

W. 4TH STREET SAFETY MANAGEMENT PLAN

FINAL REPORT



Prepared For



Prepared By



WOOD RODGERS
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME
1361 Corporate Boulevard Tel: 775.823.4068
Reno, NV 89502 Fax: 775.823.4066



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Project Team Acknowledgements

NDOT

Catherine Balcon
Jeffrey Bickett
Lori Campbell (Project Manager)
Hoang Hong
Jordan Kaczmarek
Cassie Mlynarek
Maurilio Olivares
Tara Smaltz
Joel Thornsberry
Lacey Tisler

City of Reno

Kurt Dietrich
David Hutchinson

RTC Washoe County

Amy Cummings
Dan Doenges
James Gee
Scott Gibson
Andrew Jayankura
Rebecca Kapuler
Doug Maloy
Xuan Wang
James Weston

FHWA

Juan Balbuena

Reno Fire

Tom Diani
Dick Minore

Reno Bike Project

Jillian Keller

Citizen

David Stipech

Wood Rodgers

Devin Crowley
Eric Ford
Bryan Gant (Project Manager)
Amber Harmon
Cesar Lopez
Brian Martinezmoles
Scott Rickert
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Note: All concepts shown herein are preliminary and subject to revision.



Acronyms and Abbreviations

AADT	Annual Average Daily Traffic
ADA	Americans with Disabilities Act
ADAAG	Americans with Disabilities Act Accessibility Guidelines
AM	Ante Meridiem
BRT	Bus Rapid Transit
CMF	Crash Modification Factor
FAR	Floor Area Ratio
FHWA	Federal Highway Administration
GIS	Geographic Information System
HCM	Highway Capacity Manual
HSM	Highway Safety Manual
LED	Light-Emitting Diode
LOS	Level-of-Service
LPI	Leading Pedestrian Interval
LTS	Level of Traffic Stress
MPH	Miles-per-Hour
MUTCD	Manual on Uniform Traffic Control Devices
NDOT	Nevada Department of Transportation
ONTP	One Nevada Transportation Plan
PDO	Property Damage Only
PHF	Peak Hour Factor
PM	Post Meridiem
PROWAG	Public Rights-of-Way Accessibility Guidelines
RSA	Road Safety Audit
RTC	Regional Transportation Commission of Washoe County
RTP	Regional Transportation Plan
SMP	Safety Management Plan
TAC	Technical Advisory Committee
TOD	Transit-Oriented Development
TRB	Transportation Research Board
TRINA	Traffic Records Information Access
TWTL	Two-Way-Left-Turn-Lane
UNR	University of Nevada Reno
W	West



Executive Summary

ES.1 Background

The West 4th Street Safety Management Plan (SMP) is a transportation planning effort that focuses on traffic safety for all road users, incorporating corridor studies, access management, public and stakeholder input, crash analysis, roadway engineering, and application of the Highway Safety Manual (HSM) methods to reduce roadway crashes. The SMP process is consistent with the Nevada Strategic Highway Safety Plan's goals of significantly reducing the number and severity of roadway crashes in the state.

ES.2 Study Area

The West 4th Street SMP study area, approximately 2.75-miles long, is located entirely within the City of Reno, Nevada and extends from Virginia Street on the east to McCarran Boulevard on the west, as shown in **Figure ES-1**. The West 4th Street corridor crosses Ward 1 and Ward 5 within the city limits and consists of a combination of residential, general commercial, vacant land, parks, public facilities, industrial, hotels and casinos, and office land uses.

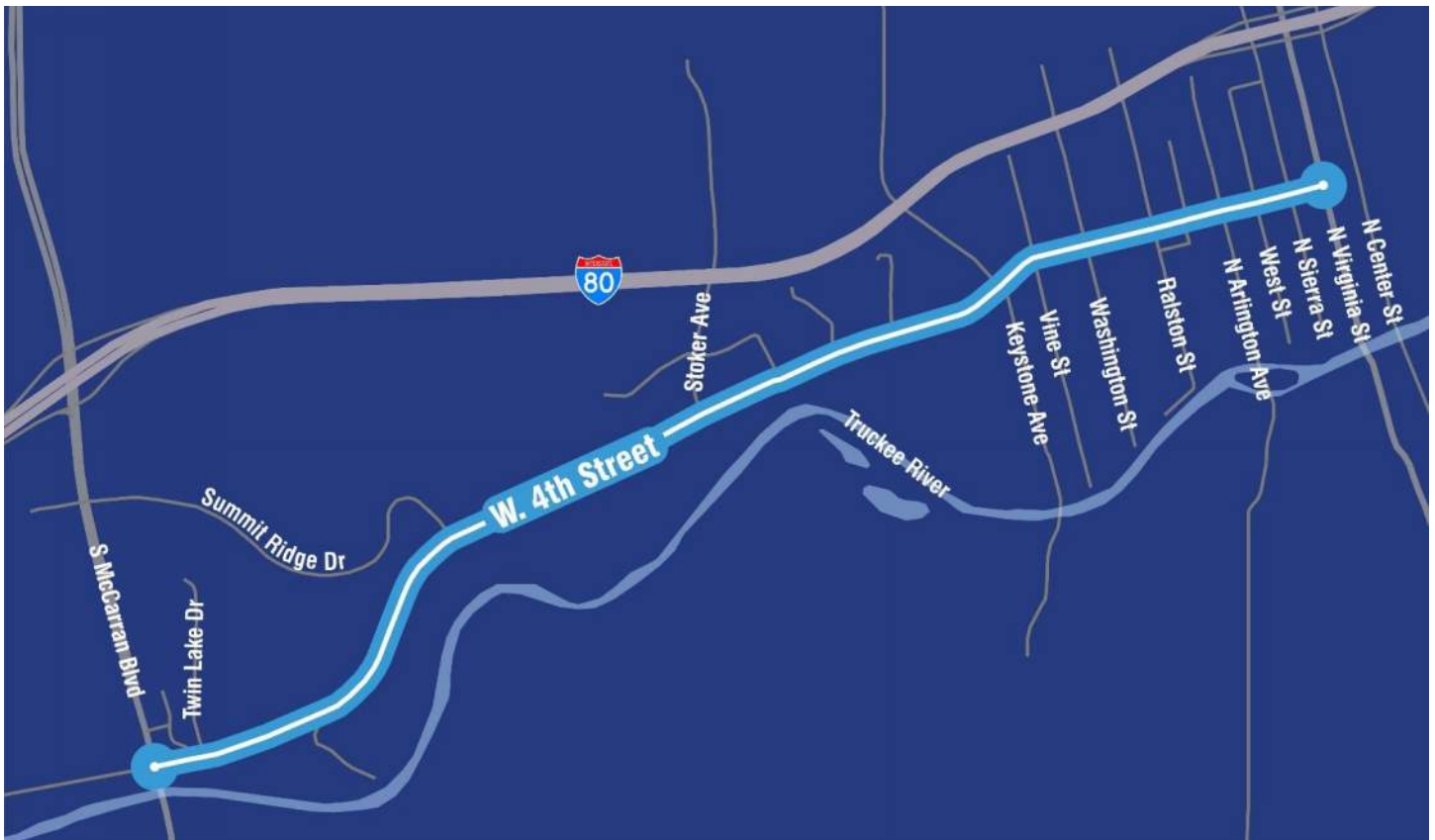


Figure ES-1: West 4th Street Study Area

ES.3 Existing Crash Conditions

The study team obtained five-year crash history data from the Nevada Department of Transportation (NDOT) for the time period between January 1, 2015 to December 31, 2019. A corresponding heat map was developed to illustrate the crash activity for the five-year period, as shown in **Figure ES-2**.



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The West 4th Street study area had a total of 314 crashes (intersections and segments) for the 5-year period, resulting in five fatalities, 158 injuries, and 151 PDO crashes. These crashes included 32 pedestrian crashes, which accounted for over 10-percent of all crashes, seven bicycle crashes, 14 motorcycle/moped crashes, and four bus crashes. The five fatal crashes included four involving vehicle-pedestrian crashes and one involving a vehicle-vehicle crash.

ES.4 Existing Roadway Conditions

The roadway configuration of West 4th Street changes throughout the study area and consists of the following:

- ◆ Virginia Street to Cemetery Road – 4-lanes with a two-way-left-turn lane (TWLTL), roadside parking, wide sidewalks/separated sidewalks with landscape strips
- ◆ Cemetery Road to west of Summit Ridge Drive – 4-lanes, center median island or open median, open shoulders with limited bicycle markings
- ◆ West of Summit Ridge Drive to McCarran Boulevard – 2-lanes with an open shoulder

The Road Safety Audit (RSA) Team, consisting of NDOT and Wood Rodgers staff, conducted a field walk audit on July 23, 2020. The RSA team walked the entire West 4th Street corridor and stopped at signalized intersections during daylight hours to observe and document concerns. Unfortunately, a larger field effort including representatives from the SMP Technical Advisory Committee (TAC) was not feasible due to the restrictions in place around the global COVID-19 pandemic. Therefore, a virtual RSA was conducted on August 25, 2020. TAC members were provided with the data gathered on the July 23rd field review, dash-cam video of the corridor (daytime and nighttime), and drone panoramic video of each intersection to review and provide additional comments and observations, which was included in the RSA. The RSA overall findings include:

- ◆ Ramp and driveway slope(s) do not meet Americans with Disabilities Act (ADA) standards and/or are missing domes at ramps
- ◆ Signal heads are missing retroreflective backplates, are not aligned over lanes, and do not match the number of lanes
- ◆ Lighting is insufficient for all crosswalk movements
- ◆ Landscape obstructions require trimming
- ◆ Sight distance from driveways does not appear to meet standards
- ◆ Bicycle lane delineation is missing or poor
- ◆ Sidewalk obstructions are causing horizontal clearance to be less than minimum standards
- ◆ Driveway spacing is not to standard, which would require consolidations and/or closures
- ◆ Transit stops lack basic amenities and need improvements

NDOT conducted a Speed Study for the West 4th Street study area to determine typical operating speeds (pre-COVID). The Speed Study broke the study area up into three segments, identifying the posted speed limit and 85th percentile speed, as shown in **Table ES-1**. Based on the Speed Study results, speeding is a concern.

Table ES-1: Speed Study Results

Segment	Posted Speed Limit	85 th Percentile Speed
Segment 1 – McCarran Boulevard to Stoker Avenue	45 MPH	56 MPH
Segment 2 – Stoker Avenue to Arlington Avenue	35 MPH	42 MPH
Segment 3 – Arlington Avenue to North Virginia Street	25 MPH	32 MPH

ES.5 Crash Risks and Factor Summary

West 4th Street is emblematic of many arterials in urban Nevada, with high speeds between major intersections and gaps in supportive infrastructure for alternative modes. Additionally, the combination of numerous local roadway cross streets accessing residential neighborhoods, numerous commercial driveways near busy intersections, and the lack of control associated with TWLTL/no center median island, results in a high number of crashes. While most of the corridor does not exceed average crash rates for similar facilities,

the sheer volume of traffic within and crossing West 4th Street, and the high speeds, results in high overall crash numbers. Alternatives developed as part of the mitigation portion of this SMP focuses on reducing speed, controlling access, channelization, and supporting alternative modes of transportation.

ES.6 SMP Alternatives

Corridor alternatives that revise the roadway cross-sectional configuration or impact linear segments of the corridor were developed for each segment of the corridor to better accommodate all modes and improve safety. The one exception is Virginia Street to Vine Street where the existing cross-section is maintained per City of Reno request. In some cases, more than one promising option was developed and each of these options are outlined below without any recommendation of one versus the other. It will be up to decision-makers to determine which alternative to advance, if any, based on numerous factors in addition to safety performance.

Vine Street to Keystone Avenue

The existing West 4th Street segment from Vine Street to Keystone Avenue currently has four (4) travel lanes and a TWLTL. Whereas the alternative cross section would reduce the roadway and sidewalk widths to incorporate a 4-foot bicycle lane on both sides of the street, as shown in **Figure ES-3**.

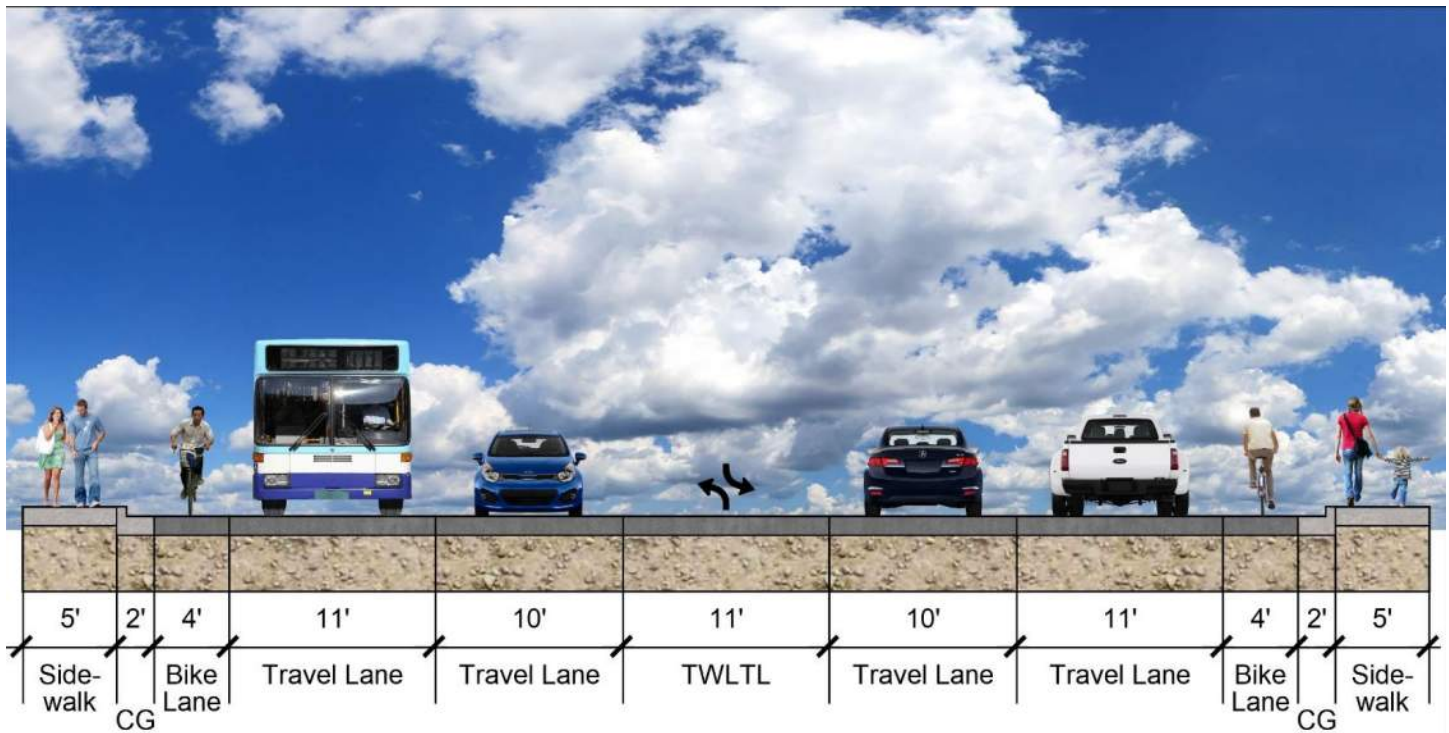
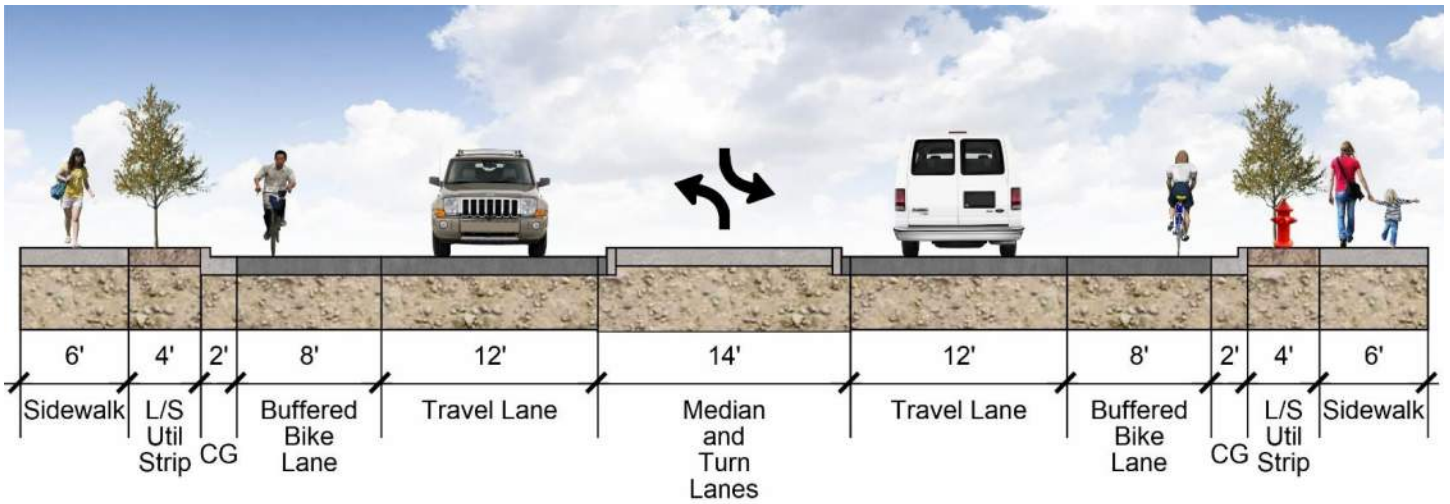


Figure ES-3: Vine Street to Keystone Avenue – Alternative Cross Section

Keystone Avenue to Stoker Avenue

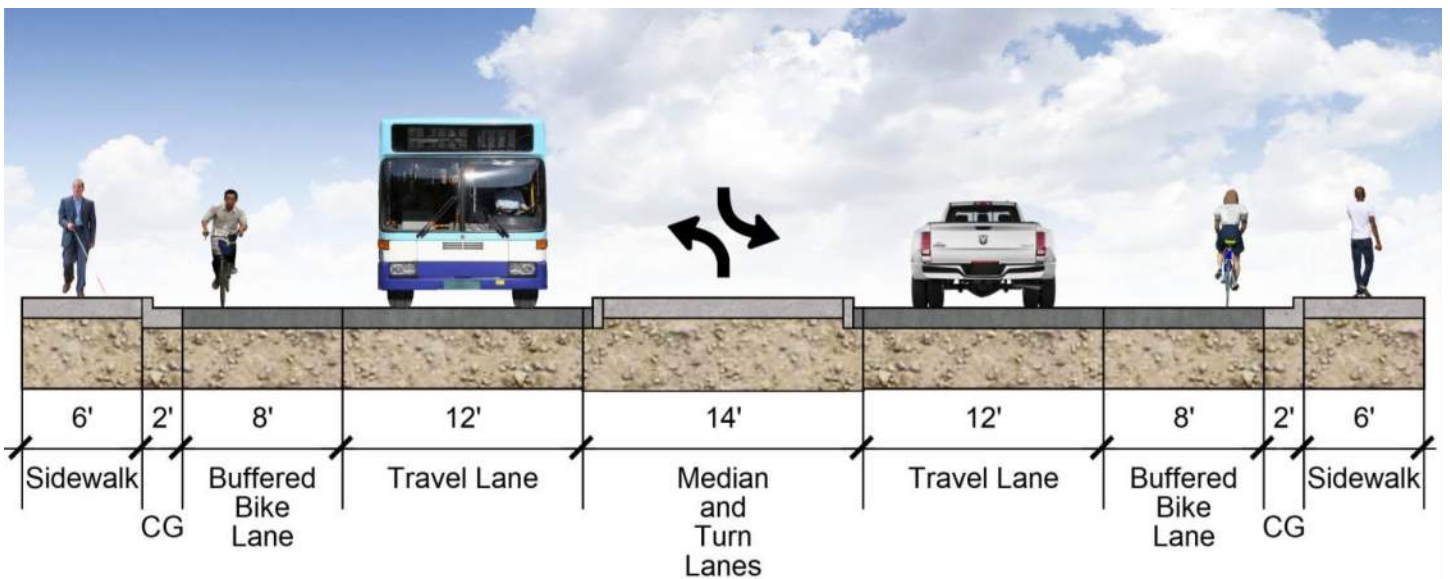
West 4th Street, west of Keystone Avenue, traffic volumes are low enough that the number of travel lanes can be reduced from four (4) to two (2), as shown in **Figure ES-4**. The alternative cross section also incorporates alternative modes of travel, such as a buffered bicycle lane in both directions and improved sidewalks in each direction. The sidewalks may or may not include a landscape strip, which improves pedestrian comfort and provides opportunities to underground existing utilities, based on agency preference and design constraints.



*Figure ES-4: Keystone Avenue to Stoker Avenue – Alternative Cross Section
(Note: The Alternative Cross Section all falls within the 85-foot to 255-foot existing right-of-way)*

Stoker Avenue to West of Summit Ridge Drive

West 4th Street, from Stoker Avenue to West of Summit Ridge Drive, traffic volumes are low enough that the number of travel lanes can be reduced from four (4), to two (2), as shown in **Figure ES-5** and **Figure ES-6**. There are two separate alternatives along West 4th Street for this section, including Alternative 1, which incorporates an 8-foot buffered bicycle lane on each side of the roadway, along with 6-foot sidewalks on both sides of the roadway, as shown in **Figure ES-5**. On the other hand, Alternative 2 incorporates wide shoulders, a 10-foot multiuse path on one side of the road, and a 6-foot sidewalk on the other side of the roadway, as shown in **Figure ES-6**.



*Figure ES-5: Stoker Avenue to West of Summit Ridge Drive – Alternative 1 Cross Section
(Note: The Alternative 1 Cross Section all falls within the 225-foot to 255-foot existing right-of-way)*

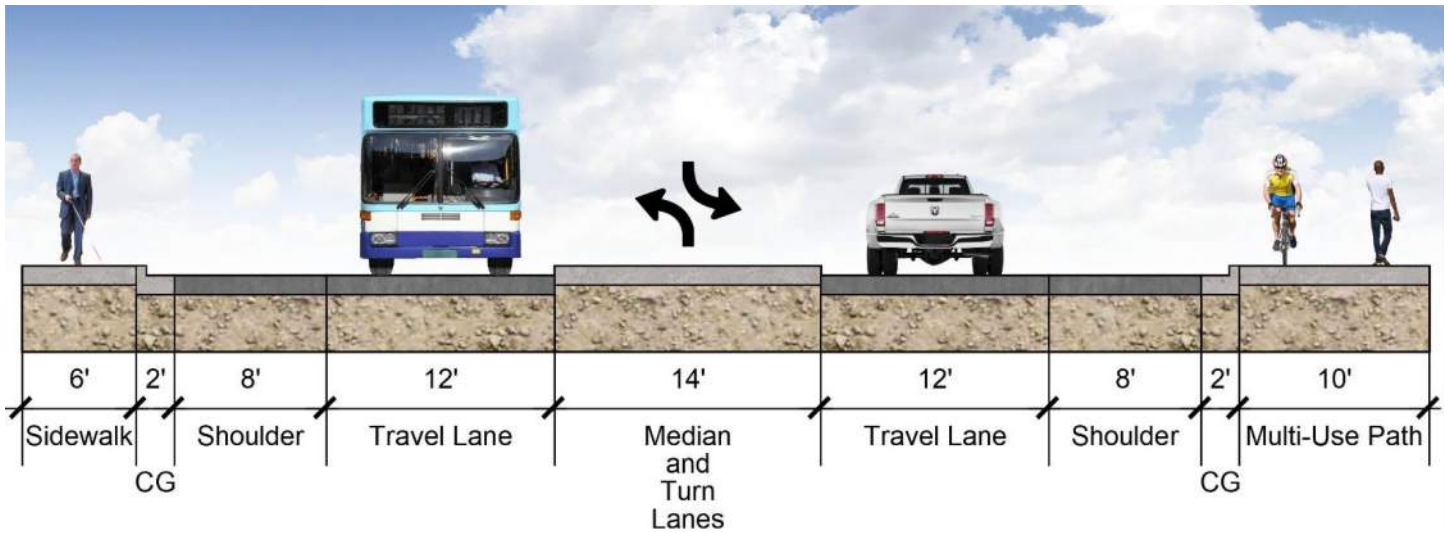


Figure ES-6: Stoker Avenue to West of Summit Ridge Drive – Alternative 2 Cross Section
 (Note: The Alternative 2 Cross Section all falls within the 225-foot to 255-foot existing right-of-way)

West of Summit Ridge Drive to West of Truckee River Trail

West 4th Street, from West of Summit Ridge Drive to West of Truckee River Trail, traffic volumes are low enough that the number of travel lanes can continue to be two. Similar to the existing segment, there are two separate alternatives along West 4th Street for this section, including Alternative 1, which incorporates a 4-foot striped bicycle lane on each side of the roadway, including sidewalks on both sides of the roadway, as shown in **Figure ES-7**. On the other hand, Alternative 2 incorporates a 10-foot multiuse path on one side of the road, with a 6-foot sidewalk on the opposite side of the roadway, as shown in **Figure ES-8**.

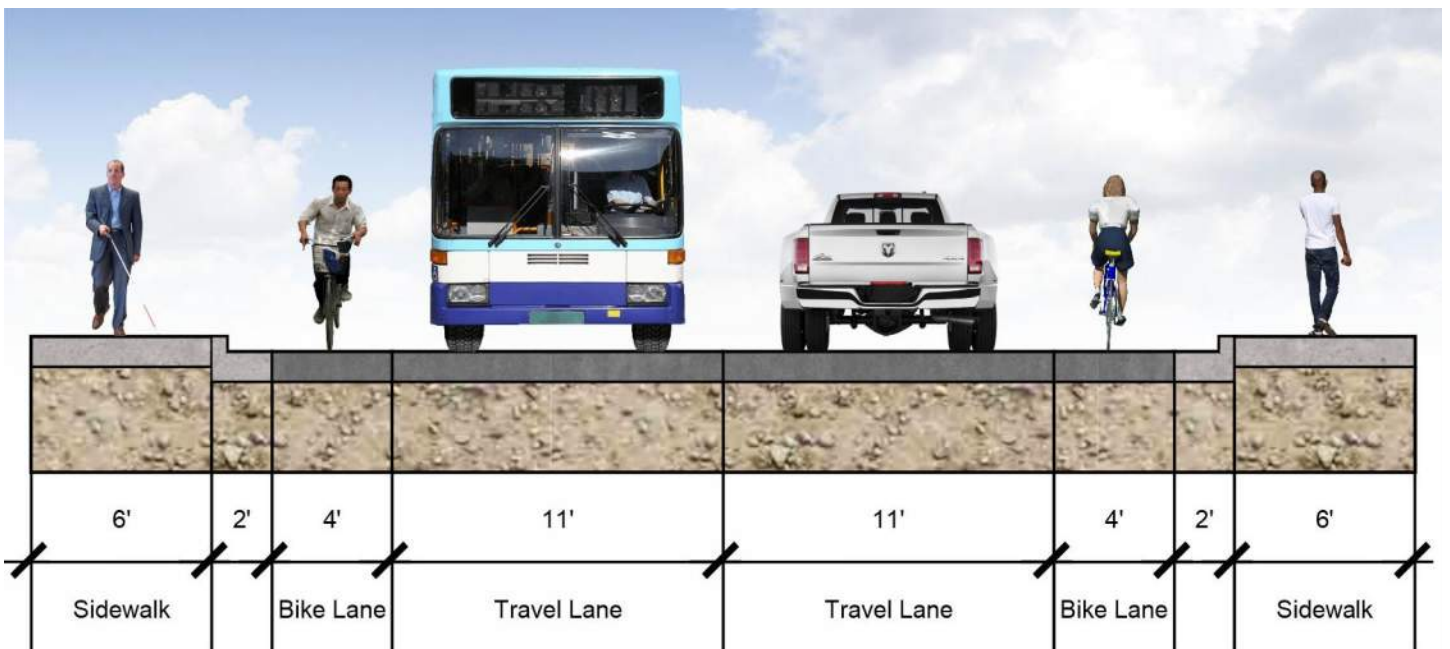
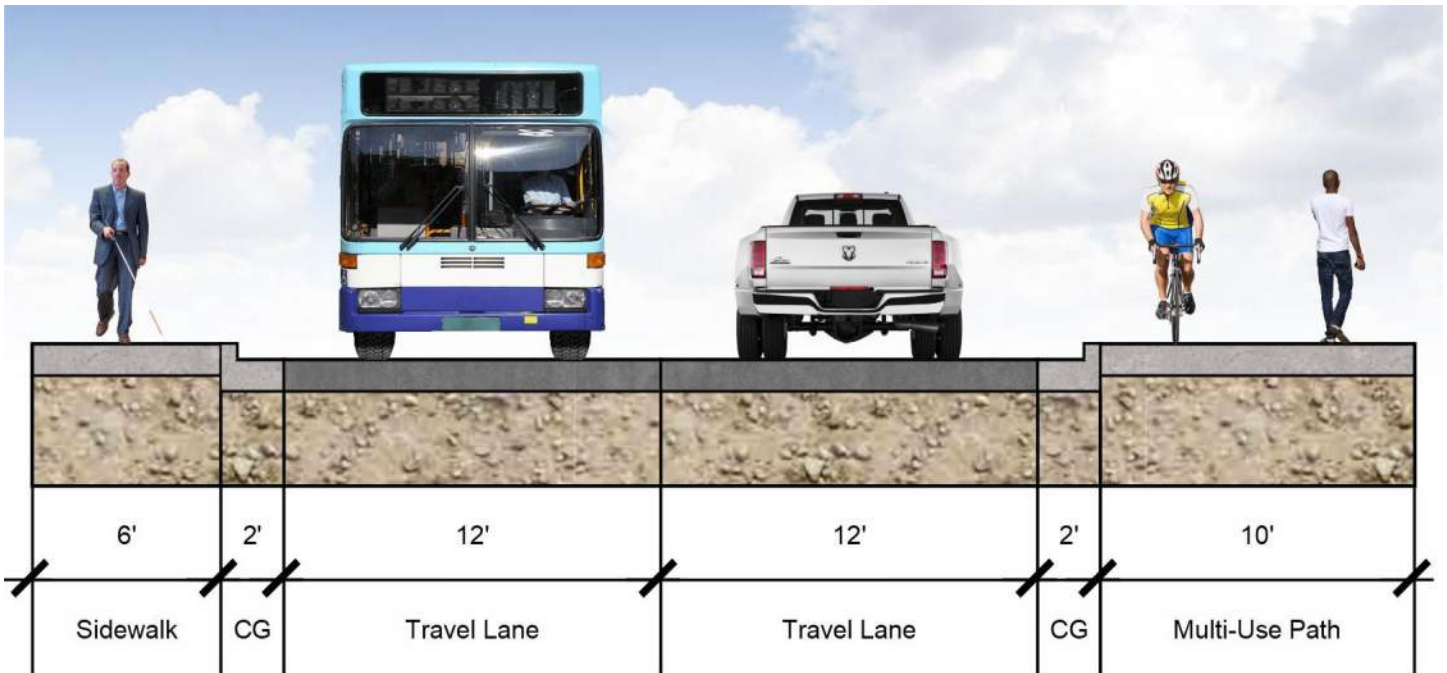


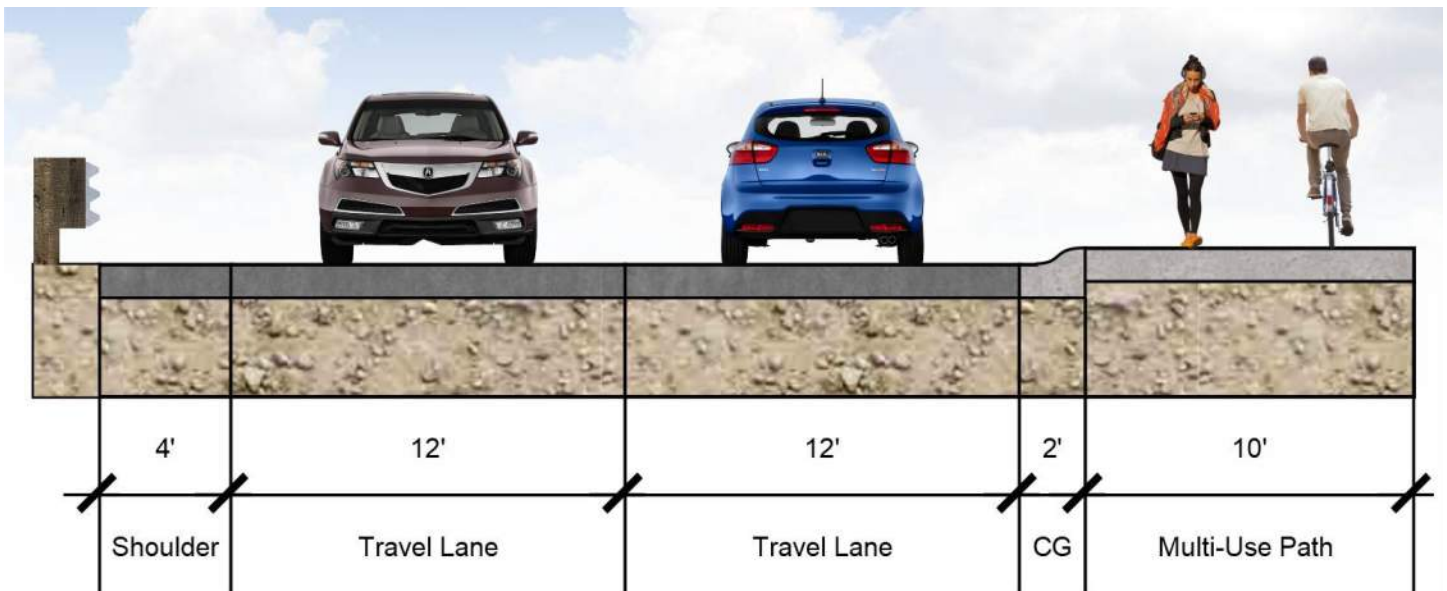
Figure ES-7: West of Summit Ridge Drive to West of Truckee River Trail – Alternative 1 Cross Section
 (Note: The Alternative 1 Cross Section all falls within the 225-foot to 415-foot existing right-of-way)



*Figure ES-8: West of Summit Ridge Drive to West of Truckee River Trail – Alternative 2 Cross Section
(Note: The Alternative 2 Cross Section all falls within the 225-foot to 415-foot existing right-of-way)*

West of Truckee River Trail to McCarran Boulevard

West 4th Street, from West of Truckee River Trail to McCarran Boulevard, traffic volumes are low enough that the number of travel lanes can continue to be two. The alternative cross section incorporates a 10-foot multiuse path, however there is no sidewalk on the opposite side of the roadway due to topographic constraints, and shown in **Figure ES-9**.



*Figure ES-9: West of Truckee River Trail to McCarran Boulevard – Alternative Cross Section
(Note: The Alternative Cross Section all falls within the 415-foot existing right-of-way)*



ES.7 SMP Corridor Alternatives Summary

The previous section outlined several corridor alternatives that could be considered to improve safety and develop complete streets in the study area. The potential safety benefits of these corridor alternatives are summarized in **Table ES-2**. The calculated crash reduction/safety benefits utilized the Federal Highway Administration’s (FHWA) Crash Modification Factors (CMF), of which NDOT has an approved list of CMFs the state uses. This information may be used to inform alternative selection and/or prioritization.

Table ES-2: Corridor Alternatives Summary

Corridor Alternative	Potential Multi-Modal Crash Reduction	Conceptual Cost	Safety Benefit-Cost
Vine Street to Keystone Avenue*	N/A	\$37,000	-
Keystone Avenue to Stoker Avenue	40%	\$1,940,000	0.21
Stoker Avenue to West of Summit Ridge Drive Alternative 1	27%	\$1,950,000	5.27
Stoker Avenue to West of Summit Ridge Drive Alternative 2	27%	\$2,060,000	4.99
West of Summit Ridge Drive to West of Truckee River Trail Alternative 1	30%	\$1,010,000	0.11
West of Summit Ridge Drive to West of Truckee River Trail Alternative 2	30%	\$1,060,000	0.11
West of Truckee River Trail to McCarran Boulevard	20%	\$880,000	0.64

*No reported crashes along the corridor for the evaluated 5-year crash data.

ES.8 SMP Spot Alternative Summary

The potential operational and safety benefits of spot location alternatives are summarized in **Table ES-3**. Similar to the “Corridor Alternatives Summary”, the calculated crash reduction/safety benefits utilized the FHWA’s CMFs. The benefit-cost calculations reflect those stemming from crash reduction only. A more detailed analysis would be required to address broader benefits, such as changes in delay, emissions, etc. This information may be used to inform alternative selection and or prioritization.

Table ES-3: Spot Location Alternatives Summary

Spot Location Alternative	Existing LOS (AM/PM)	Proposed LOS (AM/PM)	Potential Crash Reduction	Conceptual Cost	Safety Benefit-Cost
Washington Street and Ralston Street Intersection Control (max benefit)	A/A and A/A	A/A and A/A	44% and 22%	\$5,000,000	5.66
Commercial Access West of Vine Street*	-	-	N/A	\$320,000	-
Stoker Avenue Roundabout	A/A	A/B	22%	\$1,500,000	5.63
Summit Ridge Drive Roundabout	A/A	A/A	44%	\$1,250,000	0.27

*No reported crashes along the corridor for the evaluated 5-year crash data.

More detailed descriptions of each alternative can be found in the Spot Location Alternatives section in this document.

ES.9 Stakeholder and Public Participation Plan

The study team incorporated an active collaboration process to coordinate and shape the development of the SMP, therefore a TAC was assembled to provide a venue for interagency collaboration. Participating agencies included the NDOT Traffic Safety Engineering Division, NDOT Traffic Operations, NDOT District II, City of Reno, Regional Transportation Commission of Washoe County (RTC), FHWA, Reno Fire Department, Reno Bike Project, and Wood Rodgers.

In addition to the TAC meetings, a Virtual Public Information Meeting was held in lieu of an in-person public meeting due to the Covid-19 pandemic. Approximately 130 participants reviewed the online Virtual Public Information Meeting and six left responses.



Background

The West 4th Street Safety Management Plan (SMP) is a transportation planning effort that focuses on traffic safety for all road users, incorporating corridor studies, access management, public and stakeholder input, crash analysis, roadway engineering, and application of the Highway Safety Manual (HSM) methods to reduce roadway crashes. The SMP process is consistent with the Nevada Strategic Highway Safety Plan's goals of significantly reducing the number and severity of roadway crashes in the state.

Study Area

The West 4th Street SMP study area, approximately 2.75-miles long, is located entirely within the City of Reno, Nevada and extends from Virginia Street on the east to McCarran Boulevard on the west, as shown in **Figure 1**. The West 4th Street corridor crosses Ward 1 and Ward 5 within the city limits and consists of a combination of residential, general commercial, vacant land, parks, public facilities, industrial, hotels and casinos, and office land uses.

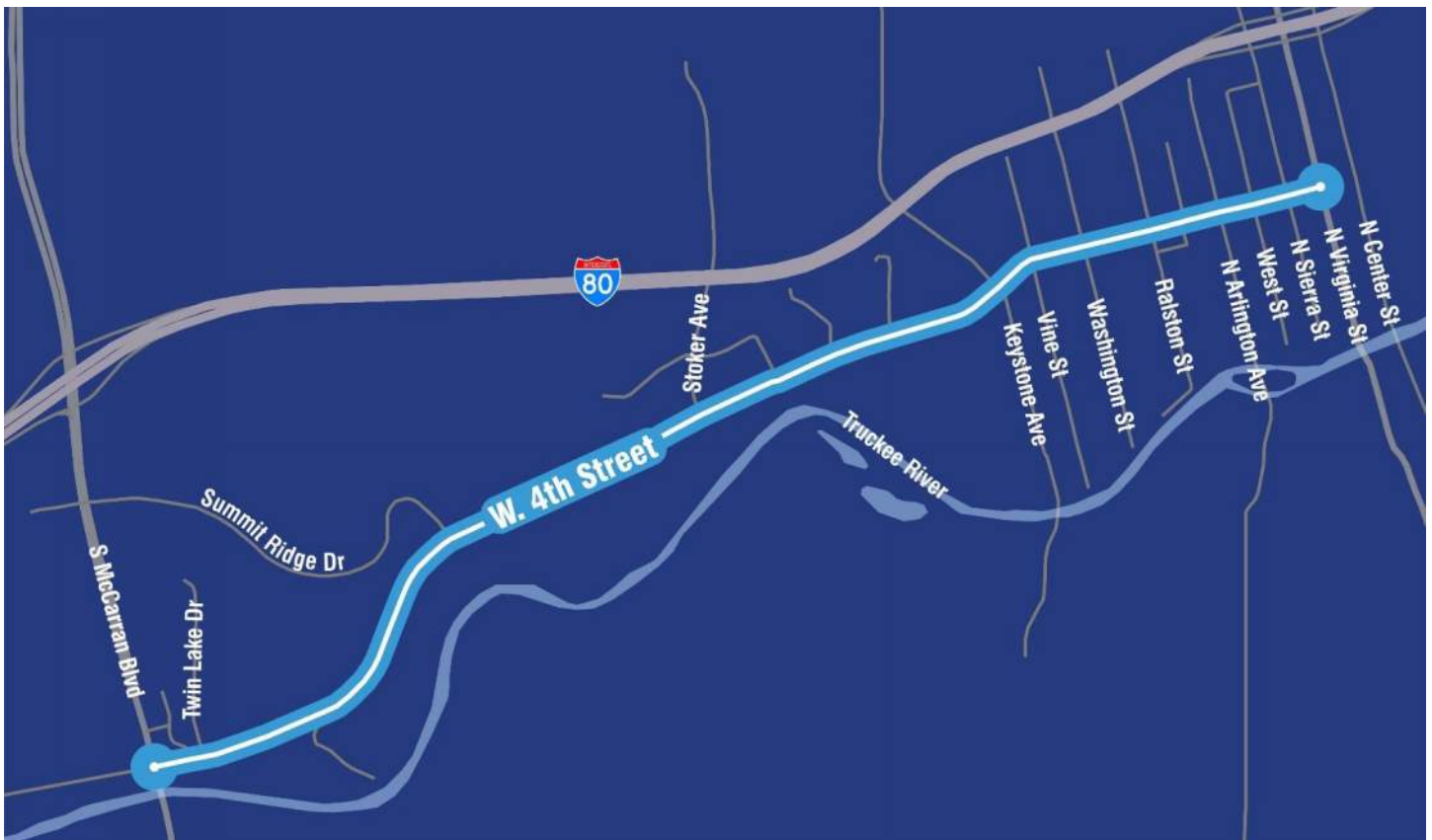


Figure 1: West 4th Street Study Area

The study corridor changes in nature as it transitions from the downtown core in the eastern portion of the study area, to a more suburban nature in the western portion of the study area. For instance, from Virginia Street to Cemetery Road, West 4th Street consists of four general purpose lanes (two in each direction), two-way-left-turn-lane (TWLTL), roadside parking, and wide sidewalks/separated sidewalks with landscape strips. From Cemetery Road to west of Summit Ridge Drive, West 4th Street consists of four general purpose lanes (two in each direction), center median island, and open shoulders with limited bicycle markings. West of Summit Ridge Drive to McCarran Boulevard, West 4th Street transitions to two travel lanes (one in each direction) with an open shoulder. Similar to the transitions in the roadway configuration, the posted speed limit along the West 4th Street corridor varies from 25 miles-per-hour (MPH) from Virginia Street to Arlington Avenue, 35 MPH from Arlington Avenue to Stoker Avenue, and 45 MPH from Stoker Avenue to McCarran Boulevard.

Going in line with the transitions in the roadway configuration and posted speed limits, the annual average daily traffic (AADT) along West 4th Street fluctuates as the highest volumes are located east of Keystone Avenue in the Downtown area, and the lowest volumes are located on the west end of the study corridor. **Figure 2** illustrates the 2019 segment volume data from the Nevada Department of Transportation’s (NDOT) Traffic Records Information Access (TRINA) application. It should be noted that segment volumes have varied the last ten years, with the highest volumes occurring during the 2014-2017 timeframe. However, the 2019 AADTs suggest volumes are generally on the rise once again, albeit not at their peaks.

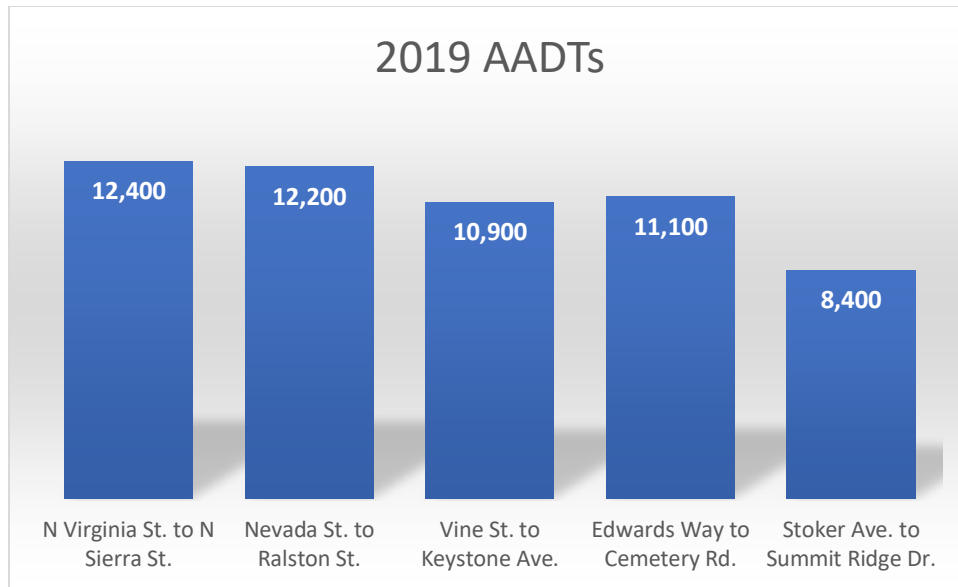


Figure 2: 2019 Corridor AADTs

Existing Crash Conditions

Crash Analysis Overview

An important consideration in determining appropriate safety alternatives is identifying locations and segments with a history of crashes. This information can help focus the analysis to hot spot locations with the greatest potential for crash reduction. To that end, the study team obtained five-year crash history data from NDOT for the time period between January 1, 2015 to December 31, 2019. A corresponding heat map was developed to illustrate the crash activity for the five-year period, as shown in **Figure 3**.



Crash Analysis Results

The five-year crash data was categorized to differentiate between mode (vehicle, bicycle, pedestrian, motorcycle) and severity (property damage only (PDO), injury, fatality). Each crash location, type, and severity were then displayed graphically on plan sheets for both intersections and segments. The following is a list of intersection and segment crash categories:

- ◆ Crashes by Age of Driver
- ◆ Crashes by Hour of Day
- ◆ Crashes by Day of Week
- ◆ Crashes by Month
- ◆ Lighting Conditions
- ◆ Vehicle 1 Driver Factor
- ◆ Crash Type
- ◆ Vehicle 1 Most Harmful Event
- ◆ Weather Factor
- ◆ Vehicle 1 Vehicle Factor
- ◆ Bus, Motorcycle/Moped, Pedal Cycle, Pedestrian, and Vehicle Crashes

An example of each type of crash plan sheet can be seen in **Figure 4** (Crash Type – full set in **Appendix A**), **Figure 5** (Crash Factors – full set in **Appendix B**), and **Figure 6** (Crash Severity – full set in **Appendix C**).

As shown throughout **Appendix A**, **Appendix B**, and **Appendix C**, the West 4th Street corridor experiences increased crashes at highly traveled signalized intersections, such as the intersection of West 4th Street and Keystone Avenue. The intersection of West 4th Street and Keystone Avenue experienced an aggregate of 78 total crashes, resulting in five (5) pedestrian-involved crashes over the 5-year time period. The 78 crashes at this intersection account for approximately one-quarter (26.9-percent) of the 290 total intersection crashes within the study area limits.

The West 4th Street study area had a total of 314 crashes (intersections and segments) for the 5-year period, resulting in five fatalities, 158 injuries, and 151 PDO crashes. These crashes included 32 pedestrian crashes, which accounted for over 10-percent of all crashes, seven bicycle crashes, 14 motorcycle/moped crashes, and four bus crashes. The five fatal crashes included four involving vehicle-pedestrian crashes and one involving a vehicle-vehicle crash. The location, time of day, and date of each fatal crash include:

- ◆ **Pedestrian Fatality 1** – 225-feet east of West 4th Street and Washington Street, nighttime, November 2016
- ◆ **Pedestrian Fatality 2** – Intersection of West 4th Street and Washington Street, nighttime, November 2016 – hit-and-run
- ◆ **Pedestrian Fatality 3** – Intersection of West 4th Street and Washington Street, nighttime, July 2018
- ◆ **Pedestrian Fatality 4** – 844-feet east of West 4th Street and Summit Ridge Drive, dawn, October 2017 – hit-and-run
- ◆ **Vehicle-to-Vehicle Fatality** – Intersection of West 4th Street and Stoker Avenue, daytime, May 2018

West 4th Street was designated for analysis due to the large number of crashes that have occurred on this Other Principal Arterial facility. Therefore, crash rates were calculated at West 4th Street intersections and segments to determine which locations were higher than the 2018 NDOT Other Principal Arterial Statewide Average Rates. These crash rates were used to decipher high crash locations and will be used for mitigation purposes during the recommendations phase of this SMP. Crash rates for major West 4th Street intersections can be viewed in **Table 1** and crash rates for each West 4th Street segment can be viewed in **Table 2**. Those locations exceeding statewide average crash rates for Other Principal Arterials are highlighted.



Figure 4: Crash Type Example Map

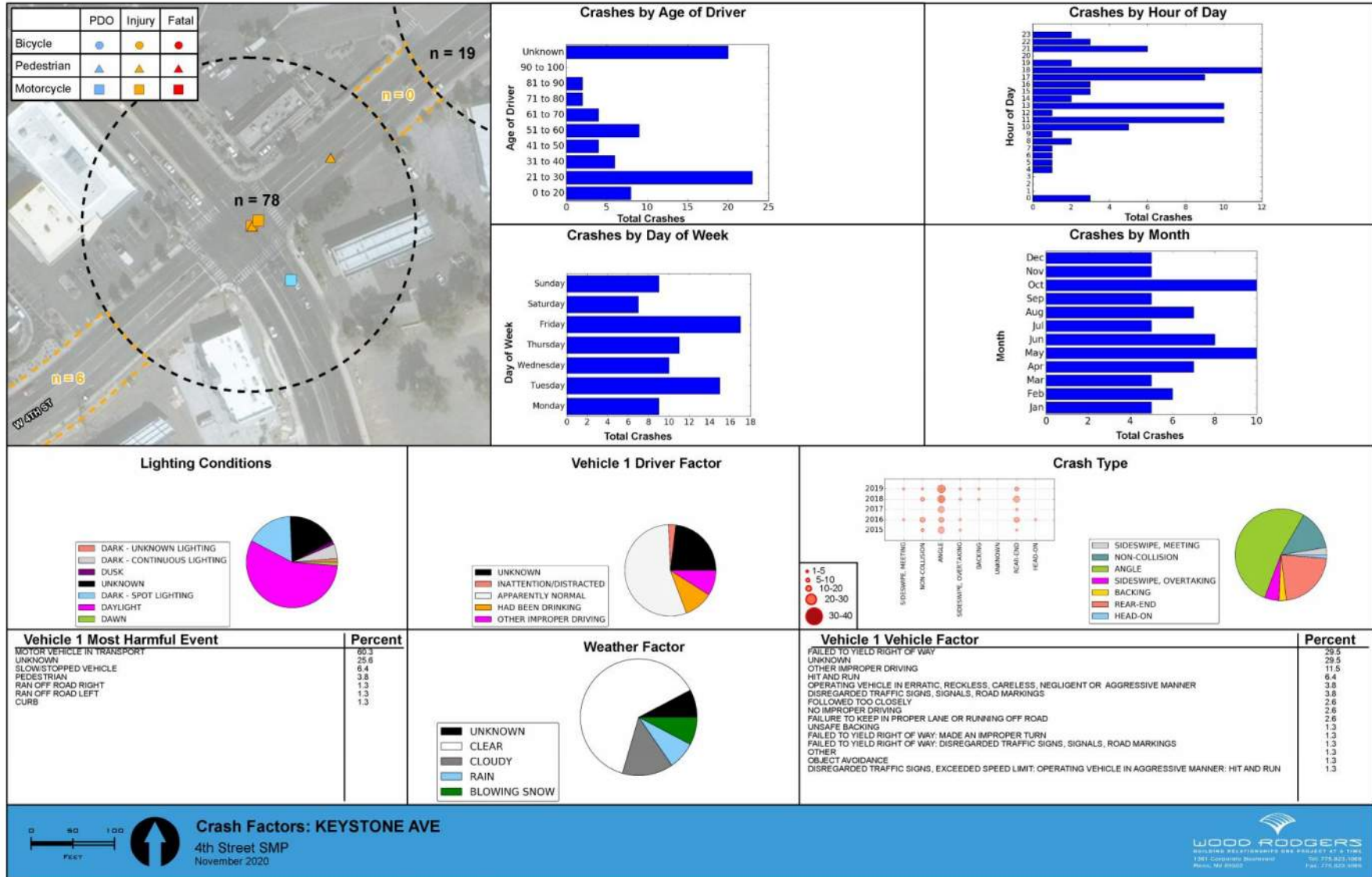


Figure 5: Crash Factors Example Map



Figure 6: Crash Severity Example Map



W. 4th Street Safety Management Plan



Table 1: Intersection Crash Rates

4th Street Cross Street	AADT	PDO			Injury			Fatal			Total		
		# of Crashes	Crash Rate	State Crash Rate	# of Crashes	Crash Rate	State Crash Rate	# of Crashes	Crash Rate	State Crash Rate	# of Crashes	Crash Rate	State Crash Rate
S Mccarran Blvd	7,840	17	1.19	1.7556	13	0.91	1.4953	0	0.00	0.0197	30	2.10	3.2705
Twin Lakes Dr	7,840	1	0.07		1	0.07		0	0.00		2	0.14	
Truckee River Trl	7,840	0	0.00		1	0.07		0	0.00		1	0.07	
Summit Ridge Dr	7,840	1	0.07		2	0.14		0	0.00		3	0.21	
Stoker Ave	8,275	6	0.40		6	0.40		1	0.07		13	0.86	
Cemetery Rd	8,710	0	0.00		2	0.13		0	0.00		2	0.13	
Edwards Way	10,520	0	0.00		1	0.05		0	0.00		1	0.05	
Keystone Ave	10,800	47	2.38		31	1.57		0	0.00		78	3.96	
Vine St	11,080	5	0.25		14	0.69		0	0.00		19	0.94	
Washington St	12,000	7	0.32		9	0.41		2	0.09		18	0.82	
Ralston St	12,920	7	0.30		17	0.72		0	0.00		24	1.02	
Nevada St	12,920	2	0.08		2	0.08		0	0.00		4	0.17	
N Arlington Ave	12,470	20	0.88		20	0.88		0	0.00		40	1.76	
West St	12,470	9	0.40		6	0.26		0	0.00		15	0.66	
N Sierra St	12,020	13	0.59		9	0.41		0	0.00		22	1.00	
N Virginia St	13,520	8	0.32		10	0.41		0	0.00		18	0.73	



W. 4th Street Safety Management Plan



Table 2: Segment Crash Rates

4th Street Segment	Segment Length (ft)	Segment Length (mi)	AADT	PDO			Injury			Fatal			Total		
				# of Crashes	Crash Rate	State Crash Rate	# of Crashes	Crash Rate	State Crash Rate	# of Crashes	Crash Rate	State Crash Rate	# of Crashes	Crash Rate	State Crash Rate
S McCarran Blvd To Twin Lakes Dr	133	0.0	7,840	0	0.00	1.7556	2	5.56	1.4953	0	0.00	0.0197	2	5.56	3.2705
Twin Lakes Dr To Truckee River Trl	1,413	0.3	7,840	1	0.26		3	0.78		0	0.00		4	1.04	
Truckee River Trl To Summit Ridge Dr	1,587	0.3	7,840	1	0.23		1	0.23		0	0.00		2	0.47	
Summit Ridge Dr To Stoker Ave	2,637	0.5	8,710	3	0.38		2	0.25		1	0.13		6	0.76	
Stoker Ave To Cemetery Rd	509	0.1	8,710	0	0.00		0	0.00		0	0.00		0	0.00	
Cemetery Rd To Edwards Way	901	0.2	10,520	0	0.00		1	0.31		0	0.00		1	0.31	
Edwards Way To Keystone Ave	936	0.2	10,520	2	0.59		4	1.17		0	0.00		6	1.76	
Keystone Ave To Vine St	74	0.0	11,080	0	0.00		0	0.00		0	0.00		0	0.00	
Vine St To Washington St	180	0.0	11,080	1	1.45		1	1.45		0	0.00		2	2.90	
Washington St To Ralston St*	360	0.1	12,920	0	0.00		0	0.00		1	0.62		1	0.62	

*All crashes from Ralston Street to Virginia Street along West 4th Street are categorized as intersection crashes

As shown in **Table 1** and **Table 2**, and also illustrated in **Figure 7**, the following locations have crash rates higher than the statewide average for Other Principal Arterials:

- ◆ West 4th Street and Stoker Avenue – Fatal Crash Rate
- ◆ West 4th Street and Keystone Avenue – PDO Crash Rate, Injury Crash Rate, Total Crash Rate
- ◆ West 4th Street and Washington Street – Fatal Crash Rate
- ◆ West 4th Street from McCarran Boulevard to Twin Lakes Drive – Injury Crash Rate, Total Crash Rate
- ◆ West 4th Street from Summit Ridge Drive to Stoker Avenue – Fatal Crash Rate
- ◆ West 4th Street from Washington Street to Ralston Street – Fatal Crash Rate

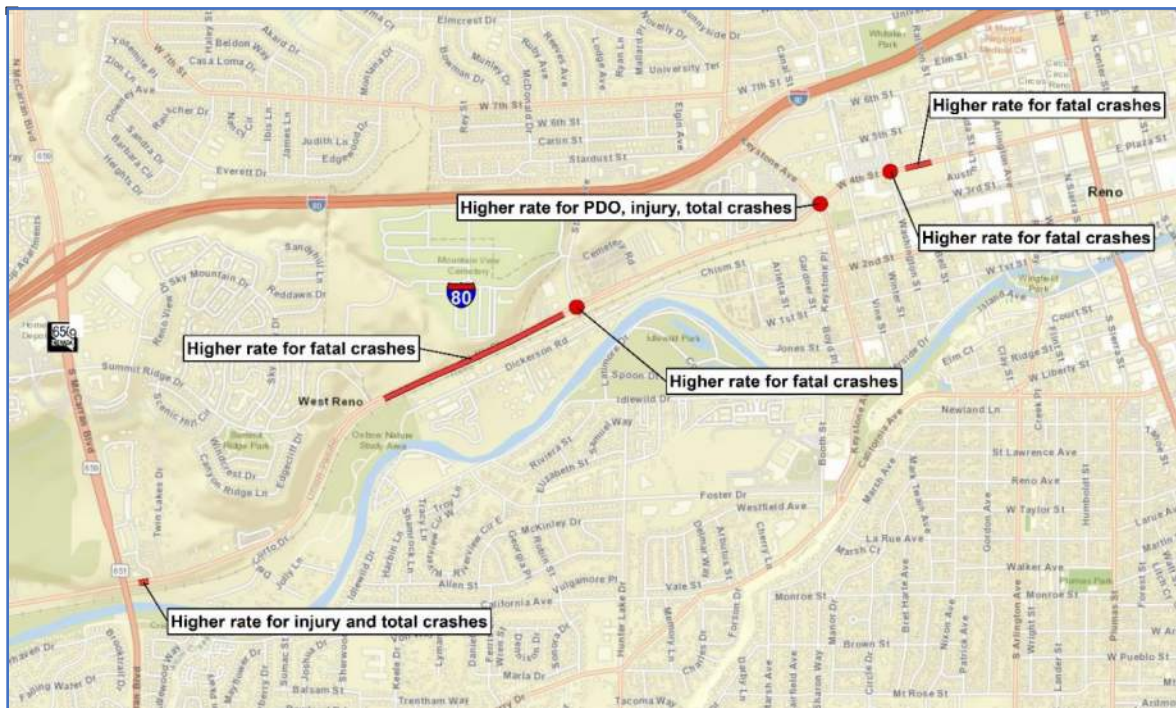


Figure 7: West 4th Street Intersections and Segments Above Statewide Average Crash Rate

Existing Roadway Conditions

The roadway configuration of West 4th Street changes throughout the study area and consists of the following:

- ◆ Virginia Street to Cemetery Road – 4-lanes with a two-way-left-turn-lane (TWLTL), roadside parking, wide sidewalks/separated sidewalks with landscape strips – See **Figure 8**
- ◆ Cemetery Road to west of Summit Ridge Drive – 4-lanes, center median island or open median, open shoulders with limited bicycle markings – See **Figure 9**
- ◆ West of Summit Ridge Drive to McCarran Boulevard – 2-lanes with an open shoulder – See **Figure 10**

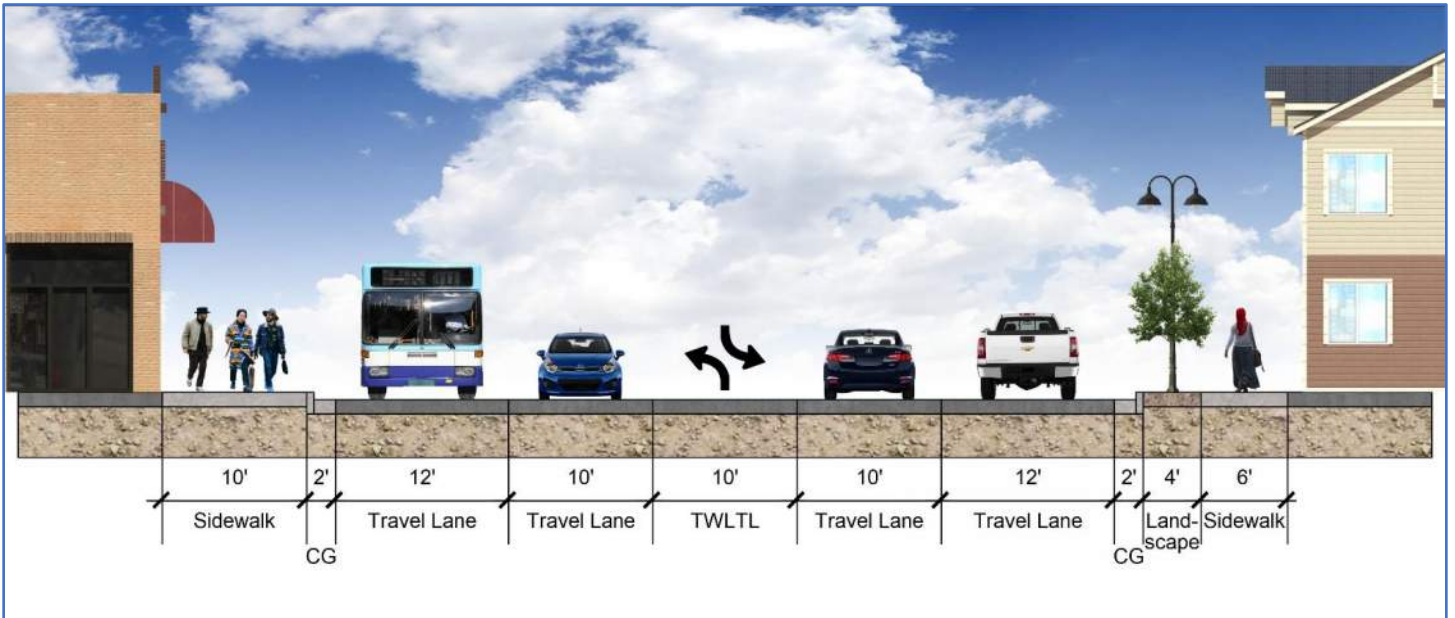


Figure 8: Cross Section of West 4th Street from Virginia Street to Cemetery Road

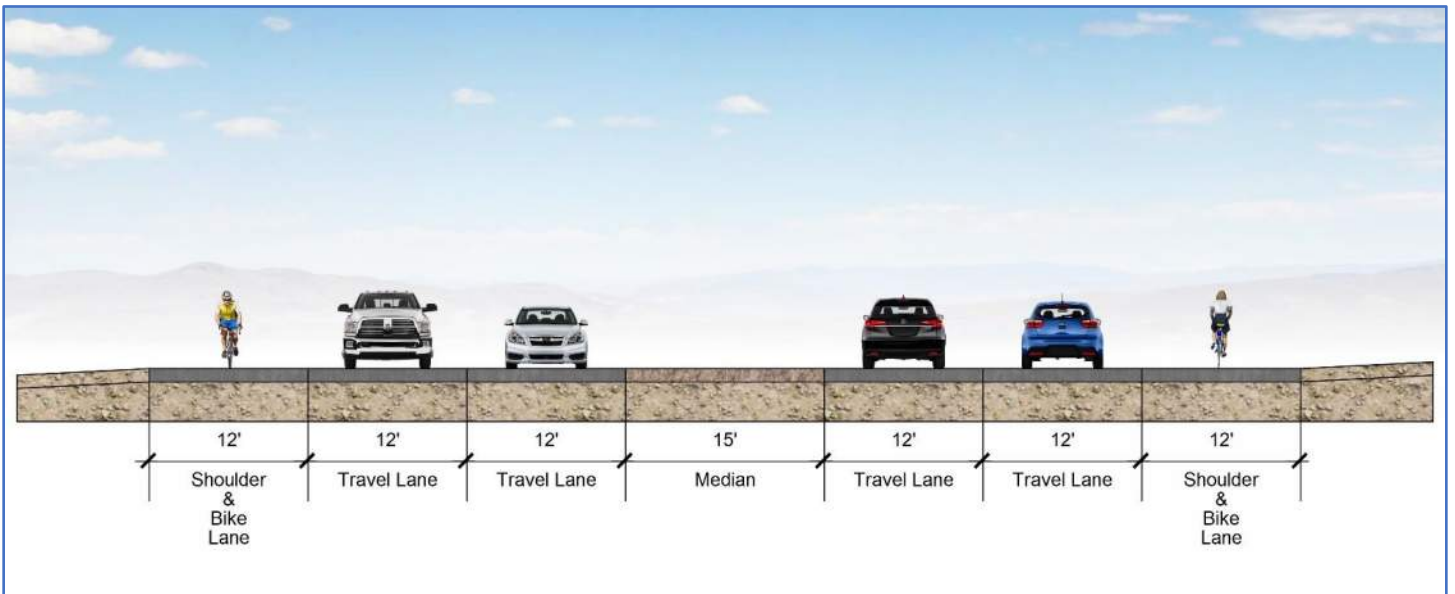


Figure 9: Cross Section of West 4th Street from Cemetery Road to West of Summit Ridge Drive

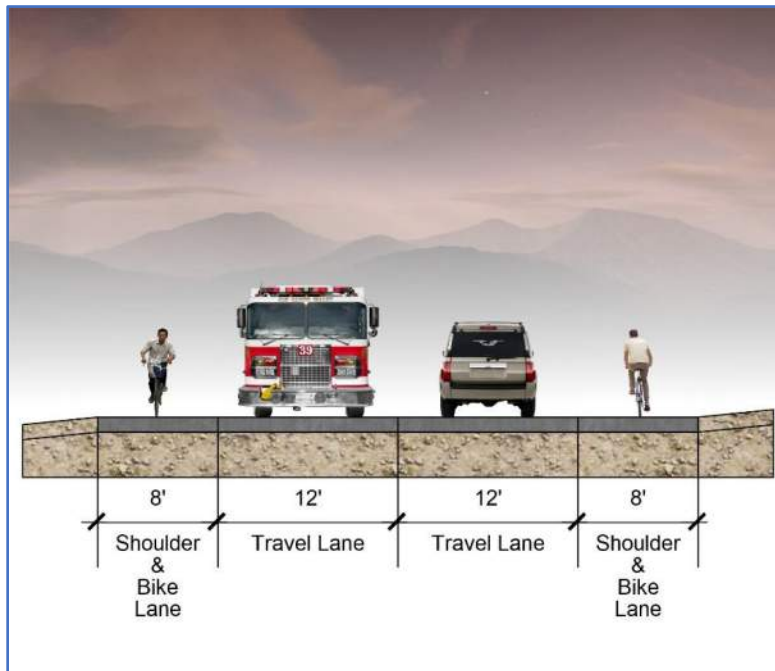


Figure 10: Cross Section of West 4th Street from West of Summit Ridge Drive to McCarran Boulevard

As mentioned, the posted speed limit along the West 4th Street corridor varies from 25 MPH from Virginia Street to Arlington Avenue, 35 MPH from Arlington Avenue to Stoker Avenue, and 45 MPH from Stoker Avenue to McCarran Boulevard.

In addition to roadway configurations, supplementary study area data was collected along the West 4th Street corridor, including:

- ◆ Existing Bicycle Facilities – See **Figure 11**
- ◆ Existing Transit Facilities – See **Figure 12**
 - Corridor Route = Route 3CC/Route 3CL
 - Nearby/Crossing Routes = Route 4, Route 6, Route 7, Route 16, RTC Rapid, UNR-Midtown Direct
- ◆ Existing Right-of-Way – See **Figure 13**

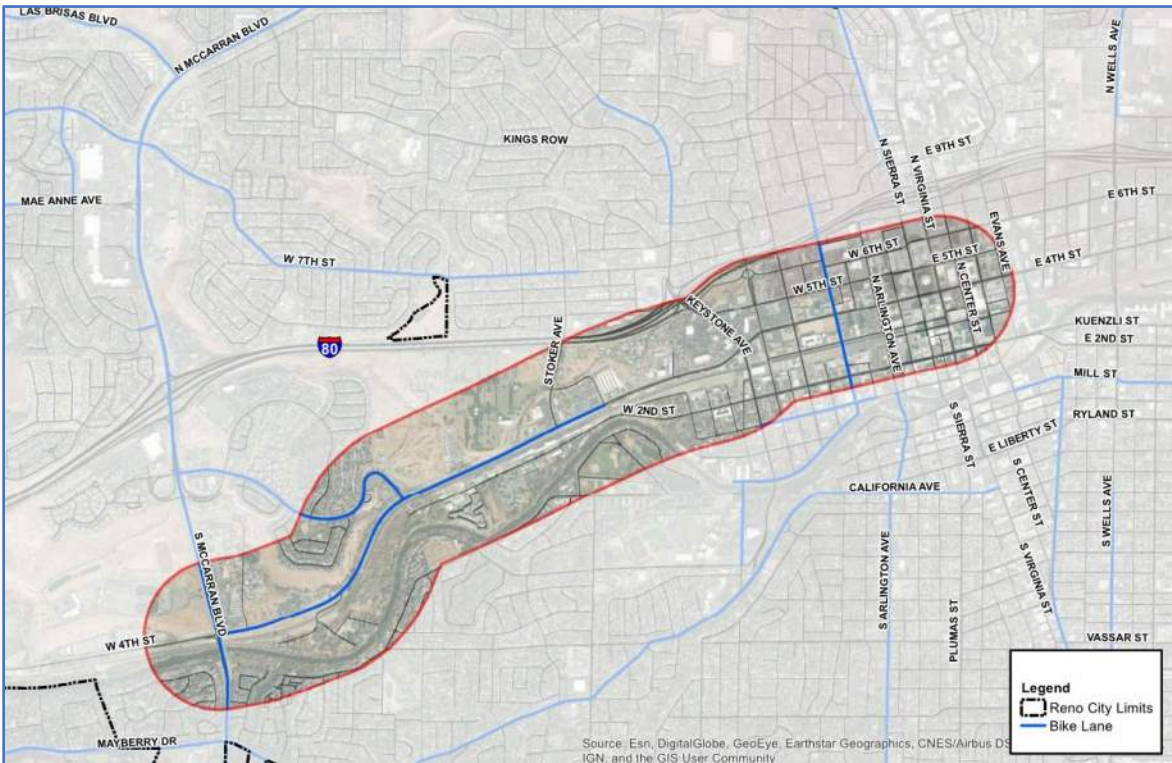


Figure 11: West 4th Street Bicycle Facilities

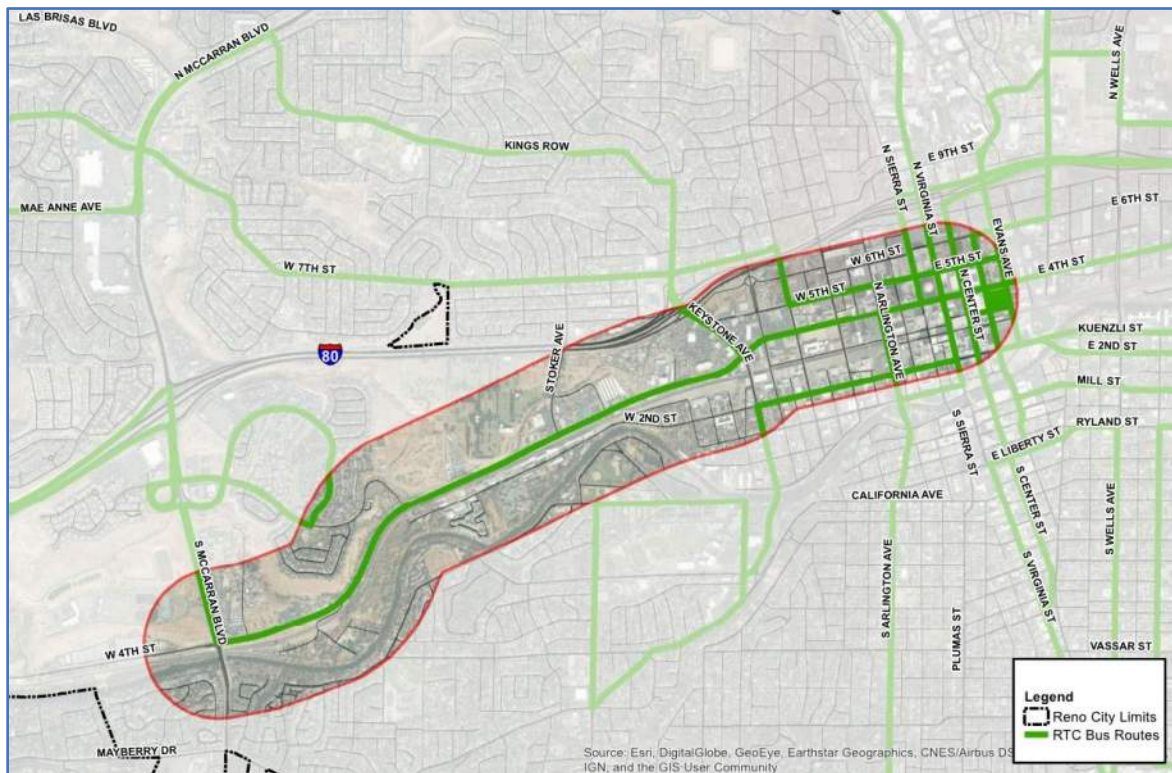


Figure 12: West 4th Street Transit Facilities

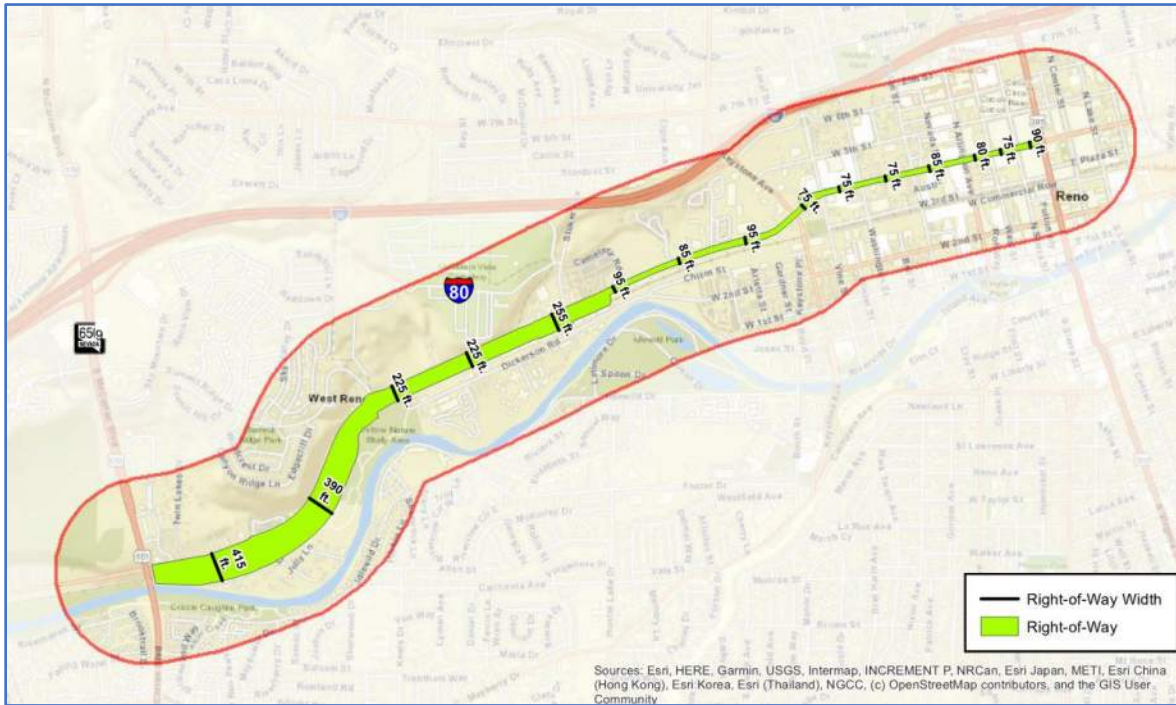


Figure 13: West 4th Street Existing Right-of-Way

Road Safety Audit (RSA)

The RSA Team, consisting of NDOT and Wood Rodgers staff, conducted a field walk audit on July 23, 2020. The RSA team walked the entire West 4th Street corridor and stopped at signalized intersections during daylight hours to observe and document concerns. Unfortunately, a larger field effort including representatives from the SMP Technical Advisory Committee (TAC) was not feasible due to the restrictions in place around the global COVID-19 pandemic. Therefore, a virtual RSA was conducted on August 25, 2020. TAC members were provided with the data gathered on the July 23rd field review, dash-cam video of the corridor (daytime and nighttime), and drone panoramic video of each intersection to review and provide additional comments and observations, which was included in the RSA. The RSA overall findings include:

- ◆ Ramp and driveway slope(s) do not meet Americans with Disabilities Act (ADA) standards and/or are missing domes at ramps
- ◆ Signal heads are missing retroreflective backplates, are not aligned over lanes, and do not match the number of lanes
- ◆ Lighting is insufficient for all crosswalk movements
- ◆ Landscape obstructions require trimming
- ◆ Sight distance from driveways does not appear to meet standards
- ◆ Bicycle lane delineation is missing or poor
- ◆ Sidewalk obstructions are causing horizontal clearance to be less than minimum standards
- ◆ Driveway spacing is not to standard, which would require consolidations and/or closures
- ◆ Transit stops lack basic amenities and need improvements

A complete list of the RSA recommendations can be found in the West 4th Street Road Safety Audit located in **Appendix D**.



Speed Study

NDOT conducted a Speed Study for the West 4th Street study area to determine typical operating speeds. The Speed Study broke the study area up into three segments, identifying the posted speed limit and 85th percentile speed, as shown in **Table 3**. Based on the Speed Study results, speeding is a concern.

Table 3: Speed Study Results

Segment	Posted Speed Limit	85 th Percentile Speed
Segment 1 – McCarran Boulevard to Stoker Avenue	45 MPH	56 MPH
Segment 2 – Stoker Avenue to Arlington Avenue	35 MPH	42 MPH
Segment 3 – Arlington Avenue to North Virginia Street	25 MPH	32 MPH

As the Speed Study observed, all three segments have an 85th-percentile speed greater than the posted speed limit, with the greatest difference being 11 MPH from McCarran Boulevard to Stoker Avenue, a distance of approximately 1.4-miles.

Existing Traffic and Road User Data

West 4th Street, within the study area, was analyzed for existing traffic conditions and other road user data. This information is used to identify areas where traffic operational deficiencies could be contributing to crashes and to inform alternatives development. One important dataset is the existing AADT, which was obtained from NDOT’s TRINA application for key corridor segments over a 5-year period, and is summarized in **Figure 14**.

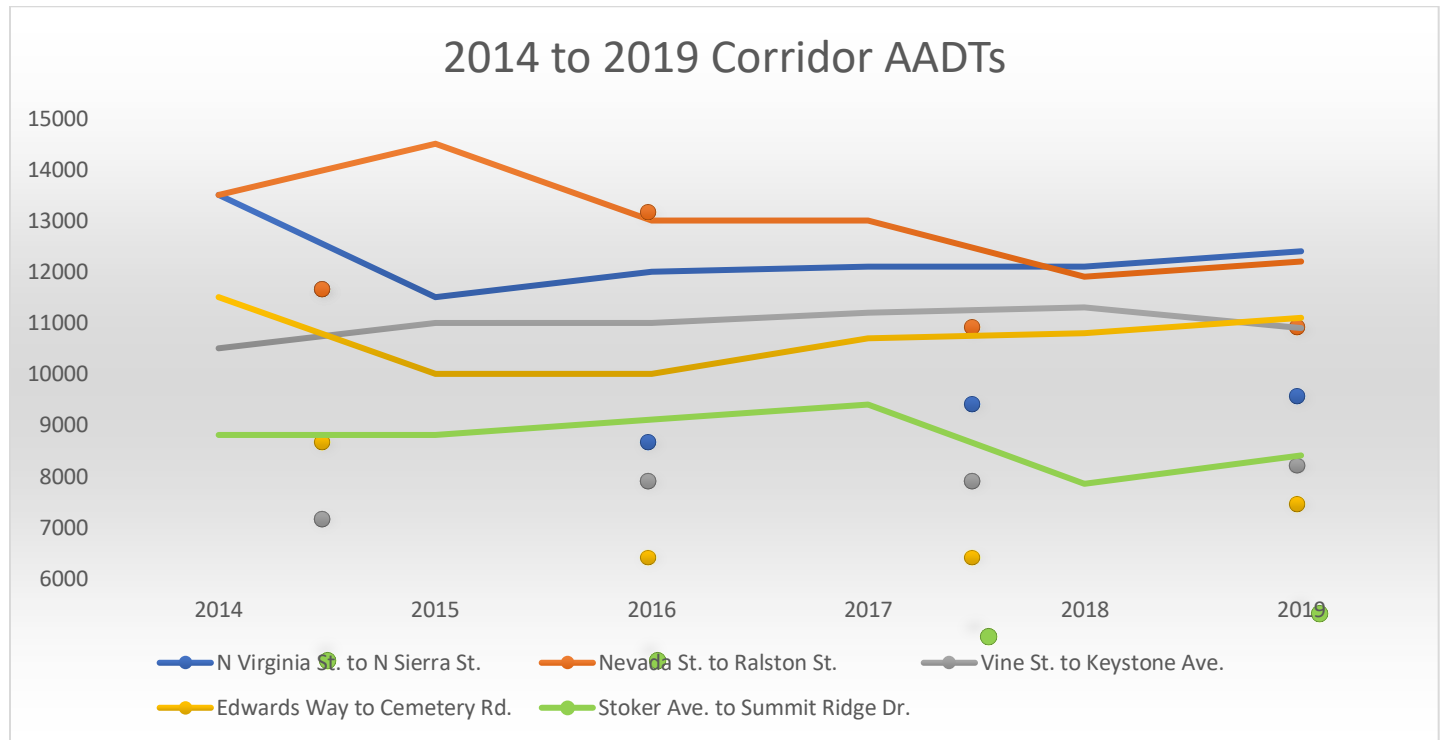


Figure 14: West 4th Street AADTs

These volumes show a small ebb and flow of volumes over time with no appreciable trend in either growth or reduction. These daily volumes all fall within typically acceptable planning-level capacity ranges for their designated segment; thus, segment capacity is not anticipated to be an issue along the West 4th Street corridor.



Intersection Level-of-Service

Traffic operations in this study have been quantified through the determination of level-of-service (LOS). LOS has been calculated for all intersection control types using methods documented in the Transportation Research Board (TRB) publication Highway Capacity Manual, Sixth Edition (HCM 6).

LOS is a qualitative measure of traffic operating conditions, whereby a letter grade “A” through “F” is assigned to study facilities, representing progressively worsening traffic operations.

Synchro 10 macrosimulation software was utilized to calculate the LOS at eleven (11) West 4th Street intersections within the study area. The collected and balanced traffic volumes (vehicular, pedestrian, bicycle) and corresponding peak hour factor (PHF) were a few of the inputs used in the analysis, the results of which can be viewed in **Appendix E**. Existing signal timings were supplied by the City of Reno and used as an additional input into Synchro 10, which are located in **Appendix F**. Existing lane geometries were collected through field visits and Google Earth.

The resulting HCM 6 LOS for all approaches and overall intersections is displayed in **Table 4**. A more detailed description of each intersection can be viewed in **Appendix G**. LOS considered below thresholds (LOS E and LOS F) are highlighted in dark blue, whereas LOS C and LOS D are highlighted as well. Two of the eleven analyzed intersections (West 4th Street/Summit Ridge Drive, West 4th Street/Washington Street) are unsignalized intersections and the intersection delay and LOS for unsignalized intersections is identical to the “worst-case” approach.

Table 4: West 4th Street SMP LOS (HCM 6) - Existing Conditions

Cross Streets	Signalization	Time	Approach Delay (Seconds) & LOS								Intersection Delay (Sec) & LOS	
			EB		WB		NB		SB			
4th Street & McCarran Boulevard	Signalized	AM	61.1	E	59.6	E	48.2	D	103.4	F	76.7	E
		PM	70.7	E	67.2	E	33.0	C	85.5	F	59.1	E
4th Street & Summit Ridge Drive	Unsignalized	AM	7.9	A	0.0	A	-	-	14.1	B	14.1	B
		PM	8.9	A	0.0	A	-	-	23.3	C	23.3	C
4th Street & Stoker Avenue	Signalized	AM	8.9	A	12.6	B	-	-	16.1	B	11.9	B
		PM	10.4	B	21.5	C	-	-	16.1	B	16.8	B
4th Street & Keystone Avenue	Signalized	AM	55.7	E	52.1	D	33.2	C	51.0	D	46.2	D
		PM	57.3	E	55.3	E	23.1	C	26.7	C	34.8	C
4th Street & Vine Street	Signalized	AM	17.7	B	13.5	B	10.5	B	10.5	B	14.7	B
		PM	21.1	C	17.5	B	10.7	B	10.9	B	17.0	B
4th Street & Washington Street	Unsignalized	AM	0.0	A	0.0	A	10.3	B	9.8	A	10.3	B
		PM	0.0	A	0.0	A	10.9	B	13.4	B	13.4	B
4th Street & Ralston Street	Signalized	AM	10.9	B	10.3	B	22.4	C	23.3	C	14.1	B
		PM	10.5	B	1.2	A	23.1	C	27.0	C	9.8	A
4th Street & Arlington Avenue	Signalized	AM	0.5	A	9.8	A	23.8	C	21.4	C	13.1	B
		PM	10.6	B	0.9	A	25.8	C	22.5	C	12.5	B
4th Street & West Street	Signalized	AM	0.4	A	9.6	A	21.8	C	21.1	C	7.6	A
		PM	10.5	B	11.8	B	23.7	C	22.8	C	13.9	B
4th Street & Sierra Street	Signalized	AM	29.9	C	26.3	C	-	-	22.1	C	24.6	C
		PM	40.7	D	25.5	C	-	-	19.3	B	27.2	C
4th Street & Virginia Street	Signalized	AM	38.4	D	32.1	C	15.9	B	18.4	B	28.3	C
		PM	35.8	D	28.5	C	17.9	B	19.2	B	26.8	C

Source: Wood Rodgers, March 2021



W. 4th Street Safety Management Plan



As shown in **Table 4**, all of the intersections perform at LOS D or better in both the AM and PM peak hours, except for McCarran Boulevard, which performs at LOS E in both the AM and PM peak hours.

One of the SMP mitigation recommendations, discussed later in this document, will be to incorporate a leading pedestrian interval (LPI) at the West 4th Street signalized intersections. A LPI gives pedestrians a head start to enter the intersection before vehicles in the parallel direction are given the green light. However, HCM 6 does not recognize “pedestrian only” phases. Thus, a separate Synchro Default LOS for all approaches and overall intersections was completed to allow for an apples-to-apples comparison of before and after the LPI is implemented. The Synchro Default LOS is displayed in **Table 5**, and a more detailed description of each intersection can be viewed in **Appendix G**. *Note: The Synchro Default has very similar LOS results as the HCM 6 LOS results, therefore using the Synchro Default to compare intersections before and after a LPI is in place will result in similar LOS results as HCM 6.*

Table 5: West 4th Street SMP LOS (Synchro Default) - Existing Conditions

Cross Streets	Signalization	Time	Approach Delay (Seconds) & LOS				Intersection Delay (Sec) & LOS	
			EB	WB	NB	SB		
4th Street & McCarran Boulevard	Signalized	AM	38.0 D	44.7 D	27.2 C	27.1 C	30.1 C	C
		PM	55.8 E	56.2 E	53.5 D	43.3 D	50.8 D	D
4th Street & Summit Ridge Drive	Unsignalized	AM	0.2 A	0.0 A	- -	14.2 B	14.2 B	B
		PM	1.0 A	0.0 A	- -	23.3 C	23.3 C	C
4th Street & Stoker Avenue	Signalized	AM	8.8 A	16.3 B	- -	13.8 B	12.2 B	B
		PM	9.0 A	14.3 B	- -	12.5 B	12.2 B	B
4th Street & Keystone Avenue	Signalized	AM	47.9 D	41.3 D	19.9 B	22.0 C	28.7 C	C
		PM	45.8 D	57.5 E	27.7 C	30.1 C	36.1 D	D
4th Street & Vine Street	Signalized	AM	17.0 B	10.8 B	8.7 A	8.0 A	13.0 B	B
		PM	11.5 B	14.8 B	8.9 A	7.6 A	12.3 B	B
4th Street & Washington Street	Unsignalized	AM	0.0 A	0.0 A	10.3 B	9.8 A	10.3 B	B
		PM	0.0 A	0.0 A	10.9 B	13.4 B	13.4 B	B
4th Street & Ralston Street	Signalized	AM	10.0 B	5.8 A	18.4 B	22.1 C	11.7 B	B
		PM	10.9 B	6.4 A	22.0 C	25.8 C	12.1 B	B
4th Street & Arlington Avenue	Signalized	AM	6.9 A	3.3 A	20.2 C	20.0 B	12.4 B	B
		PM	6.8 A	5.3 A	21.8 C	18.4 B	11.5 B	B
4th Street & West Street	Signalized	AM	7.0 A	6.3 A	13.6 B	18.4 B	8.4 A	A
		PM	7.1 A	8.5 A	17.7 B	16.3 B	9.9 A	A
4th Street & Sierra Street	Signalized	AM	50.0 D	22.3 C	- -	10.9 B	21.7 C	C
		PM	45.5 D	21.8 C	- -	10.8 B	23.9 C	C
4th Street & Virginia Street	Signalized	AM	34.7 C	32.9 C	4.6 A	5.7 A	22.3 C	C
		PM	37.1 D	35.0 C	7.6 A	7.9 A	25.5 C	C

Source: Wood Rodgers, March 2021

As shown in **Table 5**, all of the intersections perform at LOS D or better in both the AM and PM peak hours. Additionally, **Figure 15** displays the Synchro Default delay and LOS of each analyzed intersection along the West 4th Street corridor.



Figure 15: West 4th Street Existing Intersection Delay and LOS (Synchro Default)

In addition to the LOS, a queue analysis was performed to determine if the existing queue storage lengths are sufficient to hold the vehicles utilizing the existing turn pockets during the peak hours, details of which can be found in **Appendix G**. As a result, the following intersections have at least one queue length longer than the queue storage:

- ◆ West 4th Street and McCarran Boulevard – Eastbound Left (PM Peak Hour), Westbound Left (PM Peak Hour)
- ◆ West 4th Street and Keystone Avenue – Westbound Left (PM Peak Hour), Northbound Left (PM Peak Hour)
- ◆ West 4th Street and Arlington Avenue – Northbound Left (PM Peak Hour)

Level of Traffic Stress

The bicycle and pedestrian Level of Traffic Stress (LTS) methodologies are analyses that incorporate infrastructure and surrounding facility data to quantify the quality of the pedestrian and bicyclist experience along segment routes and roadway intersections. The quantifiable scoring method allows the user to rank the facility based on its ability to provide low-stress connectivity for pedestrians and bicyclists through routes that do not exceed the tolerance for traffic stress. The LTS scoring is categorized from a LTS 1 score to a LTS 4 score, where a LTS 1 score indicates a more comfortable pedestrian/bicyclist environment and a LTS 4 score indicates a less comfortable pedestrian/bicyclist environment, as illustrated in **Figure 16**.

LTS 1: Ideal Conditions

Traffic stress is considered low. Facilities require little attention and are comfortable for all users. Low roadway speeds, bicycle lanes, parking in between the sidewalk and the road, and sidewalk width attribute to LTS 1.



LTS 2: Reasonable Conditions

Facilities with little stress but need more attention than an LTS 1 facility and are comfortable for most adults. Low roadway speeds, sidewalk width, and the bicycle lane in between the sidewalk and roadway give this a LTS 2.



LTS 3: Basic Conditions

Traffic stress is considered moderate on LTS 3 facilities and are comfortable for confident pedestrians and bicyclists. Higher roadway speeds, small buffer widths, lack of items in buffer, and sidewalk condition contribute to a LTS.



LTS 4: Poor Conditions

Traffic stress is considered high. High roadway speeds, no buffers, sidewalk gaps, curb ramps missing or poor conditioned, non-ADA compliant sidewalks, and poor or no lighting conditions contribute to a LTS 4



Figure 16: LTS Scale

Scoring ratings are based on several variables generated from regional GIS and field collection datasets, such as traffic speed, roadway travel lanes, facility conditions and geometrics, and the other type of facilities oriented to accommodating pedestrians and bicyclists. **Figure 17** outlines the variable datasets used for this study and the general effect on the LTS rating.

Infrastructure	Bicycle Facility Presence	Bikeway Width & Buffer	Number of Lanes	Posted Speed Limit	Driveways	Traffic Signals
Effectiveness	Present and higher grade = more comfortable	Present and wider = more comfortable	Fewer = more comfortable	Lower = more comfortable	Fewer = more comfortable	Present = more comfortable
Infrastructure	Crosswalk Presence	ADA Compliant Curb Ramps	Sidewalk Presence & Condition	Sidewalk Width & Buffer	Car Parking Presence	Illumination
Effectiveness	Present and visible = more comfortable	More = more comfortable	Existing and in good condition = more comfortable	Present and wider = more comfortable	Present = more comfortable	Present and higher visibility = more comfortable

Figure 17: LTS Variables and Effect

The outcome of the analysis determines the rating of each roadway, sidewalk, and multiuse path by assigning a rating to each direction the road or path travels in. The resultant LTS findings for the West 4th Street corridor are illustrated in **Figure 18**.

LTS methodology limitations can include other conditional factors that individuals may perceive as unconventional when walking or bicycling in the study area that are not generally collected. Conversely, LTS scores aide in prioritizing pedestrian/bicyclist improvements and in evaluating progress toward improving pedestrian/bicyclist comfort over time. Moreover, **Appendix H** provides the detailed methodology process used in determining the pedestrian and bicycle LTS along the West 4th Street corridor.

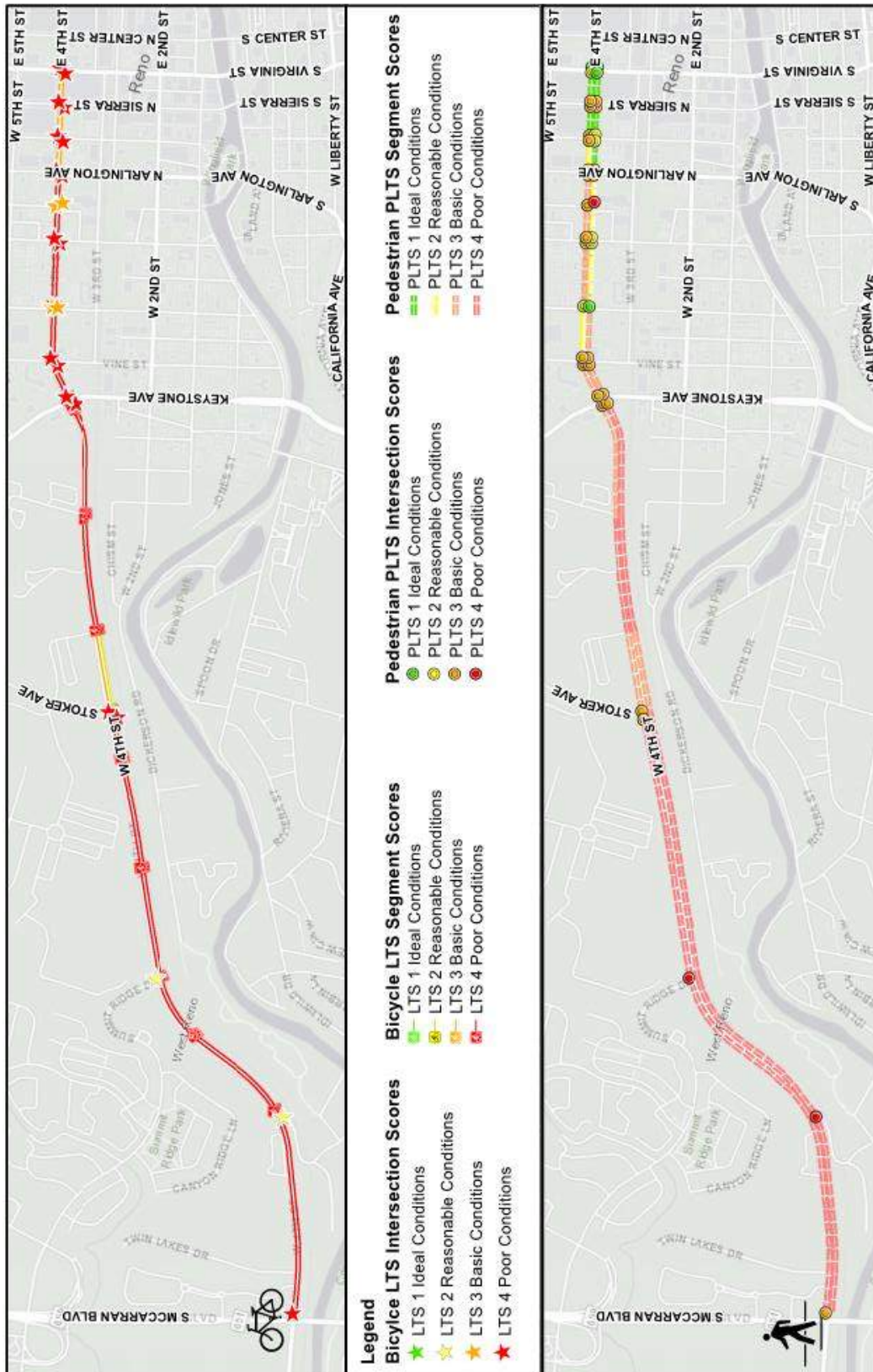


Figure 18: West 4th Street Bicycle and Pedestrian Level of Stress



Relevant Policies, Plans, and Studies

The following plans/projects have been identified by the project team as being relevant to the West 4th Street SMP and are summarized in **Table 6**. Additionally, a detailed breakdown of each plan/project can be viewed in **Appendix I**.

Table 6: Study Area Future Bicycle and Pedestrian Projects

Policy, Plan or Study	Summary
2040 Regional Transportation Plan (RTC Washoe)	Identifies the long-term (20-year) transportation investments to be made in the urbanized area of Reno, Sparks, and urbanized Washoe County. The plan provides for maintaining existing infrastructure in good condition and improving the operation of existing services. Note, during the course of this SMP, the 2040 RTP was updated to become the 2050 RTP.
Bicycle and Pedestrian Master Plan (RTC Washoe)	This document is part of the RTC’s RTP, which guides transportation investments in Reno, Sparks, and urbanized Washoe County over a 20-year period. It is the official policy document addressing the development of bicycle and pedestrian facilities for transportation purposes in the Truckee Meadows.
Complete Streets Master Plan (RTC Washoe)	Identifies the RTC Washoe’s long-range strategy for Complete Street treatments in the Reno-Sparks metropolitan area.
ADA Transition Plan (RTC Washoe)	Provides a framework for achieving equal access to RTC’s services within a reasonable timeframe, accommodating persons with disabilities.
ADA Transition Plan (NDOT)	Provides NDOT staff, state and local partners, and the citizens of Nevada, NDOT’s policies, procedures, and practices to fulfill the requirements of Section 504 of the Rehabilitation Act of 1973 and Title II of the Americans with Disabilities Act of 1990.
Keystone Avenue Corridor Study (RTC Washoe)	The study identifies, evaluates, and recommends potential multi-modal (vehicular, transit, pedestrian, and bicycle) transportation improvements along Keystone Avenue, from California Avenue to North McCarran Boulevard, in an effort to improve safety for all users of the corridor.
Virginia Street Corridor Investment Plan (RTC Washoe)	The plan identifies near-term and long-term transportation improvements that will be made along Virginia Street, from North McCarran Boulevard to Mount Rose Highway.
McCarran Boulevard – 4th Street to Las Brisas Drive RSA (NDOT)	An RSA was conducted on SR 651, West McCarran Boulevard, from 4th Street to Las Brisas Avenue. The purpose was to identify potential road safety deficiencies and recommend measures to mitigate those safety issues.
Reimagine Reno Master Plan (City of Reno)	The City of Reno used a multi-year, community-based effort to prepare a new Master Plan for the City and provides a road map for the City as it continues to grow and evolve.
Neon Line Concept (Jacobs Entertainment)	A mixed-use district, called the Neon Line, in downtown Reno on West 4 th Street from West Street to Keystone Avenue is planned and initiating development. The exact improvements of the overall plan have not been made public.

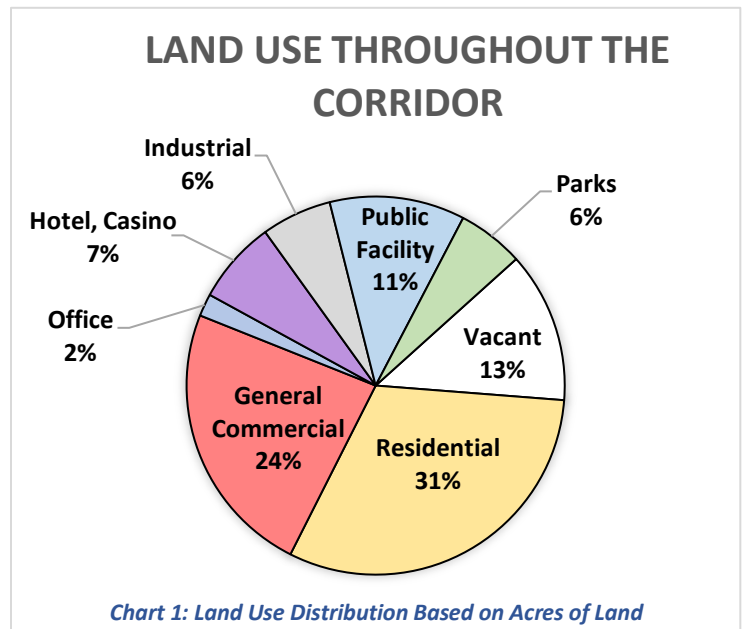
Land Use Analysis

Some key land use considerations within the West 4th Street SMP study area include:

- ◆ The corridor is a major arterial roadway with two major transportation centers at each end of the corridor, as identified within the *Reimagining Reno Master Plan*, and is used to connect surrounding neighborhoods to the downtown core in an efficient manner.
- ◆ Due to the types of land uses found along the corridor, public transportation is heavily utilized and is vital to several public transportation routes, although public transportation infrastructure may be insufficient.
- ◆ The corridor is mature with a majority of the buildings constructed prior to 1970 and the area is starting to see some areas of revitalization, with opportunities for future development with approximately 100-acres of vacant parcels, 75-percent of which is within mixed use zoning districts.
- ◆ The corridor has a mixture of residential throughout, with condominiums and multi-family near the downtown core and more traditional suburban multi-family and single-family residential to the west.
- ◆ There are no schools located along the corridor, however, as the University of Nevada, Reno supporting services move south into the downtown core, student housing will soon be located in proximity to the very eastern end of the corridor.
- ◆ The corridor is more pedestrian oriented to the east (within the downtown core), pedestrian amenities and facilities become sparse to the west.
- ◆ Commercial use has a strong presence in the corridor, especially around the Keystone Avenue intersection. Several gaming properties are located within the eastern portion of the corridor.

Existing Land Use

As mentioned earlier, the West 4th Street SMP study area is bound by Virginia Street to the east and McCarran Boulevard to the west. These two boundaries are identified in the City of Reno’s Structure Plan as a Regional Center to the east at the intersection of Virginia Street and a community/neighborhood center to the west at McCarran Boulevard. The corridor transitions from urban in the east, to suburban as it moves west, which is reflected within the intensity and density within the built environment along this corridor. This is further supported by the Land Use. The downtown core is dominated by large hotels and casinos in the east and moves to more commercial uses along the corridor, especially at the Keystone Avenue intersection, then moving into a more traditional suburban neighborhood as you approach McCarran Boulevard. **Chart 1** illustrates a breakdown of land distribution based on acres of land and **Figure 19** shows the changing land uses throughout the West 4th Street study area.



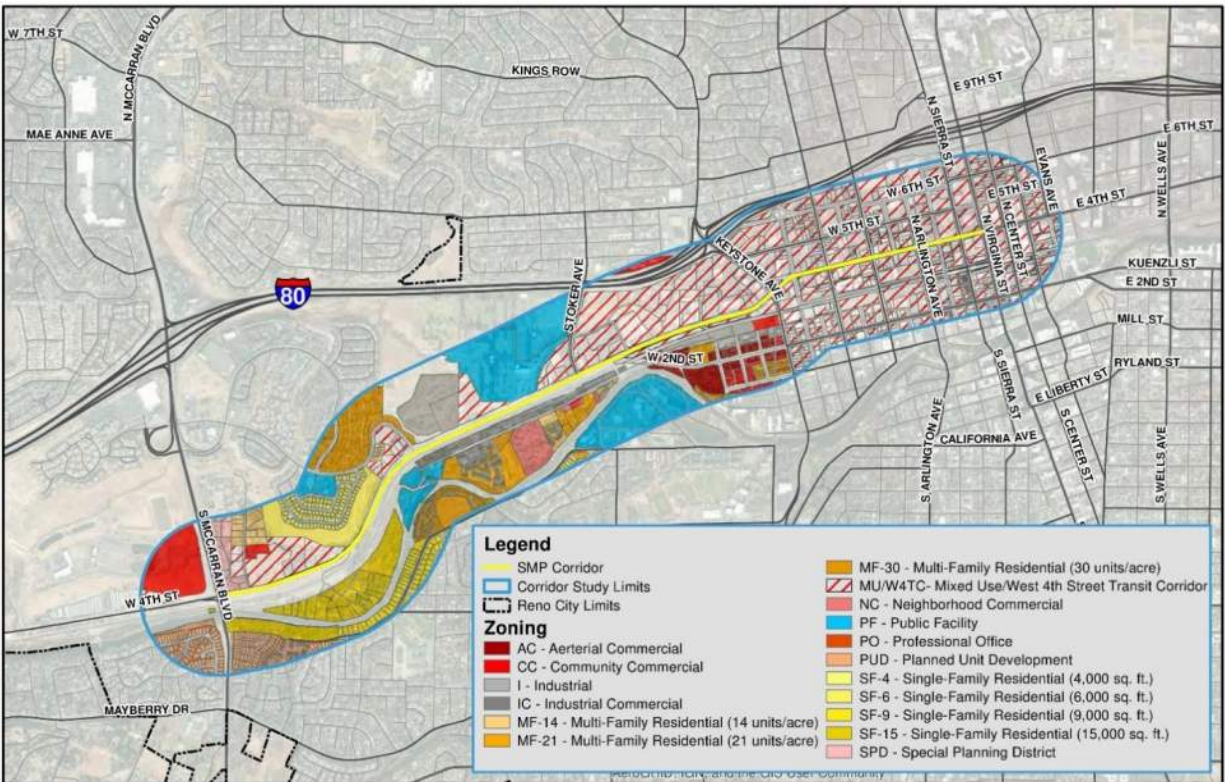


Figure 19: Land Use

Despite such a mature area with dense development, there is also a rather large amount of vacant land. Nearly 100-acres of vacant land, a majority of which (75-percent) is contained within the mixed-use zoning districts. This may be due to the fact that a majority of the buildings within the corridor were constructed prior to 1970, making most of the buildings more than 50 years old and subject to renovation and revitalization. Due to this, the area is experiencing pockets of redevelopment and a potential change in land use. Of these projects, several in the past have turned old hotels and motels into multi-family, helping the area to meet its housing needs and providing the downtown core with a growing residential community. This has contributed to a large amount of residents utilizing this corridor, and the public transportation provided along it, for everyday uses when commuting or accessing essential services.

Land Use Analyses by Roadway Section

For this land use analysis, the project area has been broken into three “planning areas.” Each planning area is described in detail on the following pages and can be viewed below in **Figure 20**.

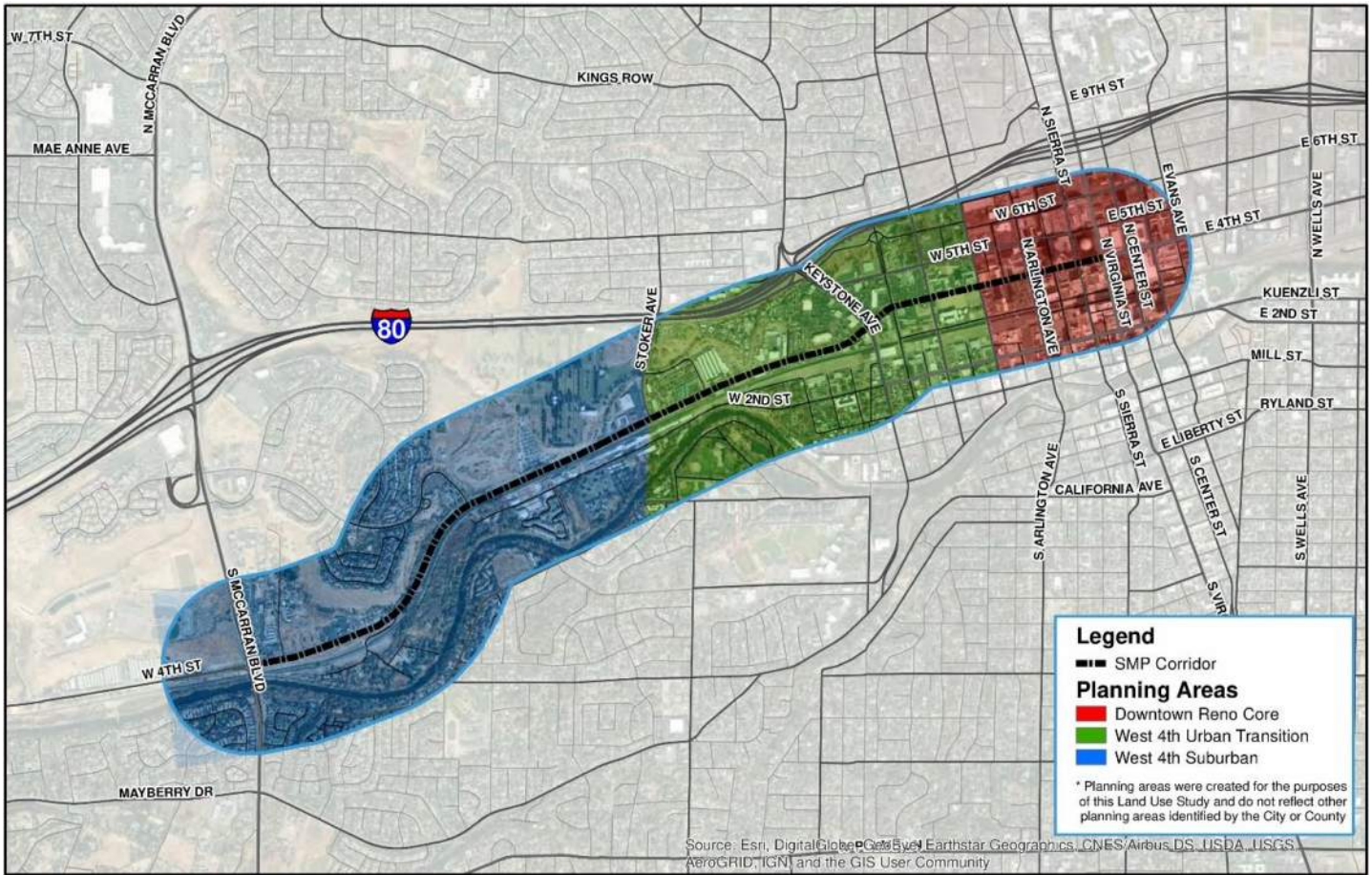


Figure 20: West 4th Street Planning Areas

Downtown Reno Core: Virginia Street to Ralston Street

Much like the district's namesake, this area is the regionally recognized urban core, which is bound on the east by Virginia Street and to the west by Ralston Street. The uses within this district are dominated by the major downtown hotel casinos and is identified within the *Re-Imagine Reno Master Plan* as the "Entertainment District." As such, in addition to the hotels, this district is also home to entertainment destinations like the Reno Events Center, Reno Ballroom, and the National Bowling Stadium, as well as the 4th Street Transit Center. The area has recently seen a number of new residential condominium towers, converted from old hotel casinos, and has increased the downtown residential population, housing more than 3,000 residential units in the study area alone. With several new student housing projects in progress just on the northeastern limits of this study area, this number is expected to increase, and the area will become home to more residents going forward, creating more of a mix of uses than what has traditionally been seen in the downtown core.

Although the major casinos attract people from over the greater region and tourists, the area is also home to many smaller historic motels and hotels that serve the community. The planning area isn't all about entertainment, it also contains an important anchor and a vital part of the community that includes the St. Mary's Campus. As one of the regions two full-service hospitals, located along the northern boundary of this planning area, this feature is a high traffic generator. As you move south to the Truckee River, the area supports an abundance of walkable commercial services including bars and restaurants that serve the local population and draw in people from all over the region. A breakdown of the land uses within this roadway section is provided in **Chart 2**.

Street Environment

Large sidewalks accommodate pedestrians within this planning area, especially around the major casinos. The streets are made up of two travel lanes in each direction with a center turn lane, some of which have a landscaped median and pockets of metered street parking. Bicycle lanes and facilities are not present at the time, but this area is identified within the *RTC Complete Streets Master Plan* as a future recommended Complete Street project. There is a heavy pedestrian presence here and, although speed limits are low in this area, distractions are a concern as is the propensity for speeding. This area has several bus routes and sees heavy utilization of public transportation; however, bus shelters and bus lanes are non-existent for the transit lines that serve this area.

LAND USE: DOWNTOWN RENO CORE

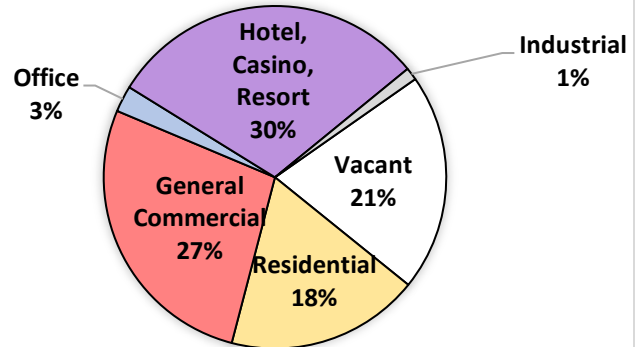


Chart 2: Land Use Distribution Virginia Street to Ralston Street

West 4th Street Urban Transition: Ralston Street to Stoker Avenue

This area is generally bound by Ralston Street to the east and Stoker Avenue to the west. Although it is not the urban Reno core, this area has similar characteristics to the hotel/casino core of Reno. Uses within this area include smaller casinos and motels, in addition to varied commercial and industrial uses. The Keystone Avenue commercial area anchors the center of this planning area. This planning area has the least amount of residential units within the corridor and is dominated by commercial and smaller hotels and casinos. This is also the oldest of the planning areas with a majority of the buildings being constructed prior to the 1960's. The area is also seeing somewhat of a transformation in land use, especially adjacent to the study corridor. Many of the properties located adjacent to the corridor have been acquired by Jacobs Entertainment, as part of their "Neon Line" entertainment district and are planned to be demolished or re-purposed to help revitalize the area. As such, nearly 50-percent of the vacant properties within the study corridor are located within this planning area.

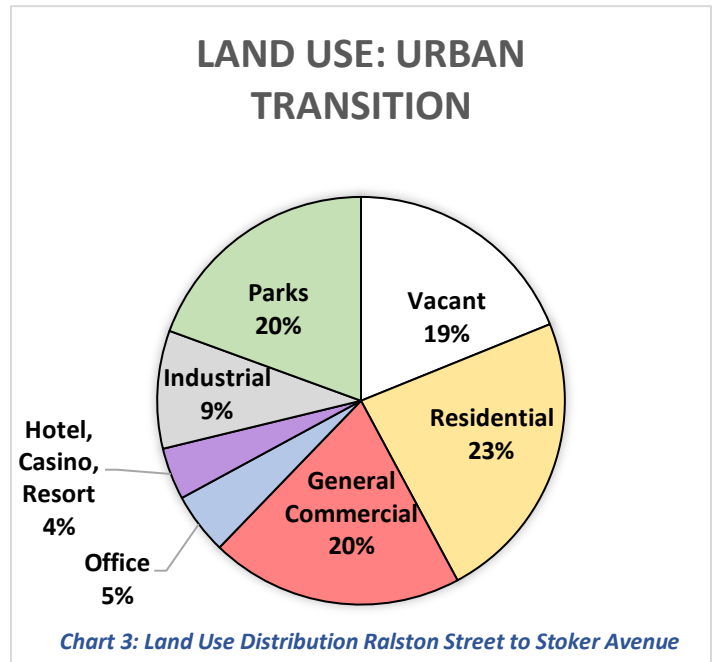
The intersection of West 4th Street and Keystone Avenue is a major intersection. Traffic is typically heavy within this section of the corridor with Keystone Avenue providing direct access to Interstate-80 to the north. The intersection is also a high traffic generator with commercial and retail services found throughout. Although there is a traditional anchor grocery store and commercial development located at this intersection, most of the restaurants and business are oriented to vehicle traffic with drive-thru service and a heavy saturation of auto repair shops and stores. As such, several unique traffic features for accessing the commercial spaces have been designed to accommodate vehicular traffic with little infrastructure for multi-modal forms of transportation. This results in concerns about pedestrian accessibility and safety, even though the area sees a high number of pedestrians and utilization of public transportation.

West of the Keystone commercial center, the land use changes into a mix of industrial with some commercial and there is a noticeable decrease in vehicle and pedestrian traffic. Along this stretch, traffic is extremely limited to the south as the Union Pacific Railroad now runs parallel to the corridor as it returns to grade, blocking any through-access to the south, with the exception of a few industrial uses adjacent to the corridor. Public transportation is still an important aspect along this portion of the corridor as Stoker Avenue

connects the corridor to a large residential neighborhood to the north. A breakdown of the land uses within this roadway section is provided in **Chart 3**.

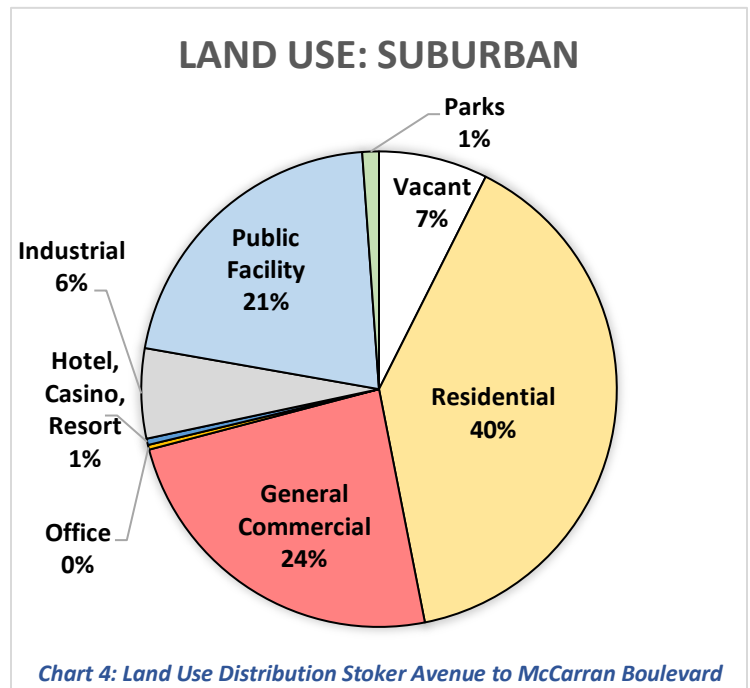
Street Environment

Standard 4-foot to 5-foot sidewalks accommodate pedestrians within this planning area with no on-street parking. Crosswalks are located at every intersection with a signalized crosswalk located at Washington Street and West 4th Street. Bicycle lanes and facilities are not present at this time; however, this area is identified within the *RTC Complete Streets Master Plan* as a future recommended Complete Street project east of Keystone Avenue. West of Keystone Avenue is also identified in the *RTC Complete Streets Master Plan* as a future recommended Complete Street project with a potential lane reduction. Although not as prominent as in the downtown core, there is a heavy pedestrian presence here. Speed limits are relatively low in this area, but the number of vehicles and pedestrians around the Keystone commercial center and the lack of multi-modal facilities is a concern as is speeding by drivers in the corridor. This area sees heavy traffic of public transportation, however, there are no bus shelters or bus lanes for the transit routes that serve this area.



West 4th Street Suburban: Stoker Avenue to McCarran Boulevard

West of Stoker Avenue, several physical land features along the corridor prevent the building intensity that is found to the east. This section of the corridor has a few commercial and industrial properties adjacent to the roadway and, due to the physical limitations of the land, the corridor has a relatively rural feel, despite being located within the McCarran loop, an area identified within the *Re-Imagine Reno Master Plan* as targeted for dense development. However, this is still a highly used route for residents accessing the downtown core or the commercial services along Keystone Avenue as it connects these areas to several large residential developments and McCarran Boulevard to the west. Summit Ridge Drive provides access to a large residential community of almost 2,000 residential units made up of a mix of multi-family and traditional single-family homes. Any through-traffic access to the south is non-existent due to the railroad and the Truckee River, leaving the only southern through-access point along this stretch to be located at McCarran Boulevard. A small commercial development located near the intersection of McCarran Boulevard is currently experiencing a transition in land use and is mostly vacant or under construction. The intersection of McCarran Boulevard is busy with vehicles as direct access to Interstate-80 is located approximately one-mile to the north. There is moderate pedestrian activity throughout this planning area although public transportation is still heavily used since this helps connect a large residential neighborhood and McCarran Boulevard to the downtown core. A breakdown of the land uses within this roadway section is provided in **Chart 4**.



Street Environment

Due to physical constraints, development is difficult in this area, leading to lower traffic and higher speeds. There are no sidewalks or any other type of pedestrian amenities along any of this portion of the corridor, although there are bike facilities. Between Stoker Avenue and Summit Ridge Drive, the roadway is a four-lane road with a center turn lane. Between Summit Ridge Drive and McCarran Boulevard, the roadway is reduced to a two-lane road with no center turn lane and bike lanes on either side. Public transit is still present along this stretch and is vital to connect residents with the services provided in the other planning areas, however, there are few transit stops within this planning area. The portion from Stoker Avenue to Summit Ridge Drive is identified within the *RTC Complete Streets Master Plan* as a future recommended Complete Street project with a potential lane reduction. A map illustrating the pedestrian, bicycle, and transit amenities within the entire West 4th Street study area is illustrated in **Figure 21**.

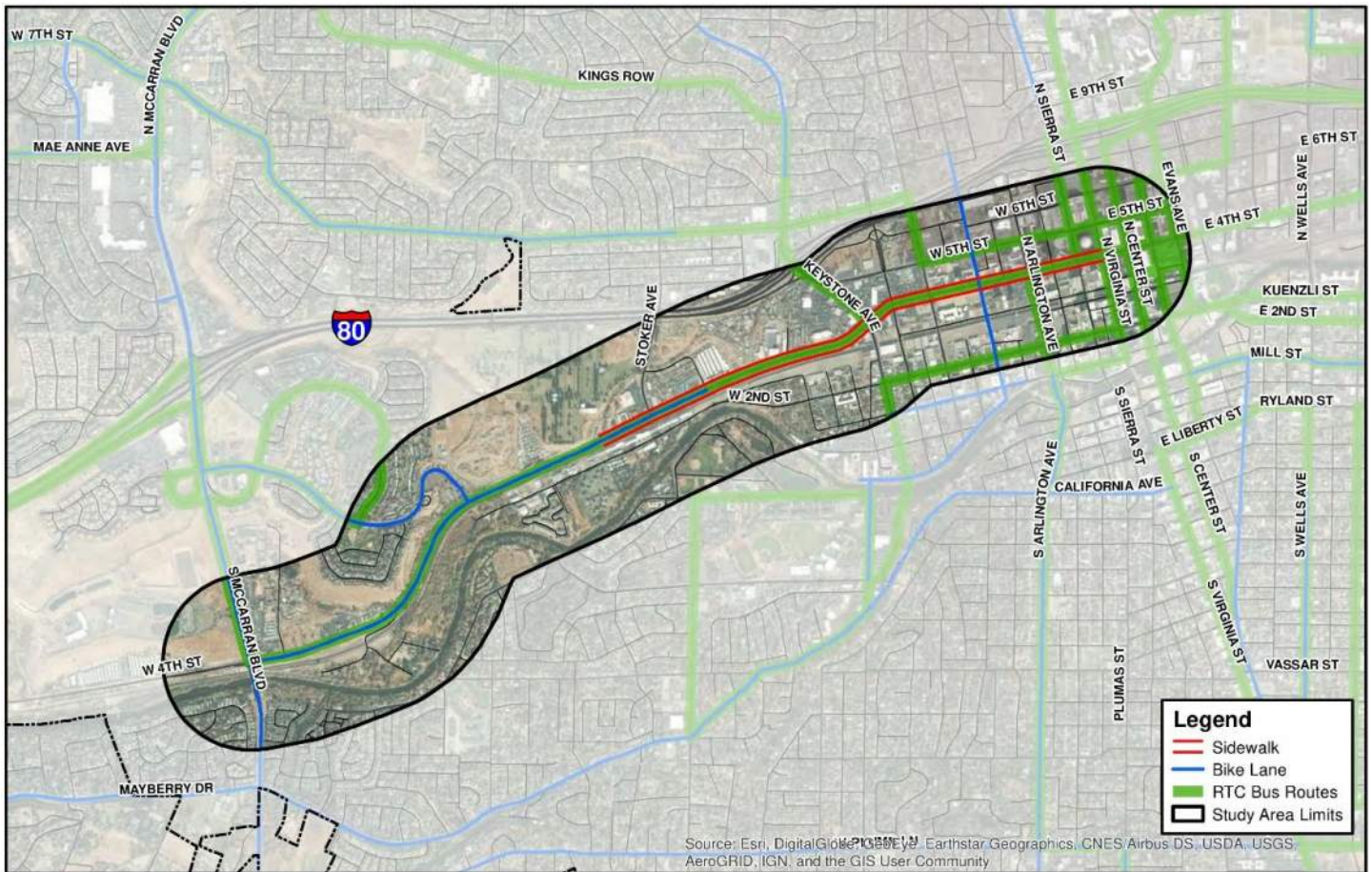


Figure 21: Multi-Modal Transportation Map

Economic Development Potential

This section presents an evaluation of economic development conditions and opportunities surrounding this corridor and summarizes information from various planning documents relevant to the study area. Furthermore, this section will look at development scenarios for the West 4th Street corridor to help understand future development potential.

Current Social/Economic Concerns

West 4th Street is a major arterial connecting the downtown core in the east, to the surrounding neighborhoods and commercial activity to the west. This serves as an important alternative to Interstate-80, is widely used by residents and pedestrians, and is seen as a vital link for the public transportation system within the Reno-Sparks area, as it connects to many different public transportation routes, including the 4th Street Transit Center. The intersection at Virginia Street and West 4th Street is identified within the *Re-Imagine*



W. 4th Street Safety Management Plan



Reno Master Plan as one of two Regional Centers within the Reno area and the McCarran Boulevard and West 4th Street intersection is identified as a community/neighborhood center. This study corridor is an important suburban/urban link between the two identified centers.

Improving public transportation, pedestrian safety, multimodal connectivity, and accessibility on this roadway will more adequately serve residents within the neighborhoods and areas adjacent to the roadway, as well as provide greater access for the broader Reno-Sparks area. Although some pedestrian and bicycle facilities are provided within sections of this corridor, pedestrian safety and total connectivity is a concern. Additionally, with the abundance of transit opportunities, there is a lack of accessible amenities, for example, bus lanes, bus pullouts, and bus shelters are almost non-existent. As the area continues to experience pockets of reinvestment and new development, including new student housing and multi-family residences within this corridor, a more robust public transportation system and multi-modal facilities should be designed to transport the residents to the essential services they need. Incomplete ADA accessible routes exist throughout this corridor and pedestrians must walk along shoulders or within the right-of-way along the western portions of West 4th Street to reach destinations by foot. This gap in connectivity is notable as it contains several single family and multi-family housing complexes, with residents likely to require alternative transportation options.

RTC Planning Documents

This corridor provides a vital connection between residents and services/employment to downtown Reno and commercial centers. A goal of the RTC's *RTP* is to, "support the economic vitality of the region by promoting safety, providing accessible places to walk and bike, improving connectivity between where people live and work, and conserving resources through environmentally and fiscally sustainable practices" (2040 *Regional Transportation Plan*, pg. 4). The entire corridor is identified as a corridor recommended for Complete Streets, within the *RTC Complete Streets Master Plan*. The corridor between Virginia Street and Keystone Avenue is identified to continue the Complete Street improvements that were completed along East 4th Street and Prater Way and identified in the *4th Street/Prater Way Corridor Study*. The remaining corridor west of Keystone Avenue is identified as a recommendation for Complete Streets with possible lane reductions and would better reflect the land uses found in that region. Improvements to the entirety of this corridor would continue to improve the public transportation services provided along East 4th Street and will fill gaps in bicycle and pedestrian connectivity, as well as improve safety, accessibility, and efficiency of transportation for all users who rely on this corridor.

Re-Imagine Reno Master Plan

Intensification of uses within the McCarran Boulevard loop is encouraged by the *Re-Imagine Reno Master Plan*. Necessary infrastructure to accommodate intensification of uses include improved transit opportunities, bicycle facilities, and accessible transportation options to allow for affordable and equitable transportation options. These improvements will also help the City to provide better connectivity between the Regional Center at Virginia Street and the Neighborhood/Community Center at McCarran Boulevard. Furthermore, improved public transit service will extend the successes of East 4th Street and Prater Way to the residents and neighborhoods along West 4th Street.

The Reno Neon Line, Urban Mixed-Use Master Plan District

The Reno Neon Line is the name for the urban mixed-use master plan district between Keystone Avenue and West Street. The master planned development, proposed by private developer Jacobs Entertainment, is already underway. Details have not been released; however, initial publicly accessible plans include a mixed-use development with art and entertainment attractions centered along West 4th Street with pedestrian friendly improvements, including 10–20-foot sidewalks. Plans call for a pedestrian oriented mixed-use development with retail, residential, art, and entertainment, including the renovation of several hotel and casinos. Although further specifics have not been released, the plans call for upwards of 2,000 residential units.

Land Capacity

Throughout the corridor there are 125± acres of vacant land. A majority of the vacant land, (85.7± acres) is located within the Downtown Corridor and West 4th Street Urban Transition planning areas. This land is mostly developable and can vary in use since it is designated as mixed-use. The rest of the vacant land (39.4± acres), is located within the West 4th Street Suburban Planning Area. Due to land constraints such as steep terrain, not all of this land is developable. A map illustrating the potential land capacity within the West 4th Street Study area is shown in **Figure 22**. Note, development is ongoing, and these values are as of early 2020.

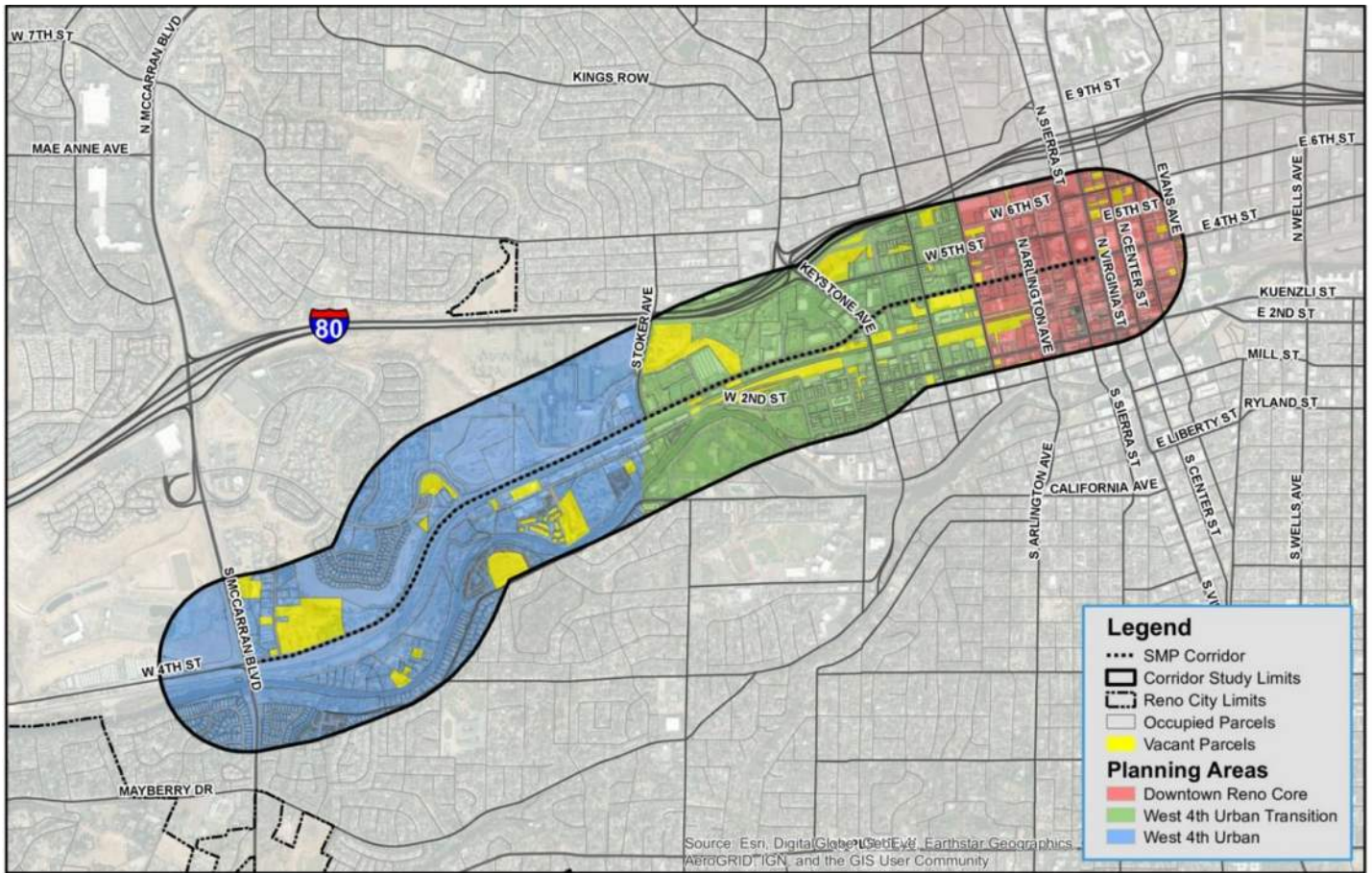


Figure 22: Potential Land Capacity within Planning Areas

To understand the potential in land capacity and how it could impact the corridor, different methods were applied to the planning areas. These methods only accounted for the currently vacant lands, (according to the most recent Assessor’s information) found within the planning areas identified in the Land Use segment of this study. In the West 4th Street Suburban planning area, the majority of the vacant land, 32.1± acres, is either approved multi-family development projects, or is zoned Multi-Family with a maximum density of 21 dwelling units per acre. The rest of the land is either zoned Single-Family Residential (15,000 sq ft), or Industrial Commercial. Based on maximum residential zoning densities and the amount of developable industrial land, the land capacity in this planning area is 710 residential units and 87,000 square feet of industrial, as shown in **Table 7**.

Table 7: West 4 th Street Urban Land Capacity	
Residential Units =	710
Industrial Sq. Ft. =	870,000

When looking at the West 4th Street Urban Transition and the Downtown Core planning areas, these planning areas were combined since these areas currently have, or are identified as, areas of future intense development. Furthermore, a majority of the vacant land was within the mixed-use zoning designation. As such, scenarios that utilized different levels of development intensity were used to determine how much land capacity is available and how it could impact the corridor over the next 20-30 years, which included the 85.7± acres of vacant land. For the sake of this scenario planning, we limited our analysis to only currently vacant land, however we acknowledge that the area could also realize additional redevelopment/revitalization of existing buildings.



The scenarios assume the new development will include a mix of Hotel/Casino (10%), Mixed Retail (20%), and Residential (70%). This mix is the same in all three scenarios. Please note, the land use mix could obviously vary in the future. We have made assumptions that, while the Hotel/Casino uses are dominant in the Core area, based upon industry trends and information gleaned from Jacobs Entertainment’s publicly accessible plans, we estimate that there will be moderate Hotel/Casino growth in the future. Further, with the observed trend of creating new residential units in the greater downtown area (both new construction and converted hotels/motels), in addition to strong growth in student housing, we have assumed a larger propensity for residential growth in this area, as compared to other land uses.

The different scenarios include different intensities of development based on an average floor area ratio (FAR). These scenarios are broken down as follows; Low (0.4 FAR), Medium (1.0 FAR), and High (2.5 FAR). Based on this, the potential for new development within the corridor can be calculated. In **Table 8**, hotel/casino and mixed retail are calculated in square feet, where residential is calculated in units, assuming approximately 1,000 square feet per unit.

Development Scenario	Floor Area Ratio (FAR)	Hotel/Casino (Square Feet)	Mixed Retail (Square Feet)	Residential (Units)
High	2.5	935,000	1,865,000	6,500
Medium	1.0	375,000	745,000	2,600
Low	0.4	150,000	300,000	1,045

Redevelopment and Revitalization

Although the corridor has been developed for some time, the planning area’s median building age can determine the area’s most likely to see the highest redevelopment potential. Of the three planning areas identified in the Land Use section, the West 4th Street Urban Transition planning area has the most potential to see the highest areas of redevelopment. A majority of the buildings within this planning area were constructed prior to 1970. Many of the older motels have lived past their useful life and many are starting to see an interest in revitalizing and repurposing, but many still exist. A majority of the buildings within the Downtown Core were constructed in the 1970’s and have been updated throughout their life. Also, throughout the Downtown Core many new projects have recently been proposed or are currently being constructed or redeveloped. However, several pockets of redevelopment opportunities still remain within the Downtown Core. The West 4th Street Suburban planning area is the newest of the planning areas and the least likely to see new revitalization opportunities throughout the corridor.

Based on the scenarios present within this corridor, especially within the West 4th Street Urban Transition and Downtown Core planning areas, there is the potential to see substantial growth and revitalization. This corridor has the potential to be a major attraction that will bring people in from all over the region and help to connect the surrounding neighborhoods to the commercial and employment centers throughout. A strong multimodal transportation network that can accommodate the future plans will help to ensure the success of the proposed developments, promote further growth and revitalization of the area, and better accommodate the current and future residents who travel this corridor.

Crash Risks and Factors Summary

West 4th Street is emblematic of many arterials in urban Nevada, with high speeds between major intersections and gaps in supportive infrastructure for alternative modes. Additionally, the combination of numerous local roadway cross streets accessing residential neighborhoods, numerous commercial driveways near busy intersections, and the lack of control associated with TWLTL/no center median island, results in a high number of crashes. While most of the corridor does not exceed average crash rates for similar facilities,



the sheer volume of traffic within and crossing West 4th Street, and the high speeds, results in high overall crash numbers. Alternatives developed as part of the mitigation portion of this SMP focuses on reducing speed, controlling access, channelization, and supporting alternative modes.

SMP Alternatives

Alternatives Background

Vehicular, bicycle, pedestrian, and transit safety alternatives have been categorized into both corridor and spot safety improvements for the West 4th Street SMP. Corridor improvements run linearly along roadway segments between intersections while spot improvements effect singular, finite locations (e.g., intersections, pedestrian crossings, etc.). The alternatives were developed by focusing on high crash locations identified in the crash analysis, field reviews and observations, and by applying engineering judgement. Existing and future

Note: All SMP alternatives are conceptual and for consideration purposes only. It will be up to the decision-makers to determine which, if any, alternatives are implemented.

“Complete streets are streets for everyone. They are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities. Complete streets make it easy to cross the street, walk to shops, and bicycle to work.”
Smartgrowthamerica.org

traffic volumes were also taken into consideration to ensure alternatives would not have a significant negative impact on traffic operations. However, it should be noted that some safety alternatives could reduce traffic performance and these tradeoffs should be balanced against safety performance. In many cases, alternatives were developed with the intent of better supporting all modes of travel through a Complete Streets philosophy.

The alternatives outlined in this chapter have been identified and developed at a planning-level. Additional refinement, traffic analysis, and engineering may be required to identify issues and further determine feasibility.

Corridor Alternatives

Corridor alternatives that revise the roadway cross-sectional configuration or impact linear segments of the corridor were developed for each segment of the corridor to better accommodate all modes and improve safety. In some cases, more than one promising option was developed and each of these options are outlined below without any recommendation of one versus the other. It will be up to decision-makers to determine which alternative to advance, if any, based on numerous factors in addition to safety performance.

Vine Street to Keystone Avenue

Through discussions with the TAC, it was determined there would be no lane reduction alternatives on West 4th Street east of Keystone Avenue. However, another goal of the TAC is to connect bicyclists traveling on West 4th Street west of Keystone Avenue to the proposed parallel cycle track on 3rd Street and the planned parallel bicycle lane on 5th Street. Therefore, a bicycle connection is an alternative along West 4th Street from Vine Street to Keystone Avenue, as shown in **Figure 23**.



Figure 23: Alternative Bike Connection from Vine Street to Keystone Avenue

The existing West 4th Street segment from Vine Street to Keystone Avenue currently has four (4) travel lanes and a TWLTL, as shown in **Figure 24**. Whereas the alternative cross section would reduce the roadway and sidewalk widths to incorporate a 4-foot bicycle lane on both sides of the street, as shown in **Figure 25**. W 4th Street is designated as a truck route by the Reno Municipal Code and an 11-foot lane would be required for the outside lanes at a minimum.

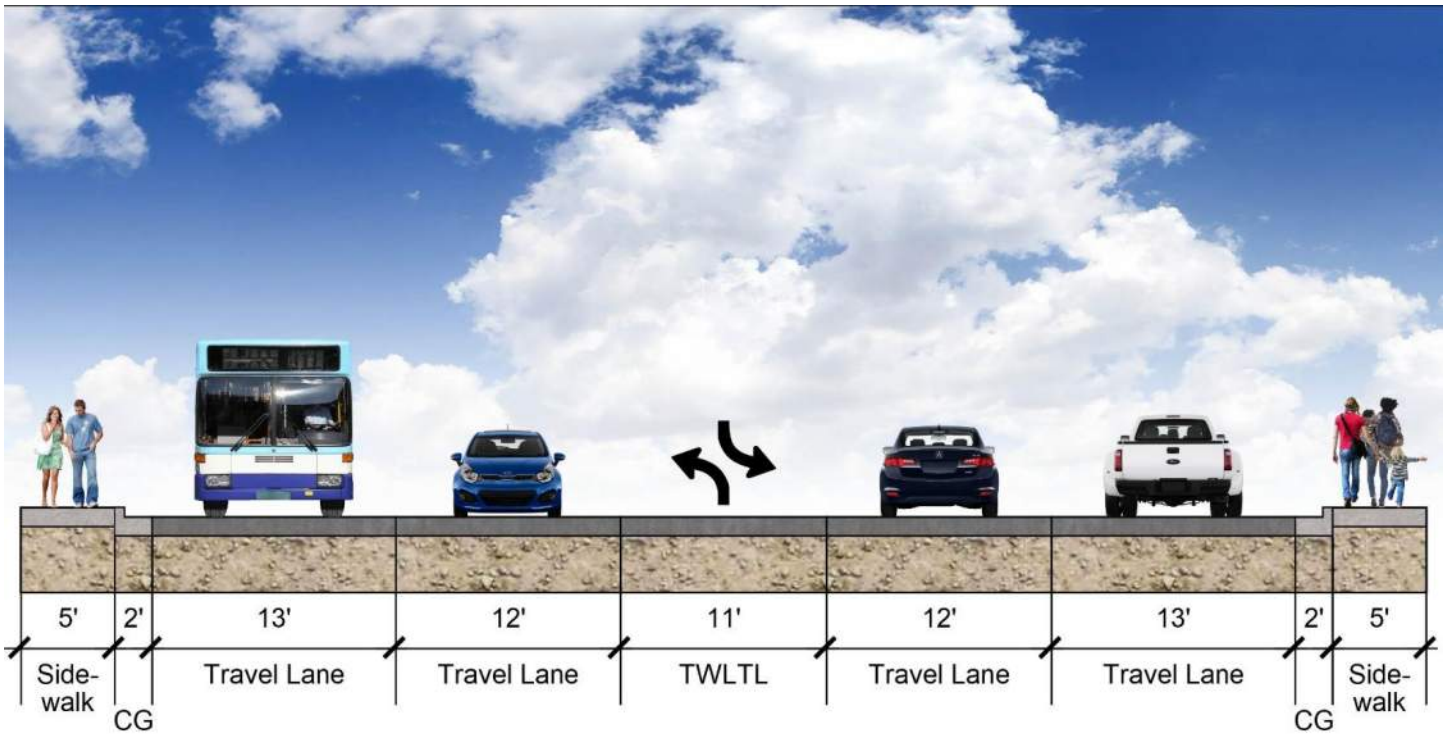


Figure 24: Vine Street to Keystone Avenue – Existing Cross Section

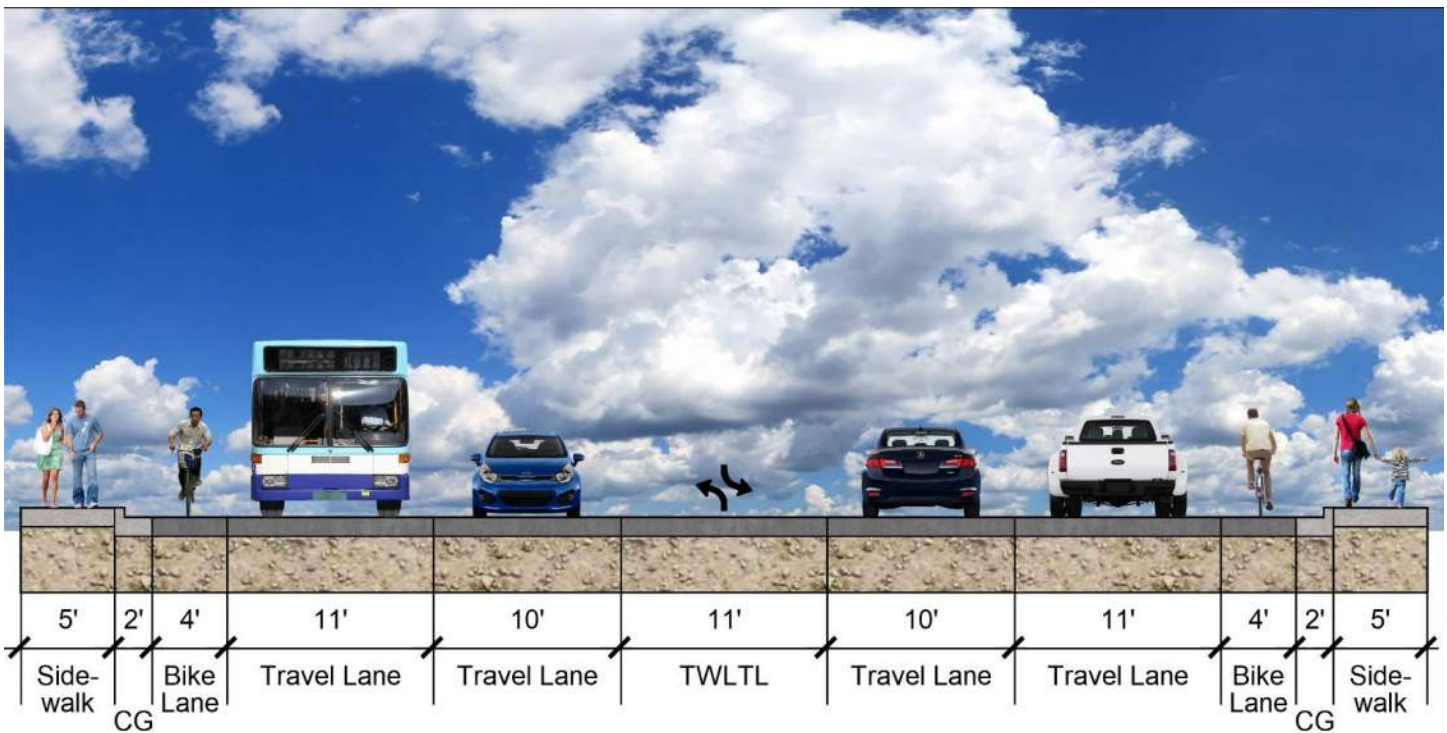


Figure 25: Vine Street to Keystone Avenue – Alternative Cross Section

Keystone Avenue to Stoker Avenue

West 4th Street, west of Keystone Avenue, traffic volumes are low enough that the number of travel lanes can be reduced from four (4), as shown in **Figure 26**, to two (2), as shown in **Figure 27**. The alternative cross section also incorporates alternative modes of travel, such as a buffered bicycle lane in both directions and improved sidewalks in each direction. The sidewalks may or may not include a landscape strip and/or utility strip, which improves pedestrian comfort and provides opportunities to underground existing utilities, based on agency preference and design constraints. Four lanes may need to be maintained approaching the Keystone intersection.

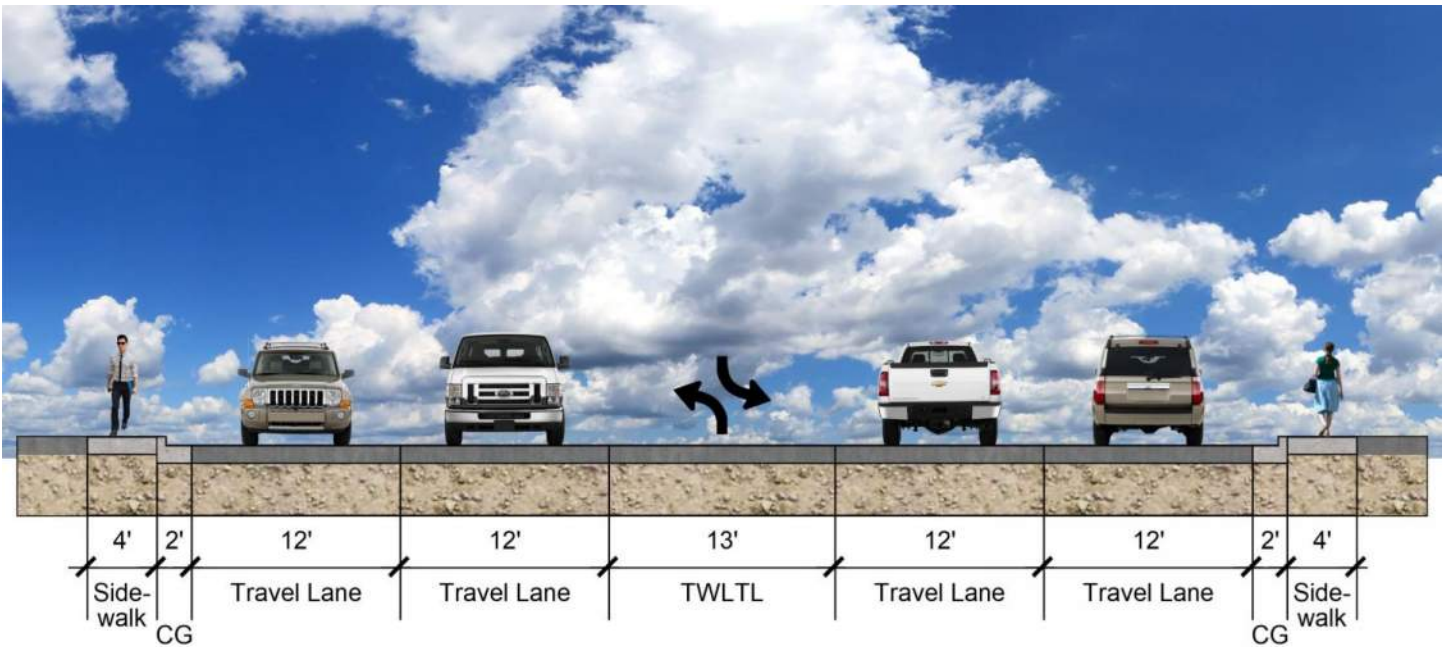


Figure 26: Keystone Avenue to Stoker Avenue – Existing Cross Section

(Note: The Existing Cross Section Varies, but all falls within the 85-foot to 255-foot existing right-of-way displayed in Figure 13)

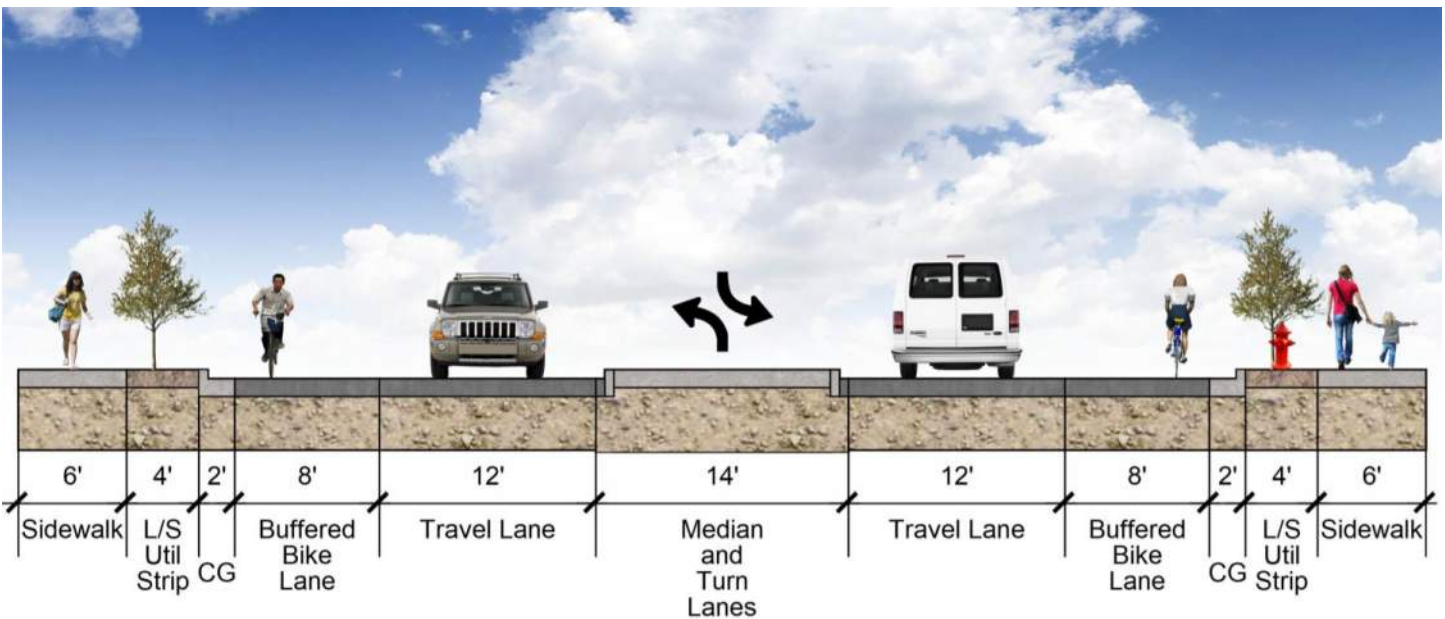


Figure 27: Keystone Avenue to Stoker Avenue – Alternative Cross Section

(Note: The Alternative Cross Section all falls within the 85-foot to 255-foot existing right-of-way displayed in Figure 13)

Stoker Avenue to West of Summit Ridge Drive

West 4th Street, from Stoker Avenue to West of Summit Ridge Drive, traffic volumes are low enough that the number of travel lanes can be reduced from four (4), as shown in **Figure 28**, to two (2), as shown in **Figure 29** and **Figure 30**. There are two separate alternatives along West 4th Street for this section, including Alternative 1, which incorporates an 8-foot buffered bicycle lane on each side of the roadway, along with 6-foot sidewalks on both sides of the roadway, as shown in **Figure 31**. On the other hand, Alternative 2 incorporates wide shoulders, a 10-foot multi-use path on one side of the road, and a 6-foot sidewalk on the other side of the roadway, as shown in **Figure 32**.

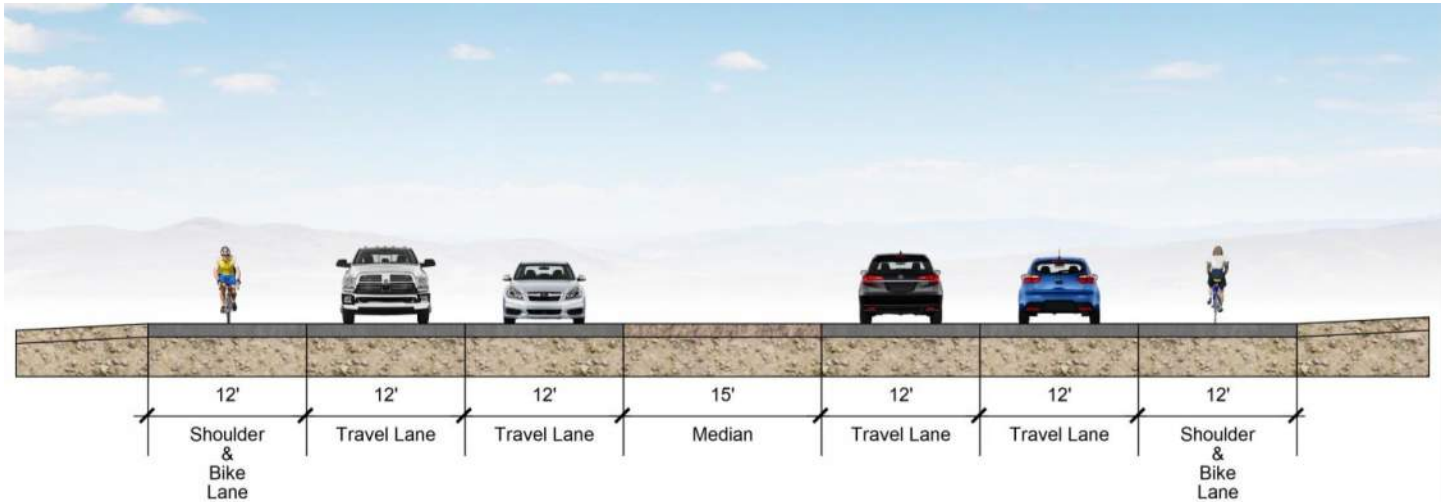


Figure 28: Stoker Avenue to West of Summit Ridge Drive – Existing Cross Section

(Note: The Existing Cross Section Varies, but all falls within the 225-foot to 255-foot existing right-of-way displayed in Figure 13)

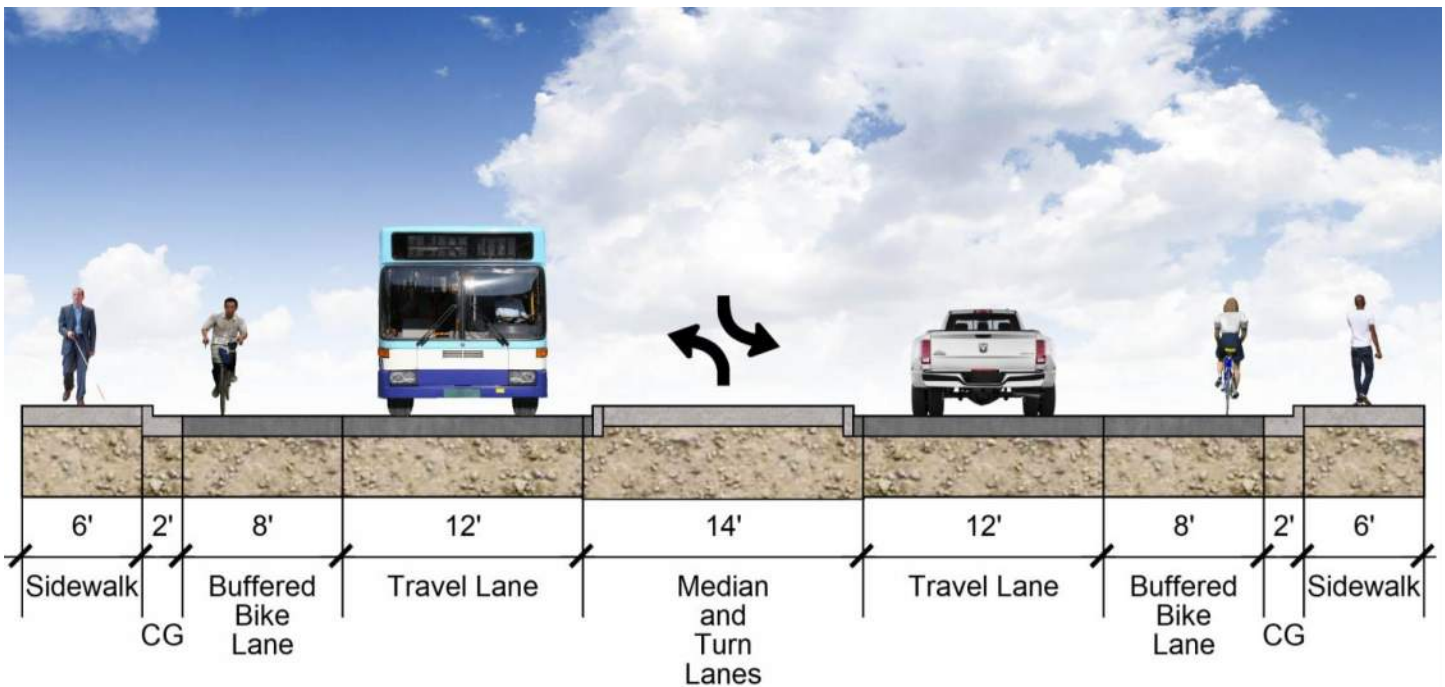


Figure 29: Stoker Avenue to West of Summit Ridge Drive – Alternative 1 Cross Section

(Note: The Alternative 1 Cross Section all falls within the 225-foot to 255-foot existing right-of-way displayed in Figure 13)

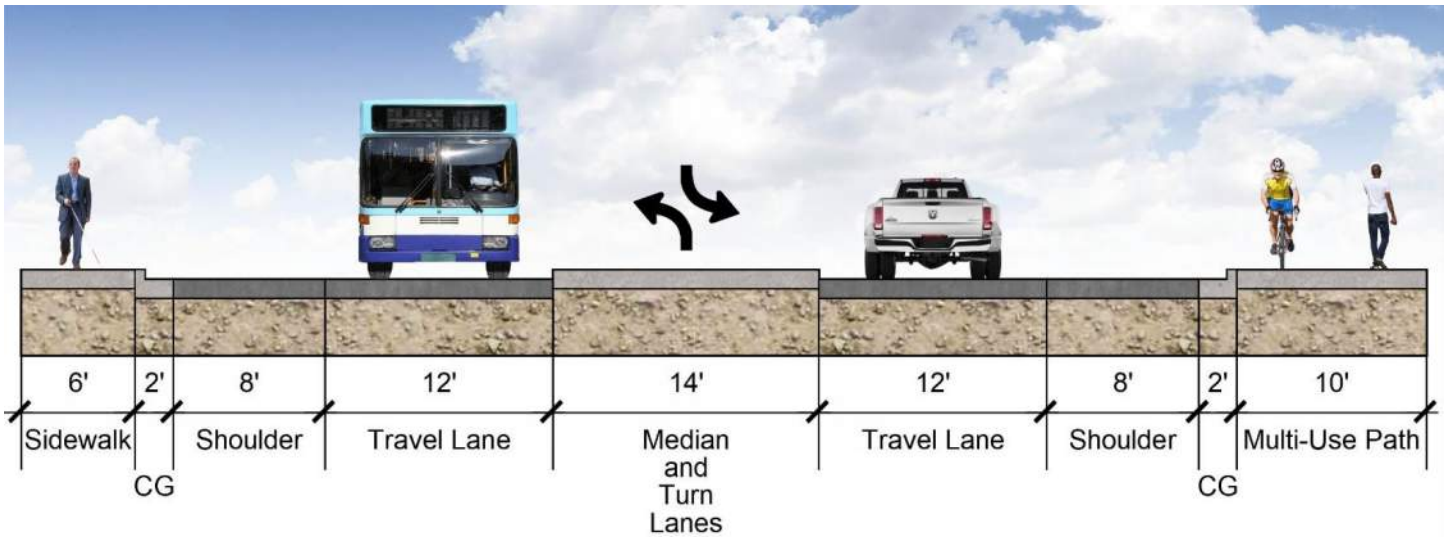


Figure 30: Stoker Avenue to West of Summit Ridge Drive – Alternative 2 Cross Section
 (Note: The Alternative 2 Cross Section all falls within the 225-foot to 255-foot existing right-of-way displayed in Figure 13)

West of Summit Ridge Drive to West of Truckee River Trail

West 4th Street, from West of Summit Ridge Drive to West of Truckee River Trail, traffic volumes are low enough that the number of travel lanes can continue to be two, as shown in **Figure 32**, **Figure 33**, and **Figure 34**. Similar to the previous segment, there are two separate alternatives along West 4th Street for this section, including Alternative 1, which incorporates a 4-foot striped bicycle lane on each side of the roadway, including sidewalks on both sides of the roadway, as shown in **Figure 33**. On the other hand, Alternative 2 incorporates a 10-foot multi-use path on one side of the road, with a 6-foot sidewalk on the opposite side of the roadway, as shown in **Figure 34**.

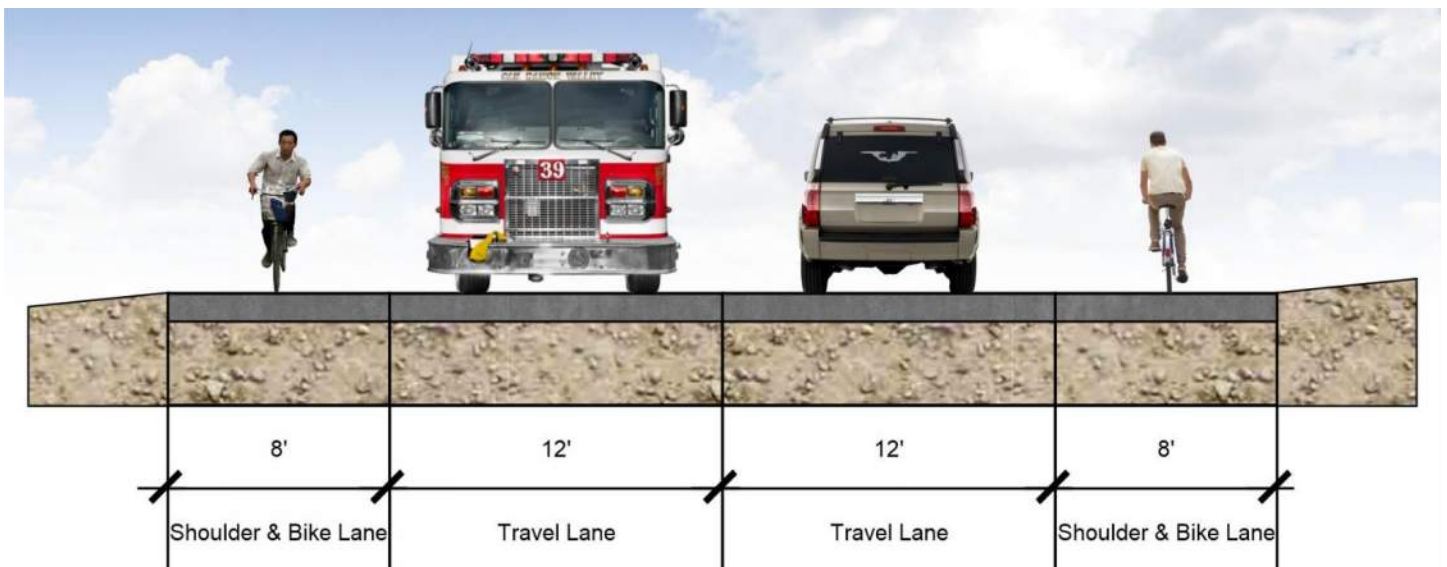
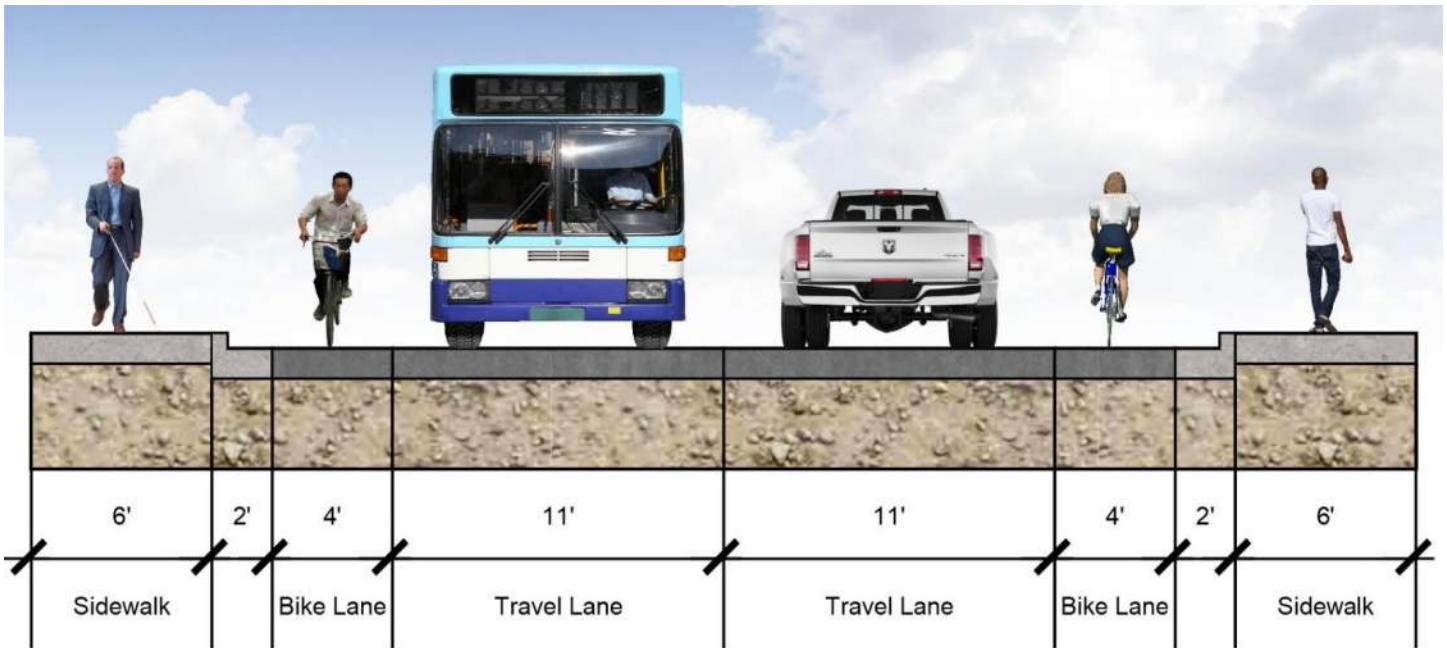
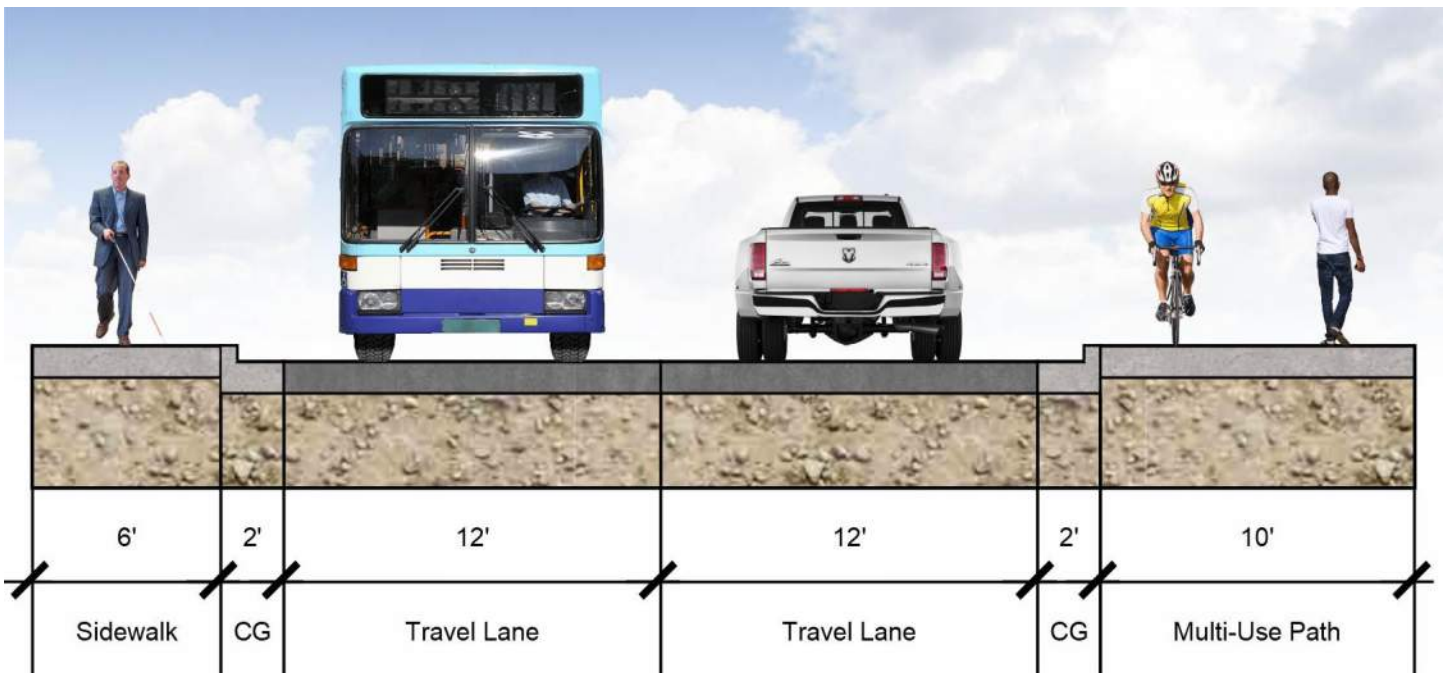


Figure 31: West of Summit Ridge Drive to West of Truckee River Trail – Existing Cross Section
 (Note: The Existing Cross Section Varies, but all falls within the 225-foot to 415-foot existing right-of-way displayed in Figure 13)



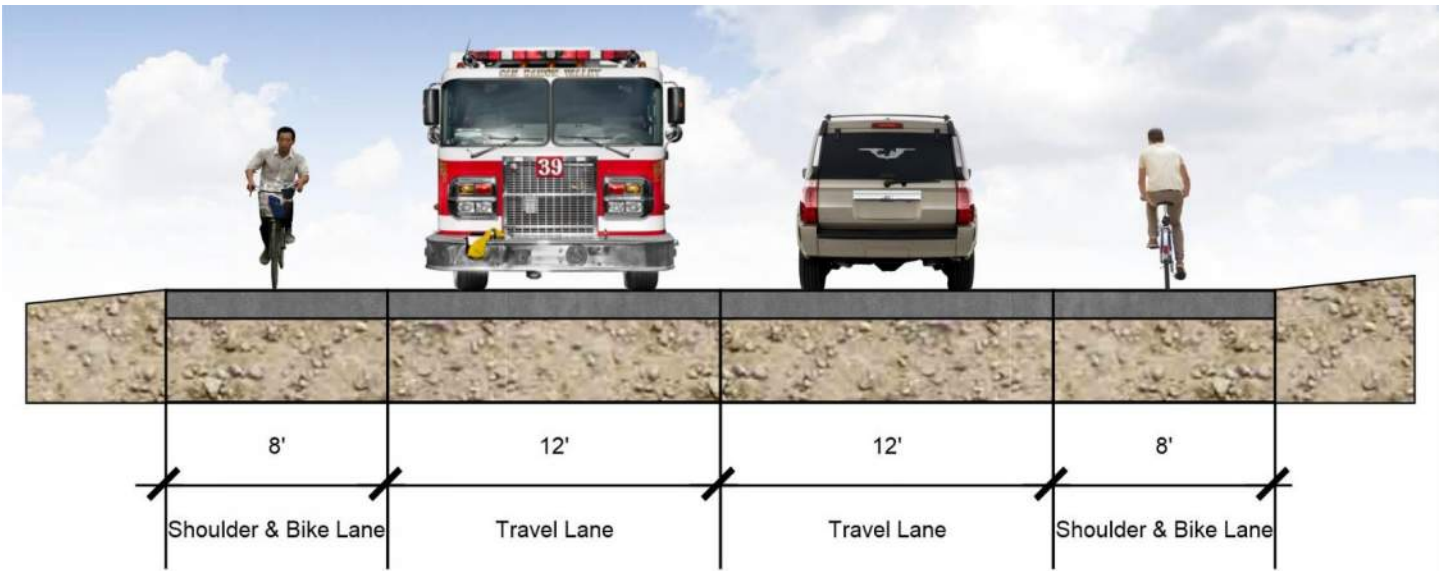
*Figure 32: West of Summit Ridge Drive to West of Truckee River Trail – Alternative 1 Cross Section
(Note: The Alternative 1 Cross Section all falls within the 225-foot to 415-foot existing right-of-way displayed in Figure 13)*



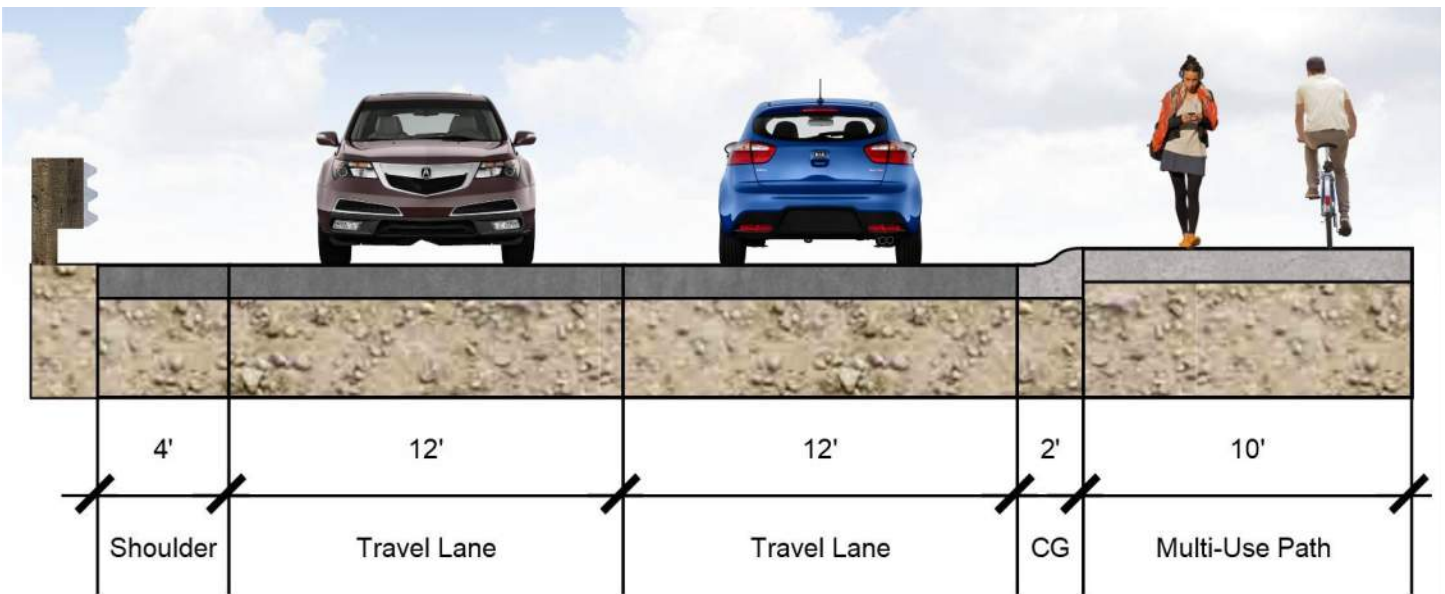
*Figure 33: West of Summit Ridge Drive to West of Truckee River Trail – Alternative 2 Cross Section
(Note: The Alternative 2 Cross Section all falls within the 225-foot to 415-foot existing right-of-way displayed in Figure 13)*

West of Truckee River Trail to McCarran Boulevard

West 4th Street, from West of Truckee River Trail to McCarran Boulevard, traffic volumes are low enough that the number of travel lanes can continue to be two, as shown in **Figure 34** and **Figure 35**. The alternative cross section incorporates a 10-foot multiuse path, however there is no sidewalk on the opposite side of the roadway due to topographic constraints.



*Figure 34: West of Truckee River Trail to McCarran Boulevard – Existing Cross Section
(Note: The Existing Cross Section Varies, but all falls within the 415-foot existing right-of-way displayed in Figure 13)*



*Figure 35: West of Truckee River Trail to McCarran Boulevard – Alternative Cross Section
(Note: The Alternative Cross Section all falls within the 415-foot existing right-of-way displayed in Figure 13)*

SMP Corridor Alternatives Summary

The previous section outlined several corridor alternatives that could be considered to improve safety and develop Complete Streets in the study area. The potential safety benefits of these corridor alternatives are summarized in **Table 9** (detailed calculations can be viewed in **Appendix J**), along with their corresponding benefit-cost calculation. The calculated crash reduction/safety benefits utilized the Federal Highway Administration’s (FHWA) Crash Modification Factors (CMF), of which NDOT has an approved list of CMFs the state uses. This information may be used to inform alternative selection and/or prioritization.

Table 9: Corridor Alternatives Summary

Corridor Alternative	Potential Multi-Modal Crash Reduction	Conceptual Cost	Safety Benefit-Cost
Vine Street to Keystone Avenue*	N/A	\$37,000	-
Keystone Avenue to Stoker Avenue	40%	\$1,940,000	0.21
Stoker Avenue to West of Summit Ridge Drive Alternative 1	27%	\$1,950,000	5.27
Stoker Avenue to West of Summit Ridge Drive Alternative 2	27%	\$2,060,000	4.99
West of Summit Ridge Drive to West of Truckee River Trail Alternative 1	30%	\$1,010,000	0.11
West of Summit Ridge Drive to West of Truckee River Trail Alternative 2	30%	\$1,060,000	0.11
West of Truckee River Trail to McCarran Boulevard	20%	\$880,000	0.64

*No reported crashes along the corridor for the evaluated 5-year crash data.

Spot Location Alternatives

Spot improvements are those safety strategies that effect singular, finite locations; and for this study, spot locations mostly consist of intersection improvements. Spot location alternatives were identified through a combination of the RSA, additional field reviews, crash data analysis, stakeholder and public input, as well as applying engineering judgement and safety best practices. It will be up to decision-makers to determine which alternative(s) to advance, if any, based on numerous factors in addition to safety performance.

Washington Street and Ralston Street Intersection Control

West 4th Street, around the intersections of Washington Street and Ralston Street, has experienced numerous pedestrian crashes and fatalities over the last few years. In fact, Washington Street was recently redesigned and reconstructed to only allow right-in/right-out vehicular movements onto Washington Street from West 4th Street, to help reduce the number of pedestrian crashes at this intersection (**Figure 36**). Therefore, improved intersection control has been proposed in the past at this location as a safety alternative for pedestrians and vehicular drivers alike. While the current right-in/right-out configuration at Washington Street appears to be effective at improving safety for pedestrians, revised intersection control at Washington Street would allow vehicular traffic to travel north/south through the intersection, which is currently prohibited. An Intersection Control Evaluation (ICE) analysis should be performed to identify the appropriate control type at each location.



Figure 36: Existing Washington Street Pedestrian Crossing (Source: Google Earth)

Commercial Access West of Vine Street

The existing commercial access just west of Vine Street provides multiple and redundant accesses to several businesses, resulting in confused drivers. Specifically, vehicular drivers see the commercial access as a continuation of West 4th Street when traveling in the westbound direction along the West 4th Street corridor, as shown in **Figure 37**. In addition to being confusing to vehicular drivers, the intersection is also confusing for pedestrians due to them crossing more traffic lanes. Therefore, an alternative is to eliminate the access point that confuses drivers and pedestrians by constructing a pocket park or raised median and converting the remaining access point along West 4th Street to a right-in/right-out movement, illustrated in **Figure 38**. As an added benefit, the pocket park would provide a small park location in an area that is a considerable distance from any other parks, improve area aesthetics, and potentially provide public art opportunities in line with other installations east on W. 4th Street.

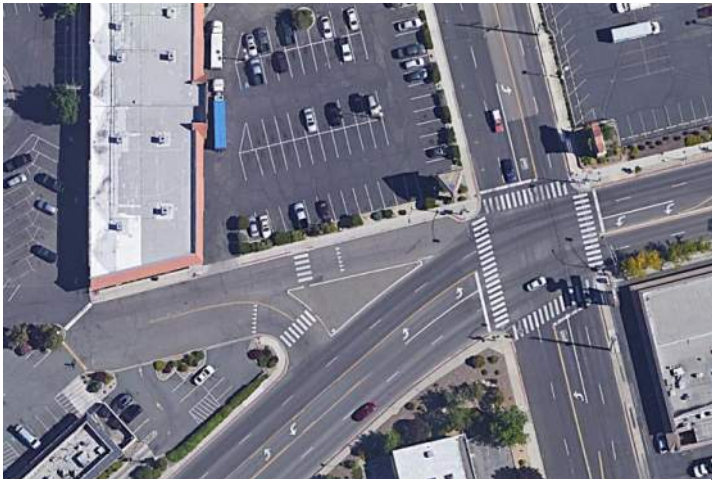


Figure 37: West of Vine Street – Existing Commercial Access



Figure 38: West of Vine Street – Alternative Pocket Park

Stoker Avenue Roundabout

West 4th Street and Stoker Avenue is currently a signalized intersection that performs at LOS B in both the AM and PM peak hours, as shown in **Table 4** (HCM 6) and **Table 5** (Synchro Default). However, this location has experienced multiple motorcycle crashes in the last 5-years and has an 85th-percentile speed that is 7 MPH to 11 MPH higher than the posted speed limit. Thus, implementing a roundabout at this intersection would help reduce speeds and crashes, as well as become an excellent turnaround location for the RTC's future planned bus rapid transit (BRT) service. An illustration of the alternative roundabout can be viewed in **Figure 39**.

Summit Ridge Drive Roundabout

West 4th Street and Summit Ridge Drive is currently an unsignalized intersection that performs at LOS B and LOS C in the AM and PM peak hours, respectively, as shown in **Table 4** (HCM 6) and **Table 5** (Synchro Default). However, this intersection does not provide pedestrian facilities (crosswalks, sidewalks) that link to the existing transit stop and it has an 85th-percentile speed that is 11 MPH higher than the posted speed limit. Thus, implementing a roundabout at this intersection would help reduce speeds and provide much needed pedestrian-transit connections. An illustration of the alternative roundabout can be viewed in **Figure 40**.

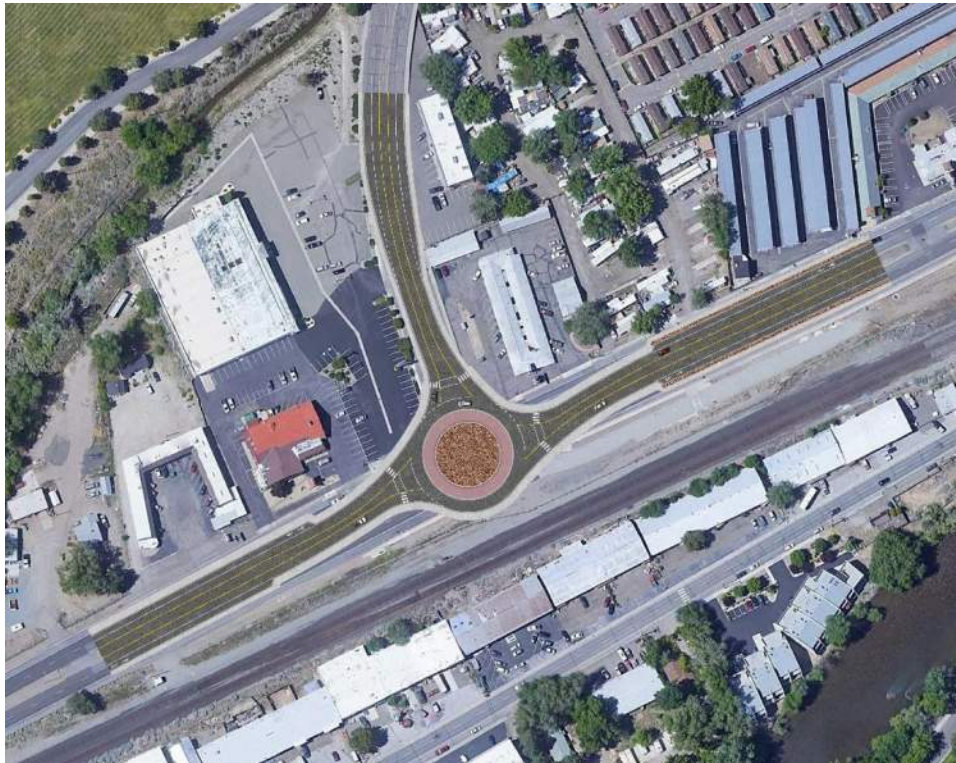


Figure 39: Alternative Roundabout at Stoker Avenue



Figure 40: Alternative Roundabout at Summit Ridge Drive



SMP Spot Alternatives Summary

The previous section outlined spot location alternatives that could be considered to improve safety and reduce crashes in the study area. The potential operational and safety benefits of these alternatives are summarized in **Table 10** (detailed calculations can be viewed in **Appendix K**), along with their corresponding benefit-cost calculations. Similar to the “Corridor Alternatives Summary”, the calculated crash reduction/safety benefits utilized the FHWA’s CMFs. The benefit-cost calculations reflect those stemming from crash reduction only. A more detailed analysis would be required to address broader benefits, such as changes in delay, emissions, etc. This information may be used to inform alternative selection and or prioritization.

Table 10: Spot Location Alternatives Summary

Spot Location Alternative	Existing LOS (AM/PM)	Proposed LOS (AM/PM)	Potential Crash Reduction	Conceptual Cost	Safety Benefit-Cost
Washington Street and Ralston Street Intersection Control (max benefit)	A/A and A/A	A/A and A/A	44% and 22%	\$5,000,000	5.66
Commercial Access West of Vine Street*	-	-	N/A	\$320,000	-
Stoker Avenue Roundabout	A/A	A/B	22%	\$1,500,000	5.63
Summit Ridge Drive Roundabout	A/A	A/A	44%	\$1,250,000	0.27

*No reported crashes along the corridor for the evaluated 5-year crash data.

Other Safety Alternatives

In addition to the corridor and spot safety alternatives described earlier, other minor spot alternatives were identified throughout the corridor, which include:

Table 11: Other Safety Alternatives Summary

Other Safety Alternatives	Potential Crash Reduction
Reduce the 45 MPH posted speed limit west of Keystone Avenue to 35 MPH to help reduce average vehicle speeds	46%
Improve the pedestrian and roadway lighting to make it easier for vehicular drivers and pedestrians to see each other	10%
Connect sidewalks and crosswalks to existing transit stops so pedestrians can safely cross the road	Varies
Add retroreflective backplates to the signal heads where one does not exist to improve the visibility of the illuminated face of the signal	15%
Optimize the signal timings to improve the coordination of the signals along West 4th Street	Varies
Extend turn pocket lengths to accommodate the vehicular queues that extend past the turn pocket, as needed	6%
Incorporate a Leading Pedestrian Interval (LPI) at all signalized intersections along West 4th Street from Keystone Ave. east to improve the safety of pedestrians crossing the street at signalized crosswalks	36%

LPI, Turn Pocket Mitigation, and Signal Optimization

The following three aforementioned “Other Safety Alternatives” were combined and analyzed through the use of Synchro 10 macrosimulation software:

- ◆ The following turn pockets were mitigated:
 - West 4th Street and McCarran Boulevard – Eastbound left-turn bay adjusted from one (1) 215-foot left-turn bay to two (2) 215-foot left-turn bays
 - Note: The westbound left-turn bay does not need to be adjusted once the signals have been optimized
 - West 4th Street and Keystone Avenue – Northbound left-turn bay adjusted from one (1) 115-foot left-turn bay to one (1) 300-foot left-turn bay
 - Note: The westbound left-turn bay does not need to be adjusted once the signals have been optimized



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- West 4th Street and Arlington Avenue – Northbound left-turn bay adjusted from one (1) 75-foot left-turn bay to one (1) 100-foot left-turn bay
- ◆ A 5-second LPI was incorporated at all signalized intersection crosswalk movements
- ◆ Signals and offsets were optimized for the entire West 4th Street corridor study area

As mentioned within the “Intersection Level-of-Service” section, HCM 6 does not recognize “pedestrian only” phases, thus the LOS was analyzed through the use of the Synchro Default. The LOS at each of the analyzed intersections when incorporating the mitigated turn pockets, LPI, and optimizing the signals can be seen in **Table 12**.

Table 12: West 4th Street SMP LOS (Synchro Default) - Mitigated Conditions with LPI

Cross Streets	Signalization	Time	Approach Delay (Seconds) & LOS								Intersection Delay (Sec) & LOS	
			EB		WB		NB		SB			
4th Street & McCarran Boulevard	Signalized	AM	21.2	C	21.4	C	21.7	C	27.3	C	24.2	C
		PM	36.6	D	32.8	C	34.3	C	37.1	D	35.3	D
4th Street & Summit Ridge Drive	Unsignalized	AM	0.2	A	0.0	A	-	-	14.2	B	14.2	B
		PM	1.0	A	0.0	A	-	-	23.3	C	23.3	C
4th Street & Stoker Avenue	Signalized	AM	13.3	B	17.5	B	-	-	7.4	A	12.7	B
		PM	11.5	B	21.7	C	-	-	10.7	B	16.2	B
4th Street & Keystone Avenue	Signalized	AM	15.8	B	20.0	B	19.0	B	24.7	C	20.4	C
		PM	25.9	C	34.6	C	28.3	C	37.4	D	31.8	C
4th Street & Vine Street	Signalized	AM	11.9	B	5.1	A	10.9	B	10.0	B	9.5	A
		PM	11.8	B	6.1	A	11.3	B	9.6	A	8.7	A
4th Street & Washington Street	Unsignalized	AM	0.0	A	0.0	A	10.3	B	9.8	A	10.3	B
		PM	0.0	A	0.0	A	10.9	B	13.4	B	13.4	B
4th Street & Ralston Street	Signalized	AM	8.0	A	13.7	B	7.8	A	9.8	A	10.0	B
		PM	9.2	A	8.7	A	14.4	B	16.6	B	10.6	B
4th Street & Arlington Avenue	Signalized	AM	7.5	A	2.9	A	11.1	B	11.2	B	8.2	A
		PM	16.6	B	4.5	A	12.6	B	10.6	B	10.4	B
4th Street & West Street	Signalized	AM	6.9	A	12.3	B	7.7	A	10.1	B	8.9	A
		PM	5.4	A	14.0	B	9.9	A	9.3	A	10.2	B
4th Street & Sierra Street	Signalized	AM	20.4	C	10.8	B	-	-	10.9	B	13.1	B
		PM	20.9	C	12.9	B	-	-	10.4	B	14.1	B
4th Street & Virginia Street	Signalized	AM	5.2	A	23.6	C	5.3	A	6.6	A	10.6	B
		PM	7.6	A	26.5	C	7.8	A	8.1	A	14.5	B

As shown in **Table 12**, all of the intersections perform at LOS D or better in both the AM and PM peak hours when incorporating the mitigated turn pockets, LPI, and optimizing the signals. Additional Synchro analysis for each of the eleven (11) intersections can be viewed in **Appendix L**.

Alternatives Considered but Not Endorsed

Multiple alternatives were considered but not endorsed by the TAC. It is important to document these along with why they were not advanced, so decision-makers understand the full scope of the study. **Table 13** lists those concepts that were considered but not endorsed, along with the reasons why.



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Table 13: Summary of Dismissed Alternatives

Alternative Concept	Reasons for Dismissal
Travel lane reduction from four (4) through vehicular travel lanes to two (2) through vehicular travel lanes East of Keystone Avenue	The City of Reno does not want to reduce the number of through vehicular travel lanes east of Keystone Avenue from 4-lanes to 2-lanes due to planned development in the area
Convert the outside lane on West 4 th Street east of Keystone Avenue to a shared bus/bike lane	The City of Reno does not want to reduce the number of through vehicular travel lanes east of Keystone Avenue from 4-lanes to 2-lanes due to planned development in the area

Environmental Considerations

Due to the conceptual nature of the alternatives outlined, impacts to the natural and human environment were not considered quantitatively or in detail, but rather at a planning level. This consideration did not have a significant impact on alternative development.

Planning Level Street Corridor and Intersection Designs

Planning-level design alternative layouts for the West 4th Street corridor and corresponding intersections were developed from Vine Street to McCarran Boulevard for both Alternative 1 and Alternative 2. The design alternatives for this West 4th Street section were broken down into the following, including an accompanying explanation of each segment:

- ◆ Vine Street to Keystone Avenue
 - This segment of West 4th Street combines the alternative cross section in **Figure 26** with the alternative pocket park in **Figure 39**.
- ◆ Keystone Avenue to Stoker Avenue
 - This segment of West 4th Street combines the alternative cross section in **Figure 28** with the alternative roundabout at Stoker Avenue in **Figure 40**.
- ◆ Stoker Avenue to West of Summit Ridge Drive
 - This segment of West 4th Street combines the alternative cross sections in **Figure 30** (Alternative 1) and **Figure 31** (Alternative 2) with the alternative roundabouts at Stoker Avenue (**Figure 40**) and Summit Ridge Drive (**Figure 41**).
- ◆ West of Summit Ridge Drive to West of Truckee River Trail
 - This segment of West 4th Street includes the alternative cross sections in **Figure 33** (Alternative 1) and **Figure 34** (Alternative 2).
- ◆ West of Truckee River Trail to McCarran Boulevard
 - This segment of West 4th Street includes the alternative cross section in **Figure 36**.

The full design alternative layouts for both Alternative 1 and Alternative 2 are illustrated in **Appendix M**.

One Nevada Transportation Plan

The One Nevada Transportation Plan (ONTP) is Nevada’s federally mandated long-range transportation plan that addresses the state’s transportation needs, priorities, and issues over a 20-year horizon. The ONTP identifies the goals, priorities, strategies, and actions necessary to maintain a safe and efficient transportation system with limited future funding. The ONTP incorporates six major goals, as shown in **Figure 41**, and sets forth a project prioritization process that matches need and potential projects to these goals. Therefore, those needs and projects that best address multiple goals will be more favorable for advancing through the project development process.



Figure 41: ONTP Goals

To aid the planning process, the corridor and major spot improvement alternatives described earlier have been qualitatively considered against the ONTP goals. **Table 14** provides a sketch planning-level review of how well each alternative supports each of the six goals areas. These factors will need to be further refined prior to detailed project prioritization but provides an initial snapshot for consideration. A qualitative scoring system is used ranging from “Highly Unsupportive” to “Highly Supportive.”

Table 14: ONTP Comparison

Alternative Description	Enhance Safety	Preserve Infrastructure	Optimize Mobility	Transform Economies	Foster Sustainability	Connect Communities
Corridor Alternatives						
Vine Street to Keystone Avenue	▲	●	▲▲	▲	▲	▲
Keystone Avenue to Stoker Avenue	▲▲	●	▲▲	▲	▲	▲
Stoker Avenue to West of Summit Ridge Drive Alternative 1	▲▲	●	▲▲	▲	▲	▲
Stoker Avenue to West of Summit Ridge Drive Alternative 2	▲▲	●	▲▲	▲	▲	▲
West of Summit Ridge Drive to West of Truckee River Trail Alternative 1	▲▲	●	▲▲	▲	▲	▲
West of Summit Ridge Drive to West of Truckee River Trail Alternative 2	▲▲	●	▲▲	▲	▲	▲
West of Truckee River Trail to McCarran Boulevard	▲▲	●	▲▲	▲	▲	▲
Spot Alternatives						
Washington Street and Ralston Street Roundabouts	▲▲	▼	▲	▲	●	▲
Commercial Access West of Vine Street	▲▲	▼	●	▲	●	▲
Stoker Avenue Roundabout	▲▲	▼	▲	▲	●	▲
Summit Ridge Drive Roundabout	▲▲	▼	▲	▲	●	▲

Stakeholder and Public Participation Plan

The study team incorporated an active collaboration process to coordinate and shape the development of the SMP, therefore a TAC was assembled to provide a venue for interagency collaboration. Participating agencies included the NDOT Traffic Safety Engineering Division, NDOT Traffic Operations, NDOT District II, City of Reno, RTC of Washoe County, FHWA, Reno Fire Department, Reno Bike Project, and Wood Rodgers. Two (2) TAC meetings, one (1) TAC RSA, and two (2) TAC Subcommittee meetings were held during the course of the project, and materials for each meeting can be found in **Appendix N**.

In addition to the TAC meetings, a Virtual Public Information Meeting was held in lieu of an in-person public meeting due to the Covid-19 pandemic. The Virtual Public Information Meeting was held on the NDOT website from May 10, 2021, through May 20, 2021, and gave the general public an opportunity to provide feedback regarding the SMP alternatives. The meeting was advertised in the Reno Gazette Journal one week ahead, the day before, and the day of the meeting, as well as 1,500 banner ads in the digital section. The

meeting was also advertised one week before the meeting in the Spanish paper El Sol de Nevada. Approximately 130 participants reviewed the Virtual Public Information Meeting and 6 left responses.

The Virtual Public Information Meeting was presented through the use of an ArcGIS StoryMap that illustrated the alternatives under consideration. The ArcGIS StoryMap included a project overview, corridor alternatives, spot location alternatives, other safety improvements, and an interactive public comment section. **Figure 42** is a snapshot of the Virtual Public Information Meeting and additional information regarding the meeting can be viewed in **Appendix O**.

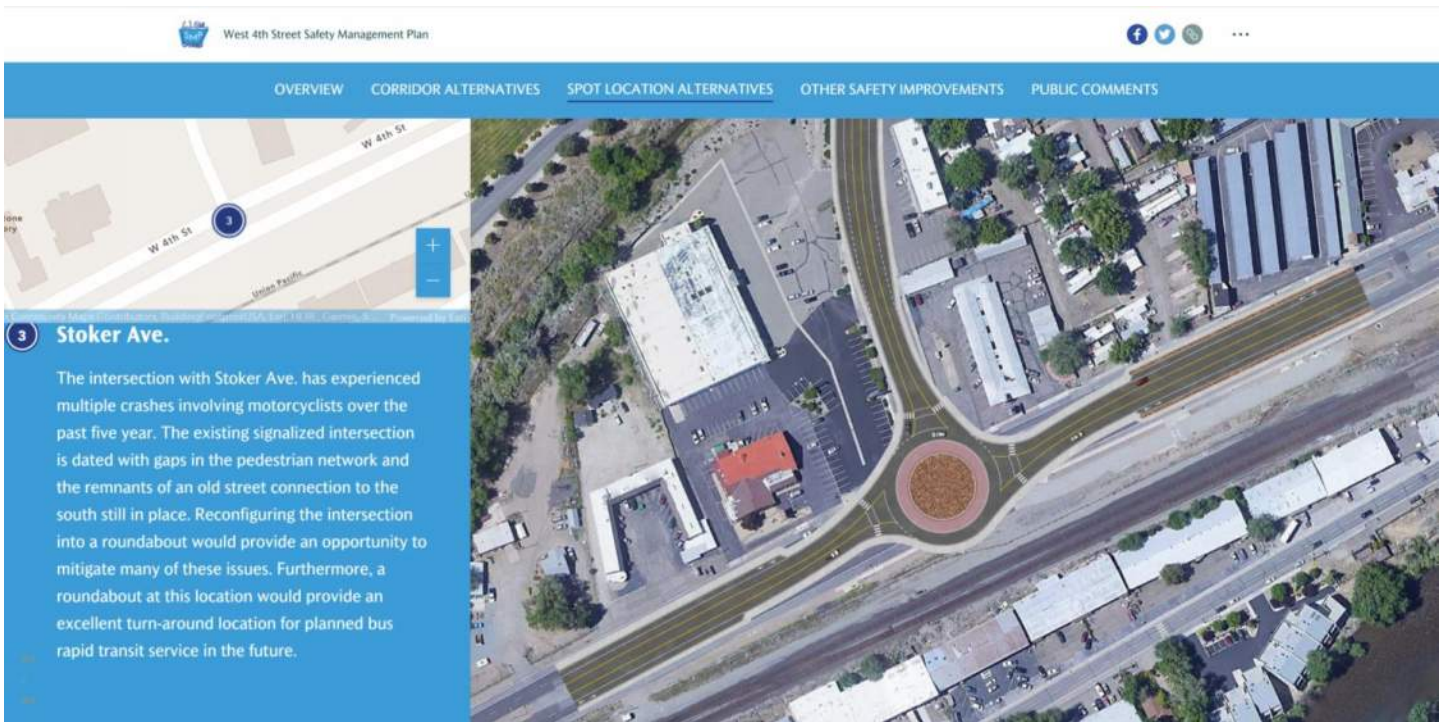


Figure 42: Virtual Public Information Meeting Snapshot



APPENDIX A – CRASH TYPE





APPENDIX B – CRASH FACTORS





APPENDIX C – CRASH SEVERITY





APPENDIX D – ROAD SAFETY AUDIT





APPENDIX E – COLLECTED AND BALANCED TURNING MOVEMENT COUNTS





APPENDIX F – EXISTING SIGNAL TIMINGS





APPENDIX G – EXISTING CONDITIONS SYNCHRO 10 REPORT





APPENDIX H – PEDESTRIAN AND BICYCLE LTS METHODOLOGY





APPENDIX I – EXISTING PLANS AND STUDIES





APPENDIX J – CORRIDOR ALTERNATIVE CALCULATIONS





APPENDIX K – SPOT ALTERNATIVE CALCULATIONS





APPENDIX L – MITIGATED CONDITIONS WITH LPI SYNCHRO 10 REPORT





APPENDIX M – PLANNING LEVEL STREET CORRIDOR AND INTERSECTION DESIGNS





APPENDIX N – STAKEHOLDER INFORMATION





APPENDIX O – PUBLIC PARTICIPATION INFORMATION

