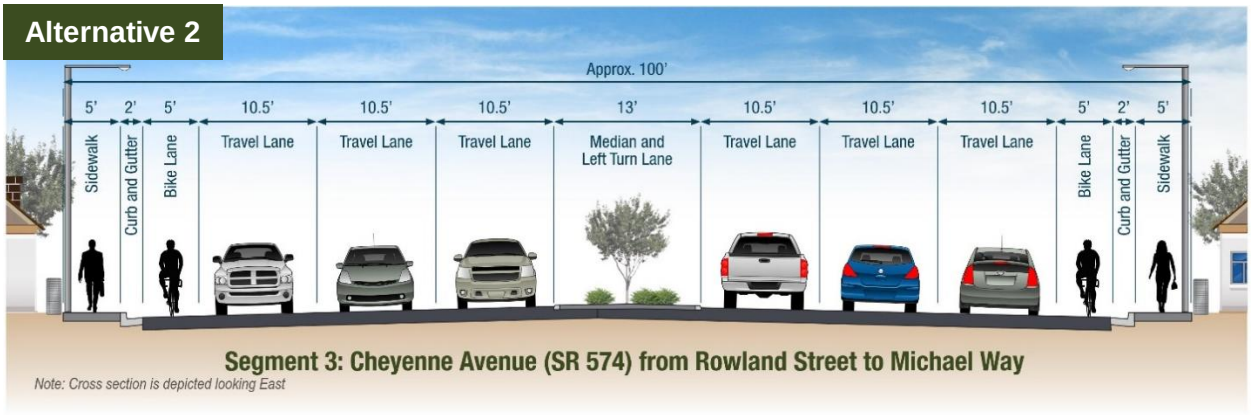
Alternative 2 improvements for Segment 3 from Rowland Street to Michael Way include the items described in Section **12.2**. **Figure 98** and **Figure 99** illustrate the existing and proposed cross sections for Segment 3.

Figure 98 – Cheyenne Avenue (SR 574) Segment 3 Existing Cross Section



Note: All cross sections are depicted looking East.

Figure 99 – Cheyenne Avenue (SR 574) Segment 3 Cross Section for Alternative 2



Note: All cross sections are depicted looking East.

12.2.2.4 Cheyenne Avenue (SR 574) Segment 4: Michael Way to Rancho Drive (SR 599)

Alternative 2 improvements for Segment 4 from Michael Way to Rancho Drive (SR 599) include the details described in **Section 12.2**. **Figure 100** and **Figure 101** illustrate the existing and proposed cross sections for Segment 4.

Figure 100 – Cheyenne Avenue (SR 574) Segment 4 Existing Cross Section

Note: All cross sections are depicted looking East.

Figure 101 – Cheyenne Avenue (SR 574) Segment 4 Cross Section for Alternative 2

Note: All cross sections are depicted looking East.

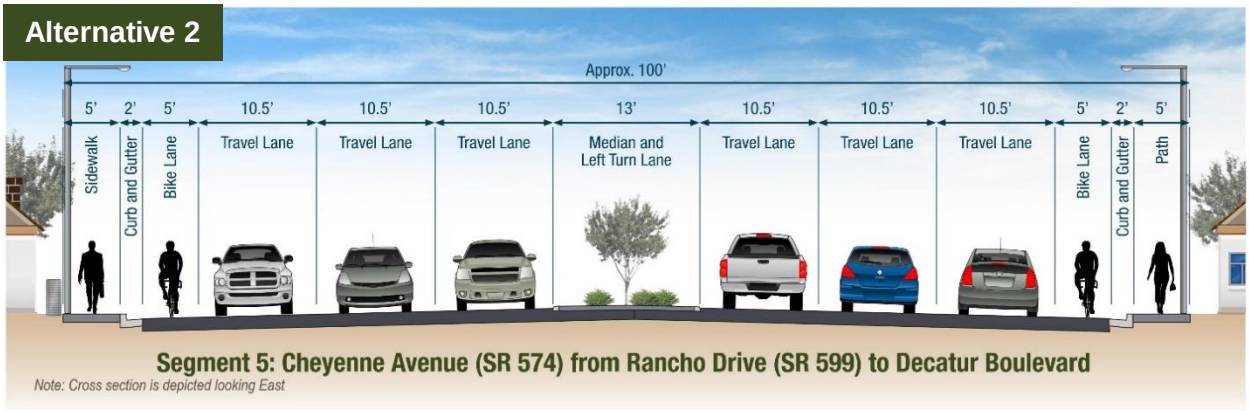
12.2.2.5 Cheyenne Avenue (SR 574) Segment 5: Rancho Drive (SR 599) to Decatur Boulevard

Alternative 2 improvements for Segment 5 from Rancho Drive (SR 599) to Decatur Boulevard includes the items described in Section **12.2**. **Figure 102** and **Figure 103** illustrate the existing and proposed cross sections for Segment 5.

Figure 102 – Cheyenne Avenue (SR 574) Segment 5 Existing Cross Section

Note: All cross sections are depicted looking East.

Figure 103 – Cheyenne Avenue (SR 574) Segment 5 Cross Section for Alternative 2



Note: All cross sections are depicted looking East.

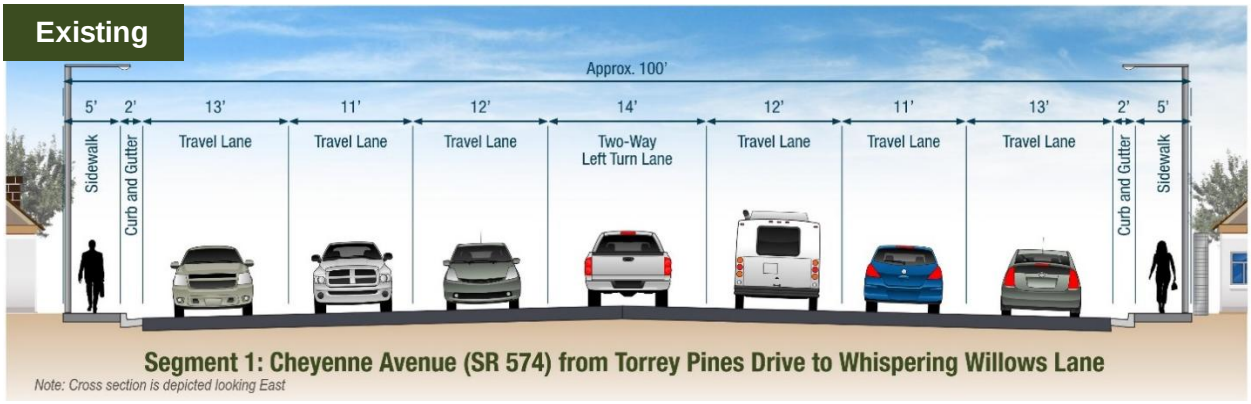
12.2.3 Cheyenne Avenue (SR 574) Alternative 3 Conceptual Design

The following subsections provide details on the Alternative 3 recommendations for each segment along the Cheyenne Avenue (SR 574) project corridor. As previously stated, Alternative 3 improvement include the installation of raised medians throughout corridor to limit left turn access, maintaining three (3) lanes of travel in each direction and restripe the roadway to reduce the lane widths to provide space for widening the sidewalk to 10 feet on both sides of the corridor.

12.2.3.1 Cheyenne Avenue (SR 574) Segment 1: Torrey Pines Drive to Whispering Willow Lane

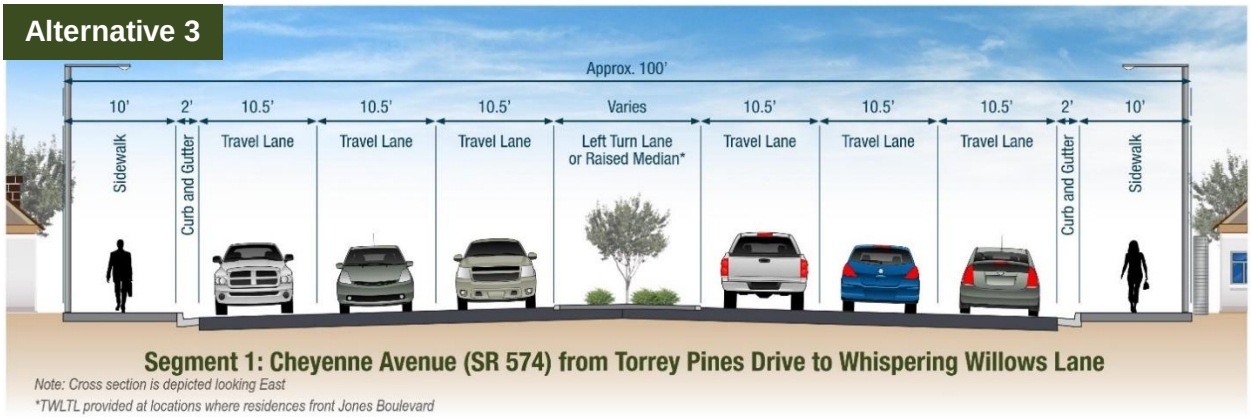
Alternative 3 improvements for Segment 1 from Torrey Pines to Whispering Willow Lane include the items mentioned in **Section 12.2**. **Figure 104** through **Figure 105** illustrate the existing and proposed cross sections for Alternative 3. **Figure 106** shows a photo rendering of the proposed improvements.

Figure 104 – Cheyenne Avenue (SR 574) Segment 1 Existing Cross Section



Note: All cross sections are depicted looking East.

Figure 105 – Cheyenne Avenue (SR 574) Segment 1 Cross Section for Alternative 3



Note: All cross sections are depicted looking East.

Figure 106 – Cheyenne Avenue (SR 574) Segment 1 Proposed Improvements (Looking North)

12.2.3.2 Cheyenne Avenue (SR 574) Segment 2: Whispering Willow Lane to Rowland Street

Alternative 3 improvements for Segment 2 from Whispering Willow Lane to Rowland Street includes the items described in **Section 12.2**. **Figure 107** through **Figure 108** illustrate the existing cross section and proposed cross sections for Segment 2.

Figure 107 – Cheyenne Avenue (SR 574) Segment 2 Existing Cross Section

Note: All cross sections are depicted looking East.

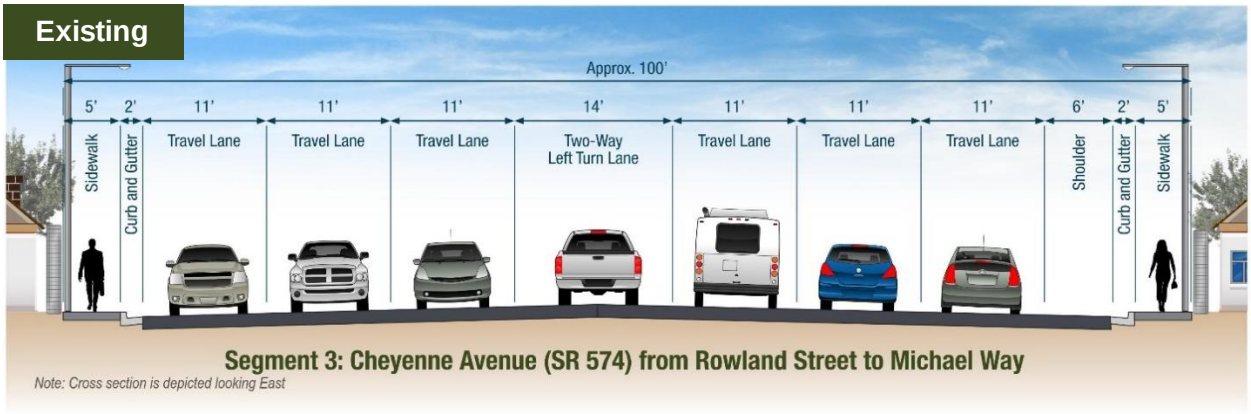
Figure 108 – Cheyenne Avenue (SR 574) Segment 2 Cross Section for Alternative 3

Note: All cross sections are depicted looking East.

12.2.3.3 Cheyenne Avenue (SR 574) Segment 3: Rowland Street through Michael Way

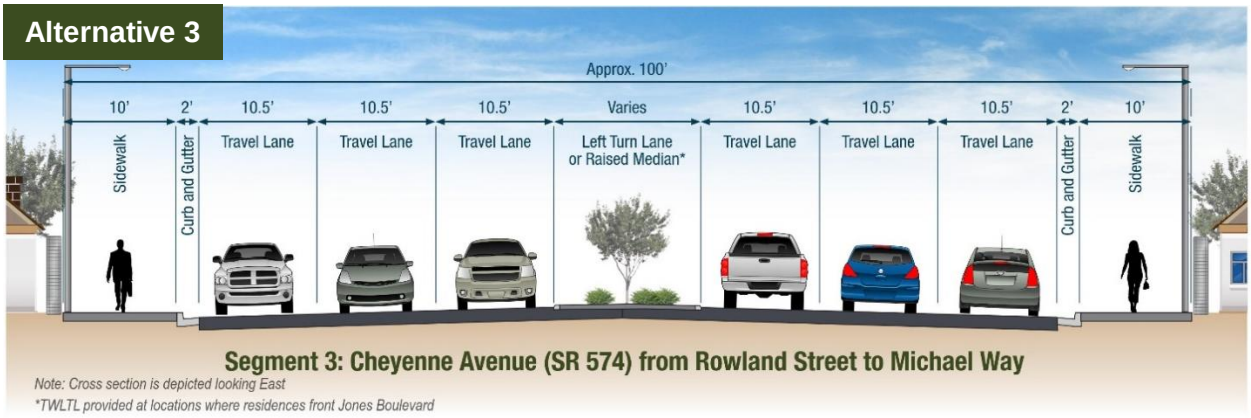
Alternative 3 improvements for Segment 3 from Rowland Street to Michael Way includes the items described in Section **12.2**. **Figure 109** and **Figure 110** illustrate the existing and proposed cross sections for Segment 3.

Figure 109 – Cheyenne Avenue (SR 574) Segment 3 Existing Cross Section



Note: All cross sections are depicted looking East.

Figure 110 – Cheyenne Avenue (SR 574) Segment 3 Cross Section for Alternative 3



Note: All cross sections are depicted looking East.

12.2.3.4 Cheyenne Avenue (SR 574) Segment 4: Michael Way to Rancho Drive (SR 599)

Alternative 3 improvements for Segment 4 from Michael Way to Rancho Drive (SR 599) include the items described in **Section 12.2**. **Figure 111** and **Figure 112** illustrate the existing and proposed cross sections for Segment 4.

Figure 111 – Cheyenne Avenue (SR 574) Segment 4 Existing Cross Section

Note: All cross sections are depicted looking East.

Figure 112 – Cheyenne Avenue (SR 574) Segment 4 Cross Section for Alternative 3

Note: All cross sections are depicted looking East.

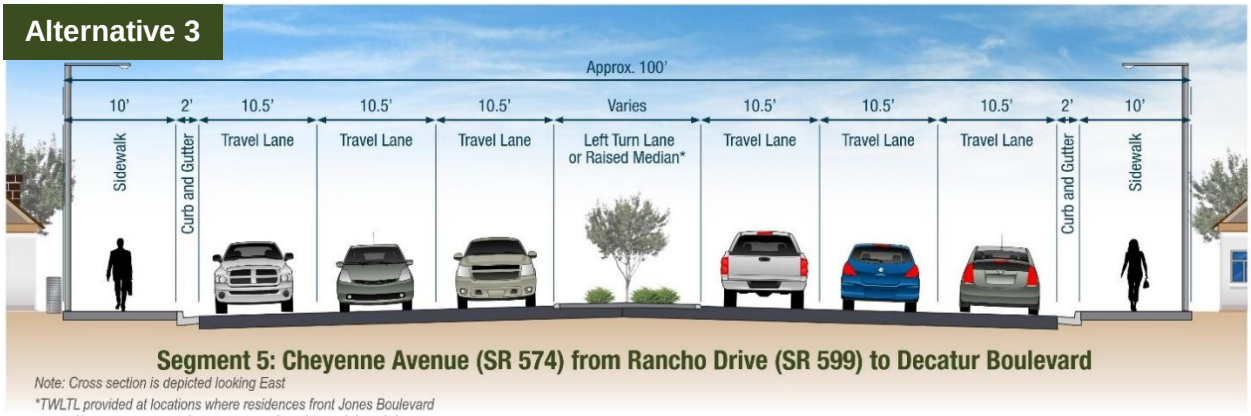
12.2.3.5 Cheyenne Avenue (SR 574) Segment 5: Rancho Drive (SR 599) through Decatur Boulevard

Alternative 3 improvements for Segment 5 from Rancho Drive (SR 599) to Decatur Boulevard include the items described in **Section 12.2**. **Figure 113** and **Figure 114** illustrate the existing and proposed cross sections for Segment 5.

Figure 113 – Cheyenne Avenue (SR 574) Segment 5 Existing Cross Section

Note: All cross sections are depicted looking East.

Figure 114 – Cheyenne Avenue (SR 574) Segment 5 Cross Section for Alternative 3



Note: All cross sections are depicted looking East.

12.2.4 Cheyenne Avenue (SR 574) High Priority Improvements

The proposed improvements were divided into two (2) categories: "High Priority" and "Additional Recommendations" as was done for the Jones Boulevard project corridor. The improvements found in the High Priority category include improvements with proven cost-effective countermeasures that are recommended to move forward with design and construction with available funds. **Table 28** provides a summary of the High Priority improvements for the Cheyenne Avenue (SR 574) corridor.

Table 28 – Cheyenne Avenue (SR 574) High Priority Recommendations

Improvements	Description	Improvement Types
Sidewalk Infill	Installation of sidewalk at locations where sidewalk is missing.	Pedestrian and ADA/PROWAG
Street Luminaire Replacement	Upgrading High Pressure Sodium luminaires to Light Emitting Diode (LED).	Vehicular, Motorcycle, Pedestrian, and Cyclists
Pedestrian Crossings ▪ Mustang Street ▪ Midblock crossing between Maverick Street and Whispering Willow Lane ▪ Midblock crossing between Goleta Drive and Terry Street/Miramar Drive	Install three (3) pedestrian crossings with pedestrian activated RRFBs and pedestrian detection technology.	Pedestrian and ADA/PROWAG
Signalized Intersection Improvements ▪ New Signal Head Placement ▪ Signal Head Realignment ▪ Retroreflective Backplates* ▪ Pedestrian and ADA/PROWAG Signalized Intersections: ▪ Torrey Pines Drive ▪ Jones Boulevard ▪ Michael Way ▪ Rancho Drive (SR 599) ▪ Decatur Boulevard	Realignment of signal heads so there is one signal head centered on each through lane and installation of new signal heads where they are missing.	Vehicular and Motorcycle

**Note that retroreflective plates are recommended but are being installed as part of another NDOT project.*

As mentioned previously, all of the proposed improvements are within the existing right-of-way. Figures showing the conceptual design for all alternatives of the Cheyenne Avenue (SR 574) project corridor are included in **Appendix Q**.

12.2.5 Cheyenne Avenue (SR 574) Additional Improvements

The Additional Recommendations for the Cheyenne Avenue (SR 574) project corridor are summarized in **Table 29,** these recommendations can be implemented individually or grouped together as funding and other considerations allow. The Cheyenne Avenue (SR 574) project corridor has three proposed alternatives. The three (3) alternatives differ as follows:

- **Alternative 1**
  - Install raised medians throughout corridor to limit left turn access
  - Reduce travel lanes from three (3) lanes each direction to two (2) lanes each direction and restripe roadway to provide a dedicated bike lane with 3-foot buffer in each direction of travel
- **Alternative 2**
  - Install raised medians throughout corridor to limit left turn access

- Maintain three (3) travel lanes each direction and restripe roadway to provide a dedicated bike lane in each direction of travel

- **Alternative 3**
  - Install raised medians throughout corridor to limit left turn access
  - Maintain three (3) travel lanes in each direction and restripe the roadway to reduce the lane widths to provide space for widening the sidewalk to 10 feet on both sides of the corridor

Table 29 – Cheyenne Avenue (SR 574) Additional Recommendations

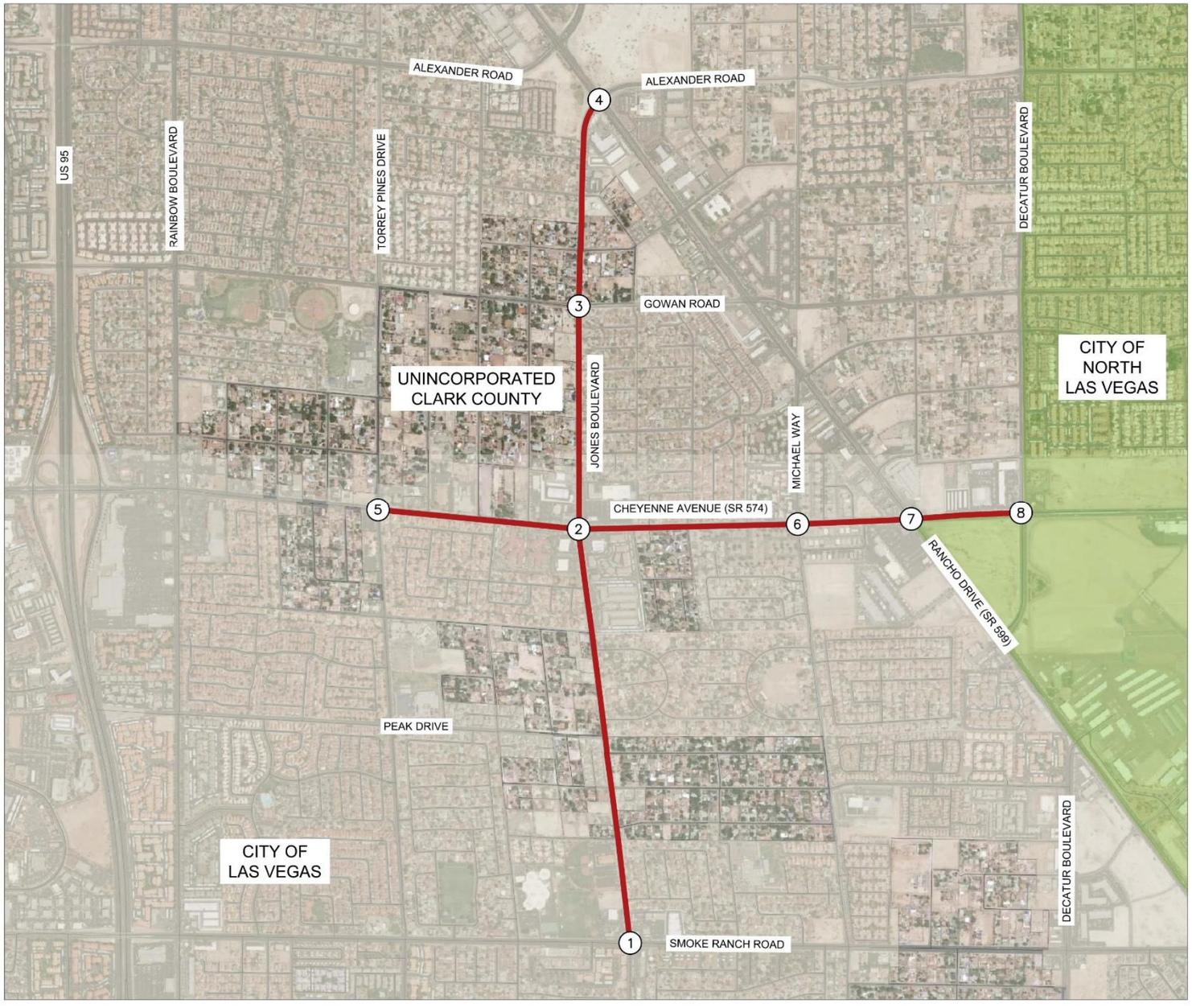
Improvements	Description	Improvement Types
Sidewalk Widening – Alternative 3	Restripe the roadway to reduce the lane widths to provide space for widening the sidewalk to 10 feet on both sides of the corridor	Pedestrian and ADA/PROWAG
Streetlight Relocation	Relocation of existing streetlights behind back of curb.	Pedestrian and ADA/PROWAG
Speed Management with Speed Feedback Signs	Installation of speed feedback signs and interconnection of devices so current speed is available to be used for speed management.	Vehicular and Motorcycle
Dilemma Zone Detection	Installation of dilemma zone detection at intersections.	Vehicular and Motorcycle
Intersection CCTV Cameras	Installation of CCTV cameras at signalized intersections.	Vehicular and Motorcycle
Access Management ▪ S-Islands: ▪ Madre Mesa ▪ Duncan Drive ▪ Median Closures (Right-in/Right-out): ▪ Sheila Avenue ▪ Brooks Avenue ▪ Heather Mist Lane ▪ Foxcroft Avenue ▪ Median Updates (Left-in/Right-in/Right-out): ▪ Morro Bay Avenue ▪ Sonoma Palms Driveway ▪ Edward Avenue	Installation of S-Island medians, median closures/updates at intersections and access drives to eliminate minor street left-turn movements.	Roadway, Vehicular, and Motorcycle
Lane Reduction – Alternative 1	Reduce travel lanes from three (3) lanes each direction to two (2) lanes each direction and restripe roadway to provide a dedicated bike lane with 3-foot buffer in each direction of travel	Roadway, Vehicular, and Motorcycle

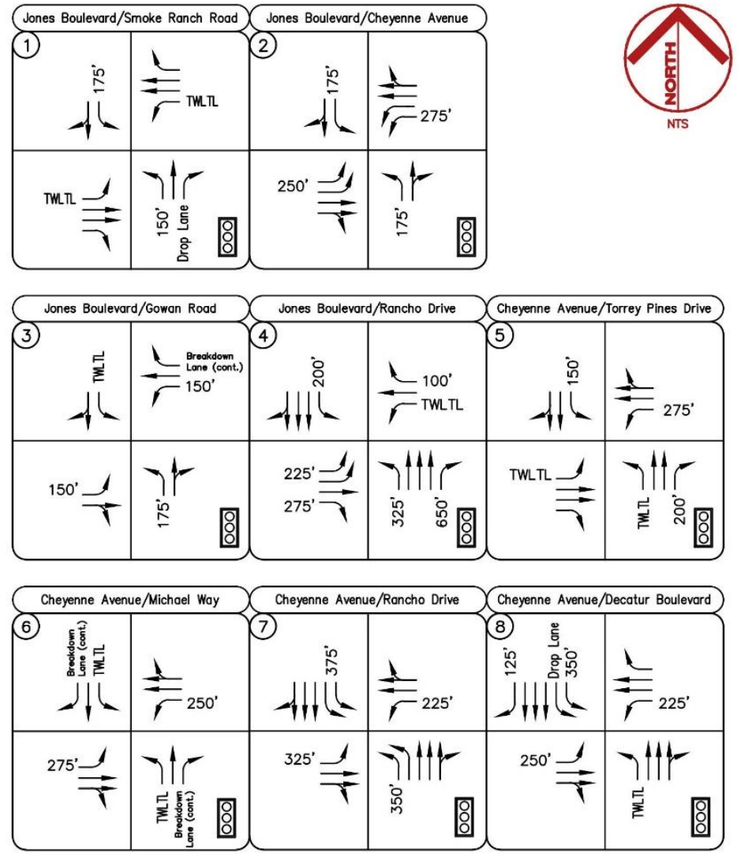
12.3 Level of Service Analysis

LOS analysis for the key intersections was conducted for each of the three (3) alternatives along the project corridors based on the same methodology and signal timing described in **Section 6.3**. The LOS analysis for each alternative is based on the lane configurations and intersection traffic control shown in **Figures 115** through **Figure 117.**

Table 30 provides a summary of the 2018 Existing Conditions LOS results for the key intersections during the AM and PM peak hours as found in **Section 6.3**. The AM and PM peak hour LOS analysis was performed for all the key intersections using the expected construction year (2020) traffic volumes and the 20-year horizon (2040) traffic volumes. **Table 31** provides a summary of the LOS analysis results in 2020 for a "no-build" scenario and for each proposed alternative. **Table 32** provides a summary of the LOS analysis results in 2040 for a "no-build" scenario and for each proposed alternative. The LOS analysis summary sheets for 2020 and 2040 scenarios are provided in **Appendix R.** The intersections anticipated to experience long delays during AM and/or PM peak hour are highlighted **red.**

Figure 115 – Project Corridors Alternative 1 Proposed Lane Configuration





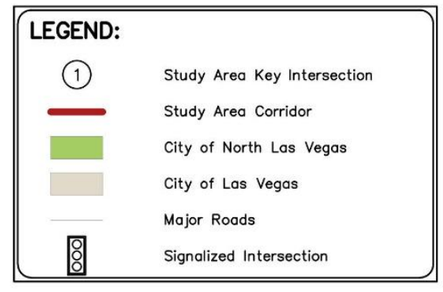
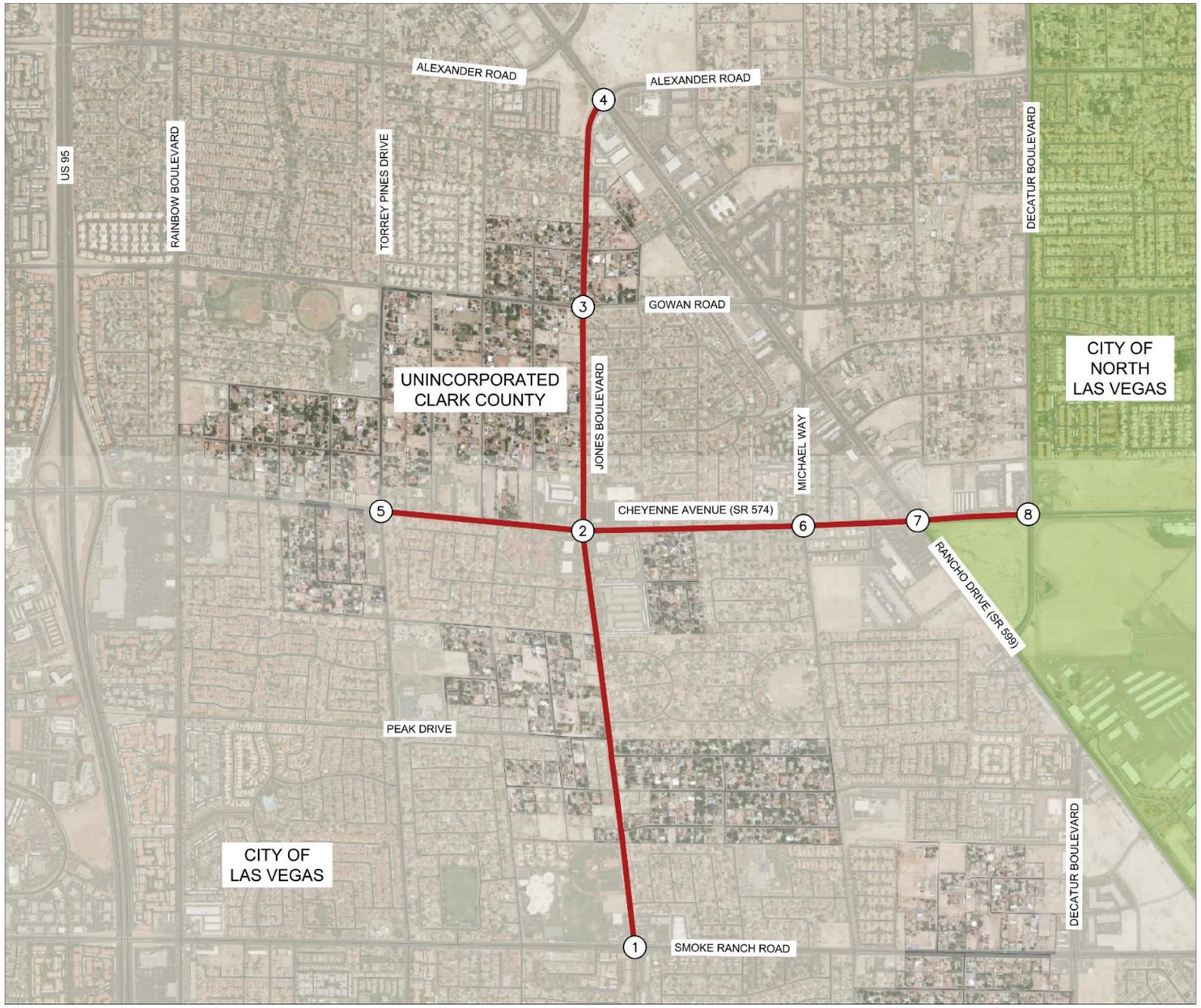
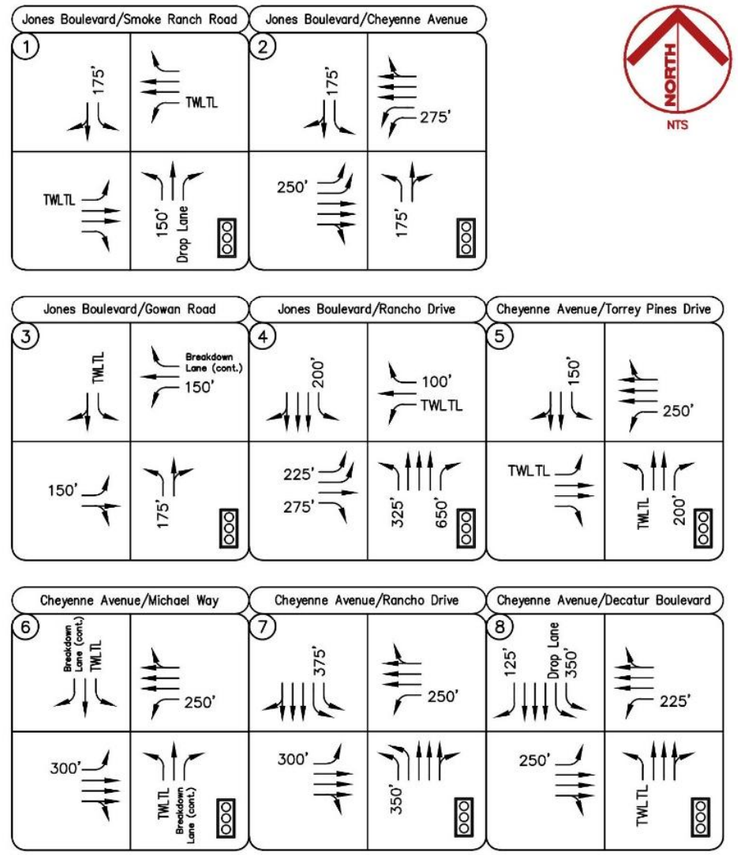


Figure 116 – Project Corridors Alternative 2 Proposed Lane Configuration

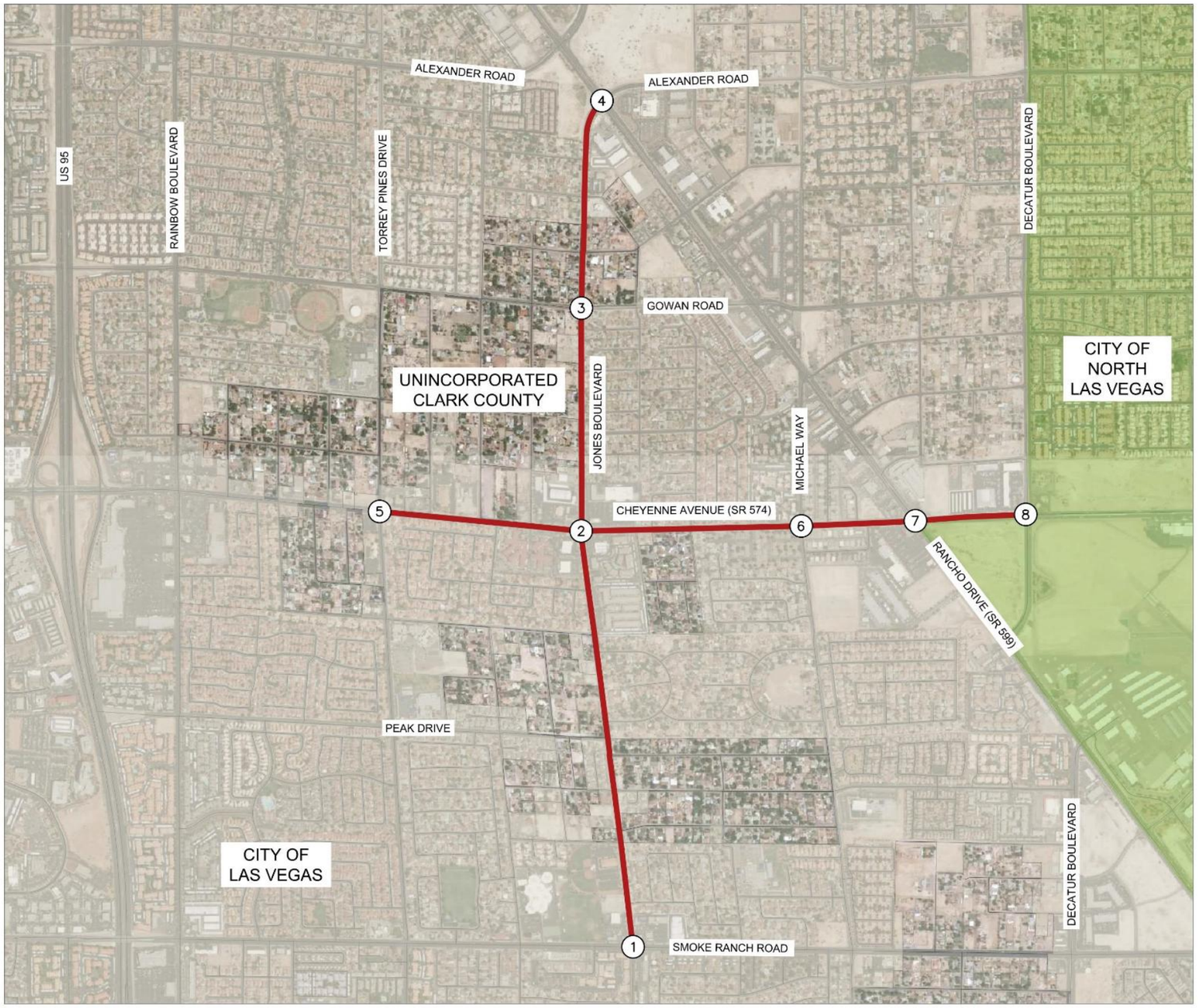


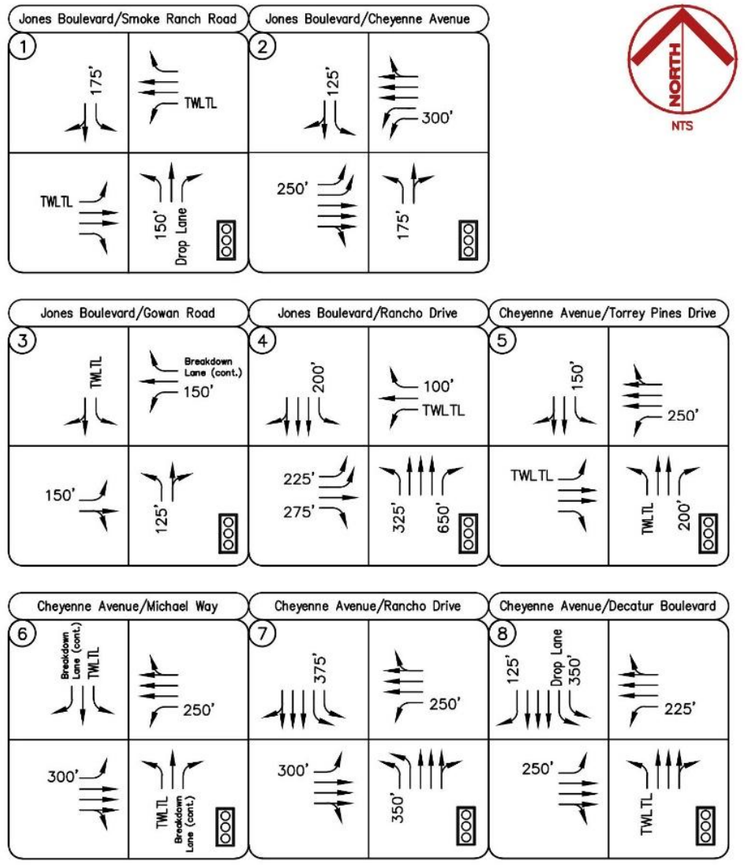


LEGEND:

- (1) Study Area Key Intersection
- Study Area Corridor
- City of North Las Vegas
- City of Las Vegas
- Major Roads
- Signalized Intersection

Figure 117 – Project Corridors Alternative 3 Proposed Lane Configuration





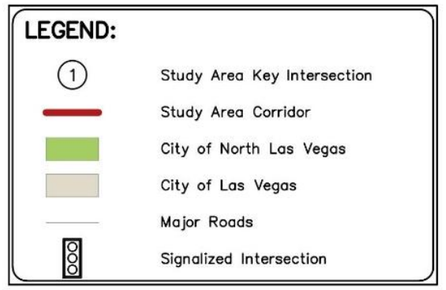


Table 30 – 2018 Existing Conditions LOS Results

Intersection Number	Intersection	AM Peak Hour		PM Peak Hour	
		Delay (s)	LOS	Delay (s)	LOS
1	**Jones Boulevard and Smoke Ranch Road**	**57.8**	**E**	**40.0**	**D**
	▪ Northbound	55.5	E	23.7	C
	▪ Southbound	54.7	D	23.4	C
	▪ Eastbound	59.1	E	58.5	E
	▪ Westbound	63.2	E	58.3	E
2	**Jones Boulevard and Cheyenne Avenue (SR 574)**	**28.0**	**C**	**49.6**	**D**
	▪ Northbound	55.4	E	68.5	E
	▪ Southbound	68.4	E	47.2	D
	▪ Eastbound	5.9	A	36.1	D
	▪ Westbound	25.9	C	54.7	D
3	**Jones Boulevard and Gowan Road**	**15.9**	**B**	**15.8**	**B**
	▪ Northbound	8.3	A	8.4	A
	▪ Southbound	10.7	B	10.3	B
	▪ Eastbound	29.3	C	30.0	C
	▪ Westbound	27.8	C	28.8	C
4	**Jones Boulevard and Rancho Drive (SR 599)**	**24.9**	**C**	**33.4**	**C**
	▪ Northbound	61.9	E	126.0	F
	▪ Southbound	62.6	E	62.5	E
	▪ Eastbound	15.2	B	13.3	B
	▪ Westbound	13.6	B	15.3	B
5	**Cheyenne Avenue (SR 574) and Torrey Pines Drive**	**12.5**	**B**	**11.3**	**B**
	▪ Northbound	62.5	E	62.2	E
	▪ Southbound	57.6	E	57.4	E
	▪ Eastbound	7.4	A	8.3	A
	▪ Westbound	6.0	A	0.6	A
6	**Cheyenne Avenue (SR 574) and Michael Way**	**13.7**	**B**	**12.7**	**B**
	▪ Northbound	53.6	D	56.0	E
	▪ Southbound	51.5	D	54.3	D
	▪ Eastbound	9.6	A	8.9	A
	▪ Westbound	9.0	A	8.1	A
7	**Cheyenne Avenue (SR 574) and Rancho Dr (SR 599)**	**60.8**	**E**	**54.4**	**D**
	▪ Northbound	57.9	E	43.4	D
	▪ Southbound	51.7	D	40.2	D
	▪ Eastbound	78.7	E	70.3	E
	▪ Westbound	51.4	D	56.2	E
8	**Cheyenne Avenue (SR 574) and Decatur Boulevard**	**53.1**	**D**	**56.2**	**E**
	▪ Northbound	56.7	E	96.3	F
	▪ Southbound	82.0	F	42.7	D
	▪ Eastbound	30.8	C	41.1	D
	▪ Westbound	36.7	D	44.6	D

Table 31 – 2020 No Build and Alternative LOS Results

Intersection Number	Intersection	2020 No Build				2020 Alternative 1				2020 Alternative 2				2020 Alternative 3			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
1	**Jones Boulevard/Smoke Ranch Road**	**58.1**	**E**	**41.2**	**D**	**69.6**	**E**	**43.7**	**D**	**69.6**	**E**	**43.7**	**D**	**69.6**	**E**	**43.7**	**D**
	▪ Northbound	54.7	D	25.4	C	41.0	D	30.0	C	41.0	D	30.0	C	41.0	D	30.0	C
	▪ Southbound	54.6	D	24.7	C	99.6	F	29.7	C	99.6	F	29.7	C	99.6	F	29.7	C
	▪ Eastbound	59.5	E	59.2	E	59.5	E	59.3	E	59.5	E	59.3	E	59.5	E	59.3	E
	▪ Westbound	65.0	E	59.1	E	65.0	E	59.1	E	65.0	E	59.1	E	65.0	E	59.1	E
2	**Jones Boulevard/Cheyenne Avenue (SR 574)**	**29.2**	**C**	**50.6**	**D**	**64.1**	**E**	**78.7**	**E**	**53.2**	**D**	**55.5**	**E**	**50.2**	**D**	**55.5**	**E**
	▪ Northbound	55.3	E	71.9	E	63.2	E	137.9	F	49.7	D	75.4	E	49.7	D	75.4	E
	▪ Southbound	70.1	E	46.9	D	105.0	F	70.7	E	71.3	E	49.2	D	71.3	E	49.2	D
	▪ Eastbound	6.3	A	36.7	D	58.0	E	54.2	D	60.1	E	43.0	D	52.0	D	43.0	D
	▪ Westbound	27.7	C	55.0	D	56.2	E	76.5	E	41.4	D	59.8	E	41.3	D	59.8	E
3	**Jones Boulevard/Gowan Road**	**16.2**	**B**	**16.0**	**B**	**17.7**	**B**	**17.1**	**B**	**17.7**	**B**	**17.1**	**B**	**17.7**	**B**	**17.1**	**B**
	▪ Northbound	8.5	A	8.6	A	9.4	A	10.0	B	9.5	A	10.0	B	9.5	A	10.0	B
	▪ Southbound	11.1	B	10.6	B	14.4	B	12.4	B	14.5	B	12.4	B	14.5	B	12.4	B
	▪ Eastbound	29.5	C	30.4	C	29.2	C	30.4	C	29.1	C	30.4	C	29.1	C	30.4	C
	▪ Westbound	27.9	C	29.1	C	27.7	C	29.1	C	27.6	C	29.1	C	27.6	C	29.1	C
4	**Jones Boulevard/Rancho Drive (SR 599)**	**26.2**	**C**	**37.2**	**D**	**25.9**	**C**	**28.2**	**C**	**26.0**	**C**	**28.2**	**C**	**26.0**	**C**	**28.2**	**C**
	▪ Northbound	61.7	E	147.3	F	61.4	E	60.3	E	61.1	E	60.3	E	61.1	E	60.3	E
	▪ Southbound	63.2	E	62.6	E	60.2	E	73.1	E	60.9	E	73.1	E	60.9	E	73.1	E
	▪ Eastbound	16.9	B	14.2	B	17.0	B	16.5	B	17.0	B	16.5	B	17.0	B	16.5	B
	▪ Westbound	14.9	B	16.4	B	15.0	B	19.2	B	15.0	B	19.2	B	15.0	B	19.2	B
5	**Cheyenne Avenue (SR 574)/Torrey Pines Drive**	**12.9**	**B**	**11.7**	**B**	**14.2**	**B**	**16.6**	**B**	**12.9**	**B**	**11.6**	**B**	**12.9**	**B**	**11.6**	**B**
	▪ Northbound	62.0	E	61.7	E	62.0	E	61.7	E	62.0	E	61.7	E	62.0	E	61.7	E
	▪ Southbound	56.9	E	56.8	E	56.9	E	56.8	E	56.9	E	56.8	E	56.9	E	56.8	E
	▪ Eastbound	7.9	A	9.0	A	9.2	A	10.9	B	7.9	A	9.0	A	7.9	A	9.0	A
	▪ Westbound	6.5	A	0.6	A	8.1	A	9.9	A	6.5	A	0.5	A	6.5	A	0.5	A
6	**Cheyenne Avenue (SR 574)/Michael Way**	**17.9**	**B**	**13.0**	**B**	**20.6**	**C**	**14.9**	**B**	**14.0**	**B**	**12.8**	**B**	**14.0**	**B**	**12.8**	**B**
	▪ Northbound	53.5	D	55.9	E	53.5	D	55.9	E	53.5	D	55.9	E	53.5	D	55.9	E
	▪ Southbound	51.2	D	54.1	D	51.2	D	54.1	D	51.2	D	54.1	D	51.2	D	54.1	D
	▪ Eastbound	18.8	B	9.2	A	22.6	C	11.1	B	9.8	A	8.8	A	9.8	A	8.8	A
	▪ Westbound	9.6	A	8.5	A	11.8	B	10.7	B	9.5	A	8.5	A	9.5	A	8.5	A
7	**Cheyenne Avenue (SR 574)/Rancho Drive**	**64**	**E**	**57.6**	**E**	**58.7**	**E**	**62.6**	**E**	**62.8**	**E**	**57.4**	**E**	**62.8**	**E**	**57.4**	**E**
	▪ Northbound	58.6	E	45.3	D	67.1	E	64.4	E	58.6	E	45.3	D	58.6	E	45.3	D
	▪ Southbound	51.0	D	42.0	D	57.1	E	74.4	E	51.0	D	42.0	D	51.0	D	42.0	D
	▪ Eastbound	86.8	F	75.2	E	62.1	E	67.9	E	80.5	F	75.0	E	80.5	F	75.0	E
	▪ Westbound	54.0	D	59.9	E	48.1	D	47.1	D	55.8	E	59.3	E	55.8	E	59.3	E
8	**Cheyenne Avenue (SR 574)/Decatur Boulevard**	**59.4**	**E**	**63.2**	**E**	**72.6**	**E**	**93.2**	**F**	**55.9**	**E**	**63.1**	**E**	**55.9**	**E**	**63.1**	**E**
	▪ Northbound	58.2	E	116.5	F	72.6	E	227.7	F	60.1	E	116.5	F	60.1	E	116.5	F
	▪ Southbound	96.6	F	42.8	D	129.8	F	66.5	E	88.8	F	42.8	D	88.8	F	42.8	D
	▪ Eastbound	31.5	C	43.3	D	35.0	C	39.7	D	33.6	C	43.1	D	33.6	C	43.1	D
	▪ Westbound	39.9	D	49.0	D	37.1	D	47.3	D	34.3	C	49.0	D	34.3	C	49.0	D

Table 32 – 2040 No Build and Alternative LOS Results

Intersection Number	Intersection	2040 No Build				2040 Alternative 1				2040 Alternative 2				2040 Alternative 3			
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
1	**Jones Boulevard/Smoke Ranch Road**	**62.4**	**E**	**51.4**	**D**	**136.5**	**F**	**77.1**	**E**	**136.5**	**F**	**77.1**	**E**	**136.5**	**F**	**77.1**	**E**
	▪ Northbound	49.6	D	37.0	D	50.8	D	100.9	F	50.8	D	100.9	F	50.8	D	100.9	F
	▪ Southbound	50.8	D	32.9	C	275.7	F	57.0	E	275.7	F	57.0	E	275.7	F	57.0	E
	▪ Eastbound	65.5	E	68.8	E	65.6	E	69.0	E	65.6	E	69.0	E	65.6	E	69.0	E
	▪ Westbound	88.7	F	69.8	E	88.7	F	69.8	E	88.7	F	69.8	E	88.7	F	69.8	E
2	**Jones Boulevard/Cheyenne Avenue (SR 574)**	**50.6**	**D**	**59.5**	**E**	**148.2**	**F**	**215.0**	**F**	**100.5**	**F**	**129.6**	**F**	**96.4**	**F**	**139.4**	**F**
	▪ Northbound	53.8	D	77.8	E	154.8	F	333.9	F	121.3	F	353.8	F	66.9	E	214.4	F
	▪ Southbound	85.2	F	48.5	D	276.2	F	179.6	F	370.0	F	235.2	F	165.4	F	104.5	F
	▪ Eastbound	40.2	D	52.2	D	126.4	F	181.8	F	42.8	D	52.2	D	105.7	F	121.3	F
	▪ Westbound	46.7	D	60.4	E	119.2	F	197.0	F	48.1	D	59.8	E	73.1	E	128.9	F
3	**Jones Boulevard/Gowan Road**	**17.8**	**B**	**17.4**	**B**	**22.6**	**C**	**21.3**	**C**	**22.7**	**C**	**21.0**	**C**	**22.7**	**C**	**21.3**	**C**
	▪ Northbound	10.4	B	11.2	B	12.2	B	16.7	B	12.3	B	17.1	B	12.3	B	16.7	B
	▪ Southbound	14.7	B	14.1	B	25.5	C	18.4	B	25.9	C	18.7	B	25.7	C	18.4	B
	▪ Eastbound	28.6	C	28.6	C	28.8	C	31.1	C	28.6	C	28.6	C	28.7	C	31.1	C
	▪ Westbound	26.6	C	27.0	C	27.0	C	27.6	C	26.6	C	27.0	C	26.9	C	27.6	C
4	**Jones Boulevard/Rancho Drive (SR 599)**	**40.3**	**D**	**42.2**	**D**	**40.5**	**D**	**42.1**	**D**	**40.3**	**D**	**42.2**	**D**	**40.4**	**D**	**42.1**	**D**
	▪ Northbound	59.9	E	65.2	E	63.1	E	63.7	E	59.9	E	65.2	E	61.6	E	63.7	E
	▪ Southbound	65.5	E	106.7	F	63.0	E	95.8	F	65.5	E	106.7	F	64.1	E	95.8	F
	▪ Eastbound	37.0	D	27.4	C	37.5	D	28.1	C	37.0	D	27.4	C	37.4	D	28.1	C
	▪ Westbound	25.3	C	34.7	C	25.3	C	36.3	D	25.3	C	34.7	C	25.2	C	36.3	D
5	**Cheyenne Avenue (SR 574)/Torrey Pines Drive**	**16.4**	**B**	**19.5**	**B**	**20.3**	**C**	**27.8**	**C**	**16.4**	**B**	**19.5**	**B**	**16.3**	**B**	**15.7**	**B**
	▪ Northbound	59.2	E	61.6	E	59.2	E	61.6	E	59.2	E	61.6	E	59.2	E	61.6	E
	▪ Southbound	53.2	D	53.5	D	53.2	D	53.5	D	53.2	D	53.5	D	53.2	D	53.5	D
	▪ Eastbound	12.5	B	14.9	B	16.2	B	27.0	C	12.5	B	14.9	B	12.4	B	14.9	B
	▪ Westbound	10.6	B	12.9	B	15.4	B	19.8	B	10.5	B	12.8	B	10.4	B	4.2	A
6	**Cheyenne Avenue (SR 574)/Michael Way**	**26.3**	**C**	**15.4**	**B**	**26.7**	**C**	**21.0**	**C**	**26.2**	**C**	**15.4**	**B**	**26.2**	**C**	**15.4**	**B**
	▪ Northbound	53.0	D	55.4	E	53.0	D	55.4	E	53.0	D	55.4	E	53.0	D	55.4	E
	▪ Southbound	49.9	D	53.0	D	49.9	D	53.0	D	49.9	D	53.0	D	49.9	D	53.0	D
	▪ Eastbound	35.1	D	11.6	B	30.1	C	17.7	B	34.8	C	11.6	B	34.8	C	11.6	B
	▪ Westbound	12.9	B	11.5	B	18.1	B	17.6	B	12.9	B	11.5	B	12.9	B	11.5	B
7	**Cheyenne Avenue (SR 574)/Rancho Drive**	**76.7**	**E**	**78.3**	**E**	**151.1**	**F**	**159.6**	**F**	**74.5**	**E**	**73.3**	**E**	**132.0**	**F**	**125.5**	**F**
	▪ Northbound	80.4	F	67.6	E	166.1	E	94.2	F	75.8	E	75.2	E	102.0	F	59.7	E
	▪ Southbound	62.5	E	77.4	E	74.4	F	180.1	F	71.8	E	74.8	E	51.4	D	49.8	D
	▪ Eastbound	101.7	F	88.2	F	181.5	F	170.9	F	93.5	F	84.4	F	218.8	F	170.1	F
	▪ Westbound	56.4	E	75.3	E	139.2	F	166.1	F	57.5	E	60.4	E	115.8	F	177.7	F
8	**Cheyenne Avenue (SR 574)/Decatur Boulevard**	**88.2**	**F**	**137.2**	**F**	**128.7**	**F**	**186.2**	**F**	**88.2**	**F**	**137.2**	**F**	**88.2**	**F**	**152.6**	**F**
	▪ Northbound	75.8	E	302.9	F	113.5	F	421.3	F	75.8	E	302.9	F	80.4	F	264.7	F
	▪ Southbound	158.0	F	88.7	F	237.0	F	93.4	F	158.0	F	88.7	F	154.7	F	44.3	D
	▪ Eastbound	44.5	D	45.6	D	52.6	D	81.7	F	44.5	D	45.6	D	42.6	D	98.1	F
	▪ Westbound	47.8	D	110.1	F	72.3	E	139.1	F	47.8	D	110.1	F	51.8	D	166.9	F

Based on the 2040 LOS analysis, most key study area intersections are anticipated to experience long delays during the AM and PM peak hours.

An additional analysis was run on the intersection of Jones Boulevard and Cheyenne Avenue (SR 574). Knowing that all improvements may not be implemented at once, the intersection was evaluated as if Cheyenne Avenue (SR 574) remained with existing lane configuration as proposed in Alternative 2/Alternative 3 and Jones Boulevard had the lane reduction implemented (All Alternatives). The results of that analysis are shown in **Table 33** for the 2020 and 2040 construction and horizon years, respectively.

Table 33 – 2020 and 2040 Jones Boulevard and Cheyenne Avenue LOS Results

Scenario	Intersection	AM Peak Hour		PM Peak Hour	
		Delay (s)	LOS	Delay (s)	LOS
2020 Jones Boulevard Alternative 1 & Cheyenne Avenue (SR 574) Existing Conditions	**Jones Boulevard and Cheyenne Avenue (SR 574)**	47.6	D	58.7	E
	▪ Northbound	50.9	D	72.3	E
	▪ Southbound	72.6	E	48.4	D
	▪ Eastbound	44.0	D	53.8	D
	▪ Westbound	41.2	D	59.9	E
2040 Jones Boulevard Alternative 1 & Cheyenne Avenue (SR 574) Existing Conditions	**Jones Boulevard and Cheyenne Avenue (SR 574)**	87.3	F	129.7	F
	▪ Northbound	140.4	F	370.1	F
	▪ Southbound	202.0	F	150.9	F
	▪ Eastbound	43.2	D	47.1	D
	▪ Westbound	66.8	E	81.3	F
2020 Jones Boulevard Alternative 1 & Cheyenne Avenue (SR 574) Alternative 2/Alternative 3	**Jones Boulevard and Cheyenne Avenue (SR 574)**	47.6	D	58.7	E
	▪ Northbound	50.9	D	72.3	E
	▪ Southbound	72.6	E	48.4	D
	▪ Eastbound	44.0	D	53.8	D
	▪ Westbound	41.2	D	59.9	E
2040 Jones Boulevard Alternative 1 & Cheyenne Avenue (SR 574) Alternative 2/Alternative 3	**Jones Boulevard and Cheyenne Avenue (SR 574)**	87.3	F	129.7	F
	▪ Northbound	140.4	F	370.1	F
	▪ Southbound	202.0	F	150.9	F
	▪ Eastbound	43.2	D	47.1	D
	▪ Westbound	66.8	E	81.3	F

13. SAFETY PERFORMANCE ANALYSIS

A safety performance analysis was performed on the project corridor in an effort to quantify the effects of the proposed safety improvements along Jones Boulevard and Cheyenne Avenue (SR 574). Principles found in the Highway Safety Manual (HSM) 1st Edition were used to perform this analysis along the project corridor based on the existing and proposed roadway conditions. The two (2) methods of analysis used where the Crash Modification Factor (CMF) Method (HSM – Part D) and the Predictive Method (HSM – Part C) as outlined in the Nevada Project Safety Process (PSP).

13.1 CMF Method

The CMF Method is used to estimate the potential for reducing crashes by applying known CMF values to the existing crash history. CMF values for the proposed improvements were found on FHWA CMF Clearinghouse website (http://www.cmfclearinghouse.org) and applied according the guidance provided in the Nevada PSP. The CMF Method was used to determine potential crash reductions for the proposed traffic signal modification improvements. **Table 34** highlights the CMF used for each of the improvements analyzed as part of the overall traffic signal modification improvements. Detailed summary pages of each of the CMFs are included in **Appendix S**. BCRs are determined in **Section 15** using these CMF values applied to the existing crash data.

Table 34 – Applied Clearinghouse Crash Modification Factors

Improvement	CMF Description	CMF ID #	Value	Star Rating
Dilemma Zone Detection	Installation of an actuated advanced warning dilemma zone protection system at high-speed signalized intersections	4857	0.918	4 Stars
New Signal Head Placement	Improve visibility of signal heads	1430	0.93	4 Stars
Retroreflective Backplates	Add 3-inch yellow retroreflective sheeting to signal backplates	1410	0.85	4 Stars
Traffic Signal Modifications - Combined	This improvement is intended to capture the combined safety benefit of all the suggested traffic signal modification improvements	4857 1430 1410	0.78*	NA

**Developed using engineering judgement. No CMF has been developed that includes all of the suggested traffic signal modification improvements being proposed as part of the SMP.*

13.2 Predictive Method

The Predictive Method in Part C of the HSM can be used to estimate predicted average crash frequencies over a given time period. To accurately implement the HSM Predictive Method, the Interactive Highway Safety Design Model (IHSDM) was used. IHSDM is a software analysis tool used to evaluate the safety and operational effects of geometric design decision on highways. IHSDM is meant to be used as a decision-support tool by providing estimates of a highway design's expected safety and operational performance and checks existing or proposed highways designs against relevant design policy values. The results of the IHSDM support decision-making in the highway design process. This software is intended to be used by highway project managers, designers, and traffic safety reviewers in state and local highway agencies and by engineering consulting firms. The IHSDM currently includes the following six evaluations modules:

- Crash Prediction
- Design Consistency
- Intersection Review
- Policy Review
- Traffic Analysis
- Driver/Vehicle

Only the crash prediction module within IHSDM was used in relation to the Jones Boulevard/Cheyenne Avenue (SR 574) SMP to estimate the predicted average crash frequency for the existing and proposed conditions. IHSDM was used to estimate predicted average crash frequencies for the following improvements:

- Jones Boulevard
  - Access Management – Corridor Median Installation
  - Access Management – Intersection Median Modifications
- Cheyenne Avenue (SR 574)
  - Lane Reduction & Access Management – Corridor Median Installation
  - Access Management – Corridor Median Installation
  - Access Management – Intersection Median Modifications

Predicted average crash frequencies over the 20-year evaluation period from 2021-2040 were calculated for the affected intersections with proposed access management modifications due to median modification changes. Crash predictions were calculated for the existing conditions and the proposed conditions for each of the affect intersections along the SMP corridors. The results of the predictive analysis for the intersection median modifications are summarized in **Table 35** through **Table 39**. It should be noted that the predicted crash results for Cheyenne Avenue (SR 574) are slightly different for a 4-lane divided and a 6-lane divided roadway as seen is in **Table 36** and **Table 37**.

Currently, the HSM doesn't have the ability to predict crashes for an intersection with and S-Island. The predicted crashes for intersections with S-Islands were calculated as the average of predicted crashes at an intersection without a median and the combination of two intersections with one-way traffic on the major street using half the AADT for the major street. This was done in an effort to more accurately predict the number of crashes based on the number of conflict points at an intersection with an S-Island median.

IHSDM's crash prediction model was used on the other improvements to generate a CMF value that could be applied to the existing crashes. This method is a combination of the CMF Method and the Predictive Method. The generated CMF values for the other improvements are displayed in **Table 38** and **Table 39**.

The IHSDM generated crash prediction analysis reports can be found in **Appendix T.** The results of the safety performance analysis were used in determining the BCR found in **Section 15**.

Table 35 – Jones Boulevard Intersection Median Modifications Crash Prediction Results

Intersection	Existing Condition Predicted Crashes	Proposed Condition Predicted Crashes	20-Year Crash Reduction
Madre Mesa Drive	26	17	9
Sheila Avenue	17	4	13
Brooks Avenue	16	4	12
Heather Mist Lane	17	4	13
Morro Bay Avenue	9	5	3
Duncan Drive	14	9	5
Edward Avenue/ Gilmore Avenue	16	9	7
Foxcroft Avenue	6	2	5
Total	**121**	**55**	**66**

Due to rounding the crash prediction values may not add up to the "Total" value.

Table 36 – Cheyenne Avenue (SR 574) Intersection Median Modifications Crash Prediction Results (4 Lane Divided)

Intersection	Existing Condition Predicted Crashes	Proposed Condition Predicted Crashes (4 Lane Divided)	20-Year Crash Reduction
Mustang Street	42	14	28
Maverick Street	42	22	20
Whispering Willow Lane	74	65	9
Bronco Street	57	42	15
Rowland Street	39	13	26
Goleta Drive	39	13	26
Miramar Street/Terry Street	39	37	3
Joanne Way	57	33	24
Total	**391**	**238**	**153**

Due to rounding the crash prediction values may not add up to the "Total" value.

Table 37 – Cheyenne Avenue (SR 574) Intersection Median Modifications Crash Prediction Results (6 Lane Divided)

Intersection	Existing Condition Predicted Crashes	Proposed Condition Predicted Crashes (6 Lane Divided)	20-Year Crash Reduction
Mustang Street	42	14	28
Maverick Street	42	28	14
Whispering Willow Lane	74	74	0
Bronco Street	57	42	15
Rowland Street	39	13	26
Goleta Drive	39	13	26
Miramar Street/Terry Street	39	37	3
Joanne Way	57	38	19
Total	**391**	**258**	**132**

Due to rounding the crash prediction values may not add up to the "Total" value.

Table 38 – Jones Boulevard Applied IHSDM Crash Modification Factors

Improvement	CMF Value	Crash Reduction Percentage
Access Management – Corridor Median Installation	0.367	63.3%

Table 39 – Cheyenne Avenue (SR 574) Applied IHSDM Crash Modification Factors

Improvement	CMF Value	Crash Reduction Percentage
Access Management – Corridor Median Installation	0.977	2.3%
Lane Reduction & Access Management – Corridor Median Installation	0.479	52.1%

14. PROPOSED IMPROVEMENT COSTS

Cost estimates for the proposed improvements of the Jones Boulevard/Cheyenne Avenue (SR 574) SMP are presented in this section. These preliminary cost estimates are based on 2018 dollars and were based on unit cost values referenced from recent projects. The total cost estimates include the following categories and are considered to be an opinion of probable cost:

- Removal of existing roadway, roadside elements, and existing median
- Proposed improvements within and adjacent to the roadway section
- Improvement to landscaping
- Signage improvements
- Signal improvements
- Traffic calming devices
- Permanent signing improvements (assumed at 1% of removal and improvement total)
- Construction surveys (assumed at 3% of removal and improvement total)
- Quality Control (assumed at 3% of removal and improvement total)
- Traffic Control (assumed at 7% of removal and improvement total)
- Mobilization (assumed at 10% of removal, improvement and other construction costs mentioned above)
- Preliminary Engineering (assumed at 15% of removal and improvement total)
- Construction Engineering (assumed at 10% of removal and improvement total)

Additionally, a 20% contingency was applied to the preliminary estimate to account for variations in construction costs and scheduling challenges. The following elements were not included in the preliminary cost estimate:

- Environmental documentation or mitigation
- Right-of-way
- Utility installation or relocation
- Signal Pole and Mast Arm Modifications
- Streetlight Modifications

Table 40 and **Table 41** provide a summary of the preliminary cost estimate for the proposed improvement projects along Jones Boulevard and Cheyenne Avenue (SR 574), respectively. The range of prices is provided due to the different options available for speed management interconnection devices. The preliminary cost estimate for the proposed improvements is found in **Appendix U**

Table 40 – Jones Boulevard Improvement Estimated Project Costs

Improvements	Description	Estimated Project Cost
Alternative 1 – Access Management and Lane Reduction with On-Street Parking	▪ Install raised medians throughout corridor to limit left turn access. ▪ Reduce travel lanes from two (2) lanes each direction to one (1) lane each direction and restripe roadway to provide a dedicated bike lane with 3-foot buffer in each direction of travel ▪ Maintain on-street parking where residential property fronts Jones Boulevard	**$7,240,749 to $8,846,391**
Alternative 2 – Access Management and Lane Reduction without On-Street Parking	▪ Install raised medians throughout corridor to limit left turn access ▪ Reduce travel lanes from two (2) lanes each direction to one (1) lane each direction and restripe roadway to provide a dedicated bike lane with 3-foot buffer in each direction of travel ▪ Remove all on-street parking and widen sidewalk to 10 feet along both sides of the corridor	**$10,608,681 to $12,214,323**
Alternative 3 – Access Management and Lane Reduction with Shared Bus/Bike Lane	▪ Install raised medians throughout corridor to limit left turn access ▪ Reduce travel lanes from two (2) lanes each direction to one (1) lane each direction and restripe roadway to provide a shared bus/bike lane in each direction of travel	**$6,310,793 to $7,916,435**

Table 41 – Cheyenne Avenue (SR 574) Improvement Estimated Project Costs

Improvements	Description	Estimated Project Cost
Alternative 1 – Access Management and Lane Reduction with Buffered Bike Lanes	▪ Install raised medians throughout corridor to limit left turn access ▪ Reduce travel lanes from three (3) lanes each direction to two (2) lanes each direction and restripe roadway to provide a dedicated bike lane with 3-foot buffer in each direction of travel	**$7,183,701 to $8,096,198**
Alternative 2 – Access Management and Bike Lanes	▪ Install raised medians throughout corridor to limit left turn access ▪ Maintain three (3) travel lanes each direction and restripe roadway to provide a dedicated bike lane in each direction of travel	**$6,294,805 to $7,207,302**
Alternative 3 – Access Management and Sidewalk Widening	▪ Install raised medians throughout corridor to limit left turn access ▪ Maintain three (3) travel lanes in each direction and restripe the roadway to reduce the lane widths to provide space for widening the sidewalk to 10 feet on both sides of the corridor	**$10,474,983 to $11,387,480**

15. BENEFIT-COST ANALYSIS

The 20-year BCRs of the proposed safety improvements were calculated based on the results found in **Section 13**. The estimated cost of the proposed improvements by alternative can be found in **Section 14.** This information was used to determine the potential benefit of the proposed improvements in terms of a crash reduction using both the CMF and Predictive Method to calculate a safety BCR. **Table 41** shows the societal costs by crash severity used in this analysis. **Table 43** and **Table 44** shows the calculated annual benefit, annualized cost, BCR, and the average annual net return for each of the improvements along Jones Boulevard and Cheyenne Avenue (SR 574), respectively. **Appendix V** includes the complete BCR calculation for each of the improvements.

Table 42 – Crash Severity Societal Cost

Crash Severity	Societal Cost/Crash*
K – Fatal Injury Crash	$6,084,310
A – Incapacitating Injury Crash	$320,877
B – Non-Incapacitating Injury Crash	$117,176
C – Possible Injury Crash	$65,878
O – Property Damage Only Crash	$10,588

**2018 Societal Costs*

Table 43 – Jones Boulevard Annual Benefit, Annual Cost, and Benefit-Cost Ratio

Improvement	Annual Benefit	Annual Cost	BCR	Annual Net Return
Dilemma Zone Detection	$49,725	$25,003	1.99	$24,722
New Signal Head Placement	$42,448	$1,926	22.04	$40,522
Retroreflective Backplates	$90,960	$1,857	48.98	$89,103
Traffic Signal Modifications - Combined	$133,408	$32,809	4.07	$100,599
Access Management – Corridor Median Installation	$419,863	$189,759	2.21	$230,104

Note: Analysis completed based on 2018 dollars for benefit and cost numbers

Table 44 – Cheyenne Avenue (SR 574) Annual Benefit, Annual Cost, and Benefit-Cost Ratio

Improvement	Annual Benefit	Annual Cost	BCR	Annual Net Return
Dilemma Zone Detection	$685,750	$33,377	20.55	$652,373
New Signal Head Placement	$585,396	$3,852	151.99	$581,545
Retroreflective Backplates	$1,254,420	$2,751	455.96	$1,251,669
Traffic Signal Modifications - Combined	$1,839,817	$46,032	39.97	$1,793,784
Access Management – Corridor Median Installation	$811,858	$113,324	7.16	$698,534
Lane Reduction & Access Management – Corridor Median Installation	$938,129	$336,432	2.79	$601,698

Note: Analysis completed based on 2018 dollars for benefit and cost numbers

16. RECOMMENDATIONS

Based on the analyses and information presented in this report along with input from the TAC, the corridor recommendations were prioritized as follows:

16.1 High Priority Improvements

Table 45 and **Table 46** summarize the High Priority Improvements for the project corridors. The High Priority Improvements are recommended as a first priority when trying to improve safety for all road users along the project corridors.

Table 45 – Jones Boulevard High Priority Improvements with Cost Summary

Improvements	Description	Estimated Project Costs
Sidewalk Infill	Installation of sidewalk at locations where sidewalk is missing.	**$350,000-$400,000**
Street Luminaire Replacement	Upgrading High Pressure Sodium luminaires to Light Emitting Diode (LED).	**$55,000-$100,000**
Pedestrian Crossings ▪ Madre Mesa Drive ▪ Heather Mist Lane ▪ Santa Catalina Avenue ▪ Edward Avenue	Upgrade of the existing pedestrian crossing at Heather Mist Lane and addition of three (3) pedestrian crossings with pedestrian activated RRFBs and pedestrian detection technology.	**$1.2 - $1.6 Million**
Signalized Intersection Improvements ▪ New Signal Head Placement ▪ Signal Head Realignment ▪ Retroreflective Backplates* ▪ Pedestrian and ADA/PROWAG ▪ Intersection CCTV Cameras Signalized Intersections: ▪ Smoke Ranch Road ▪ Gowan Road ▪ Rancho Drive (SR 599)	Realignment of signal heads so there is one signal head centered on each through lane and installation of new signal heads where they are missing. Installation of CCTV cameras at the signalized intersections.	**$324,000**

**Note that retroreflective plates are recommended but are being installed as part of another NDOT project.*

A hybrid of the three (3) alternatives for Jones Boulevard can be implemented during the design and construction phases of the projects. Buses are able to use the available parking area and bike lane to pick up passengers if Alternative 1 is implemented, this is similar to what is currently being done along the corridor where buses pull over on the available shoulder.