



REGIONAL
BICYCLE & PEDESTRIAN PLAN
FOR SOUTHERN NEVADA

Regional Bicycle & Pedestrian Plan for Southern Nevada

Regional Transportation Commission of Southern Nevada
with support from the Southern Nevada Health District



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Cover Image Top: Trails Park Wash Trail (Image Credit: City of Las Vegas)

Cover Image Bottom: Floyd Lamb Park (Image Credit: City of Las Vegas)



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Contents

Executive Summary	11
CHAPTER 1	
Introduction	19
CHAPTER 2	
Existing Conditions Report.....	29
CHAPTER 3	
Stakeholder Participation Summary	109
CHAPTER 4	
Goals and Objectives	133
CHAPTER 5	
Recommended Policies and Programs	157
CHAPTER 6	
Design Guidance.....	189
CHAPTER 7	
Infrastructure and Implementation.....	235
CHAPTER 8	
Conclusion.....	277
Appendix A: Review of Existing Studies.....	A-1
Appendix B: Review of Southern Nevada Health Determinants	B-1
Appendix C: Multi-modal Level of Service Analysis	C-1
Appendix D: Project Tables and Prioritization Scoring.....	D-1
Appendix E: Existing and Proposed Facility Types by Jurisdiction.....	E-1

Acronyms

AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY TRANSPORTATION OFFICIALS	NDEP	NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
ACS	AMERICAN COMMUNITY SURVEY	NHTS	NATIONAL HOUSEHOLD TRAVEL SURVEY
ADA	AMERICAN WITH DISABILITIES ACT	OHV	OFF-HIGHWAY VEHICLE
ADT	AVERAGE DAILY TRAFFIC	PROWAG	PUBLIC RIGHT-OF-WAY ACCESSIBILITY GUIDELINES
APBP	ASSOCIATION OF PEDESTRIAN AND BICYCLE PROFESSIONALS	RDA	REDEVELOPMENT AUTHORITY
APWA	AMERICA PUBLIC WORKS ASSOCIATION	RRFB	RECTANGULAR RAPID FLASH BEACON
BRT	BUS RAPID TRANSIT	RTC	REGIONAL TRANSPORTATION COMMISSION OF SOUTHERN NEVADA
CCSD	CLARK COUNTY SCHOOL DISTRICT	RTP	REGIONAL TRANSPORTATION PLAN
CEDS	COMPREHENSIVE ECONOMIC DEVELOPMENT STRATEGY	RTCA	RIVERS, TRAILS, AND CONSERVATION ASSISTANCE PROGRAM
CDSN	CONSERVATION DISTRICT OF SOUTHERN NEVADA	SNHD	SOUTHERN NEVADA HEALTH DISTRICT
CMAQ	CONGESTION MITIGATION AND AIR QUALITY	SNPLMA	SOUTHERN NEVADA PUBLIC LANDS MANAGEMENT ACT
CIP	CAPITAL IMPROVEMENT PROGRAM	SNRHA	SOUTHERN NEVADA REGIONAL HOUSING AUTHORITY
CLV	CITY OF LAS VEGAS	SNRPC	SOUTHERN NEVADA REGIONAL PLANNING COALITION
CPTED	CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN	SNS	SOUTHERN NEVADA STRONG
DMV	DEPARTMENT OF MOTOR VEHICLES	SNWA	SOUTHERN NEVADA WATER AUTHORITY
EPA	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY	SRTS	SAFE ROUTES TO SCHOOL
FHWA	FEDERAL HIGHWAY ADMINISTRATION	STP	SURFACE TRANSPORTATION PROGRAM
GIS	GEOGRAPHIC INFORMATION SYSTEM	TAP	TRANSPORTATION ALTERNATIVES PROGRAM
HAWK	HIGH-INTENSITY ACTIVATED CROSSWALK	TDM	TRANSPORTATION DEMAND MANAGEMENT
HOA	HOMEOWNERS ASSOCIATION	TIP	TRANSPORTATION IMPROVEMENT PROGRAM
HOV	HIGH OCCUPANCY VEHICLE	TIGER	TRANSPORTATION INVESTMENT GENERATING ECONOMIC RECOVERY
HUD	U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT	TOD	TRANSIT ORIENTED DEVELOPMENT
ITE	INSTITUTE OF TRANSPORTATION ENGINEERS	TRB	TRANSPORTATION RESEARCH BOARD
LEED	LEADERSHIP IN ENERGY EFFICIENT DESIGN	UNLV	UNIVERSITY OF NEVADA, LAS VEGAS
LOC	(BICYCLIST) LEVEL OF COMFORT	USDA	U.S. DEPARTMENT OF AGRICULTURE
LWCF	LAND AND WATER CONSERVATION FUND	USDOT	U.S. DEPARTMENT OF TRANSPORTATION
MPH	MILES PER HOUR	VOC	VOLATILE ORGANIC COMPOUND
MPO	METROPOLITAN PLANNING ORGANIZATION		
MUTCD	MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES		
MSA	METROPOLITAN STATISTICAL AREA		
NACTO	NATIONAL ASSOCIATION OF CITY TRANSPORTATION OFFICIALS		

Figures

Figure 1.1: Bicyclists in Downtown Las Vegas, Credit: City of Las Vegas Bicycle Club	20
Figure 1.2: Impact of speed and a pedestrian risk of severe injury or death. (Tefft, 2012)	21
Figure 1.3: RTC Bicycle and Pedestrian Plan (Oct. 2008).	23
Figure 1.4: Nevada Moves Day, Credit: City of Las Vegas	24
Figure 1.5: Desired Outcomes of the Regional Bicycle and Pedestrian Plan Development	26
Figure 1.6: Southern Nevada Strong Regional Plan (Jan. 2015)	28
Figure 2.1: Temperature-mode share relationship (Data: Alliance for Biking and Walking, 2014)	30
Figure 2.2: RTC Bike Center at the Bonneville Transit Center offers bike storage, bike repair services, and shower facilities.	31
Figure 2.3: Existing Study Diagram	32
Figure 2.4: Related Studies Diagram	34
Figure 2.5: Southern Nevada Strong Vision Plan	37
Figure 2.6: Percent of all U.S. Bicycle Trips by Race/Ethnicity and Racial Breakdown Nationally and Locally.	39
Figure 2.7 Racial and Ethnic Composition: Las Vegas-Paradise, NV Metro Area, 1980-2040	39
Figure 2.8: Average Travel Time to Work (Minutes) for All Modes by Race/Ethnicity: Las Vegas-Paradise, NV Metro Area	40
Figure 2.9: Share of population and pollution burden, by race/ethnicity, in the Las Vegas-Paradise, NV Metro Area	42
Figure 2.10: Percentage of overweight or obese people, by race/ethnicity, in the Las Vegas-Paradise, NV Metro Area	42
Figure 2.11: Socio-Economic Indicators	44
Figure 2.12: Cheyenne Ave features 12' travel lanes with 14' outside lanes	47
Figure 2.13: Downtown Las Vegas. Image: Southern Nevada Strong	48
Figure 2.14: Commute Mode Share Comparison Between RTC Project Area Municipalities & Peer Cities in the Western U.S.	53
Figure 2.15: Mode Share Comparison Between RTC Area Jurisdictions	56
Figure 2.16: School Trip Mode Share Comparison Between RTC Area Jurisdictions.	57
Figure 2.17: Amargosa Trail, Henderson	58
Figure 2.18: Separated Bike Lane, Boulder City	59
Figure 2.19: Existing Bicycling and Walking Facilities in RTC Project Area Municipalities & Similar Cities in the Western U.S.	59
Figure 2.20: Buffered Bike Lane, Salt Lake City	60
Figure 2.21: Bike Lane, Henderson	60
Figure 2.22: McCullough Hills Trail, Henderson	61
Figure 2.23: Active Transportation Network Make-up for RTC Project Area & Similar Cities in the Western U.S.	62
Figure 2.24: Existing Bicycle Facility Density for RTC Project Area Municipalities & Similar Cities in the Western U.S.	62
Figure 2.25: Southern Nevada Transportation Safety Plan Recommendations	66
Figure 2.26: High Priority Bicycle and Pedestrian Safety Strategies recommended by the SNTSP	67
Figure 2.27: 2011-2015 Year over Year Pedestrian Crashes	69
Figure 2.28: 2011-2015 Year over Year Bicycle Crashes	69
Figure 2.29: 2011-2015 Speed Limits at Crash Locations	70
Figure 2.30: 2011-2015 Pedestrian and Bicycle Crash Locations	70
Figure 2.31: 2011-2015 Pedestrian and Bicycle Crashes, Time of Day	71
Figure 2.32: 2011-2015 Pedestrian and Bicycle Crashes, Driver Actions	71
Figure 2.33: Regional Bicycle Network Gap Analysis Prioritization Matrix	77
Figure 2.34: Level of Comfort effect on perceived trip distance	80
Figure 2.35: Las Vegas Wash Trail	92
Figure 2.36: Bicycle and Pedestrian Health Determinants for Southern Nevada (Derived from SNS Goals)	104

Figures

Figure 3.1: Public Outreach . . . . .	.111
Figure 3.2: Stakeholder Participation . . . . .	.111
Figure 3.3: Decision-making structure . . . . .	.112
Figure 3.4: Online Survey Interface . . . . .	.117
Figure 3.5: Survey Results – Demographics . . . . .	.119
Figure 3.6: Survey Results – Income / Bicycling & Walking Habits . . . . .	.120
Figure 3.7: Survey Results – Challenges & Opportunities . . . . .	.121
Figure 3.8: Online Mapping Tool Interface - Existing Conditions Input . . . . .	.123
Figure 3.9: Online Mapping Tool Interface - Proposed Facilities Input . . . . .	.130
Figure 4.1: RBPP goals . . . . .	.134
Figure 6.1: National Design Guidance Manual Covers . . . . .	.190
Figure 6.2: State Design Guidance Manual Covers . . . . .	.191
Figure 6.3: Bicycle Facility Selection Guidance Table . . . . .	.192
Figure 6.4: Typical Distribution of Bicyclist Types . . . . .	.193
Figure 6.5: Pedestrian Crossing at a Roundabout . . . . .	.194
Figure 6.6: Crossing Treatment Selection Guidance . . . . .	.195
Figure 6.7: Examples of Crossing Treatments . . . . .	.195
Figure 6.8: Sidewalk Near School In Boulder City . . . . .	.196
Figure 6.9: Sidewalk Zones and Widths . . . . .	.197
Figure 6.10: Curb Ramp Variants . . . . .	.198
Figure 6.11: Typical Features of Curb Extensions . . . . .	.199
Figure 6.12: Streetscape with Green Infrastructure . . . . .	.200
Figure 6.13: Example of Conventional Driveway . . . . .	.201
Figure 6.14: Variants of Marked Crosswalk . . . . .	.202
Figure 6.15: Example of Median Refuge Island . . . . .	.203
Figure 6.16: Example of Active Warning Beacon . . . . .	.204
Figure 6.17: Example of Pedestrian Hybrid Beacon . . . . .	.205
Figure 6.18: Example of Pelican Crossings . . . . .	.206
Figure 6.19: Example of Scramble Crosswalk . . . . .	.207
Figure 6.20: Examples of Bicycle Parking . . . . .	.208
Figure 6.21: Example of Shared Roadway . . . . .	.209
Figure 6.22: Example of Bicycle Boulevard . . . . .	.210
Figure 6.23: Example of On-Street Bicycle Lane . . . . .	.211
Figure 6.24: Example of Buffered Bike Lane . . . . .	.212
Figure 6.25: Example of One-Way Separated Bike Lane . . . . .	.213
Figure 6.26: Example of Two-Way Separated Bike Lane . . . . .	.214
Figure 6.27: Example of Shared Use Path . . . . .	.215
Figure 6.28: Example of Shared Use Paths Along Roadway . . . . .	.216
Figure 6.29: Examples of Shared Use Path Crossings . . . . .	.217
Figure 6.30: Example of Grade-Separated Crossings . . . . .	.218
Figure 6.31: Example of Bike Box . . . . .	.219

Figures

Figure 6.32: Example of Two-Stage Turn Box	220
Figure 6.33: Example of Bike Lanes at Added Right Turn Lanes	221
Figure 6.34: Example of Bike Lanes at Through Lane to Right Turn Lane Transition	222
Figure 6.35: Example of Combined Bike Lane/Turn Lane	223
Figure 6.36: Example of Intersection Crossing Markings	224
Figure 6.37: Example of Mixing Zone	225
Figure 6.38: Types of Bicycle Detection	226
Figure 6.39: Example of Protected Bicycle Signal Phase	227
Figure 6.40: Example of Bike Lanes at Channelized Turn Lanes	228
Figure 6.41: Example of Bike Lanes at Entrance and Exit Ramp	229
Figure 6.42: Example of “Toucan” Signal.	230
Figure 6.43: Example of Protected Intersection	231
Figure 6.44: Example of Single Lane Roundabout with Bicycle and Pedestrian Crossings & Infrastructure	232
Figure 6.45: Examples of Minor Bicycle Boulevard Intersections	233
Figure 6.46: Examples of Major Bicycle Boulevard Intersections	234
Figure 7.1: Wide Sidewalk Allowing Walking Six Abreast	236
Figure 7.2: Stephanie Street Separated Bike Lane, Henderson	238
Figure 7.3: Buffered Bike Lane.	238
Figure 7.4: Bicycle Boulevard Traffic Calming and Diversion	239
Figure 7.5: River Mountains Loop Trail near Lake Mead NRA	239
Figure 7.6: Makeup of the Total Study Area Buildout (Existing + Proposed) Bicycling and Walking Facility Mileage	240
Figure 7.7: System Mileage Increases and Future High Comfort Share (Entire Study Area)	240
Figure 7.8: Existing and Proposed Bicycling and Walking Facilities in RTC Project Area Municipalities	242
Figure 7.9: Existing and Proposed Total Buildout’s Bicycling and Walking Facility Density for RTC Project Area Municipalities & Similar Cities in the Western U.S.	242
Figure 7.10: Makeup of the Total Buildout (Existing + Proposed) Bicycling and Walking Facility Mileage (Las Vegas)	244
Figure 7.11: System Mileage Increases and Future High Comfort Share (Las Vegas)	244
Figure 7.12: Makeup of the Total Buildout (Existing + Proposed) Bicycling and Walking Facility Mileage (North Las Vegas).	246
Figure 7.13: System Mileage Increases and Future High Comfort Share (North Las Vegas)	246
Figure 7.14: Makeup of the Total Buildout (Existing + Proposed) Bicycling and Walking Facility Mileage (Henderson)	248
Figure 7.15: System Mileage Increases and Future High Comfort Share (Henderson)	248
Figure 7.16: Makeup of the Total Buildout (Existing + Proposed) Bicycling and Walking Facility Mileage (Boulder City)	250
Figure 7.17: System Mileage Increases and Future High Comfort Share (Boulder City).	250
Figure 7.18: Makeup of the Total Buildout (Existing + Proposed) Bicycling and Walking Facility Mileage (Clark County).	252
Figure 7.19: System Mileage Increases and Future High Comfort Share (Clark County)	252
Figure 7.20: Denver & Rio Grande Western Rail Trail, Utah	257
Figure 7.21: Las Vegas Wash Trail	258
Figure 7.22: Separated Bike Lane Drainage Considerations.	266
Figure 7.23: Concrete Section of the Las Vegas Wash Trail	268
Figure 7.24: Bridge Structure Deck in Concrete to Reduce Maintenance	268
Figure 8.1: A mother and child riding together in Southern Nevada.	279

Maps

Map 2.1: Equity Analysis Map	45
Map 2.2: ACS Bike Mode Share by Home ZIP Code Map	54
Map 2.3: ACS Walk Mode Share by Home ZIP Code Map	55
Map 2.4: Existing Facilities Map	63
Map 2.5: Transit Boardings with Bicycles Map (Top 10 Routes Labeled)	65
Map 2.6: Pedestrian Crash (2011-15) Analysis Density Map	73
Map 2.7: Bicycle Crash (2011-15) Analysis Density Map	75
Map 2.8: High Priority Bicycle Facility Recommendations Map with Regional Routes Highlighted from the 2014 Regional Bicycle Network Gap Analysis	79
Map 2.9: Existing Level of Comfort 1 Map (Collector and Arterial Roadways)	85
Map 2.10: Existing Level of Comfort 1-2 Map (Collector and Arterial Roadways).	87
Map 2.11: Existing Level of Comfort 1-3 Map (Collector and Arterial Roadways)	89
Map 2.12: Existing Level of Comfort Map (Collector and Arterial Roadways).	91
Map 2.13: Possible Shared-use Path Corridors (Opportunities & Constraints) Map	93
Map 2.14: Protected Lands (Opportunities & Constraints) Map	95
Map 2.15: Road Diet Candidates (Opportunities & Constraints) Map	97
Map 2.16: Priority 2011-15 Crash Corridors & Intersections (Opportunities & Constraints) Map	99
Map 2.17: Southern Nevada Strong Priority Transit Corridors (Opportunities & Constraints) Map.	101
Map 3.1: Outreach and Equity	115
Map 3.2: Survey Responses by Zip	122
Map 3.3: Online Mapping Tool Results - "Walk/Bike Routes I Currently Use"	126
Map 3.4: Online Mapping Tool Results - "Walk/Bike Routes I'd Like to Use"	127
Map 3.5: Online Mapping Tool Results - "Places I'd Like to Walk/Bike to"	128
Map 3.6: Wikimapping Results - "Barriers to Walking/Biking"	129
Map 3.7: Wikimapping Results - "Recommended New Bikeways".	131
Map 3.8: Wikimapping Results - "Top 3 Recommended Projects".	132
Map 7.1: Existing & Proposed Facilities Map	241
Map 7.2: Existing & Proposed Separated Bike Lane Map	243
Map 7.3: Existing & Proposed Facilities Map (Las Vegas).	245
Map 7.4: Existing & Proposed Facilities Map (North Las Vegas)	247
Map 7.5: Existing & Proposed Facilities Map (Henderson)	249
Map 7.6: Existing & Proposed Facilities Map (Boulder City)	251
Map 7.7: Existing & Proposed Facilities Map (Clark County)	253
Map 7.8: Existing & Proposed Facilities Map w/ Road Diets Highlighted	255
Map 7.9: Existing Level of Comfort Map (Collector and Arterial Roadways)	260
Map 7.10: Future Level of Comfort Map (Collector and Arterial Roadways).	261

Tables

Table 2.1: Walk Friendly Community Survey Results	50
Table 2.2: Bicycle Friendly Community Survey Results.	51
Table 2.3: Local Jurisdiction Bicycle Parking Requirements	52
Table 2.4: Level of Comfort Data Sources	81
Table 2.5: Enhanced Level of Comfort (LOC) Criteria to Assess Bicycling Conditions	82
Table 2.6: Existing Bicycle and Pedestrian Programs in Southern Nevada	106
Table 3.1: Pop-Up Meetings Attended	116
Table 7.1: Multi-modal Level of Service Analysis Results Summary	256
Table 7.2: Criteria and Sub-Criteria Weights and Scores	263
Table 7.3 Estimated Facility Type Cost Estimates Per Mile (Center Line), Miles Per \$100,000 (Center Line), New Miles Proposed	264
Table 7.4 Estimated Spot Improvement Type Cost Estimates Each, Installations Per \$100,000	264
Table 7.4 Recommended Routine Shared-Use Path Maintenance Frequency and Estimated Costs	267
Table 7.5 Local Bicycle and Pedestrian Funding Options	270
Table 7.6 State and Federal Bicycle and Pedestrian Funding Options	271
Table 7.7 Regional Bicycle and Pedestrian Funding Options	274
Table 7.8 Private, Non-Profit, or Corporate Bicycle and Pedestrian Funding Options	275

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Executive Summary

Vision and Goals

The Regional Bicycle and Pedestrian Plan's (RBPP) guiding vision and goals were developed and refined through collaboration with stakeholders, the public, local jurisdiction staff, RTC staff, and the project team, with the Southern Nevada Strong plan providing the framework for the development of these goals and their corresponding objectives and policies. Additionally, this plan recommends goal-oriented performance measures that will allow tracking and reporting of progress and successes.

VISION

“Southern Nevada will develop a safe, connected, and convenient walking and bicycling system that serves as a viable transportation and recreation asset while advancing the region’s economic, educational, health, and environmental goals.”

GOALS



GOAL 1: COMFORT & SAFETY

DEVELOP COMPREHENSIVE FACILITIES THROUGHOUT SOUTHERN NEVADA THAT MAKE BICYCLING AND WALKING SAFE, COMFORTABLE AND CONVENIENT FOR ALL AGES AND ABILITIES



GOAL 2: ACCESS

IMPROVE BICYCLING AND WALKING ACCESS TO COMMUNITY DESTINATIONS ACROSS SOUTHERN NEVADA INCLUDING CONNECTIONS TO TRANSIT



GOAL 3: EDUCATION & ENCOURAGEMENT

ENCOURAGE BROADER PARTICIPATION, APPRECIATION, AND AWARENESS OF WALKING AND BICYCLING THROUGH PROGRAM EFFORTS TARGETED AT ALL AGES AND ABILITIES

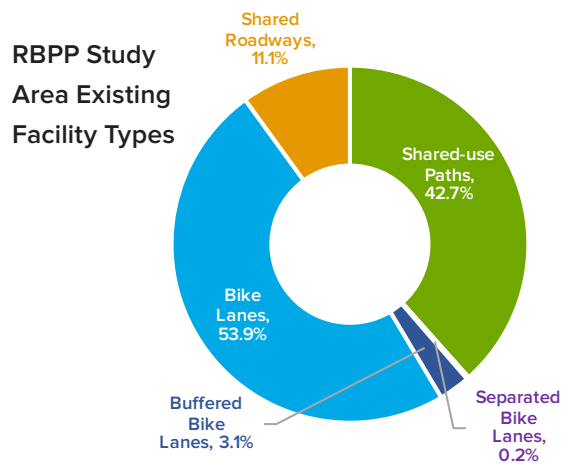


GOAL 4: EQUITY & HEALTH

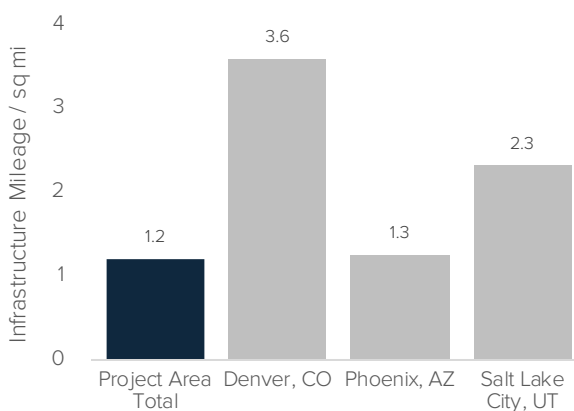
RECOGNIZE THE TRANSPORTATION SYSTEM'S IMPACT ON AIR QUALITY AND COMMUNITY HEALTH WHILE PROVIDING LADDERS OF OPPORTUNITY TO UNDERSERVED NEIGHBORHOODS

Existing Conditions

Chapter Two in the RBPP analyzes the existing conditions in Southern Nevada, including where equity disparities exist; how many trips in Southern Nevada are done by walking or bicycling; where crashes involving people walking and bicycling occur and what factors contribute to those crashes; and, what the existing walking and bicycling system looks like, how it functions, and who it is designed to serve.



Existing Study Area Bicycling and Walking Facility Density Compared to Similar Western U.S. Cities



Of all trips in Southern Nevada, about 1% are done by bicycle and another 8 to 12% by walking.

Most crashes occur on roadways with speed limits between 35 and 45 mph.

The analysis considering speeds, traffic volumes, number of lanes, and signalized intersections determined that about 14-17% of collectors and arterials are comfortable enough for the typical adult or any child to ride a bike on.

There are currently 868 miles of bike lanes, paved paths, and shared roadways (bike routes) in the RBPP study area. Approximately 400 (46%) of those miles are high comfort facilities, appropriate for all ages and abilities.

Public Outreach

In order to best determine Southern Nevadans' walking and bicycling needs, the project team conducted diverse public outreach efforts throughout the planning process. The project team and the RTC committed to an approach that:

- Included as many people as possible, emphasizing contributions from low-income and minority populations (see Equity Analysis).
- Provided ample and early opportunities for stakeholders to raise issues important to them.
- Ensured that all comments directly contributed to the planning process
- Continued efforts from and provided consistent and effective coordination with related plans, like Southern Nevada Strong.

PUBLIC OUTREACH METHODS

- **Pop-Up Meetings:** More than 300 people reached through 12 pop-up events at flea markets, farmers markets, outdoors events, etc.
- **Online Survey & Mapping Tools:** More than 1,000 people responded to an early 2016 online survey with opinions about what would make walking and bicycling easier. More than 1,200 more comments were received in early and late 2016 through an interactive map that encouraged drawing desired facilities and reviewing plan recommendations, respectively.
- **Stakeholder Outreach:** The project team met frequently with stakeholder groups, local jurisdictions, and other agencies to ensure a collaborative process that reflected the desires of all involved in improving walking and bicycling in Southern Nevada.

TOP 3 OBSTACLES OR CONCERNS

- **1.** **Safety concerns**
(Inadequate lighting, too much traffic)
- **2.** **Weather**
(Too hot, not enough shade)
- **3.** **Not convenient**
(Too much to carry, takes too long, no good route)

TOP 3 DESIRED IMPROVEMENTS

- **1.** **Better facilities**
(Wider/separated sidewalks and bike lanes)
- **2.** **More regional paved trails**
- **3.** **More safe routes to school**
(Sidewalks, crosswalks, safety signage)

Recommendations

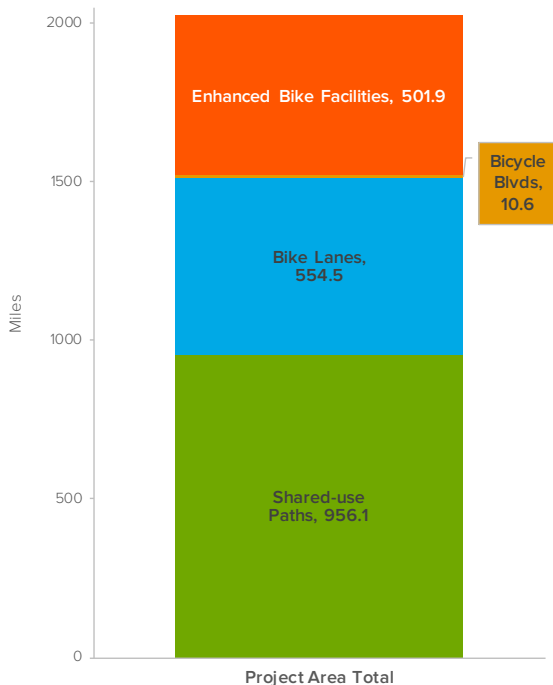
Southern Nevadans indicated that they would like wider and more physically separated bike lanes and sidewalks, more regional paved shared use paths, and safer routes to school. The RBPP recommends programs and policies that support walking and bicycling for all ages and abilities and about 2,023 miles of walking and bicycling facilities when the proposed system is completely built out (1,336 new miles).

The most comfortable facility type possible (given traffic volumes and other implementation considerations) was chosen for each major corridor in the RBPP study area. High comfort facilities will connect people of all ages and abilities to jobs, homes, parks and open space, and schools.

About 73% of the total 2,023 miles will be high comfort facilities, compared to about 46% currently.

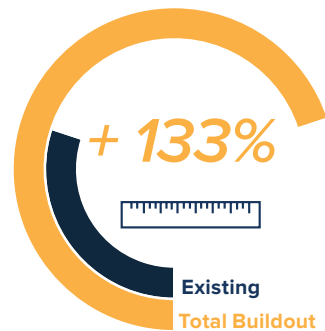
After total build out, 46% of non-freeway, collector and above roadways will be comfortable enough for the typical adult or any child to ride a bike on (compared to 14-17% currently).

RBPP Study Area Future Facility Types & Mileages

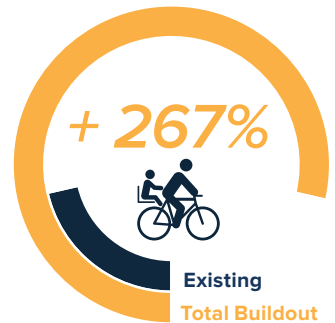


Note: Separated and buffered bike lanes combined as "Enhanced Bike Facilities"

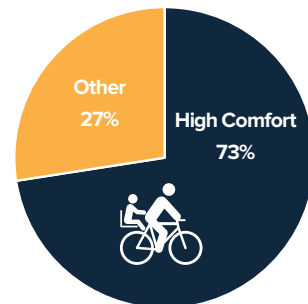
Total Facility Mileage

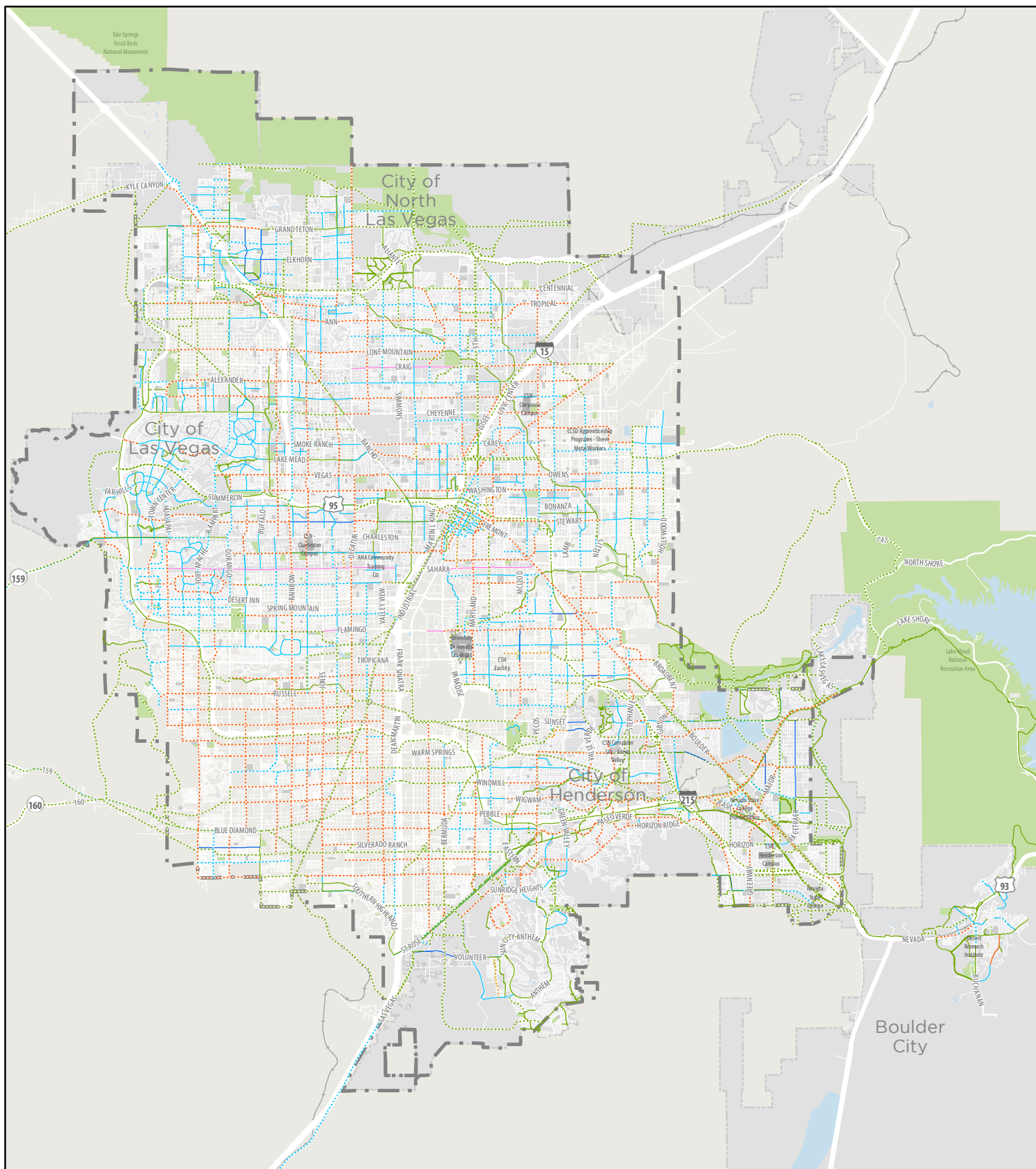


High Comfort Facilities



% of High Comfort Facilities





See Map 7.3 in Document
Regional Bicycle and Pedestrian Plan for
Southern Nevada

Existing & Proposed Facilities Map

Data Source: Clark County and RTC GIS; 2011 North Las Vegas
Comprehensive Bikeway and Trails Plan, 2014 Regional Bicycle
Gap Analysis, 2016 Las Vegas Mobility Master Plan
Map Created: April 13, 2017
Map Produced By: Alta Planning + Design

- Proposed Facilities**
(New or Previously Planned)
- Enhanced Bicycle Facility
(Separated or Buffered Bike Lane)
 - Bike Lane
 - Bicycle Boulevard
 - Shared-use Path

- Existing Facilities**
- Separated Bike Lane
 - Buffered Bike Lane
 - Bike Lane
 - Bus/Bike Lane
 - Shared-use Path

- Park/Nat'l Area
- School
- College
- Municipality
- Southern Nevada Public
Land Management Act
Boundary

Note: This map of existing and proposed facilities was developed to achieve the goals of the Regional Bicycle and Pedestrian Plan. Additional review and analysis of proposed facilities may be required prior to implementation. Additionally, when both are present, proposed facility linework obscures existing facilities in some cases.

0 2 4 8 Miles







Prioritization & Implementation

Southern Nevada's existing system and more robust proposed, future system (at total build out) rival those of comparable regions throughout the U.S. The RBPP includes prioritization, maintenance, and design recommendations to ensure an efficient and cost-effective implementation.

Proposed linear infrastructure projects were prioritized using criteria and other considerations from Goals 1, 2, and 4 (2), as well as factors related to regional significance and feasibility (table below).

In addition to providing capital and maintenance costs, the plan also identifies 28 local, regional, state, federal, non-profit, and other funding or financing strategies and sources that can be used to implement proposed facilities, programs, and policies.

	Overall Criteria Weight	Sub-Criteria	Sub-Criteria Score	Description
 Comfort & Safety	8	Addresses Bicycle/Pedestrian Crashes	5	Project will address corridors and intersections with high rates of bicycle or pedestrian crashes
		Provides a high comfort facility	3	Project provides a facility of high comfort that appeals to users of all ages and abilities (LOC 1 or 2)
 Access	5	Provides access to transit	2	Project improves direct access to transit
		Addresses a network gap	3	Project was identified as a high priority project in the RTC Bike Gap Analysis
 Equity / Health	3	Serves areas with low equity / high inequality	2	Project serves areas with low equity, high inequality (orange or red on "Equity" map)
		Addresses populations with health issues	1	Project addresses areas with high age-adjusted death rates due to heart disease, stroke, diabetes, or certain cancers
 Regional Significance	5	Connects multiple jurisdictions with biking or walking facilities	2	Project connects multiple jurisdictions
		Connects to bike share station	1	Project improves direct access to a bike share station and provides a route for users to use
		Consistency with local and regional plans	2	Project supports recommendations from other local and regional planning efforts
 Feasibility	4	Public support	2	Project received a high level of public support throughout the planning process
		Potential for Near-Term Implementation Synergy	1	Ability for projects to share resources or leverage other near-term planned construction projects (road resurfacing, utility work from TIP, FRI-C, FRI2, etc.)
		Quick Wins	1	Project requires a modest investment, has few barriers to implementation (paint only, no roadway redesign), and could be constructed within six months

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CHAPTER 1

Introduction



The Importance of Bicycling & Walking

Benefits for Southern Nevada

Active transportation is defined as “human-powered modes of transportation, primarily walking and bicycling”. In addition to providing a low-cost and accessible form of transportation, walking and bicycling offer many additional benefits to communities that choose to create an environment where these forms of transportation are convenient, safe, and normal.

HEALTH / WELLNESS



Physical and programmatic improvements that encourage more walking and bicycling can provide a wide range of health benefits to communities. Better active transportation facilities improve safety and encourage more people to walk and bike, which in turn improves community health.

Easily accessible walking and cycling facilities, such as bike lanes, paved trails and sidewalks, can help people more easily incorporate physical activity into their daily lives and meet minimum daily physical activity guidelines as prescribed by the Surgeon General. In Southern Nevada, 14.8 percent of high school students report being physically inactive (not participating in at least 60 minutes of physical activity in

Figure 1.1:
Bicyclists in Downtown Las Vegas, Credit: Las Vegas Valley Bicycle Club



the past 7 days). Similarly, 22 percent of adults in Southern Nevada report being physically inactive.¹ Living close to parks and recreation facilities has also been linked to an increase in physical activity. Engaging in regular physical activity has numerous health benefits, including reducing the risk and severity of heart disease and diabetes, reducing the risk of some types of cancer and reducing the risk of premature death.

SAFETY



Investments in bicycling and walking can also improve safety. Planning for safety requires a multi-modal approach of accommodating pedestrians, bicyclists, and motorists as they share space on the street. Studies have shown slower motor vehicle speeds exponentially increase survival rates for both pedestrians and people riding bicycles involved in collisions with motorists.²

¹ www.healthysouthernnevada.org

² *Motor Vehicle Crashes, Injuries, and Deaths in Relation to*

At 25 mph, a pedestrian or bicyclist has an 89 percent survival rate, compared with survival rates of 68 percent and 35 percent at 35 mph and 45 mph, respectively.

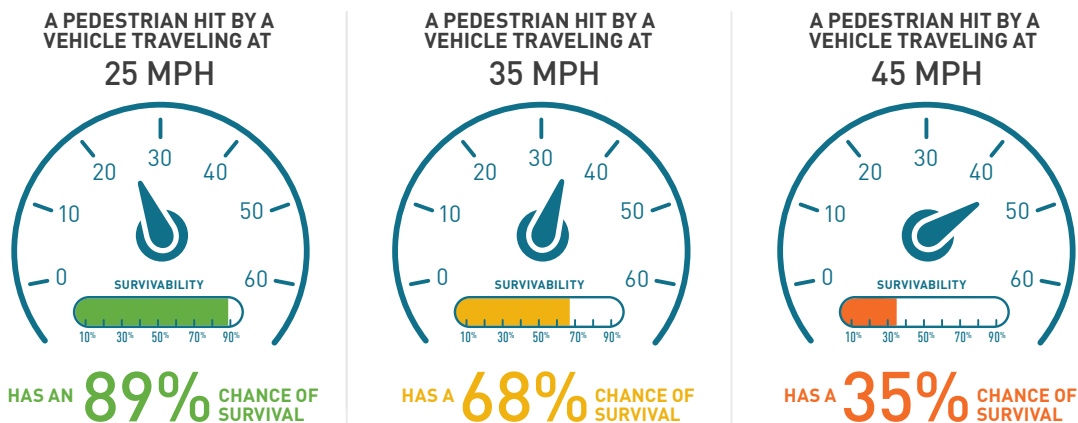
Increasing safety for all road users is an important health objective for all communities in the region. Infrastructure improvements for walking and biking, while creating safe places for active modes, have also been associated with an increase in safety for people driving. In Southern Nevada, the fatality rate due to motor vehicle collisions in 2016 was 9.1 deaths per 100,000 people and has been increasing steadily since 2005, up from 7.3 in that year.

Studies from across the world also suggest that the risk of injury or death in a collision with motor vehicles declines as more people walk or bicycle. Policies that increase the numbers of people walking and bicycling appear to be an effective route to improving the safety for all roadway users.

Driver Age: United States, 1995 – 2010. AAA Foundation for Traffic Safety. 2012. <https://www.aaafoundation.org/sites/default/files/2012OlderDriverRisk.pdf>

Figure 1.2:

Impact of speed and a pedestrian risk of severe injury or death. (Tefft, 2012)



The Importance of Bicycling & Walking

Benefits for Southern Nevada

THE ENVIRONMENT



Bicycling and walking can also offer significant benefits to the Southern Nevada environment. Due to motor vehicles, construction, and commercial and industrial enterprises, air pollution challenges have grown in proportion to the population and economic growth in the valley. Las Vegas received an “F” for ozone levels from the American Lung Association and was labeled the 16th most ozone-polluted city.

The Regional Transportation Plan (RTP) Access 2040 includes air quality in one of the six secondary strategies of the plan (“Improve Public Health Related to Transportation”) and as an indicator for one of the secondary strategies (“Conserve & Protect Natural Resources”). A growing public awareness of air quality can be found in numerous goals within the recently completed Southern Nevada Strong (SNS) Regional Plan, which address point and mobile air quality sources.

ECONOMIC DEVELOPMENT



In addition to benefiting community health, safety, and the environment, bicycling and walking can promote thriving economies. A recent study of Complete Streets projects around the country found that employment levels, business starts, and property values were higher near completed projects, compared to pre-improvement levels and areas that were not improved.³

³ Complete Streets for America, *Safer Streets, Stronger Economies*, March, 2015

EQUITY



There are numerous reasons why active transportation investment in underserved neighborhoods makes sense. Minorities, the elderly, and those living near the poverty line are less likely to have access to a vehicle, making them more reliant on biking, walking, or public transit for their transportation needs. In fact, 8.5 percent of Southern Nevada residents do not have reliable access to an automobile. Health issues also disproportionately affect these same communities. People living at up to four times the poverty line display obesity levels seven to ten percentage points higher than those who earn more⁴. Finally, bicycle and pedestrian safety issues are often exacerbated in underserved areas. A 2014 study on governing.com found that pedestrian fatalities were higher in neighborhoods with lower per capita income and in census tracts with high poverty⁵. This plan has taken specific measures to address equity issues relating to active transportation. Public involvement efforts have been tailored to encourage input from underserved neighborhoods, and project identification and prioritization will also include “equity” as a key criteria.

⁴ Alliance for Biking and Walking, *2016 Benchmarking Report*, 33

⁵ Governing, 2014, August. <http://www.governing.com/gov-data/pedestrian-deaths-poor-neighborhoods-report.html>

Purpose of the Plan

RBPP: What & Why

The purpose of the Regional Bicycle and Pedestrian Plan for Southern Nevada (RBPP) is to provide a framework for improving the bicycle and pedestrian environment throughout the urbanized area of Southern Nevada. The actions and investments identified in the plan will advance the vision through new bicycle and pedestrian infrastructure (off-street trails and on-street bicycle facilities); maintenance; bicycle parking spaces and other end-of-trip facilities; and programs to enhance safety for all roadway users and encourage more people to ride bicycles. Due to the plan's high level conceptual nature, additional, more detailed review is likely required for infrastructure recommendations.

WHAT THIS PLAN COVERS

The study area for the RBPP includes all of Clark County. However, due to development patterns in Southern Nevada, the plan will focus on the urbanized area. The plan will identify and prioritize projects of "regional significance". Plan elements of regional significance accomplish one or more of the following criteria:

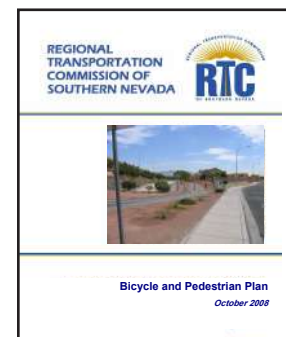
- Identify bicycling and walking facilities that link communities
- Identify bicycling and walking facilities that serve regional hubs or destinations
- Identify policies and guidelines to support the continued improvement of the biking and walking environment
- Establish regional programs and provide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

The Plan will address how the RTC measures performance for bicycling and walking in accordance with federal mandates. The Plan will support the inclusion of elements that meet the RTC Policy for Complete Streets (2012) and will help determine project prioritization for RTC regional funding programs. Compliance with existing plans, such as the Regional Bicycle and Pedestrian Plan, is one of many criteria considered for RTC funding. In addition to serving as a standalone document, the Plan will be included as an appendix in the next update to the RTC Regional Transportation Plan (RTP). The RTP is a comprehensive and long-range plan for the transportation system in the Las Vegas metropolitan area. The RTP is updated every four years and provides guidance on the use of federal transportation funds.

WHY NOW

The most recent Bicycle and Pedestrian Plan for Southern Nevada was completed in 2008. Prior to 2008, the Las Vegas urbanized area was one of the fastest growing regions in the country. This unprecedented growth left many newly developed areas without access to public transportation options and limited connections to the regional bicycling and walking network.

Figure 1.3:
RTC Bicycle and Pedestrian
Plan (Oct. 2008)



Purpose of the Plan

RBPP: What & Why

A subsequent recession brought high foreclosure and unemployment rates. The economic downturn exposed challenges with the region's built environment, including limited transportation choices and unhealthy development patterns. In response to these issues, Southern Nevada is undergoing a paradigm shift in how they view their built environment and their aspirations for the future. A renewed interest in biking, walking, transit, and community health was thoroughly documented in the 2015 Southern Nevada Strong (SNS) Regional Plan. This interest in improving non-motorized transportation facilities holds the potential to unlock latent demand for bicycling and walking, especially when comfortable connections to significant regional destinations can be made.

In addition to changing community desires and needs, active transportation planning and design practices have continued to evolve since the 2008 Plan. The 2008 Plan recommended a network of 586 miles of bike lanes, 309 miles of bike routes, and 689 miles of shared use paths. Since this time, innovative facilities have become more common throughout the country such as bicycle boulevards, buffered bike lanes, and separated bike lanes. These new facilities offer greater potential to unlock latent demand for bicycling and walking facilities by making the network more comfortable for a wider range of users.

Since 2008, the RTC has also developed a stronger focus on Complete Streets. The 2012 Regional Complete Streets Study and subsequent RTC Policy for Complete Streets are

Figure 1.4:
Nevada Moves Day, Credit: City of Las Vegas



the cornerstone of this commitment, however most recent and ongoing RTC studies include Complete Streets to some degree.

Given these developments, the RTC's decision to update the RBPP comes at an opportune time. Growing awareness and demand for active transportation facilities from citizens to policy makers has fostered an energized, engaged, and vocal population that informed this plan's recommendations and can carry the vision forward.

Partner Agencies and Organizations

Many agencies and organizations have been involved in the development of this plan. Major funding for this plan was secured by the Southern Nevada Health District (SNHD) through a Partnerships to Improve Community Health (PICH) grant from the Centers for Disease Control. The PICH grant was awarded to address tobacco use and exposure, poor nutrition, physical inactivity, lack of access to chronic disease prevention, and risk reduction and management opportunities in Clark County. Other partners in the Regional Bicycle and Pedestrian Plan update include RTC municipalities and jurisdictions such as Boulder City, City of Henderson, City of Las Vegas, City of North Las Vegas, City of Mesquite, and Clark County.

Additionally, a number of other organizations have participated in Stakeholder Advisory Groups or were frequently consulted as part of the development of the plan. These agencies include:

- The Bureau of Land Management (BLM)
- Clark County Regional Flood Control District
- Clark County School District (CCSD)
- The National Park Service (NPS)
- Nevada Department of Transportation (NDOT)
- The Outside Las Vegas Foundation (OLVF)
- Partners for a Healthy Nevada
- Southern Nevada Bicycle Coalition
- University Medical Center of Southern Nevada
- University of Nevada Las Vegas (UNLV)
- US Fish and Wildlife (USFW)
- US Forest Service (USFS)

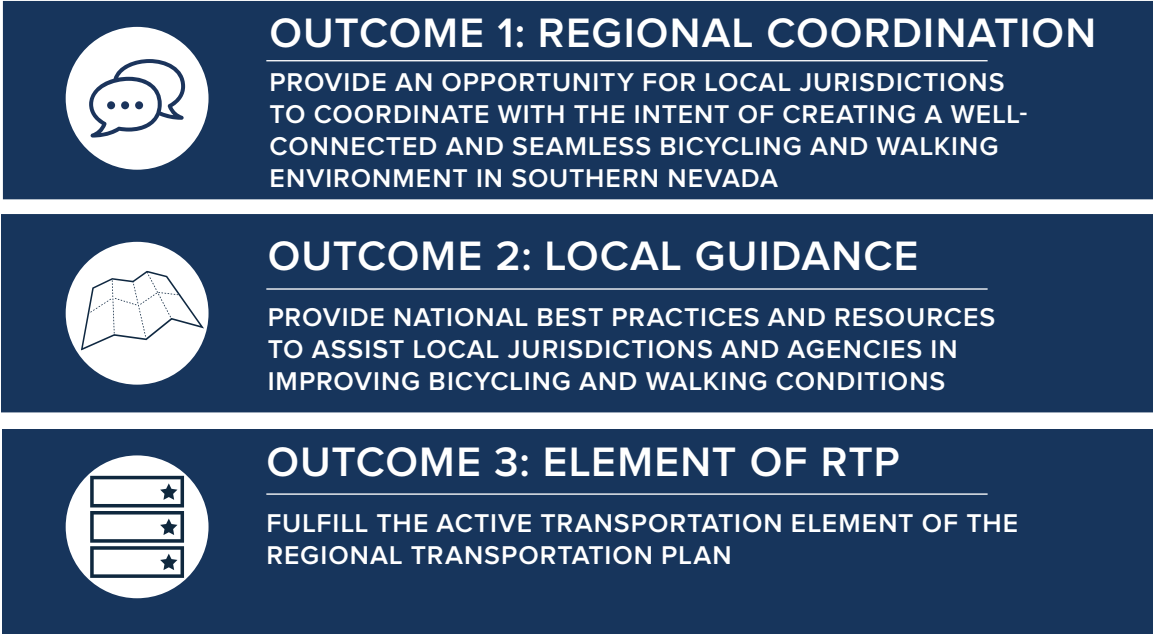
Plan Coordination

How the Plan Will be Used

The RBPP is intended to fulfill three primary outcomes:

1. **Regional Coordination:** The plan seeks to provide an opportunity for jurisdictions to coordinate on issues such as facility designs, route-planning, bicycling and walking policies, and programs. The intent is to create a seamless environment for people walking and bicycling in Southern Nevada.
2. **Local Guidance:** The plan also seeks to provide national best practices and guidance on recommended regional routes and facilities. This guidance is meant to serve as a resource for local jurisdictions as they consider opportunities and implement projects.
3. **Regional Transportation Plan (RTP) Element:** Pending approval, this plan will be incorporated into the RTC’s Regional Transportation Plan (RTP). The RTP is a comprehensive plan for the transportation system in the Las Vegas metropolitan area. It details the transportation investment anticipated for a 20-year timeframe. As part of the RTP, bicycle and pedestrian projects identified through this study will also be incorporated into the Transportation Improvement Program (TIP) which identifies near term (four year) federally funded projects.

Figure 1.5:
Desired Outcomes of the Regional Bicycle and Pedestrian Plan Development



Although the RBPP seeks to create a framework for regional improvement of the bicycle and pedestrian environment, there are many active transportation issues that are difficult to address at a regional scale. Additionally, the plan is intended to allow sufficient implementation flexibility so that local jurisdictions can respond to subsequent engineering judgement, opportunities for cost savings, or changes in public opinion. As such, it is important to understand the limitations of what the RBPP is intended to do and can feasibly accomplish.

1. The RBPP is not intended to identify specific bicycling and walking projects for federal funding, nor does it seek to exclude projects from funding consideration. Compliance with the RBPP is one of many criteria considered when evaluating funding requests.
2. The RBPP does not replace the need for local bicycle and pedestrian planning. This planning effort has focused on biking and walking connections between jurisdictions and to regionally-significant destinations. Connectivity to local destinations, such as elementary schools or pocket parks, has not been specifically considered by the RBPP. Plans by local jurisdictions should seek to define these connections and address issues specific to particular neighborhoods or localities.
3. Recommended projects of higher complexity, such as those that require road diets, relocation of curb and gutter, or elimination of on-street parking, may require additional engineering or public outreach. Engineering judgement should be utilized when considering the RBPP's facility recommendation, potential impacts, and overall adherence to the RBPP's goals of providing a safe, comfortable, and accessible bicycling and walking system.

Supporting the Priorities of Southern Nevada Strong

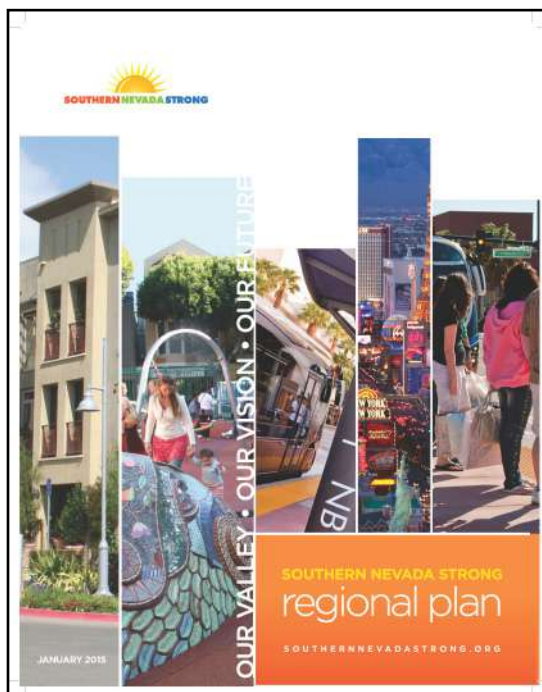
The Southern Nevada Strong (SNS) Regional Plan is the result of an enormous community visioning and outreach effort for the Las Vegas valley. Over 70,000 people were engaged in the process through a variety of means including open houses, focus groups, fliers, email blasts, phone surveys, and a wide range of other activities. This extensive outreach process led to a thoroughly vetted vision for the future of the Las Vegas valley. The vision included a strong focus on creating healthy urban communities with housing and transportation options. The Regional Bicycle and Pedestrian Plan, among other initiatives, represents the next phase of planning and implementation efforts originated

by SNS. The three key themes developed by SNS serve as a key point of reference for the bicycle and pedestrian plan. These include:

1. Improve Economic Competitiveness and Education
2. Invest in Complete Communities
3. Increase Transportation Choice

The Regional Bicycle and Pedestrian Plan advances each of these themes in a number of ways. Chapter Four (Goals and Objectives) specifically describes the relationship of the RBPP's goals with that of SNS.

Figure 1.6:
Southern Nevada Strong Regional Plan (Jan. 2015)



Southern Nevada Strong Vision Statement:

“In 2035, the Southern Nevada region has a strong entrepreneurial spirit sustaining its high quality of life. This vibrant, unique region is characterized by a resilient economy, excellent educational opportunities, urban and natural amenities, and integrated transportation networks.”



CHAPTER 2

Existing Conditions Report



Biking and Walking in Southern Nevada

Weather

Temperature

Daytime temperatures in Southern Nevada routinely hit triple digits in the summer months, making mid-day bicycling or walking trips uncomfortable. However, a hotter climate does not necessarily mean that bicycling and walking become less viable modes of transportation. Many communities see a shift in peak bicycling and walking times to earlier in the morning and later in the afternoon or early evening during the summer. Combining trips home from work with transit can make commuting by bicycle easier.

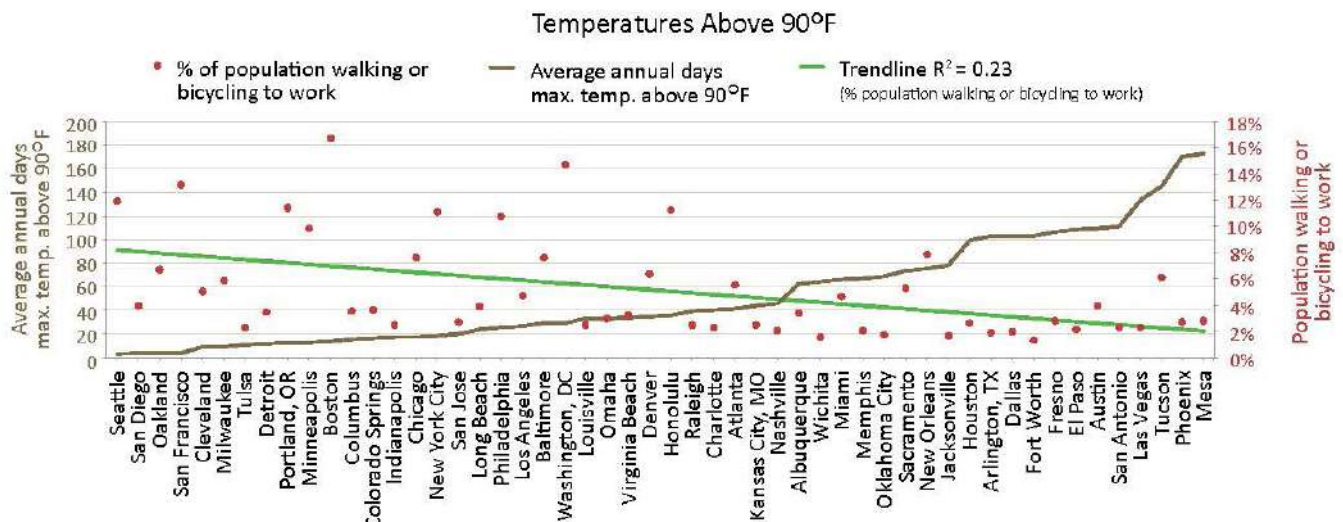
Tucson, Arizona, is one example of a western desert community where trips are frequently taken by walking and bicycling (3.4 percent and 3.5 percent of commute to work trips, respectively, which is an above average rate, especially given its climate). The City found that their extensive network of more than 700 miles of

bike lanes were used less during the summer because the majority of them were on major arterial streets. Arizona's summer heat was exacerbated as the amount of asphalt around bicyclists increased. Since the City has begun to develop their bicycle boulevard network on minor streets with less asphalt, less traffic, more shade trees, and lower ambient temperatures, there has been a less dramatic dip in bicycling rates during the summer.

Precipitation

Cities in the United States in drier climates with less rain and snowfall do not tend to have higher rates of walking and bicycling than those in more temperate climates. In fact, cities with significant rain or snow, like Portland, OR, and Minneapolis, MN, have some of the highest rates of walking and bicycling among large cities in the US.

Figure 2.1:
Temperature-mode share relationship (Data: Alliance for Biking and Walking, 2014)



Land Use Patterns and Transit

Land Use Patterns

Land use and active transportation share an inherent connection. Dense, mixed use centers provide more destinations and services within convenient biking and walking distance than single-use, suburban development patterns. Prior to the Great Recession, sporadic growth and development created isolated developments with limited connectivity to the greater biking and walking network. These broader development patterns and land use influences undoubtedly affect walking and biking activity in Southern Nevada.

Transit

Active transportation and transit share a close and symbiotic relationship. Nearly every transit trip begins and ends with walking or bicycling. Improving bicycling and walking infrastructure allows transit service catchment areas to expand and is among the most fundamental strategies to address first and last mile connectivity.

In Southern Nevada, transit also holds the potential to reverse some of the uncoordinated growth that has negatively affected the walkability and bike-ability of Southern Nevada. As the RTC evaluates high-capacity transit systems such as light rail, there will be a need to reevaluate and rezone land uses around stations to successfully leverage the new system. Transit-oriented development (TOD) creates mixed use, walkable nodes around these areas which in turn will create more services and destinations within walking and bicycling distance for Southern Nevada residents while also creating greater demand for walking and biking facilities.

Corridors such as Maryland Parkway, Flamingo Road, and Las Vegas Boulevard are just a few of the corridors under consideration for transit upgrades. The RBPP will seek to support these future transit investments by identifying and prioritizing corresponding active transportation improvements to ensure first/last mile connectivity.

Figure 2.2:

RTC Bike Center at the Bonneville Transit Center offers bike storage, bike repair services, and shower facilities.



Review of Related Studies

Guiding, Foundational and Contributing Studies

The RBPP has required review and coordination with a wide number of regional and local studies. Studies range in scope and complexity from local trail studies to city-wide mobility plans to regional vision plans. The planning team for the RBPP has categorized these corresponding efforts into three types of studies:

- Guiding Studies – These studies have set the stage for the creation of this plan. The RBPP represents the next implementation step in achieving certain aspects of these studies.
- Foundational studies – The RTC has invested in a number of studies that inform significant elements of the RBPP. The findings of these

studies have been utilized and incorporated into the broader framework of the RBPP

- Contributing studies – These studies address specific projects, localities, or sub-topics within the context of a regional bicycling and walking system.

The RTC's Regional Transportation Plan also serves a key role in the context of Southern Nevada bicycling and walking planning. Pending adoption of this plan, the RBPP will be incorporated into the Regional Transportation Plan.

A complete summary of existing studies that were reviewed can be found in Appendix A of this plan.

Figure 2.3:
Existing Study Diagram



GUIDING STUDIES

RTC Policy for Complete Streets

The RTC Policy for Complete Streets (and corresponding Complete Streets Design Guidelines for Livable Communities) establish the broad framework and goals for accommodating all modes, including bicyclists and pedestrians throughout Southern Nevada. The policy established the following goals:

1. Southern Nevada's transportation network will be supported through a variety of feasible transportation choices, which allows for sustainable growth.
2. The livability of neighborhoods and commercial centers located along the region's transportation corridors will be enhanced by a safe and inviting pedestrian environment.
3. The design of multimodal roadway facilities will not compromise the needs of larger vehicles such as transit vehicles, fire trucks, and freight delivery trucks.
4. Inclusion of Complete Streets design elements will allow for design flexibility on different street functions and neighborhood contexts.
5. Inclusion of Complete Streets design elements will improve the integration of land use and transportation, while encouraging economic revitalization through infrastructure improvements.

Southern Nevada Strong Regional Plan

Southern Nevada Strong was developed to foster regional support for long-term economic

success and stronger communities by integrating reliable transportation, quality housing for all income levels, and job opportunities throughout Southern Nevada. Developing transportation choices was a clear regional priority and specifically, active transportation was included in many plan goals. The plan was categorized by three themes or outcomes, which are detailed on p. 26. Major goals applicable to the RBPP are shown in bold text on the following page.

FOUNDATIONAL STUDIES

RTC Complete Streets Design Guidelines for Livable Communities

The RTC Complete Streets Design Guidelines for Livable Communities identify a comprehensive toolbox of treatments for all aspects of street design including specific accommodations for bicyclists and pedestrians. The RTC engaged stakeholders and jurisdictions in a robust and inclusive process to customize the guidelines for Southern Nevada communities. Participants included representatives from Clark County, Boulder City, City of Las Vegas, City of North Las Vegas, City of Henderson, Nevada Department of Transportation, Clark County Regional Flood Control District, Clark County Fire Department, Southern Nevada Homebuilders Association, and transportation and planning consultants.

The Complete Streets Design Guidelines will serve as the basis for defining various pedestrian and bicycle facilities and improvements such as trails, bikeways, and crossing improvements.

Review of Related Studies

Guiding, Foundational and Contributing Studies

Chapters 5 (Intersection Design), Chapter 6 (Universal Pedestrian Access), Chapter 7 (Pedestrian Crossings), and Chapter 8 (Bikeway Design) of the Complete Streets Design Guidelines for Livable Communities will be of particular importance to the RBPP.

Southern Nevada Transportation Safety Plan

The Southern Nevada Transportation Safety Plan includes a detailed analysis of crash data throughout the region. Based on bicycle and pedestrian crash data (among other crash types), critical emphasis areas (CEAs) and focus areas were established to mitigate crash factors. A summary of the results of this effort can be found in the Crash Analysis section on p. 66.

Regional Bicycle Network Gap Analysis

The purpose of the Regional Bicycle Network Gap Analysis was to determine where critical gaps exist in the bicycle network and evaluate locations where bicycle facilities are needed to connect in order to allow users to seamlessly ride their bicycles to key destinations throughout the Las Vegas Valley.

The Regional Bike Gap Analysis utilized a methodology that weighed potential bikeway projects for connectivity to the existing bicycle network, connectivity to community destinations such as parks, schools, and commercial sites; and latent demand based on population and employment density. Based on this analysis, priority projects were identified to complete the bikeway network.

CONTRIBUTING STUDIES

An extensive list of contributing local studies were reviewed. These included local and site specific planning efforts, open space plans, other focus areas associated with active transportation. Projects reviewed included:

- RTC Transportation Investment Business Plan
- RTC Regional Pedestrian Infrastructure Inventory and Analysis
- NDOT Nevada Statewide Bicycle Plan
- Regional Bicycle and Pedestrian Counts

CONTRIBUTING STUDIES (CONT.)

- SNRPC Regional Open Space Plan
- Community Mobility Study for Central Las Vegas (Phase I and II)

Figure 2.4:
Related Studies Diagram



-
- RTC Regional Schools Multimodal Transportation Access Study¹
 - RTC Henderson Downtown Pedestrian Circulation Plan
 - Las Vegas Mobility Master Plan
 - RTC Bike Share Implementation Study
 - Henderson Trails and Open Space Plan
 - Southwest Trail Connectivity Study
 - Riverside Road Trail from Mesquite to Bunkerville Study
 - Stephanie Street Corridor Transportation Study
 - Eastern Ave Mobility and Safety Plan

ONGOING STUDIES

In addition to completed studies, a number of other planning, design, and engineering efforts are underway throughout Southern Nevada that influence the RBPP. These include:

- West Charleston Boulevard Corridor Plan
- EPA Bruce Street Green & Complete Street Design Assistance
- City of Las Vegas Northwest Open Space & Trails Plan
- Las Vegas Mobility Master Plan
- Henderson Master Streets and Highways Plan
- Planning Variables Development and Methodology (RTP 2017-2040 Appendix)
- Henderson Strong Comprehensive Plan Update
- Washington Avenue and Owens Avenue/Vegas Drive Complete Streets Study
- Spencer Greenway Trail and UNLV Campus Bike Plan
- School Walk Audits (Safe Routes to School)
- City of Henderson ADA Transition Plan
- RTC Transit Ridership and TOD Study
- Regional Schools Multimodal Transportation Access Study

¹ http://www.rtcnv.com/wp-content/uploads/2012/06/SchoolAccessStudy_Report_2015-06-30.pdf

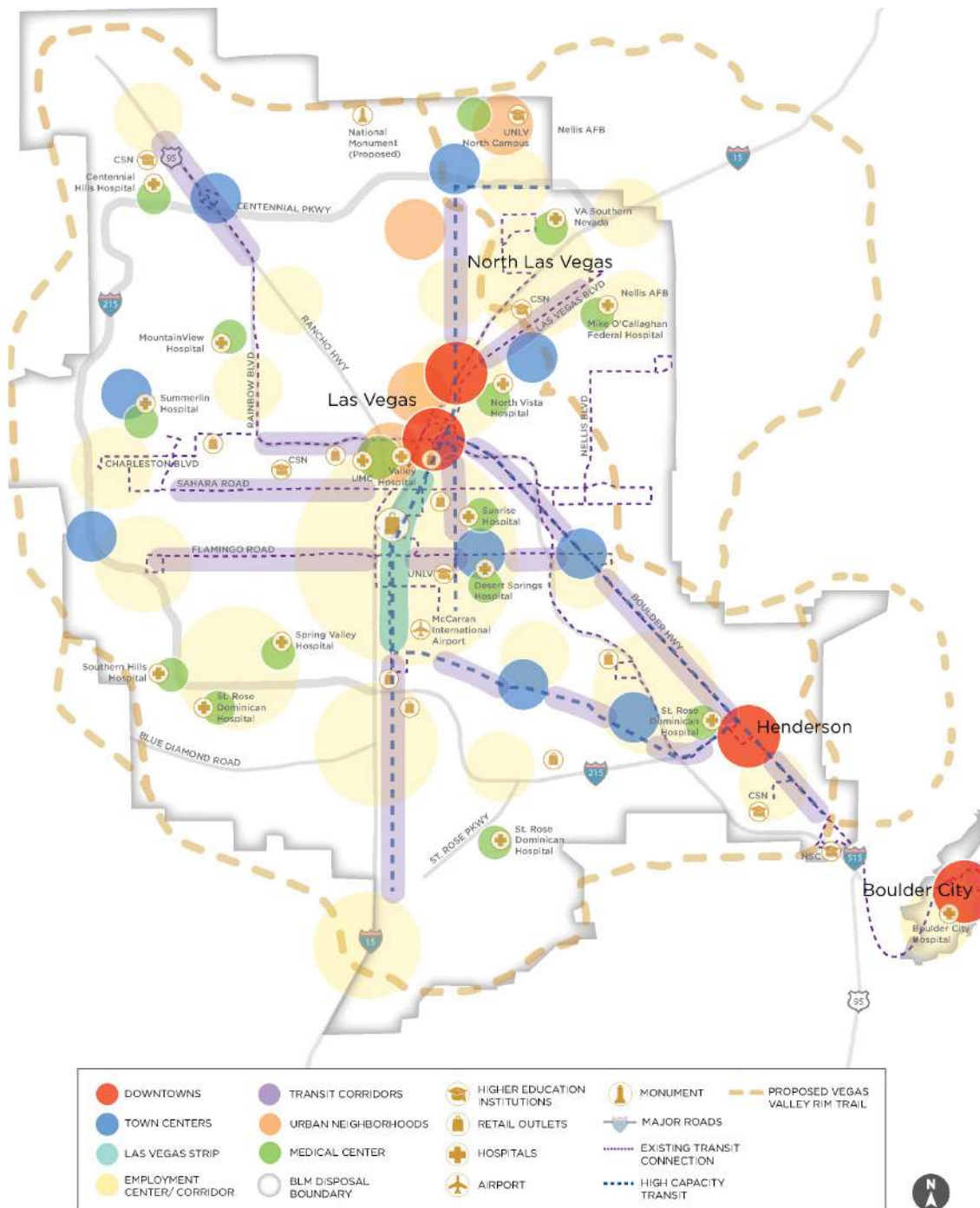
Review of Related Studies

Southern Nevada Strong

SOUTHERN NEVADA STRONG THEMES & GOALS



Figure 2.5:
Southern Nevada Strong Vision Plan



Equity Analysis

Why Equity Matters

The goal of equity in transportation planning is to provide access to resources for populations whose options are currently limited. In particular access to critical resources, such as jobs, education, affordable housing, health care, and other important daily destinations should be accessible to all.

BUILT ENVIRONMENT

Many factors in the built environment contribute to the inequitable distribution and availability of resources to populations, including lack of accessibility to bicycling and walking facilities, distribution discrepancies in where affordable housing is located, and the location of low-income neighborhoods and multi-family housing adjacent to high speed, high volume roads. The consequences of inequitable distribution of resources are negative effects for vulnerable populations, including increased travel times and costs (see Figure 2.8), increased health disparities and health care costs, and decreased mobility.

ETHNICITY AND RACE

Between 2001 and 2009, the percentage of bicycling trips made by minority groups in the U.S. has begun to shift to align with overall population percentages. As such, bicycling rates among minorities are growing at a faster rate than evidenced by Caucasians (see Figure 2.6).

However, inequity in the distribution of bicycling and walking facilities to serve racial and ethnic minorities very much still exists and varies from region to region. Locally, Southern Nevada's demographics indicate a more diverse population breakdown than the United States as a whole, and therefore, a higher likelihood for inequity and associated risks.

According to the National Equity Atlas, in 2000, non-white residents were the majority (60 percent) of the population of the Las Vegas-Paradise, NV Metro Area. Since 2010, that number has dipped below 50 percent. As Figure 2.7 demonstrates, the percentage of minority populations in Southern Nevada is expected to continue to increase. By 2040, white residents will make up 38 percent of the metro area population.

According to the 2014 Southern Nevada Household Travel Survey, African-American/Black and American Indian/Alaska Native residents travel an average of 7.7 and 7.6 miles to work each way, respectively, which is lower than the 8.7 mile average commute trip length for the region. However, as evidenced above and in the Travel Survey, people of color typically have longer commute travel times. This can be attributed to greater use of transit, walking, and bicycling, in addition to other factors.¹

¹ Westat. 2014 Southern Nevada Household Travel Survey. Retrieved on March 16 from http://www.rtcnv.com/wp-content/uploads/2012/06/2014_SNV_HTS_Final_Report.pdf.

Figure 2.6:
Percent of all U.S. Bicycle Trips by Race/Ethnicity and Racial Breakdown Nationally and Locally. (Data: Pucher, J., Buehler, R. *Bicycling Trends and Policies in Large North American Cities*, 2011)

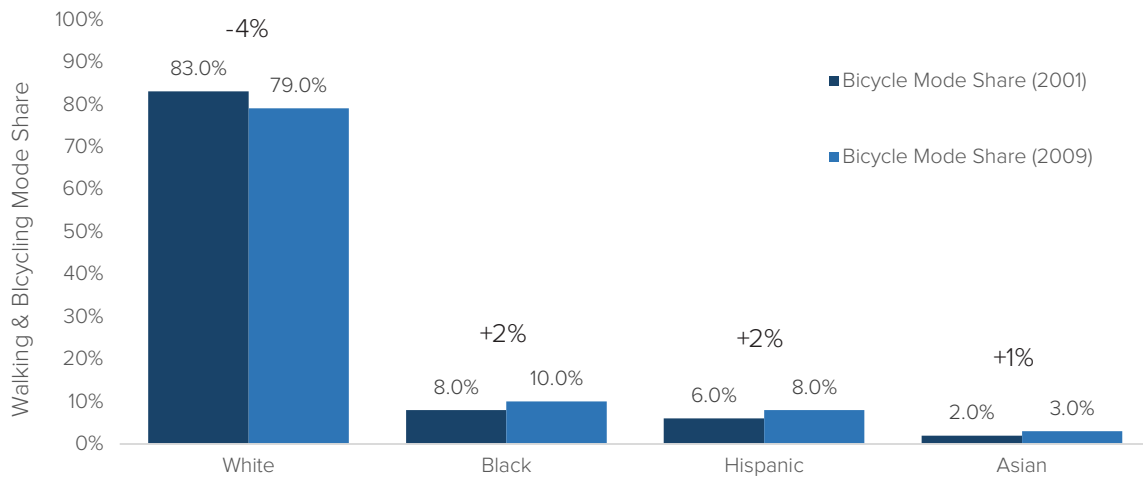
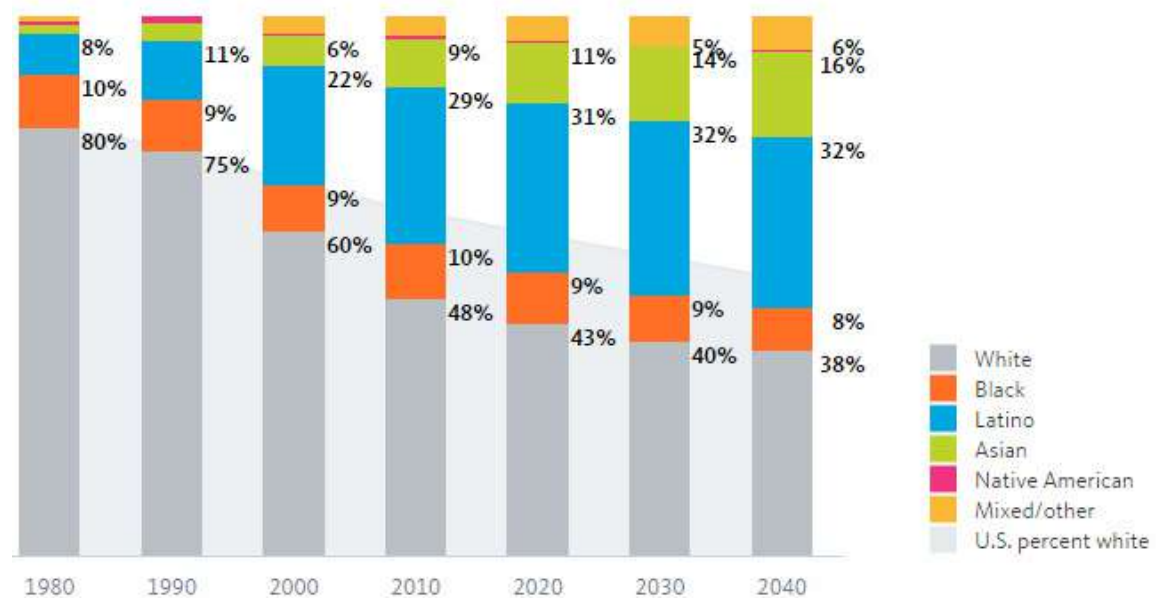


Figure 2.7:
Racial and Ethnic Composition: Las Vegas-Paradise, NV Metro Area, 1980-2040 (Data: National Equity Atlas)

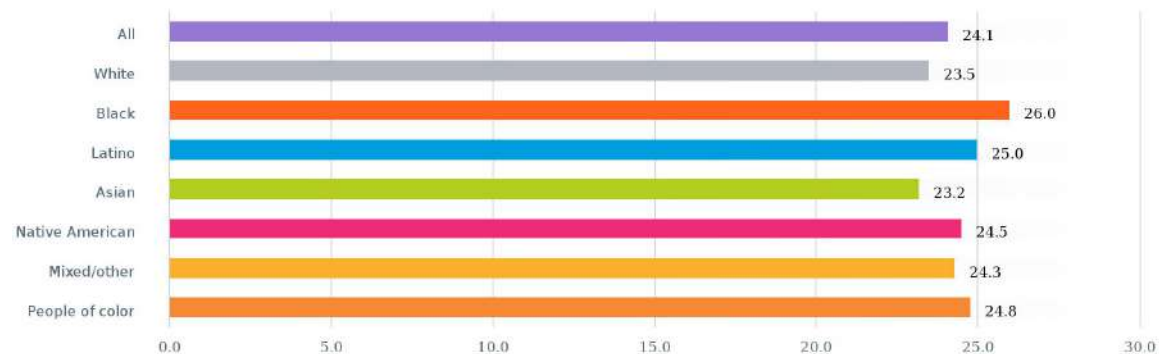


Equity Analysis

Why Equity Matters

Figure 2.8:

Average Travel Time to Work (Minutes) for All Modes by Race/Ethnicity: Las Vegas-Paradise, NV Metro Area
(Data: National Equity Atlas)



The National Equity Atlas explains why longer commute times for most non-white population groups matter: “Long commute times indicate a lack of nearby job opportunities, and slow transit options [or insufficient bicycling and walking connectivity], and can lead to high transportation and child care costs, job instability, and lower quality of life for workers. Employers also suffer from higher turnover and less access to the workforce. Long auto commutes also increase air pollution and contribute to [negative health effects].”

SOCIAL MOBILITY & INCOME

Social (or upward) mobility is defined as the ability of individuals and families to move out of poverty. Job access and commute times play important roles in determining the level of social mobility, which in turn have an impact on income inequality and the strength and stability of the

economy.² Places with higher social mobility also have less residential segregation, less income inequality, better primary schools, greater social capital, and greater family stability. The impact of transportation, especially active transportation, on the ability of low-income families to escape poverty is most striking in areas with high degrees of segregation, income inequality, and sprawl.

Among the 50 largest metropolitan regions in the United States, researchers found that the Las Vegas region ranks 31st in upward social mobility, which is measured by the average incomes of people born to parents earning less than the area’s median income. Peer cities Salt Lake City, Phoenix, and Denver are 1st, 28th, and 19th, respectively.³

² Boushey, H. & Price, C. (2014). How are Economic Inequality and Growth Connected? A review of recent research. Washington Center for Equitable Growth.

³ Chetty et. al. (2014). Where is the Land of Opportunity? The Geography of Intergenerational Mobility in the United States. Harvard University Equality of Opportunity Project. Retrieved from: <http://www.equality-of-opportunity.org/papers/> on March 8, 2016.

Low-income households are also increasingly located in suburban, auto-oriented parts of the region that are not well served by transit and where walking and bicycling may not be perceived as safe, convenient, or socially acceptable options. This leads to some families spending up to 37 percent of their income on transportation to access employment opportunities and meet daily needs.⁴ Walking and bicycling are affordable transportation options. Walking is virtually free and owning and operating a bicycle for one year costs approximately \$121.16. In comparison, the average cost of owning and operating a vehicle for one year is \$8,946.⁵

12.2 percent of all families and 9.6 percent of families with children in Southern Nevada live below the federal poverty level, about one-half percentage point above the Nevada state average.⁶ Making lower-cost forms of transportation, such as walking, bicycling, and transit, available and attractive to low-income residents of Southern Nevada can reduce the personal, household, and societal costs of transportation and contribute to social mobility. In the long term, increased social mobility is also likely to produce a more prosperous and economically competitive region. It should be noted that ethnicity, race, and other social factors do not inherently dictate one's economic wellbeing, but the trends in the

overall population help to paint a picture of the composite equity issues in the region.

HEALTH

Physical inactivity has been linked to higher rates of obesity, heart disease, certain cancers, diabetes, stroke, depression, anxiety, and osteoporosis – diseases that can be prevented by, among other means, bicycling and walking more.⁷ Many factors contribute to disparities in health, including environmental impacts (i.e. air quality), individual physical activity levels, healthcare availability and accessibility, access to healthy and affordable foods, access to places for physical activity, and stress. Non-white populations are also more likely to be exposed to harmful pollutants and are at a higher risk for disease. Nationwide and locally in the Las Vegas-Paradise, NV Metro Area, people of color, whether above or below poverty, carry a disproportionate pollution burden, meaning they are more likely to be exposed to dangerous toxins from mobile (automobiles), major stationary, and area sources, putting them at higher risk for chronic diseases and premature death.⁸

Some communities, ethnicities, and genders also have higher rates of obesity and other health risks than the overall population due in

4 The Center for Neighborhood Technology. Housing and Transportation (H+T) Affordability Index. Accessed at: <http://www.cnt.org/tools/housing-and-transportation-affordability-index>

5 AAA (American Automobile Association)

6 Healthy Southern Nevada. Demographic Dashboard. <http://www.healthysouthernnevada.org/index.php?module=Indicators&controller=index>

7 Cohen, J., Boniface, S., & Watkins, S. (2014, March). "Health implications of transport planning, development and operations." *Journal of Transport and Health*. <http://www.sciencedirect.com/science/article/pii/S2214140513000169>. Accessed March 8, 2016.

8 National Equity Atlas. Share of population and pollution burden, by race/ethnicity, in the Las Vegas-Paradise, NV Metro Area. http://nationalequityatlas.org/indicators/Air_pollution:_Unequal_burden/By_race~ethnicity:35876/Las_Vegas-Paradise,_NV_Metro_Area/false/Risk_type:Cancer_only/Source_type:All_sources/. Accessed March 9, 2016.

Equity Analysis

Why Equity Matters

Figure 2.9:

Share of population and pollution burden, by race/ethnicity, in the Las Vegas-Paradise, NV Metro Area (Data: National Equity Atlas)

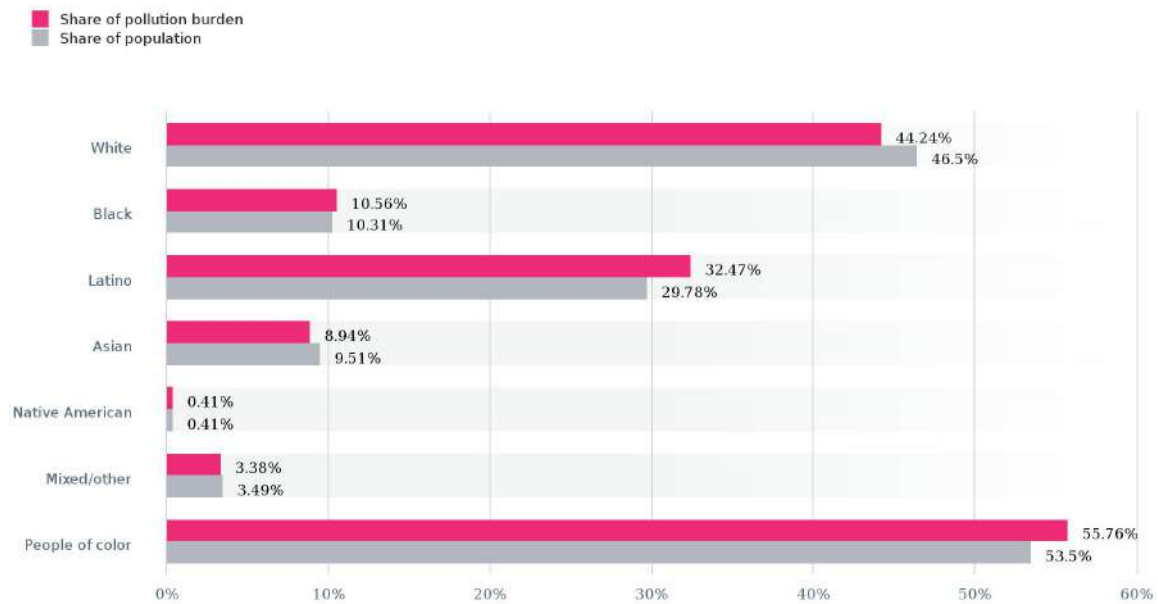
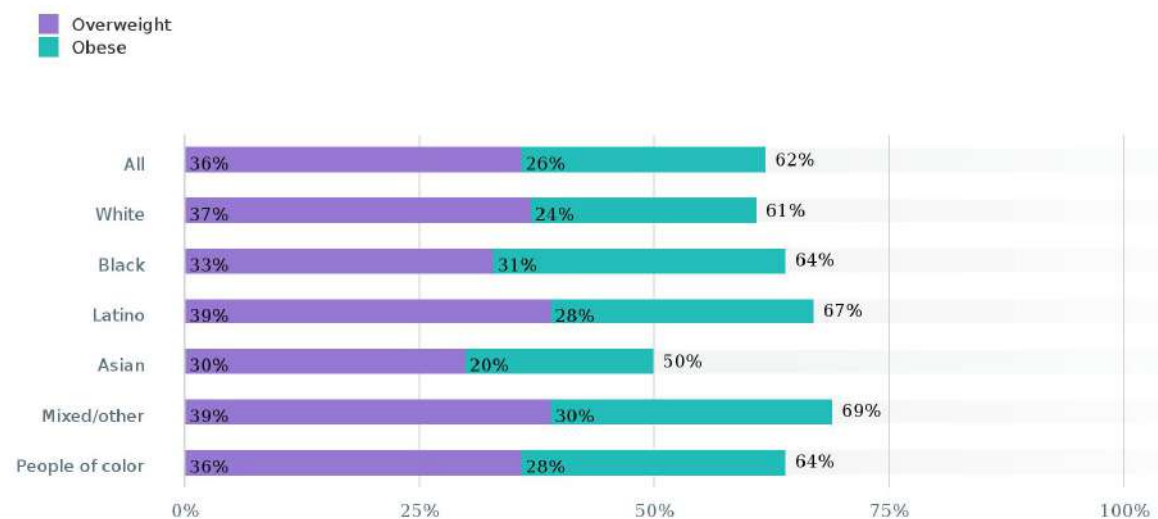


Figure 2.10:

Percentage of overweight or obese people, by race/ethnicity, in the Las Vegas-Paradise, NV Metro Area (Data: National Equity Atlas)



part to increased distance from jobs, healthy food retail, and recreation areas; impact of ethnicity or culture on health outcomes; low income and the inability to purchase healthy foods, due to cost and lack of access; and lack of time for exercise and relaxation.⁹

Improving walking and bicycling opportunities and connections for at-risk populations identified in Figures 2.9 and 2.10 will improve public health and economic vitality.

ACCESS TO AN AUTOMOBILE

According to the Census Bureau's 2010-2014 American Community Survey, 3.7 percent of Southern Nevada household members 16 years old or older do not have access to a motor vehicle and an additional 24.3 percent have access to only one motor vehicle.

Furthermore, many residents are too young to drive; are incapable or at least less likely to drive due to age, illness, or disability; are unable or unwilling to afford the costs of owning and operating a car; or for other reasons are simply unfit, unable, or unwilling to drive. Transportation choices for this sizable percentage of the population may include walking, riding a bicycle, taking transit, or carpooling. One of the goals of this plan is to provide access to good bicycling and walking infrastructure, especially in parts of the region with lower automobile ownership.

28% of Southern Nevada Residents have no or only shared access to an automobile

⁹ http://nationalequityatlas.org/indicators/Overweight_and_obese/By_race~ethnicity:7386/Las_Vegas-Paradise,_NV_Metro_Area/false/

Equity Analysis

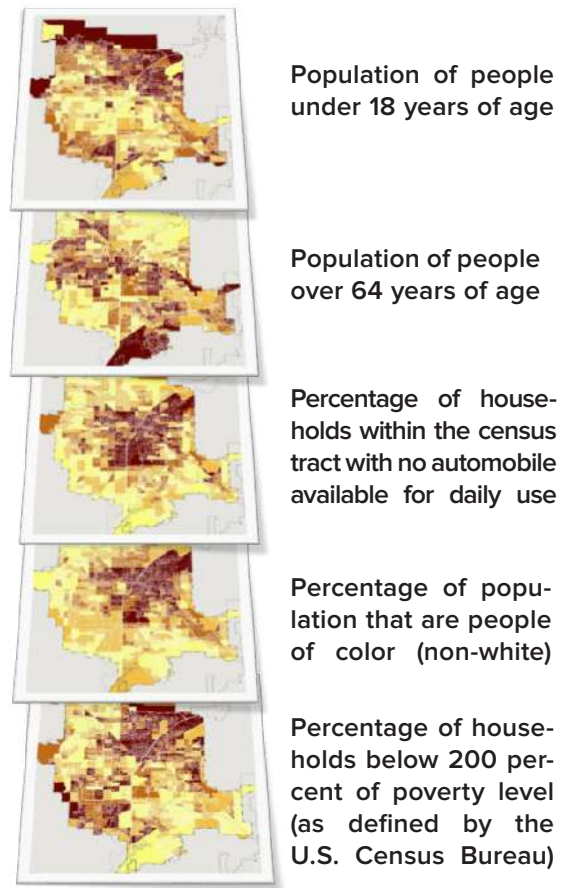
Equity Analysis Methodology

The equity analysis model considers demographic factors that can indicate populations and neighborhoods whose transportation needs are typically underserved by the existing system, especially by bicycling and walking facilities. Active transportation investments in these areas could help alleviate a broader range of issues (access to jobs, education, and healthcare, for example) than investments in neighborhoods with more transportation options. To date, the equity analysis has been utilized to inform public outreach efforts. Future facility, policy, and prioritization recommendations could also take equity concerns into account.

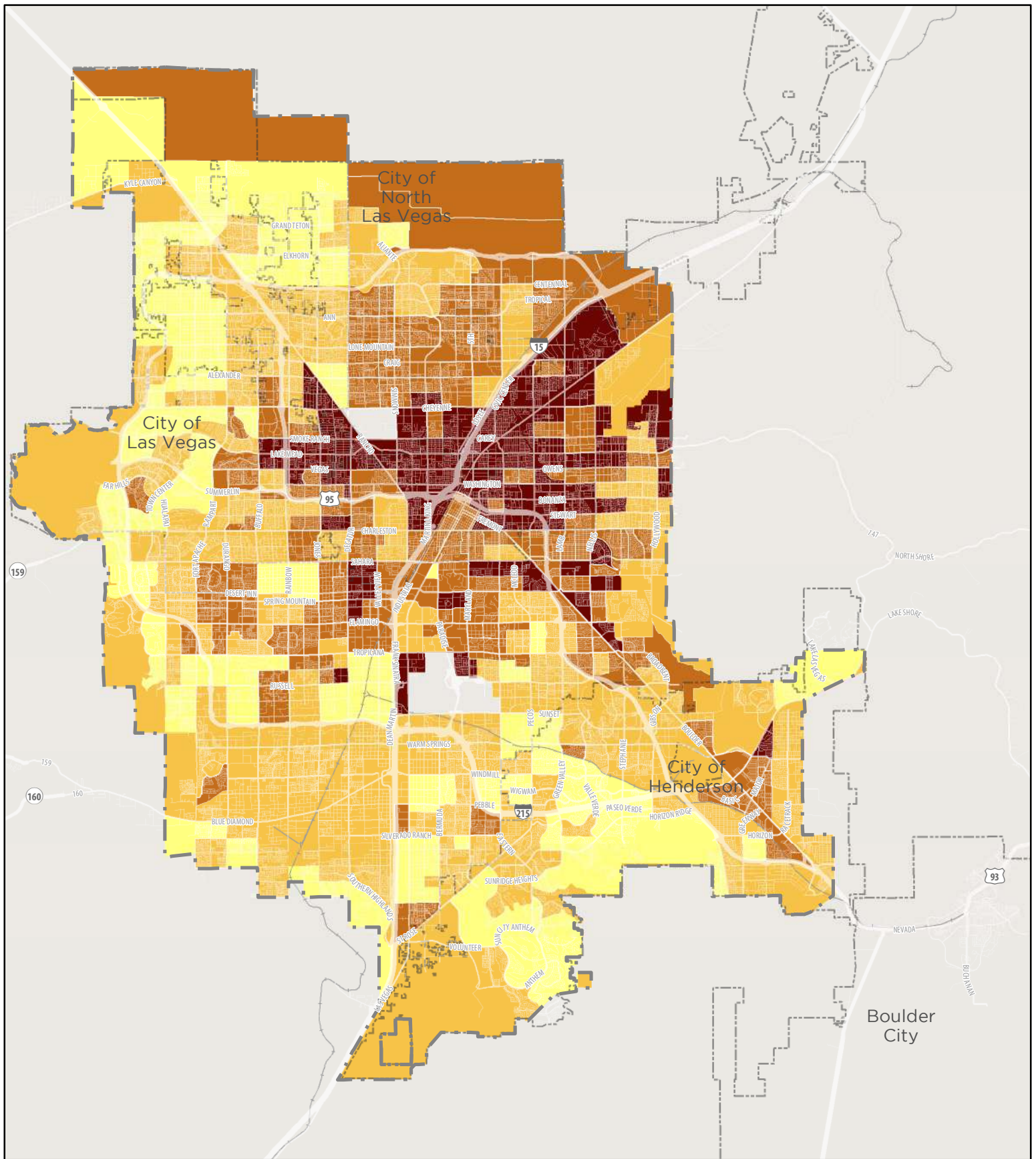
The analysis utilized quartiles for each of the indicators, so that census tracts were assigned a score for each variable based on the percentile the data represents. For tracts that were located in the 75th percentile, a score of 1 (lowest) was assigned; census tracts located in the 25th percentile were assigned a score of 4 (highest). The scores for all indicators were combined into a composite score, ranging from 4 (lowest) to 20 (highest). Tracts that scored higher have a higher identified need and typically represent low-income, minority neighborhoods who rely more heavily on bicycling, walking, or transit as their primary form of transportation. Conversely, areas with lower scores generally represent more affluent neighborhoods where access to an automobile is more readily available and where poverty levels are low.

The following socio-economic indicators were used to determine underserved populations, as shown in the map on the next page:

Figure 2.11:
Socio-Economic Indicators



Overall, the greatest composite equity needs are in Las Vegas north of and clustered around US 95, near Nellis Air Force Base, along I-15 north of US 95, and near the UNLV campus.

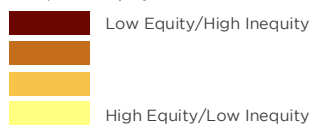


Map 2.1
Regional Bicycle and Pedestrian Plan for Southern Nevada

Equity Analysis Map

Data Source: U.S. Census Bureau, Clark County and RTC GIS
Map Created: March 2016
Map Produced By: Alta Planning + Design

Composite Equity Score*



*Equity scores are based upon census tract data and may include some uninhabited areas. McCarran and North Las Vegas Airports have been removed.



Existing Bicycling & Walking System

Introduction

In order to successfully realize the vision and goals of this plan, careful analysis of the region's existing bicycling and walking trends and facilities is necessary to develop a strategic plan for improvement. This analysis will identify existing strengths that could be leveraged as well as noting weaknesses which should be improved. This chapter summarizes existing conditions for the RTC Southern Nevada Regional Bicycle & Pedestrian Master Plan and creates the framework upon which the plan's ultimate recommendations will be developed.

EXISTING BICYCLING AND WALKING EFFORTS IN SOUTHERN NEVADA

Walking and bicycling infrastructure throughout the Las Vegas Valley varies between jurisdictions. Some areas, such as Las Vegas and Henderson, exhibit well-developed bicycle and pedestrian networks with relatively few gaps. Alternatively, connectivity and consistency issues in other areas of urbanized Clark County are partially due to sporadic and developing land use and roadway network implementation.

In 2012, the RTC adopted a Complete Streets Policy, which allows the RTC to allocate these funds to local jurisdictions for Complete Streets construction projects. Since this time, Complete Streets Design Guidelines and a number of area and corridor studies have identified bicycle and pedestrian improvements. Additionally, a state-legislated effort assigned donations when registering an automobile to a complete-streets fund for the RTC to allocate to infrastructure projects that improve walking and biking.

BICYCLE FACILITIES

With a few exceptions, most of the on-street bicycle infrastructure being installed in the urbanized areas of Clark County (shown in the maps in this chapter) consists of bike lanes or bike routes with wide outside lanes. Unfortunately, bike lanes on many Southern Nevada streets do not provide a comfortable enough experience to attract those other than confident cyclists due to high traffic volumes and speeds, lack of physical protection, faded striping, and insufficient bike lane width. Some municipalities have begun to install different types of infrastructure such as buffered and separated bike lanes.

In addition to linear facilities, the RTC and the City of Las Vegas have developed a bike share station network in downtown Las Vegas aimed at reducing the number of short distance vehicle trips and related congestion.

PEDESTRIAN FACILITIES

Pedestrian facilities in Southern Nevada generally fall into two categories: sidewalks and shared use paths, which are also shared with people on bicycles. Sidewalk networks within Southern Nevada are generally complete except for developing portions of the urbanized areas of Clark County that do not have complete roadway or sidewalk infrastructure fully in place. Standard sidewalks range in width from 3.5 to 5 feet. Some areas such as the Las Vegas Strip and Downtown Las Vegas exceed these widths. Landscape buffer widths range from 0 to 5 feet, with many roadways lacking any buffer between the edge of the roadway and the sidewalk.

Existing Street Systems, Land Use and Policy

EXISTING STREET SYSTEMS

Existing streets in Southern Nevada pose both opportunities and challenges to improving bicycling and walking conditions. Opportunities exist in the form of streets with wide lanes that could be effectively narrowed and space reallocated for bicyclists or pedestrians. 12-foot-wide (and wider) travel lanes are common throughout the Las Vegas Valley. Since 2010, FHWA has steadily been promoting a more flexible and context-sensitive approach to roadway design. Evidence of this approach includes the following guidance from USDOT and FHWA:

- [USDOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations](#)

- [USDOT 2013 Design Flexibility Memo](#)
- [FHWA Bicycle and Pedestrian Funding, Design, and Environmental Review: Addressing Common Misconceptions](#)
- [FHWA Revision of Thirteen Controlling Criteria for Design and Documentation of Design Exceptions](#)

This trend towards flexibility has eased design controls on streets below 50 mph and legitimized narrower lanes and other design strategies that may create improved opportunities for bicycle and pedestrian facilities.

Although wide streets allow opportunities to improve bicycle and pedestrian conditions, the layout of the existing street network does present obstacles. Street connectivity

Figure 2.12:
Cheyenne Ave features 12' travel lanes with 14' outside travel lanes



Existing Bicycling & Walking System

Existing Street Systems, Land Use and Policy

throughout Southern Nevada is generally limited. Development patterns have historically focused on creating developments that are self-contained with little street connectivity between neighborhoods. Most meaningful connections between neighborhoods or land uses require circuitous routes and/or travel along higher volume collector or arterial streets. This presents challenges for bicyclists or pedestrians who would prefer to travel along lower volume streets.

EXISTING LAND USE

Land use and transportation share an inherent connection. Trip distance comprises one of the first questions when considering bicycling or walking as a viable mode of transportation. Land use patterns in the Las Vegas Valley have historically been planned as single uses which often create trip distances beyond a comfortable walking distance. The predominance of single family housing development and growth around on the urban fringe has further exacerbated trip distances between residences, employment centers, shopping, and other everyday services. These land-use patterns

Figure 2.13:
Downtown Las Vegas. Image: Southern Nevada Strong



create longer commutes and make it more difficult or time-consuming to access services and amenities. As a result, most Southern Nevada residents who can afford car ownership, rely on motorized transportation for the bulk of their trips. Simultaneously, land uses designed around the automobile have resulted in site development standards that promote large surface parking lots, deep setbacks, and an environment generally designed for vehicular speeds.

Although the land use practices of the last 50 years present challenges to increasing bicycling and walking activity, Southern Nevada residents expressed a strong desire for more transportation options, including bicycling and walking, in the Southern Nevada Strong Regional Plan. SNS identified a new long-term direction for land use and transportation planning in the Las Vegas Valley. Mixed use development and walkable centers are envisioned throughout the Valley with transit linking each center. This development pattern would bring services, jobs, and amenities within more comfortable

bicycling and walking distance for many residents. The RBPP seeks to identify the complementary bicycling and walking facilities and improvements needed to pair with incremental land use changes to create a community where walking and biking is a viable and convenient form of transportation.

EXISTING POLICY

Bicycling and walking infrastructure varies widely throughout the Las Vegas Valley. To efficiently review the current policy landscape for each of the RTC jurisdictions, a survey was developed based upon established Walk Friendly Community and Bicycle Friendly Community criteria. The intent of the survey was to broadly identify general policies and programs currently utilized by local jurisdictions and also identify potential gaps in policy that could be addressed by the RBPP. Table 2.1 illustrates the results of the Walk Friendly Community survey while Table 2.2 illustrates the results of the Bicycle Friendly Community survey.

Existing Bicycling & Walking System

Community Survey Results

Table 2.1:
Walk Friendly Community Survey Results

	Boulder City	Clark County	Henderson	Las Vegas	North Las Vegas	Mesquite
<div></div> = Existing Plan, Policy, Program, etc.						
<div></div> = Missing Plan, Policy, Program, etc.						
ENGINEERING						
Comprehensive, connected, well-maintained pedestrian network	•	•	•	•		•
Complete streets ordinance or policy	•	•	•	•	•	
Public right of way ADA Transition Plan	•		•		•	•
Policy: Sidewalks required both sides arterial streets		•	•	•	•	•
Policy: Sidewalks required both sides collector streets		•	•	•	•	•
Sidewalks required with new development*	•	•	•	•	•	•
EDUCATION						
Safe Routes to School pedestrian education program	•	•	•	•	•	•
Adult Pedestrian Education Programs			•			•
Education of Motorist/Pedestrian Rights	•		•	•	•	•
EVALUATION						
Program to reduce pedestrian-vehicle crashes			•	•	•	•
Pedestrian or Pedestrian Safety Action Plan			•	•	•	
Pedestrian Advisory Committee	•		•	•	•	
Pedestrian Program Manager	•		•	•		
Connectivity policy, pedestrian-friendly block lengths, connectivity standards for development or convenient pedestrian access requirements		•	•	•	•	
Served by public transit	•	•	•	•	•	•
ENFORCEMENT						
Law enforcement training on rights and responsibilities of all road users	•		•	•	•	•
Law enforcement / public safety officer foot patrols			•	•		
Ordinances promoting safety/accessibility for pedestrians	•		•	•	•	•
ENCOURAGEMENT						
Celebration of pedestrians or special media outreach	•		•	•	•	
Major community pedestrian events			•	•		
Pedestrian advocacy group			•	•		•

* Some rural preservation areas do not require sidewalks or curb improvements

Table 2.2:

Bicycle Friendly Community Survey Results

• = Existing Plan, Policy, Program, etc.



□ = Missing Plan, Policy, Program, etc.




	Boulder City	Clark County	Henderson	Las Vegas	North Las Vegas	Mesquite
ENGINEERING						
Comprehensive, connected, well-maintained bicycling network	•	•	•	•		•
Bike parking readily available	•	•	•		•	
Complete streets ordinance or policy	•		•	•	•	•
Bike lanes required with new development			•	•		•
EDUCATION						
Safe Routes to School Program	•	•	•	•	•	•
Bicycling education courses for adults			•	•		•
Motorist and cyclist education	•		•	•	•	•
EVALUATION						
Plan or program to reduce bike-car crashes			•	•	•	•
Current bicycle plan	•		•	•	•	•
Bicycle advisory committee	•		•			•
Bicycle program manager	•		•			
Connectivity policy, bicycle-friendly block length standards and connectivity standards for new developments (convenient bicycle access requirements)			•	•	•	
ENFORCEMENT						
Law enforcement training about rights and responsibilities of all road users	•		•	•	•	•
Law enforcement / public safety bike patrol			•	•	•	•
Ordinances that promote safety and accessibility for bicyclists	•		•	•	•	•
ENCOURAGEMENT						
Bicycle map	•	•	•	•	•	•
National Bike Month activities (community rides, Bike To Work Day, media outreach)		•	•	•		•
Host major community cycling events or rides	•		•		•	•
Community bicycle advocacy group		•	•	•		•

Existing Bicycling & Walking System

Local Jurisdiction Bicycle Parking Requirements

Table 2.3:
Local Jurisdiction Bicycle Parking Requirements

 = Yes
 = Description of Policy

Jurisdiction	No Bike Parking Code	Incentivized Bicycle Parking	Required Bicycle Parking	Source
Clark County		In order to mitigate parking impacts without reducing the number of parking spaces. Credit: 1 vehicular space for every 4 bicycle or motorcycle spaces; 2 vehicular per 1 shower; total vehicular spaces cannot be reduced by more than 5% or 10 spaces, whichever is less		30.60.040
City of Las Vegas				19.10 Zoning
City of North Las Vegas		Eligible off-street parking waiver by increasing bicycle spaces by 100% and adding bicycle lockers (H)	When there are 25 or more vehicular spaces, bicycle parking facilities located near (within 150') of the main entrance are required. Amount of bicycle parking depends on the district (G)	17.24.040.G& 17.24.040.H
City of Henderson		Community Dev Director may approve up to 5% reduction in off-street vehicular spaces for developments that provide enclosed (indoor or locker) secure bike parking equal to number of vehicular spaces replaced and a showering/ changing facility (7.4.d) Community Dev. Director may approve a reduction in vehicular parking to land or building owners that provide secure parking and shower/changing facilities	Non-residential, mixed-use, and multi-family residential developments with 20 or more vehicular spaces, at least one bike rack that can accommodate at least four bicycles is required. Short term must be provided at least near the main entrance and then distributed to serve all primary entrances; long term parking must be provided on site (locker or indoor room). Amount of short term bicycle parking depends on the land use (Table 19.7.4-9). Amount of long term bicycle parking not specified.	19.7.4.d; 19.7.9.c.2.v; 19.7.9.d.3.i; 19.7.7.c.1.v; 19.7.13
City of Mesquite				
Boulder City				

Existing Bicycling & Walking System

Commuting to Work

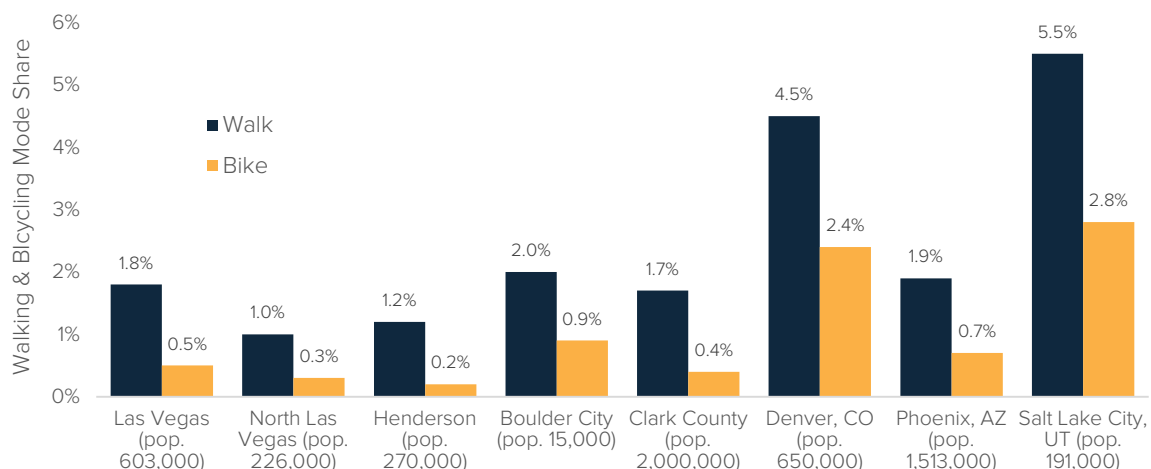
COMMUTING TO WORK (AMERICAN COMMUNITY SURVEY'S JOURNEY TO WORK DATASET)

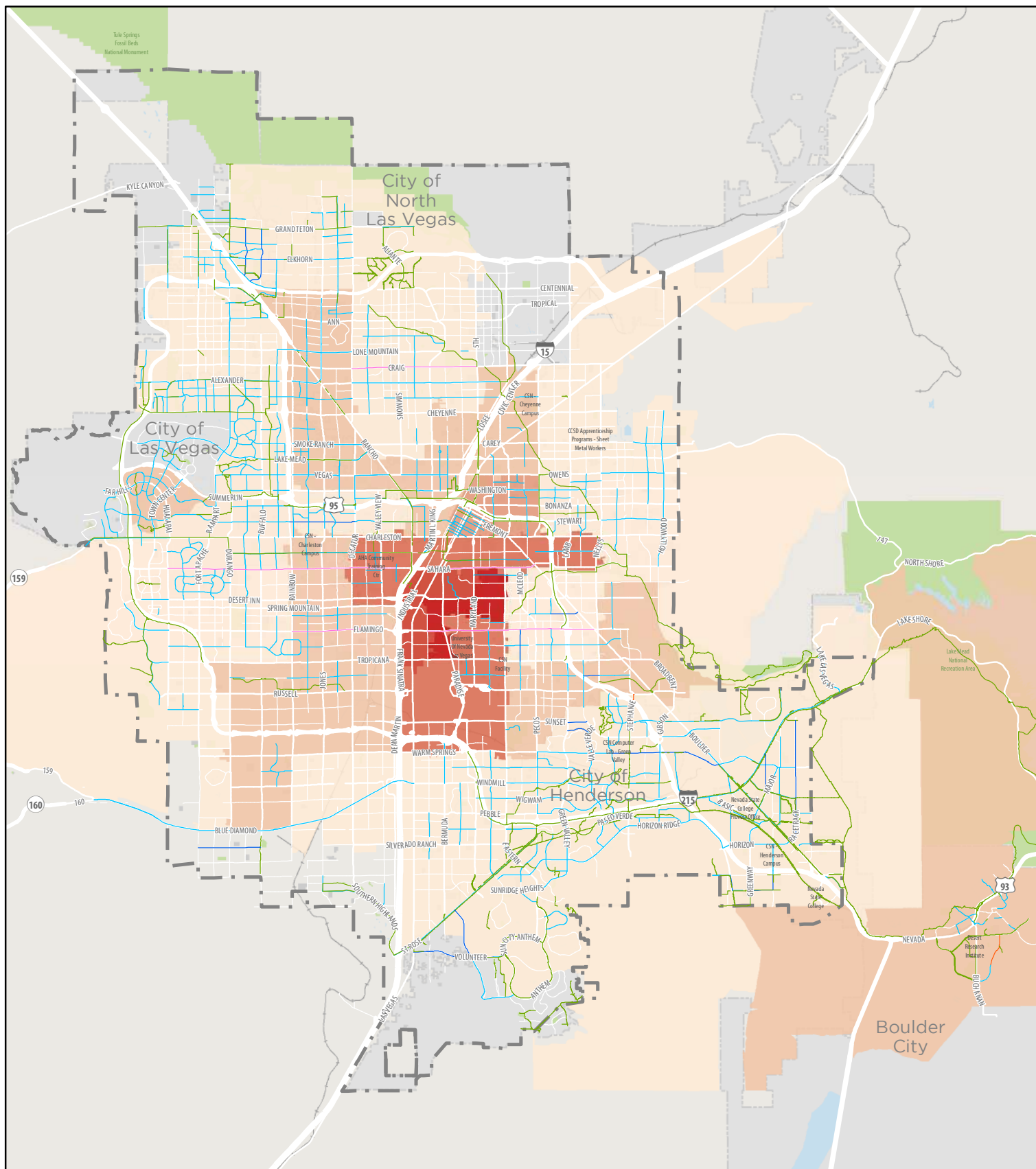
The American Community Survey (ACS) Journey to Work data measures commute mode share and mode choice, among other data. However, the ACS only collects information about the main transportation mode for trips from home to work and excludes non-work trips, all trips made by those outside of the workforce (including children, retirees, unemployed residents, and stay-at-home parents – 55 percent of Southern Nevada residents), and trips made by those who commute to work by different means depending on the day, weather, and time of year. The ACS is, however, a consistent benchmark over longer periods of time. It should be noted that the commute trip mode shares shown in Figure 2.14 are likely lower than the overall walking and bicycling rates in Clark County for all trips.

The ACS data shows that even cities that have hundreds of miles of existing bicycling and walking facilities, like Las Vegas and Henderson, have relatively low rates of walking and bicycling to work. This is likely due in part to the ACS excluding recreational or other utilitarian trips. For example, 80 percent of Henderson residents work outside of the city and 40 percent work more than 10 miles from their homes, thereby reducing the likelihood that they would choose to or are able to ride or walk to work. In Denver, for example, 47 percent of residents work within the city, increasing the likelihood of walking or bicycling to work.

Bicycling and walking mode share by Census tract is shown in the following two maps. Some of the tracts located on the periphery of the valley have higher-than-average walking rates that may be anomalies attributable to higher margins of error.

Figure 2.14:
Commute Mode Share Comparison Between RTC Project Area Municipalities & Peer Cities in the Western U.S.
(Data: American Community Survey Five-Year Estimates, 2010–2014)



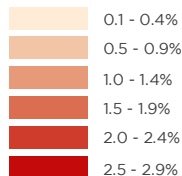


Map 2.2
Regional Bicycle and Pedestrian Plan for
Southern Nevada

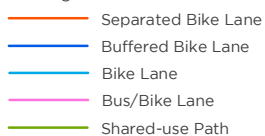
ACS Bike Mode Share by Home ZIP Code Map

Data Source: US Census Bureau, Clark County, and RTC GIS
Map Created: March 2016
Map Produced By: Alta Planning + Design

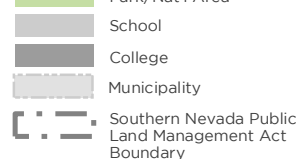
Bike to Work Mode Share

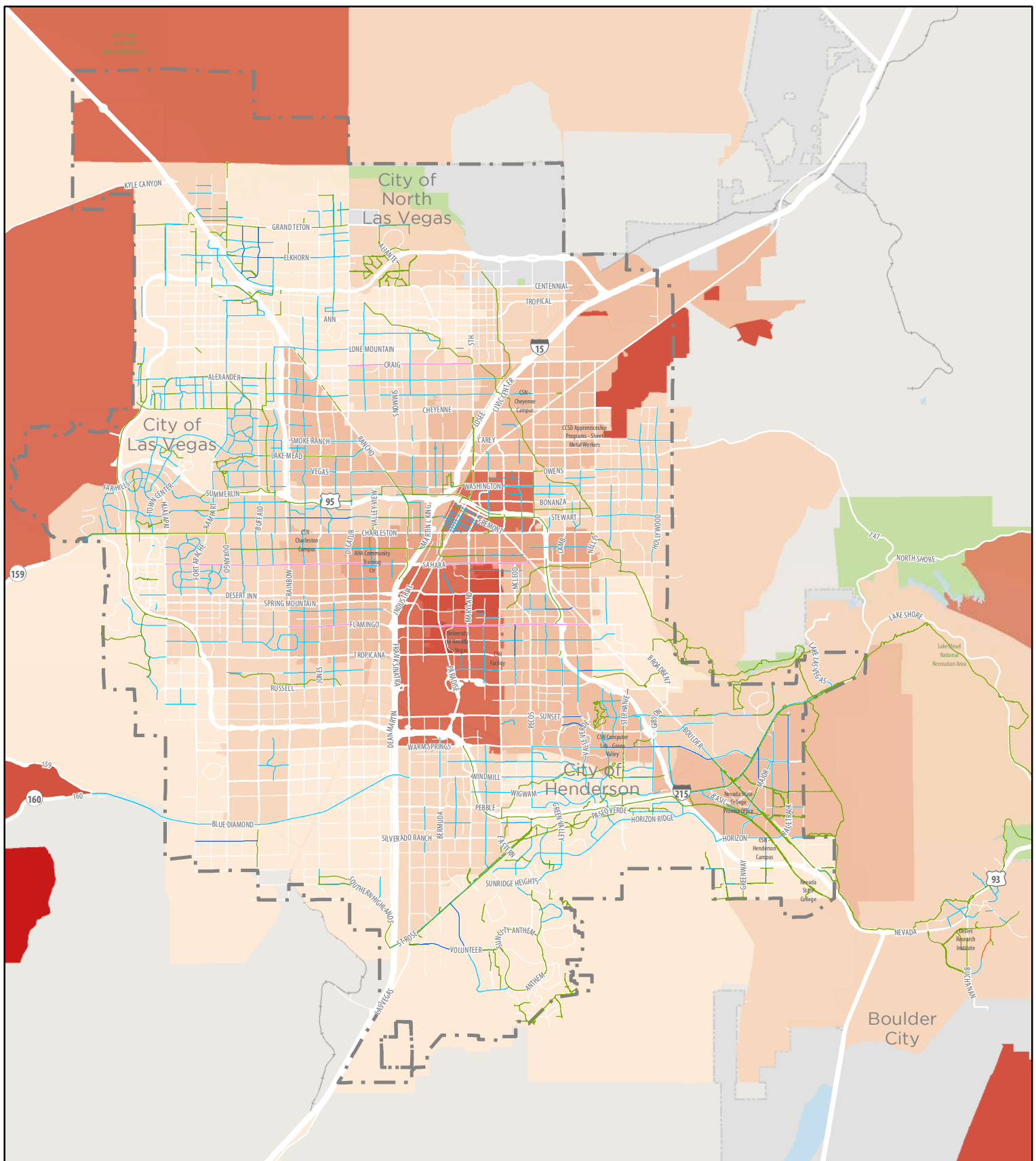


Existing Facilities



Park/Nat'l Area





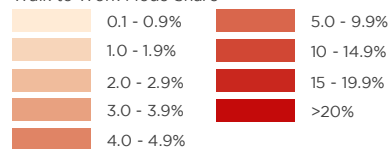
Map 2.3

Regional Bicycle and Pedestrian Plan for Southern Nevada

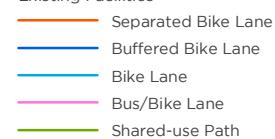
ACS Walk Mode Share by Home ZIP Code Map

Data Source: US Census Bureau, Clark County, and RTC GIS
Map Created: March 2016
Map Produced By: Alta Planning + Design

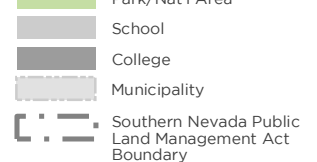
Walk to Work Mode Share



Existing Facilities



Park/Nat'l Area



Existing Bicycling & Walking System

2014 Southern Nevada Household Travel Survey

Because the ACS is not a perfect metric of walking and bicycling rates due to the singular focus on commute trips, it is also necessary to analyze the Southern Nevada Household Travel Survey to provide a broader picture of existing travel habits in Southern Nevada. The 2014 Survey was a region-wide survey of 7,000 households that contains a wealth of information about transportation behaviors, attitudes, and trends, regardless of trip purpose. Because of the irregular frequency of performing travel surveys, however, the tremendous amount of valuable data cannot be monitored on a year-to-year basis (like the ACS), making the monitoring and

reporting of incremental changes more difficult. A combined estimated 12.1 percent of all trips, regardless of purpose, in Southern Nevada are done by walking and bicycling. Individual municipalities are also included and broken down in Figure 2.15. When examining trips to school, a combined 18 percent of all trips are done by walking and bicycling (see Figure 2.16).

It should be noted, however, that the Southern Nevada Household Travel Survey's (and the ACS's) data are only representative of those who are currently walking and riding. If and when improvements to the overall system are made, the percentage of people who can choose to

Figure 2.15:

Mode Share Comparison Between RTC Area Jurisdictions (Data: Southern Nevada Household Travel Survey)

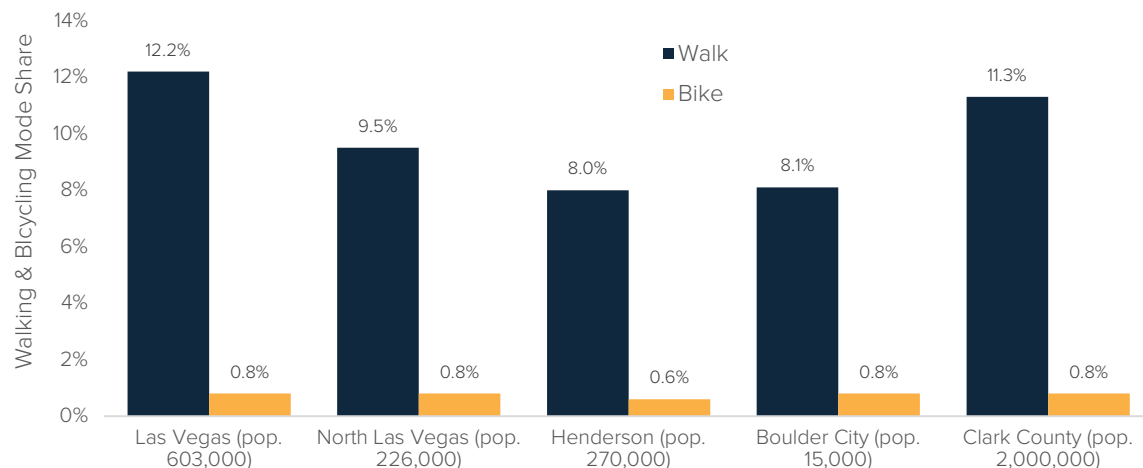
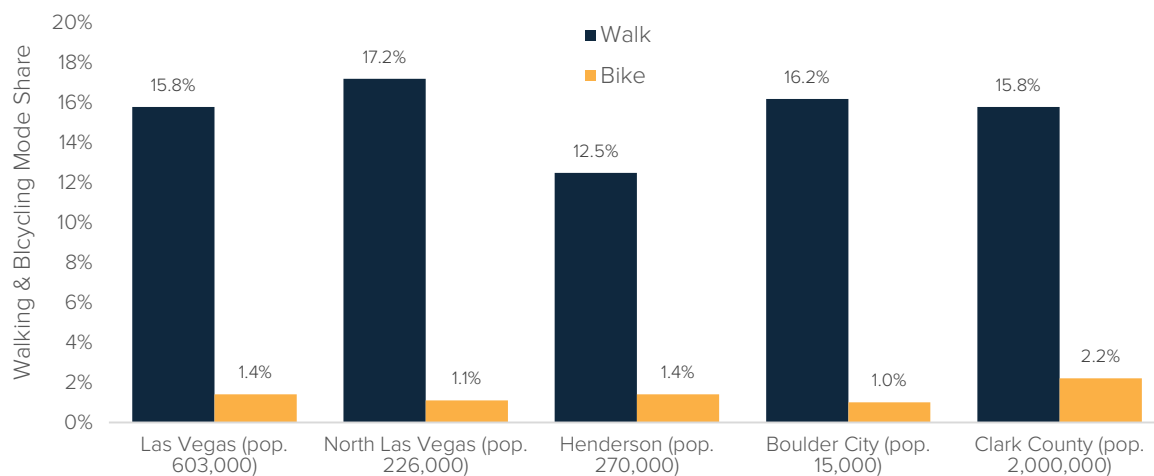


Figure 2.16:
School Trip Mode Share Comparison Between RTC Area Jurisdictions. (Data: 2014 Southern Nevada Household Travel Survey)



walk or bike instead of drive will likely increase and trip purposes will become more varied. Planning and implementation should not only focus on the needs of current users, but also on the needs of the latent population, as well.

Although commute trips offer the most consistent measurements to track progress, they are often the most difficult trip to make via biking or walking. Many factors including job location, availability of changing rooms, and work schedule may make biking and walking commute trips impossible for some people. However, many Southern Nevada residents and visitors have the ability to convert their shorter trips to schools, recreation areas, churches, or shopping into active transportation trips. Improving end-of-trip facilities, like bicycle storage, lockers,

and showers for commuters as well as improving recreational routes for those who are taking other trips will make moving about on foot and by bike easier and more enjoyable.

Additional takeaways from the Survey that may be helpful to the analysis in this Plan include:

- Boulder City is the only municipality in the region that has a notably shorter average school trip times (10.2 minutes versus the regional average of 16.4 minutes). Eastern areas of Las Vegas have the longest average time for school commutes at 18.8 minutes.
- Paradise and eastern areas of Las Vegas have the greatest share of households with no personal vehicles (compared to the region average of 8.3%) at 17.5% and 16.8%, respectively.

Existing Bicycling & Walking System

National Walking & Bicycling Trends

Data collected from the National Household Travel Survey (NHTS) in 2009 and the American Community Survey (ACS) in recent years estimate that out of all trips made in the U.S., regardless of purpose, 1.0 percent are made by bicycle and 10.4 percent are by foot. In fact, just commute-related bicycling trips in the United States have increased 60 percent from 2000 to 2012.¹⁰ The bicycling mode share in Clark County is slightly lower than the national average, while walking mode share is about 20 percent of the national average, which is likely due in part to low density land uses, sporadic development patterns, abundant free parking, high-speed and high-volume roadways, and the impact of hot summer temperatures (even though the region boasts a dry and mild climate for most of the year).

Existing Bicycling & Walking Facilities Network

The region currently has approximately 868 total center line miles of on-street bikeways and off-street, shared-use paved facilities. The facility type breakdown by jurisdiction is in Figures 2.19 and 2.23, as well as in Map 2.4 and Appendix E.

EXISTING FACILITY TYPES

The region has made considerable investments in bike lanes and shared-use paths, especially

¹⁰ Alliance for Biking and Walking, Bicycling and Walking in the United States, 2014 Benchmarking Report.

along arterial roadways and drainage ways, respectively. In terms of percentage of total mileage, cities in Southern Nevada are more heavily invested in dedicated facilities (like bike lanes and paths) than their three peer cities (Salt Lake City, Denver, and Phoenix) with a relatively small share of shared roadways (Figure 2.23).

Shared-use Paths – 370 miles

Shared-use paths have been widely implemented throughout the region, especially along or within drainage ways (washes and drainage ditches), and currently make up about 42 percent of the total bicycling and walking network mileage (excluding sidewalks). These paths, sometimes called trails, are paved facilities shared by bicyclists, pedestrians, runners, and other allowed non-motorized modes. Other than maintenance vehicles, automobiles are not allowed to use shared-use paths. Paths are typically located in their own rights of way separated from roads, but can also be built adjacent to roads with adequate separation. Some of the most notable regional paved trails (or shared-use paths) include the River Mountains Loop Trail, the Las Vegas Wash Trail, and the I-215 West Beltway Trail.

Figure 2.17: Amargosa Trail, Henderson



Existing Bicycling & Walking Facilities Network

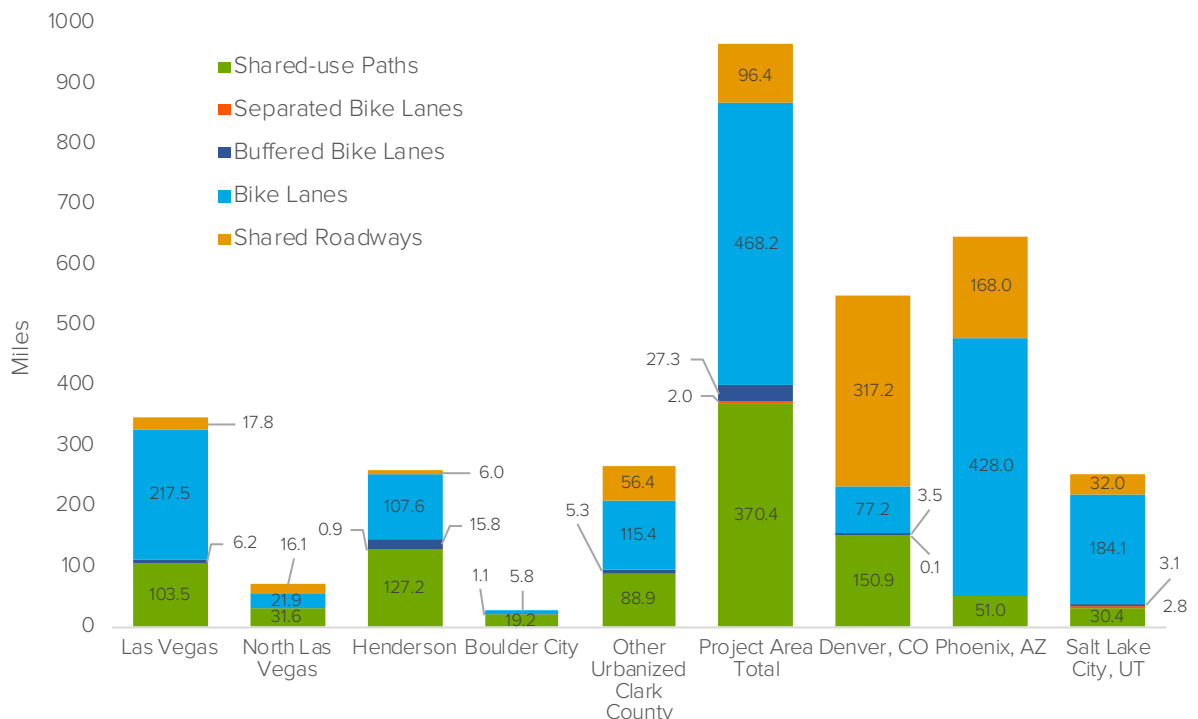
Separated Bike Lanes – 2 Miles

Separated bike lanes, also known as cycle tracks or protected bike lanes, are physically separated facilities that provide dedicated space for bicyclists. Normally, pedestrians travel along a separate sidewalk or shared use path near these facilities. Separated bike lanes may be configured as a protected facility at street level with a parking lane or other barrier between the bike lane and the motor vehicle travel lane. They may also be configured as a raised bike lane to provide additional vertical separation. Separated bike lanes may be configured for one- or two-way travel. Two-ways typically require greater control at intersections to allow a variety of turning movements.

Figure 2.18:
Separated Bike Lane, Boulder City



Figure 2.19:
Existing Bicycling and Walking Facilities in RTC Project Area Municipalities & Similar Cities in the Western U.S.



Existing Bicycling & Walking System

Existing Bicycling & Walking Facilities Network

Figure 2.20:
Buffered Bike Lane, Salt Lake City



Figure 2.21:
Bike Lane, Henderson



Buffered Bike Lanes – 27 Miles

Buffered bike lanes are conventional bike lanes paired with a designated, painted buffer space, that increases the distance between the bike lane and adjacent motor vehicle travel lanes and/or parking lane. Buffered bike lanes follow general guidance for buffered preferential vehicle lanes as per MUTCD guidelines (section 3D-01). They are designed to increase the space between the bike lane and the travel lane and/or parked cars. This treatment is appropriate for bike lanes on roadways with high motor vehicle traffic volumes and speed, adjacent to parking lanes, or a high volume of truck or oversized vehicle traffic.

Bike Lanes – 468 miles

This type of bikeway uses striping, symbols, and sometimes signage to assign space on the road to bicyclists. Bike lanes encourage predictable movements by both bicyclists and motorists by assigning each mode separate spaces. There are more than 468 total miles of bike lanes in the project area, nearly 50 percent of which are located in the City of Las Vegas.

In addition to traditional bike lanes, Downtown Las Vegas has a unique subset of this facility type that includes a green thermoplastic within the two white parallel bike lane lines. Studies in Portland, OR, St. Petersburg, FL, and Austin, TX, found that significantly more motorists yielded to bicyclists and slowed or stopped before entering the conflict area after the application of

the colored pavement when compared with an uncolored treatment. In addition, green pavement treatments help to more clearly communicate the bike lane area to the large numbers of visitors and tourists who frequent Downtown Las Vegas.

Shared Roadways – 96 miles

Shared roadways highlight the legal right of bicyclists to operate in the travel lane without providing a dedicated facility or space. They can be identified by signage and/or pavement markings. Bicycle boulevards, bike routes, shared lane markings, bus/bike lanes, and other shared designations are all identified as shared roadways although the level of comfort for bicyclists can vary widely. These facilities are often used to fill a network gap – connecting two paths, trails, or bike lanes. However, when installed on busier streets, they are often insufficient to encourage the average person to ride a bicycle and can provide a false sense of protection for bicyclists.

Unpaved Trails

Unpaved trails are not included in the project area maps or facility mileage calculations because they almost always serve a strictly recreational purpose. Unpaved trails can be dirt, gravel, crushed limestone, and other natural surfaces, and exist in separate rights of way for exclusive use by hikers, mountain bikers, and sometimes equestrians (see example in Figure 2.22). Unpaved trails can be narrow singletrack or wider, more accessible trails.

Figure 2.22:
McCullough Hills Trail, Henderson



EXISTING FACILITY DENSITY

Although certain areas of Southern Nevada are relatively well-served by bicycling and walking facilities (excluding sidewalk data), other areas are generally lacking facilities or exhibit variable connectivity. Southern Nevada's existing facility density (its cumulative number of paths, trails, bike lanes, and shared roadways divided by the total land area within each jurisdiction's boundaries) is comparatively lower than the region's peer cities. Existing facility density represents one way, among many, that communities can measure how well their residents are being served.

Figure 2.24 shows how Southern Nevada jurisdictions' existing facility mileages per square mile compare to peer cities.

Existing Bicycling & Walking System

Existing Bicycling & Walking Facilities Network

Figure 2.23:

Active Transportation Network Make-up for RTC Project Area & Similar Cities in the Western U.S.

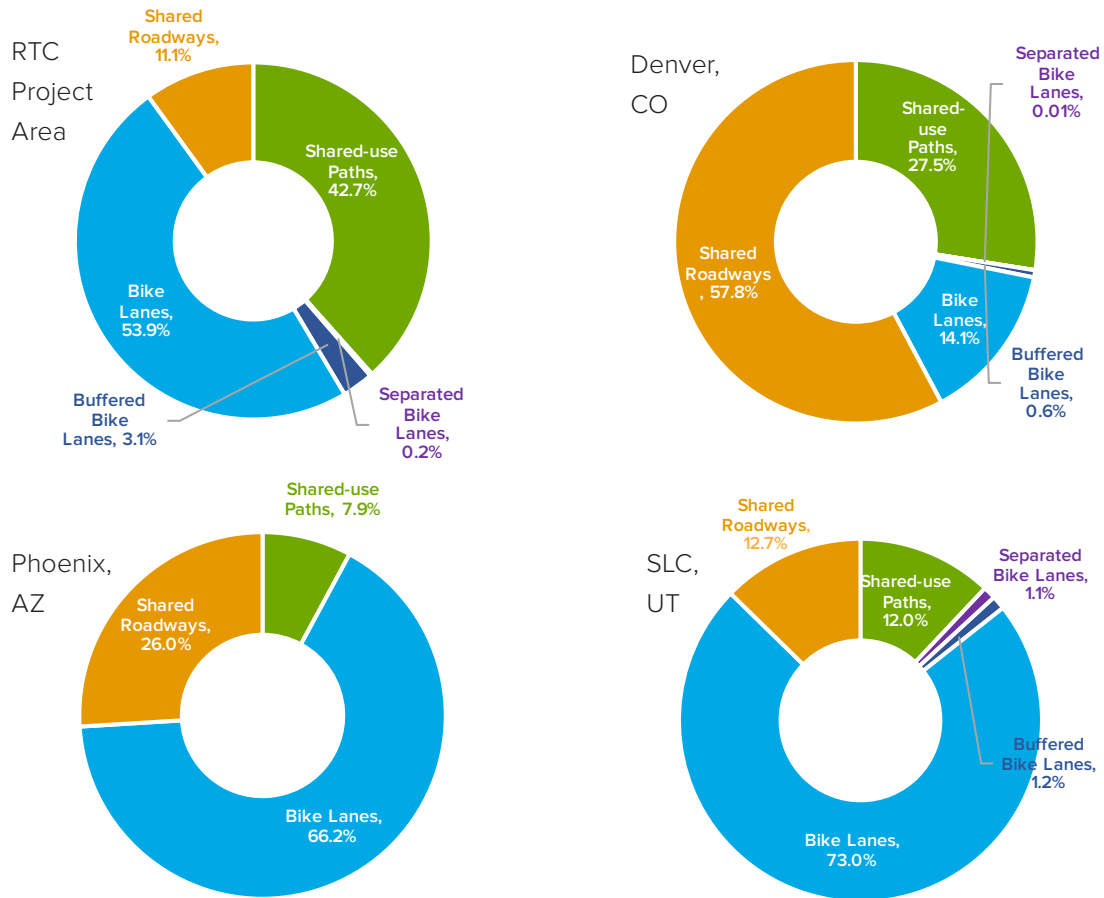
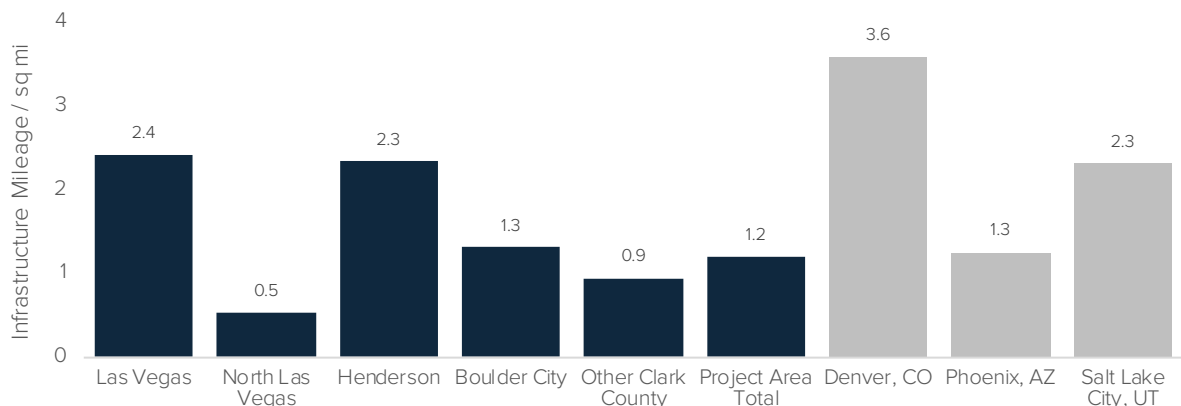
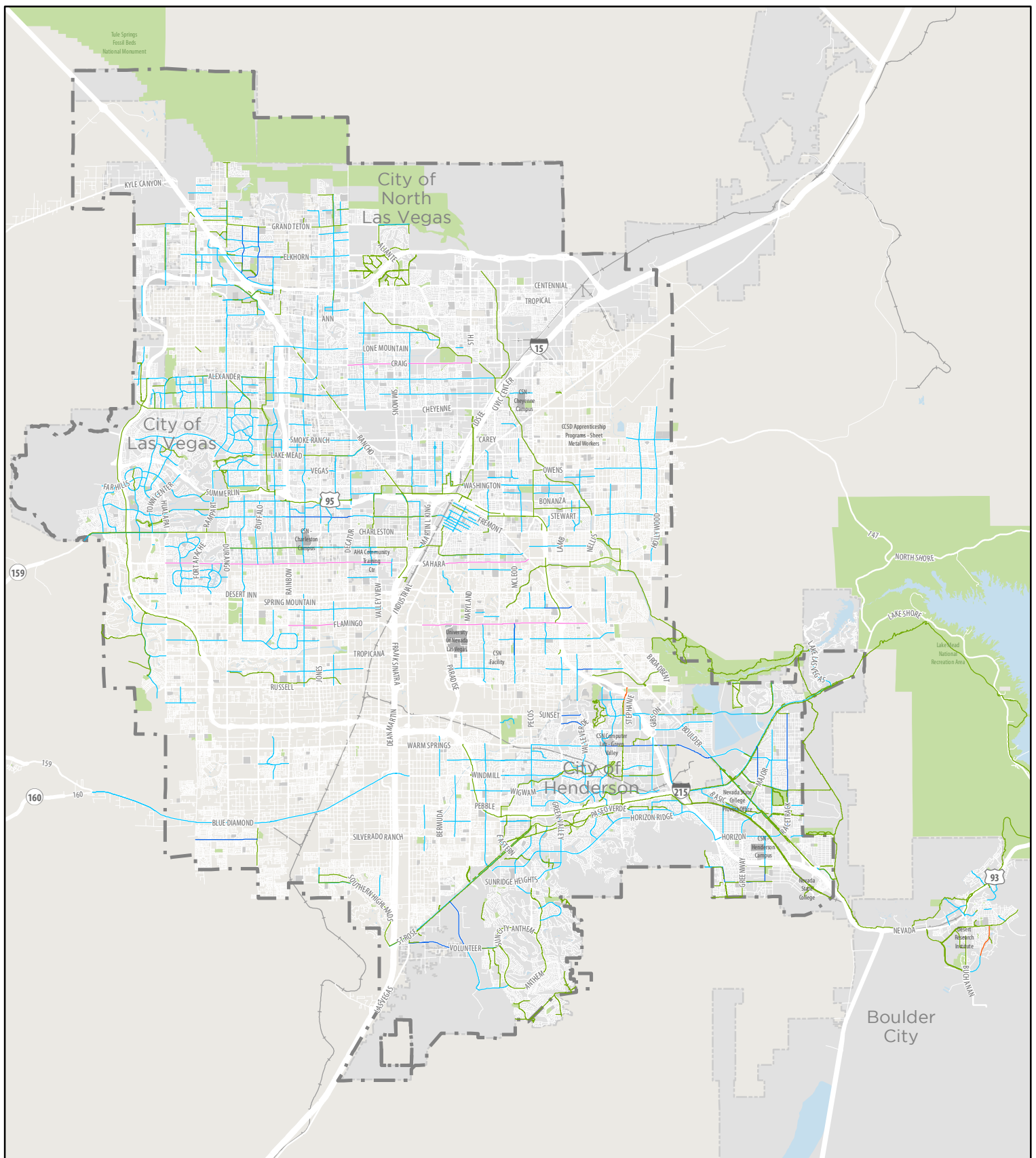


Figure 2.24:

Existing Bicycle Facility Density for RTC Project Area Municipalities & Similar Cities in the Western U.S.

Note: These densities do not reflect the highest mileage/developed square miles because most jurisdictions have at least some land that is not suitable for bicycling and walking facilities.





Map 2.4

Regional Bicycle and Pedestrian Plan for Southern Nevada

Existing Facilities Map

Data Source: Clark County and RTC GIS; 2011 North Las Vegas Comprehensive Bikeway and Trails Plan, 2014 Regional Bicycle Gap Analysis, 2016 Las Vegas Mobility Master Plan
 Map Created: December 5, 2016
 Map Produced By: Alta Planning + Design

- Existing Facilities**
- Separated Bike Lane
 - Buffered Bike Lane
 - Bike Lane
 - Bus/Bike Lane
 - Shared-use Path

- Park/Nat'l Area
- School
- College
- Municipality
- Southern Nevada Public Land Management Act Boundary



Existing Bicycling & Walking System

Existing Bicycling & Walking Facilities Network

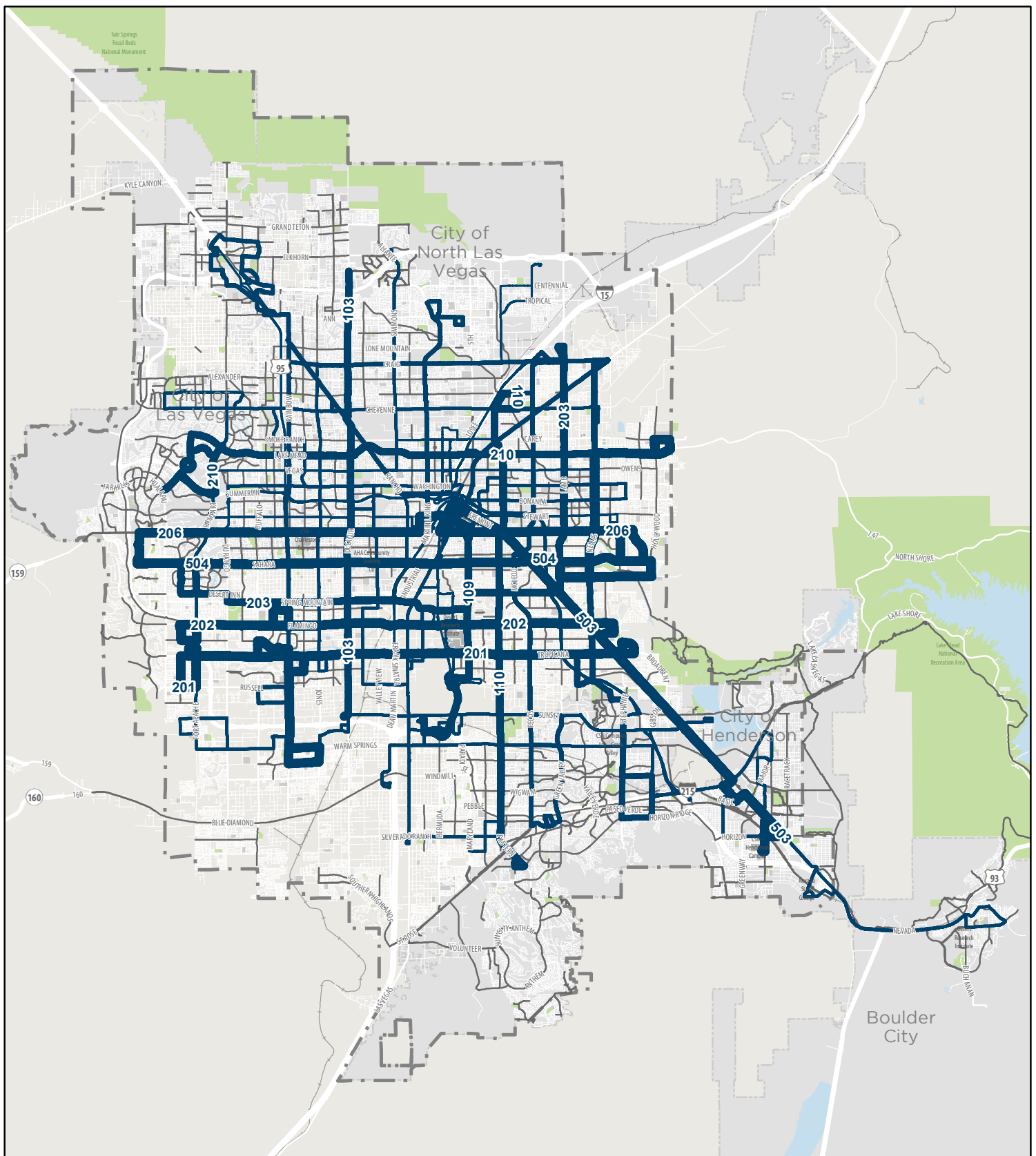
TRANSIT INTEGRATION

In 2015, the RTC transit system carried more than 66 million passengers and nearly every transit trip on Southern Nevada's 38 bus routes begins as a walking or bicycling trip. Improving integration between the active transportation and the transit system (i.e. improving bicycle accommodation on buses, connections to transit stops and stations, and accessibility) will increase the safety, comfort, and likelihood of transit, walking, and bicycling trips in Southern Nevada.

Transit can also provide a convenient and relatively inexpensive alternative to walking and bicycling during inclement weather or when a destination's location is not suitable for walking and bicycling. Additionally, transit and walking and bicycling trips can be combined to make lengthy trips more feasible for those without access to an automobile. Many of the RTC transit system's buses accommodate bicycles in a rack mounted to the front.

The map on the following page shows how many passengers boarded with bicycles on each route (where data was available). The thickness of the line indicates the relative popularity of boarding with a bike on a particular route. Since January 2010, bicycle boardings have steadily increased system-wide, indicating a growing interest in combining bicycling and transit trips.

There was no data available, however, at a station or stop level, so bicycle boardings have been averaged over the entire length of the route. It is likely that some locations along routes as well as entire districts are more popular for bicycle boardings than others.



Map 2.5
Regional Bicycle and Pedestrian Plan for
Southern Nevada

Transit Boardings w/ Bicycles Map (Top 10 Routes Labeled)

Data Source: Clark County, and RTC GIS
Map Created: March 2016
Map Produced By: Alta Planning + Design

Bus Routes by Avg. Bike Boardings/Month

- > 3,000
- 2,001 - 3,000
- 1,501 - 2,000
- 1,001 - 1,500
- 501 - 1,000
- 200 - 500
- Path, Bike Lane, or Route

Top 10 Routes for
Avg. Bike Boardings/Month:

1. 504 (3,653)
2. 202 (3,635)
3. 206 (3,518)
4. 503 (3,491)
5. 201 (3,274)
6. 110 (2,953)
7. 109 (2,260)
8. 210 (2,198)
9. 203 (2,084)
10. 103 (2,042)

- Park/Nat'l Area
- School
- College
- Municipality
- Southern Nevada Public Land Management Act Boundary

0 2 4 8 Miles



Crash & Safety Analysis

Southern Nevada Transportation Safety Plan Review

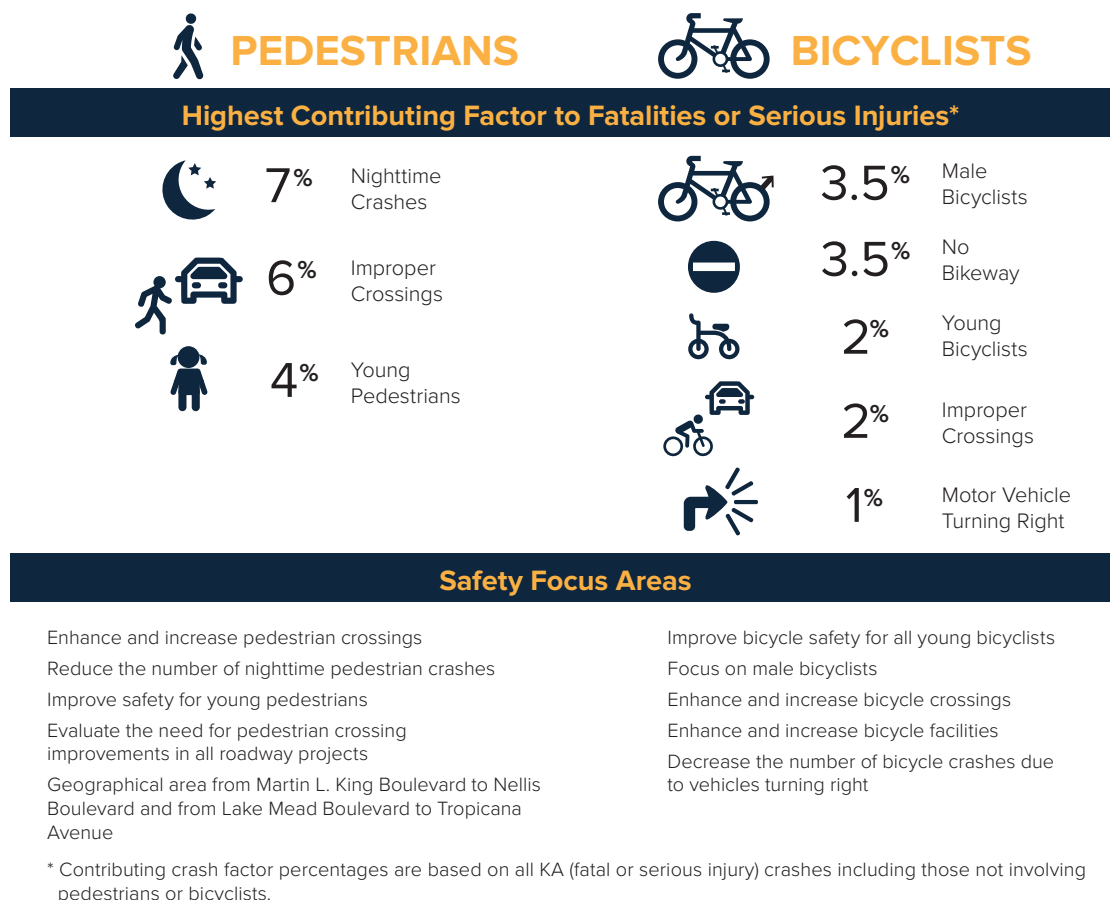
In 2015, the Regional Transportation Commission (RTC) completed the Southern Nevada Transportation Safety Plan (TSP) in response to the need to reduce and eliminate traffic deaths and serious injuries in Southern Nevada. This goal is consistent with national and statewide efforts to reach zero traffic fatalities. To this end, the TSP sought to evaluate the causes of crashes in the region and identify strategies to improve transportation safety for all road users, with the more immediate goal of reducing the

five year rolling average of traffic-related fatalities and serious injuries by 50 percent in 2035. The TSP process established critical emphasis areas (CEAs) that were determined to be especially important to reaching the zero fatalities goal.

Much of the plan focused on the safety of vulnerable roadway users, as pedestrians and bicyclists are disproportionately impacted by traffic injuries and fatalities. The TSP categorized pedestrian and bicycle safety as a Category 1

Figure 2.25:

Southern Nevada Transportation Safety Plan Data and Recommendations



CEA, which are defined as containing a significant engineering component. Crash analysis was performed on each CEA within Category 1 to identify unique crash contributing factors, which were used to develop focus areas.

In response to these findings, the TSP developed Action Plans to implement new policies, projects and studies for the critical emphasis areas. Recommendations to reduce bicycle and pedestrian crashes included pedestrian crossing improvements at high crash locations and development of candidate corridors and design guidelines for bike boulevards, buffered bike lanes and cycle tracks as part of an alternative bikeways study. A toolbox of engineering strategies was also developed, based on crash modification factors, which are measures of the safety effectiveness of a particular treatment or design element. Strategies for pedestrian and bicycle safety include the following items:

1. Construct pedestrian refuge islands and raised medians (High Priority)

2. Develop and implement roadway, intersection, horizontal curves, and pedestrian lighting standards (High Priority)
3. Implement traffic calming techniques (High Priority)
4. Improve geometry of pedestrian and bicycle facilities
5. Install pedestrian and bicycle facilities at signalized intersections
6. Install or upgrade traffic and pedestrian signals
7. Install pedestrian hybrid beacons
8. Provide crosswalk enhancements
9. Provide sidewalks/walkways and curb ramps

Crash Analysis

Crash data is an important statistic in tracking and analyzing bicycle and pedestrian safety. Crash data for all reported crashes involving

Figure 2.26:

High Priority Bicycle and Pedestrian Safety Strategies recommended by the Transportation Safety Plan (TSP)



Pedestrian refuge island



Pedestrian lighting standards
(Source: Holophane)



Traffic calming techniques

Crash & Safety Analysis

Crash Analysis

bicyclists or pedestrians in Southern Nevada between January 2009 and December 2015 were provided by the Nevada Department of Transportation (NDOT).

During those six years, 4,866 pedestrian and bicycle crashes were reported on public roadways in the Las Vegas Valley. Of these, 2,881 crashes (59 percent) involved pedestrians and 1,683 crashes involved bicyclists (41 percent). Among all pedestrian crashes, 122 resulted in fatalities (5 percent), while 69 bicycle crashes (4 percent) resulted in fatalities. There has been a noticeable decrease in pedestrian crashes since 2013, falling by 15 percent between 2013 and 2015 (Figure 2.27). However, bicycle crashes have mostly held steady between 2011 and 2015, with a brief up-tick in 2014 (Figure 2.28).

A review of crash locations found that the most common location for incidents was along high-traffic arterial streets, which provide the most continuous routes in the regional street network and serve as primary retail and employment corridors (Figure 2.30). Multiple intersections along Charleston Boulevard, Nellis Boulevard, Las Vegas Boulevard, Maryland Parkway, and Flamingo Road were listed in the ten highest pedestrian and bicycle crash locations. These roads tend to be higher speed (Figure 2.29), wider, have more lanes for traffic and larger intersections, and have inadequate (or lack altogether) dedicated bicycle facilities or buffered sidewalks.

Greater than 40 percent of all pedestrian collisions occurred when it was dark, compared to 14 percent for bicycle crashes (Figure 2.31). In general, crashes were most likely to occur during afternoon commute hours (between 3 and 6 PM). Most crashes resulting in fatal and serious injuries occurred on higher speed (35-45 mph) collector and arterial roadways where pedestrian interactions and on-street bicycle facilities are common. Roadways with higher speeds see fewer incidents, as they typically have limited access points and do not include bicycle facilities, which limits potential conflicts between road users.

Over 20 percent of pedestrian collisions and nearly 40 percent of bicycle collisions occurred when a motor vehicle was turning right, a movement known as a “right hook” (Figure 2.32). Overall, almost 40 percent of pedestrian crashes and 50 percent of bicycle crashes were reported to have taken place at an intersection (Figure 2.30). Traffic calming, lighting, dedicated right turn lanes to the right of bike lanes, correct lateral positioning of bicyclists and pedestrian refuges or waiting areas in the line of sight of motorists could reduce these types of crashes.

The following charts provide a year to year breakdown for bicycle and pedestrian crashes and fatalities/serious injuries, vehicle actions, lighting conditions, time of day and posted speed limit (for fatalities and serious injury crashes).

Figure 2.27:
2011-2015 Year over Year Pedestrian Crashes (Data: Nevada Department of Transportation [NDOT])

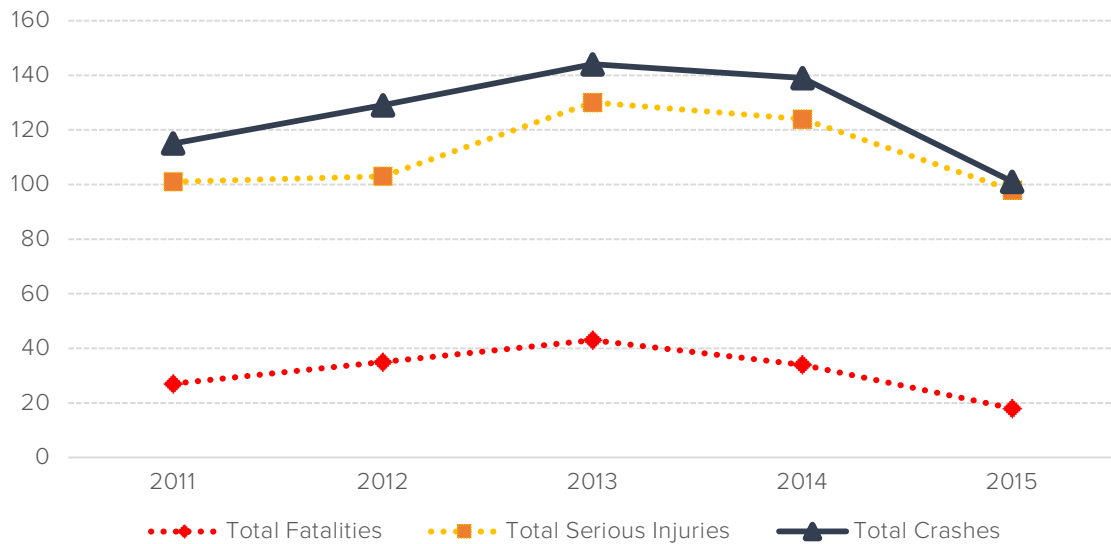
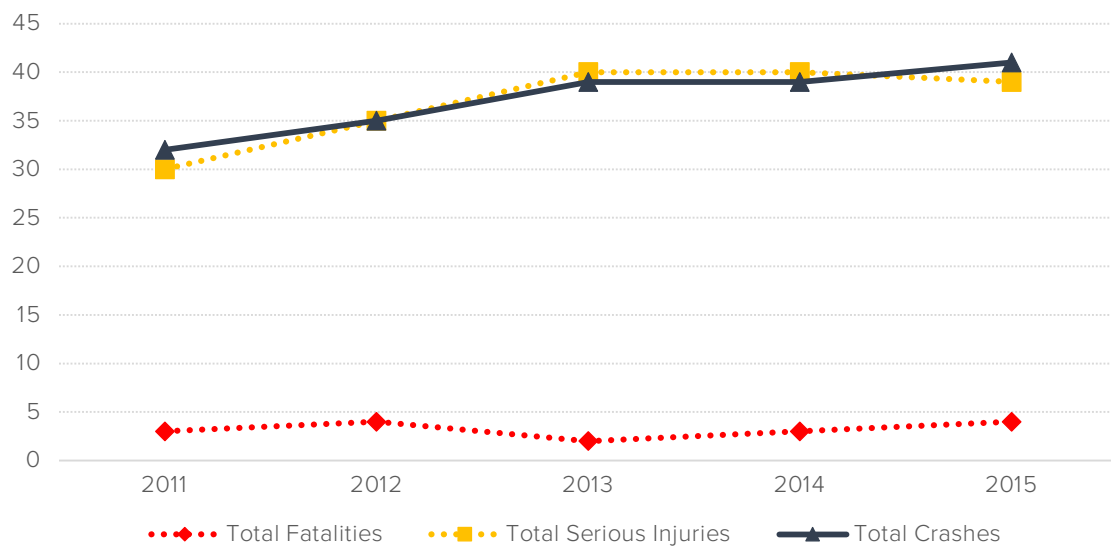


Figure 2.28:
2011-2015 Year over Year Bicycle Crashes (Data: Nevada Department of Transportation [NDOT])



Crash & Safety Analysis

Crash Analysis

Figure 2.29:
2011-2015 Speed Limits at Crash Locations (Data: Nevada Department of Transportation (NDOT))

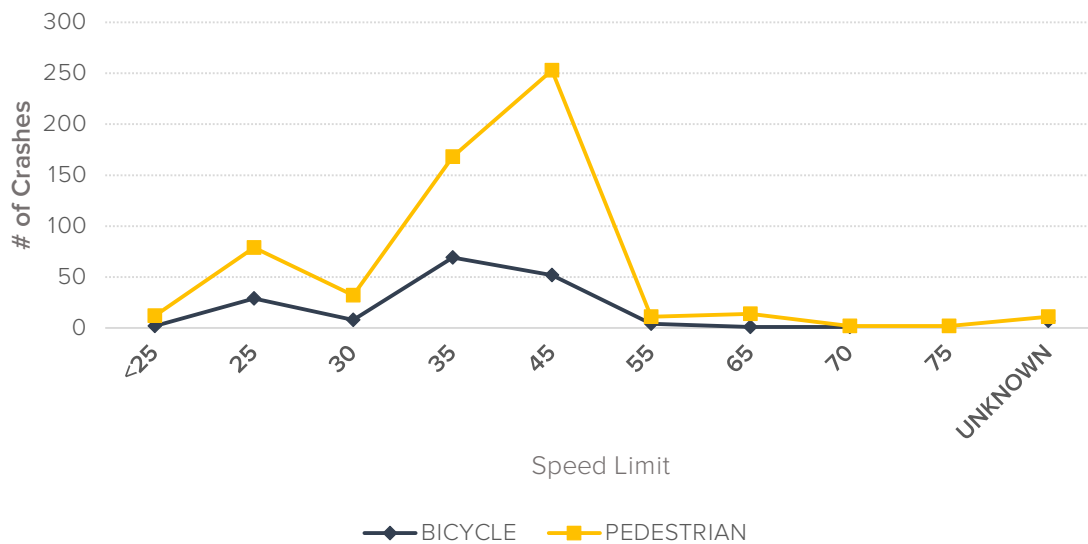


Figure 2.30:
2011-2015 Pedestrian and Bicycle Crash Locations (Data: Nevada Department of Transportation (NDOT))

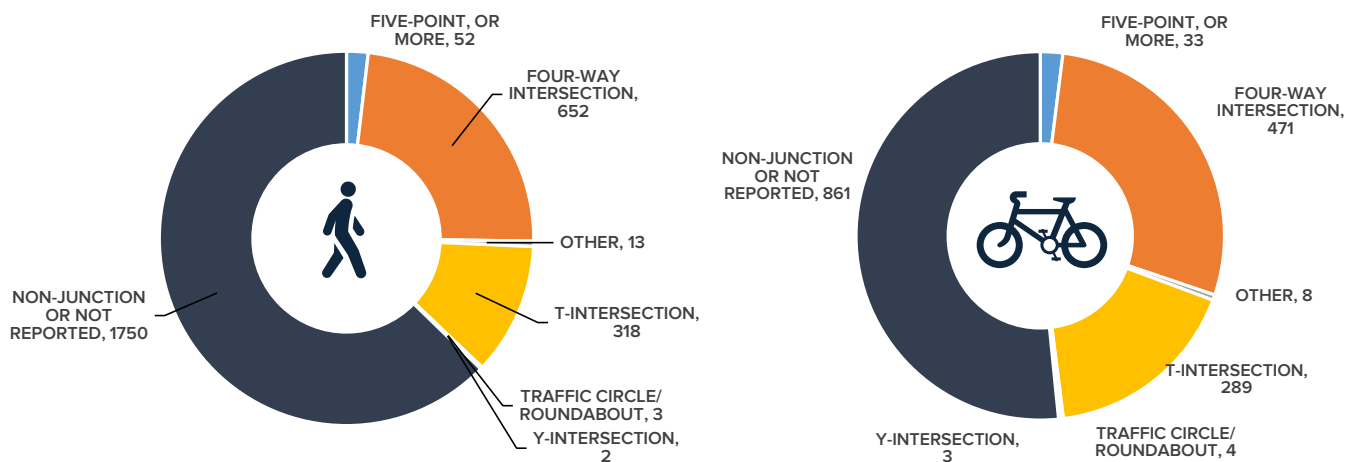


Figure 2.31:
2011-2015 Pedestrian and Bicycle Crashes, Time of Day (Data: Nevada Department of Transportation (NDOT))

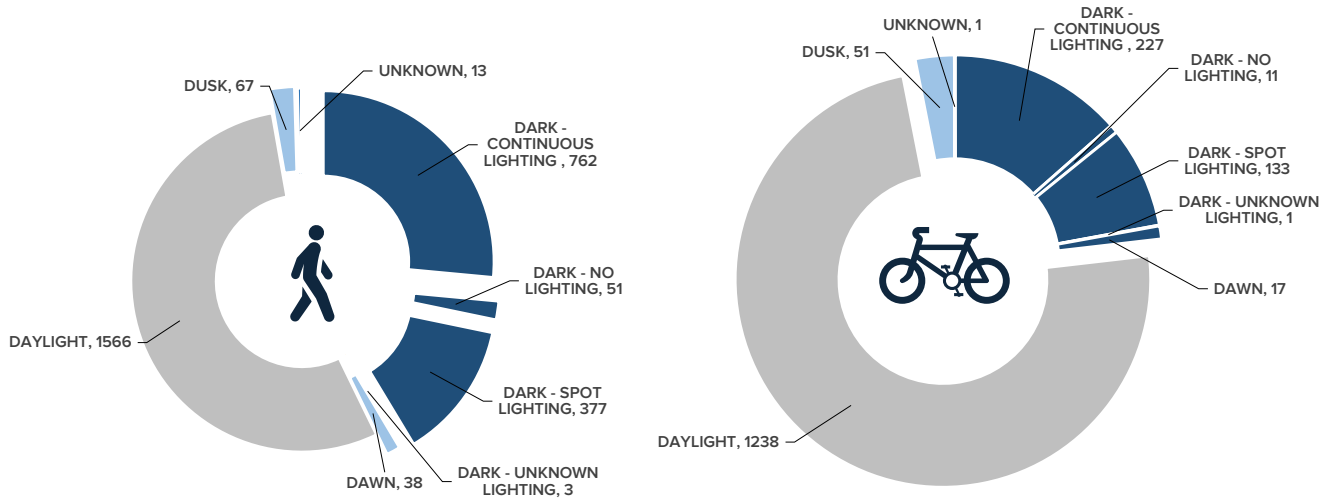
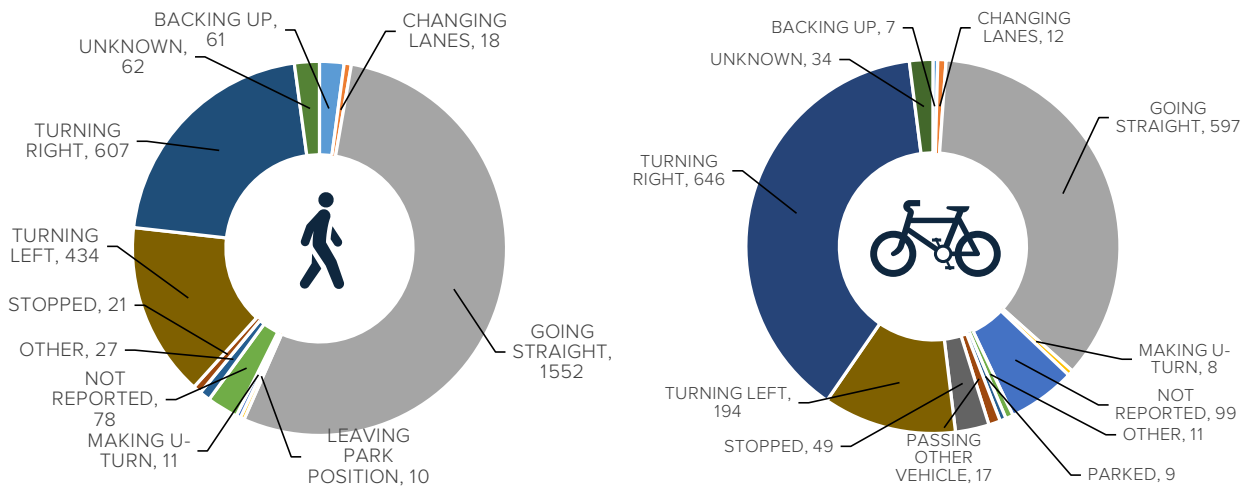


Figure 2.32:
2011-2015 Pedestrian and Bicycle Crashes, Driver Actions (Data: Nevada Department of Transportation (NDOT))



Crash & Safety Analysis

Top Pedestrian Crash Locations

TOP PEDESTRIAN CRASH CORRIDORS

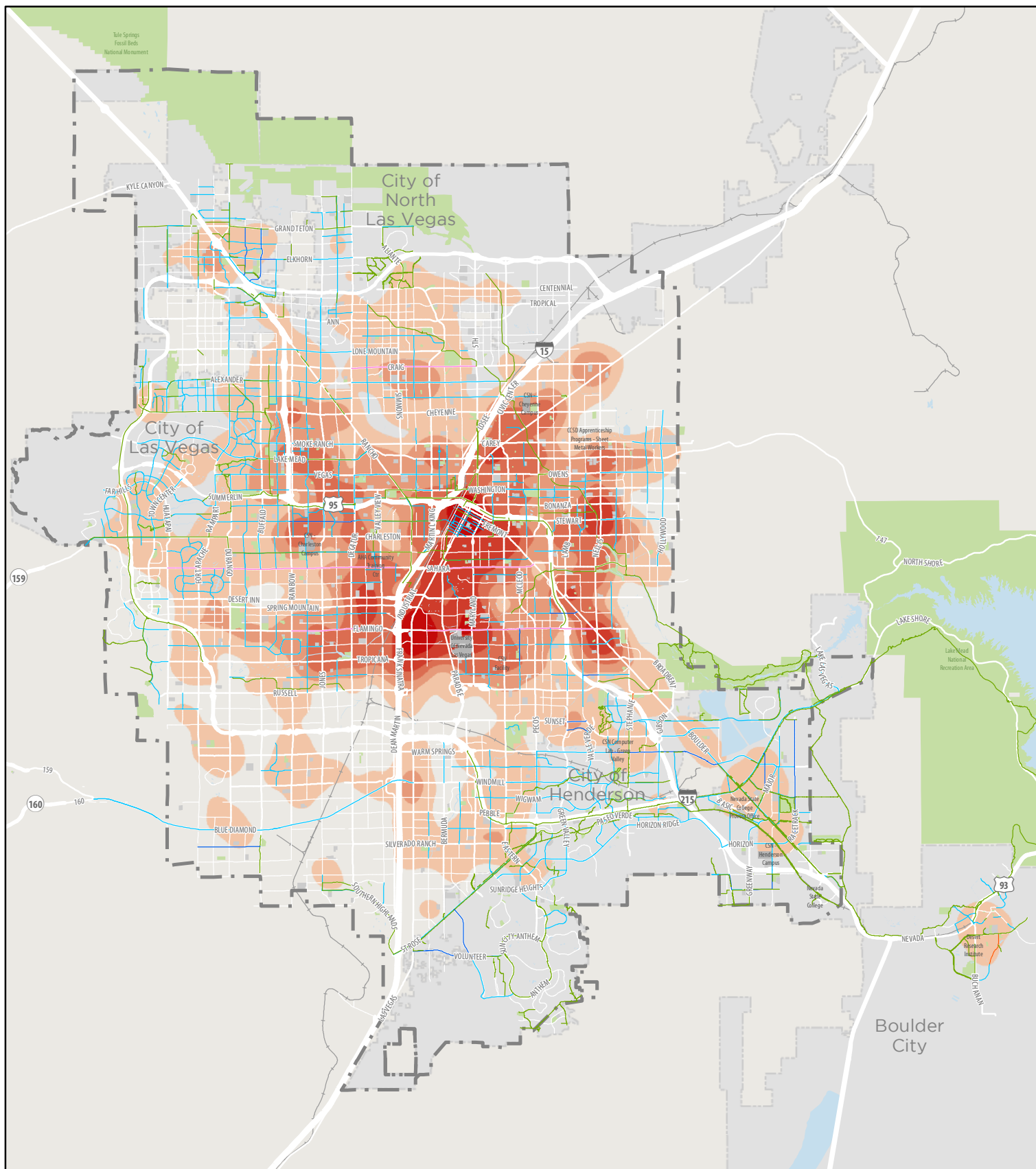
Based on review of statewide crash data for the years 2011-2015, the top 10 corridors for pedestrian-related crashes in Southern Nevada are located in the locations listed below. Where a reason was attributed, a plurality of these crashes' contributing factors included either a failure to yield right of way to pedestrians by motorists or improper crossing of roadway by pedestrians. Some crashes had multiple contributing factors by both motorists and pedestrians.

1. Las Vegas Blvd (167)
2. Charleston Blvd (123)
3. Sahara Ave (98)
4. Flamingo Rd (90)
5. Tropicana Ave (84)
6. Boulder Hwy (82)
7. Lake Mead Blvd (81)
8. Nellis Blvd (75)
9. Maryland Pkwy (69)
10. Eastern Ave (53)

TOP INTERSECTIONS FOR PEDESTRIAN CRASHES

Based on review of statewide crash data for the years 2011-2015, the top 14 intersections for pedestrian-related crashes in Southern Nevada are located in the following locations:

1. Boulder Hwy at Nellis Blvd (13)
2. Maryland Pkwy at Flamingo Rd (11)
3. Flamingo Rd at Koval Lane (9)
4. Maryland Pkwy at Reno Ave (8)
5. Las Vegas Blvd at Bellagio Dr (8)
6. Lamb Blvd at Charleston Blvd (8)
7. Nellis Blvd at Stewart Ave (8)
8. Bonanza Rd at Eastern Ave (8)
9. Nellis Blvd at Cedar Ave (8)
10. Boulder Hwy at Indios Avenue (8)
11. Charleston Blvd at Maryland Pkwy (4)
12. Charleston Blvd at Shadow Ln (4)
13. Charleston Blvd at Decatur Blvd (4)
14. Charleston Blvd at 28th St (4)



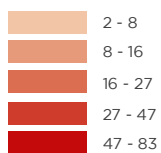
Map 2.6

Regional Bicycle and Pedestrian Plan for
Southern Nevada

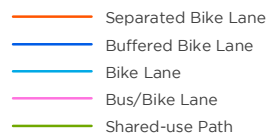
Pedestrian Crash (2011-15) Analysis Density Map

Data Source: NDOT, Clark County and RTC GIS
Map Created: March 2016
Map Produced By: Alta Planning + Design

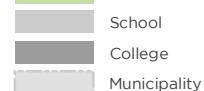
Pedestrian Crash Density (per sq. mi.)



Existing Facilities



Park/Nat'l Area



Southern Nevada Public
Land Management Act
Boundary



Crash & Safety Analysis

Top Bicycle Crash Locations

TOP 10 CORRIDORS FOR BICYCLE CRASHES

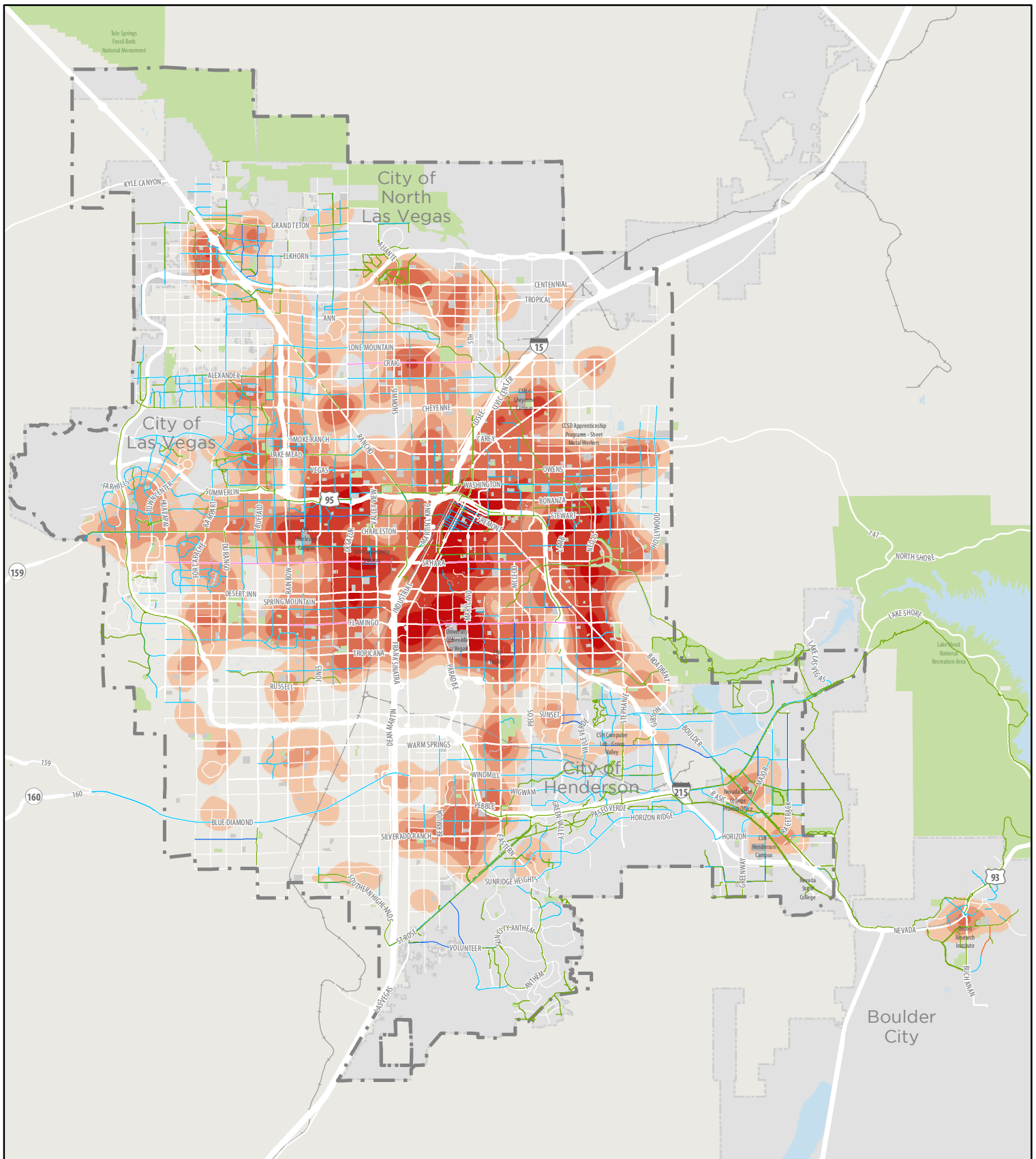
Based on review of statewide crash data for the years 2011-2015, the top 10 corridors for bicycle-related crashes in Southern Nevada are located in the locations listed below. Where a reason was attributed, a plurality of these crashes' contributing factors included either a failure to yield right of way to bicyclists by motorists, or failure to obey signs and signals, improper crossing, or riding on the wrong side of the road by bicyclists. Some crashes had multiple contributing factors by both motorists and bicyclists.

1. Las Vegas Blvd (94)
2. Charleston Blvd (81)
3. Flamingo Rd (70)
4. Sahara Ave (47)
5. Tropicana Ave (43)
6. Nellis Blvd (42)
7. Lake Mead Blvd (38)
8. Decatur Blvd (35)
9. Eastern Ave (34)
10. Maryland Pkwy (33)

TOP INTERSECTIONS FOR BICYCLE CRASHES

Based on review of statewide crash data for the years 2011-2015, the top 19 intersections (4 collisions or greater) for bicycle-related crashes in Southern Nevada are located in the following locations:

1. Las Vegas Blvd at Caesars Palace Dr (7)
2. Nellis Blvd at Cedar Ave (6)
3. Las Vegas Blvd at Flamingo Rd (6)
4. Flamingo Rd at Jones Blvd (5)
5. Charleston Blvd at Rainbow Blvd (5)
6. Decatur Blvd at Desert Inn Rd (5)
7. Boulder Hwy at Sun Valley Dr (5)
8. Charleston Blvd at Jones Blvd (5)
9. Tropicana Ave at Cameron St (4)
10. Valley View Blvd at Sahara Ave (4)
11. Swenson St at Flamingo Rd (4)
12. Las Vegas Blvd at Stewart Ave (4)
13. Maryland Pkwy at Desert Inn Rd (4)
14. Flamingo Rd at Las Vegas Blvd (4)
15. Harmon Ave at Audrie St (4)
16. Flamingo Rd at Maryland Pkwy (4)
17. Lake Mead Blvd at Pecos Rd (4)
18. Flamingo Rd at Arville St (4)
19. Charleston Blvd at Maryland Pkwy (4)



Map 2.7

Regional Bicycle and Pedestrian Plan for Southern Nevada

Bicycle Crash (2011-15) Analysis Density Map

Data Source: NDOT, Clark County and RTC GIS
Map Created: March 2016
Map Produced By: Alta Planning + Design

Bicycle Gap Analysis

Regional Bicycle Network Gap Analysis Review

The 2014 RTC Regional Bicycle Network Gap Analysis lays the groundwork for and informs much of the RBPP's Gap Analysis. The plan analyzed all streets within the Las Vegas urbanized areas with speed limits over 25 mph. The plan analyzed and prioritized gaps in the bicycle network throughout the Las Vegas Valley.

METHODOLOGY

The Regional Bicycle Network Gap Analysis utilized two criteria in assessing gaps in the regional bicycle network. These criteria were:

1. Demand Score – Calculated based upon population and employment density data
2. Connectivity Score – Calculated based upon connectivity (within 1/2 mile) to area destinations

Demand Score

Bicycle ridership is higher in locations with greater population and employment levels. As such, a demand score was calculated for each roadway segment with a speed limit greater than 25 miles per hour. The demand score was based on:

- Population density within ½ mile buffer of each segment
- Employment density within ½ mile buffer of each segment

Population density + employment density for each roadway segment gap was analyzed and the top 90-100 percent scores were awarded 10 points. 80-90 percent scores were awarded nine points and so on.

Connectivity Score

In addition to demand, connectivity was also analyzed by the study. Gaps in the bicycle network within a variety of locations were evaluated to determine a connectivity score for each roadway segment over 25 mph. Roadway segments that addressed multiple gap connections (schools and parks for example) were awarded a corresponding number of points for each gap type. Locations initiating creation of a gap score for a roadway segment included:

- Parks
- Schools (all)
- Airports
- Regional malls
- Park and rides
- “Club Ride” origins and destinations for bike
- Census tracts with high bike commutes

Additional gap scores were also created for roadway segments with the following characteristics:

- Low AADT relative to the number of travel lanes
- Transit routes with high bike ridership
- High density residential areas
- Low wage jobs

PRIORITIZATION AND SCORING

Roadway segments were then plotted on the matrix below to aid in prioritization efforts. Segments with a high demand and connectivity score were logically designated as high priority

corridors for implementation of bicycle facilities. Segments with one high score (demand or connectivity) were identified as medium priorities and those segments with low demand and connectivity scores were low priorities.

Implementation

The Regional Bicycle Network Gap Analysis did not specifically designate facility types for the high priority gaps identified in the plan. The RBPP will address this issue. Additionally, a number of corridors were eliminated from the Regional Bicycle Network Gap Analysis due to feasibility challenges regarding implementing bikeways in constrained locations. These facilities included:

- Grand Central Parkway – Alta Boulevard to City Parkway
- Las Vegas Boulevard – Sahara Avenue to Stewart Avenue
- Charleston Boulevard – Rampart Boulevard to Nellis Boulevard
- Lake Mead Boulevard – Simmons Road to Anasazi Drive
- Valley View Boulevard – Charleston Boulevard to Desert Inn Road
- Stewart Avenue – Main Street to 15th Street
- Cheyenne Avenue within the City of North Las Vegas limits, from Decatur Boulevard to Civic Center Drive

Figure 2.33:
Regional Bicycle Network Gap Analysis Prioritization Matrix



Bicycle Gap Analysis

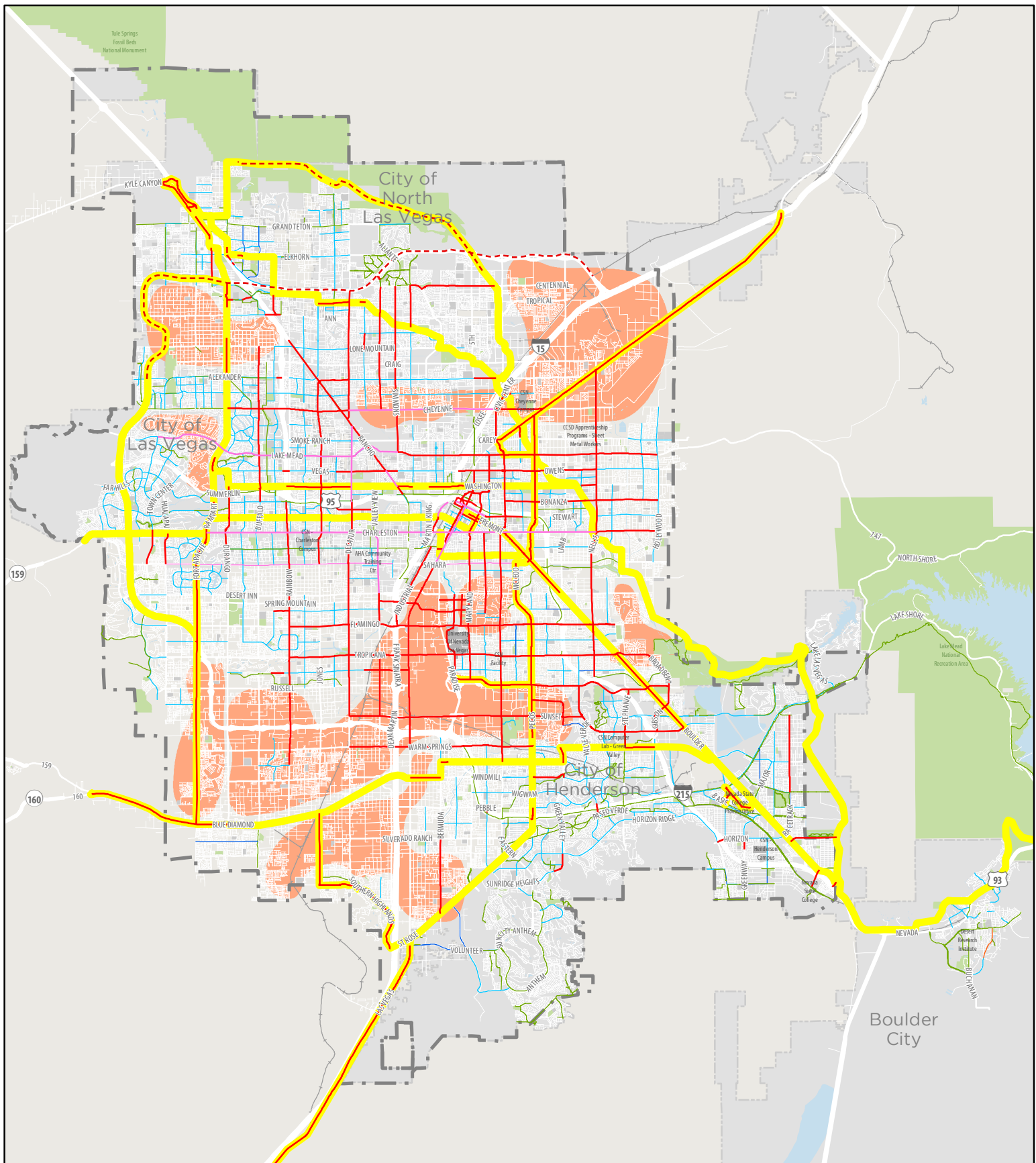
Regional Bicycle Network Gap Analysis Review

- Decatur Boulevard – Rancho Drive to the 215 Beltway
- Rancho Drive – Washington Avenue to Vegas Drive

Although these corridors were eliminated from the Regional Bicycle Network Gap Analysis, they have been included on the map to the right (in pink) so that parallel corridors can be planned for and accommodated.

ADDITIONS TO THE 2014 REGIONAL BICYCLE NETWORK GAP ANALYSIS

The Regional Bicycle Network Gap Analysis established a solid baseline of needed facilities to create a complete bicycle network in Southern Nevada. In addition to the demand and connectivity previously calculated, this analysis has supplemented prior gap analysis efforts by identifying “area gaps”. Area gaps extend beyond the scale of individual corridors and indicate larger neighborhoods with few bicycle connections. These may be in developing areas of the region where roadway networks are partially built out. However, completion of the bicycle network through these areas may address larger regional connectivity needs.



Map 2.8
Regional Bicycle and Pedestrian Plan for
Southern Nevada

High Priority Bicycle Facility Recommendations Map with Regional Routes Highlighted from the 2014 Regional Bicycle Network Gap Analysis

Data Source: Clark County and RTC GIS,
2014 Gap Analysis
Map Created: March 2016
Map Produced By: Alta Planning + Design

High Priority Recommended Facilities

- On-Street Facility
- - - Shared-use Path
- Removed from Regional
Bicycle Network Gap
Analysis (Low Feasibility)
- Regional Routes
- Area Gap

Existing Facilities

- Separated Bike Lane
- Buffered Bike Lane
- Bike Lane
- Bus/Bike Lane
- Shared-use Path

- Park/Nat'l Area
- School
- College
- Municipality

 Southern Nevada Public
Land Management Act
Boundary

0 2 4 8 Miles

Bicycle Level of Comfort Analysis

The Importance of Comfortable Bicycle Facilities

Comfortable facilities and routes are an important component for increasing bicycling activity. High comfort facilities, like shared-use paths (trails), separated bike lanes, and bicycle boulevards, appeal to a more diverse cross section of the public than traditional facilities (bike lanes) along high volume / high speed (35 mph and up) streets.

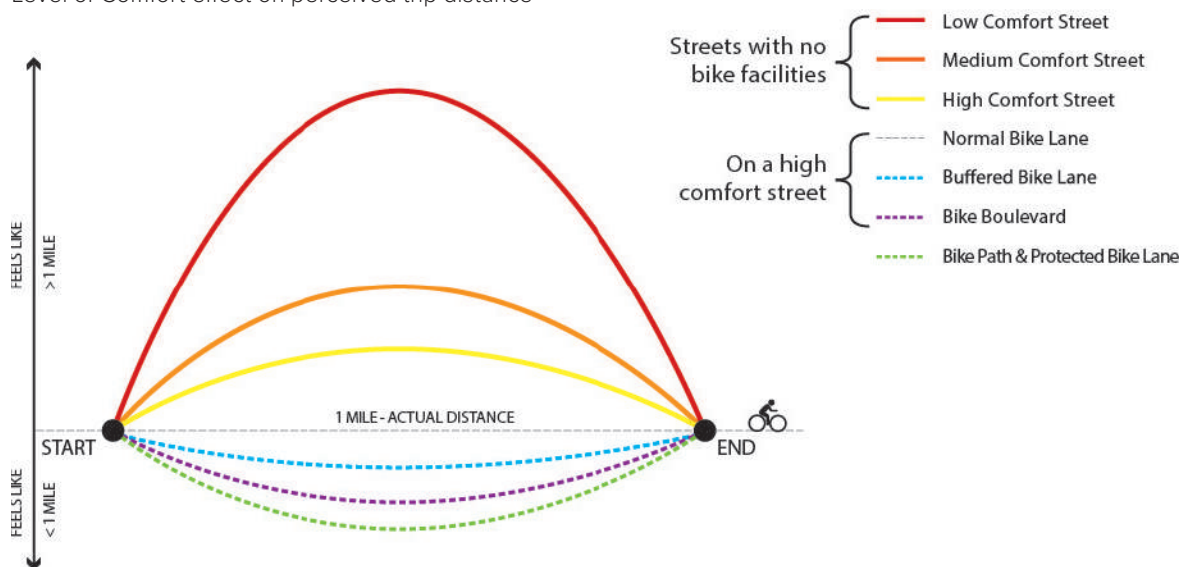
Many streets that have bike lanes are also low-comfort; as building traditional bike lanes on 35 mph, multi-lane streets simply isn't enough to get more people riding bikes. High-stress streets are often designed for driving speeds well above the posted speed limit, discouraging all but the most confident of bicyclists. High-stress streets can also act as barriers to bicycling, with easy crossings only possible at intersections with traffic lights.

A majority of the public would like to walk or ride bicycles more but are discouraged from doing so by perceived safety concerns, lack of facilities, or a lack of knowledge about where the appropriate facilities are located. Surveys nationally show that 50-60 percent of people say they would ride a bicycle more (or start riding) if they had access to facilities that provided more separation from traffic, lower traffic speeds, and/or lower traffic volumes.¹¹ Additionally, evidence has shown that increasing the number of bicyclists on the road improves safety for all transportation modes. Cities with high bicycling rates tend to have lower crash rates.¹²

11 Four Types of Cyclists. (2009). Roger Geller, City of Portland Bureau of Transportation: <http://www.portlandonline.com/transportation/index.cfm?a=237507>.

12 Marshall, W., and N. Garrick, 2011 - Evidence on why bike-friendly cities are safer for all road users, Environmental Practice, 13, 1.

Figure 2.34:
Level of Comfort effect on perceived trip distance



People riding bicycles feel most comfortable on facilities with few or no vehicles and low speeds. As vehicle speeds and volumes increase, more and more separation between bicyclists and vehicles is necessary to maintain comfort and safety for all potential bicyclists.

Separated or traffic-calmed on-street facilities like separated bike lanes or bicycle boulevards, respectively, also create a better pedestrian experience by reducing traffic speeds or, in the case of separated bike lanes, increasing the distance and physical separation between sidewalks and motor vehicle travel lanes.

Level of Comfort Methodology

The methods used for the Level of Comfort (LOC) analysis were adapted from the 2012 Mineta Transportation Institute (MTI) Report 11-19: Low-Stress Bicycling and Network Connectivity. The approach outlined in the MTI report uses roadway network data, including posted speed limit, the number of travel lanes, and the presence and character of bicycle lanes, as a proxy for bicyclist comfort level. The method used in this analysis utilizes additional data such as on-street parking in Downtown Las Vegas, traffic signals, shared-use paths, and motor vehicle volumes (ADT), in addition to the MTI roadway network data.

Table 2.4:
Level of Comfort Data Sources

Model Input	Source	Notes
Posted Speed Limit	RTC	Example: a road without bike lanes and a 55 mph posted speed limit has a higher level of traffic stress than a 25 mph road without bike lanes, even if the roads are the same width (see below)
Number of Travel Lanes	RTC	Wider, faster roadways are less comfortable for people riding bicycles
Parking Lane Width	RTC	Related to travel lanes and speed; parking lane width reduces level of comfort due to “dooring” potential and motorists crossing bike lane to access spaces. Data only available in Downtown Las Vegas
Traffic Signals	RTC	Allow connections between low stress clusters
Bicycle-Specific Facilities and Width	RTC, Henderson, Clark County, Las Vegas, North Las Vegas, Boulder City, City of Mesquite	5’ bike lane width was assumed unless otherwise stated in data checked by Clark County, Henderson, and RTC staff
Shared-use Paths	RTC	Shown as LOC 1 in order to show low stress connections where roads may not exist
Average Daily Traffic	RTC, NDOT	Provided for major roadways. Local roadways (classification lower than collector) used assumption of less than 3,000 ADT

Bicycle Level of Comfort Analysis

Level of Comfort (LOC) Methodology

All arterial and collector roadway segments are classified into one of four levels of comfort (LOC) based on these factors.

LOC 1, the highest level of comfort, is assigned to roads that would be tolerable for most children to ride;

LOC 2 roads are those that could be comfortably ridden by the mainstream adult population;

LOC 3 is the level assigned to roads that would be acceptable to current “enthused and confident” bicyclists;

LOC 4 is assigned to segments that are only acceptable to “strong and fearless” bicyclists, who will tolerate riding on roadways with higher motorized traffic volumes and speeds.

A bicycle network is likely to attract a large portion of the population if its fundamental attribute is low stress, high comfort connectivity. In other words, a network should provide direct routes between origins and destinations that do not include links that exceed one’s tolerance for traffic stress. The LOC Analysis uses the aforementioned objective data to identify high traffic stress links, bicycle network gaps and gaps between “low stress” links, and a score assessing the relative user comfort or level of stress a user may experience on each link is mapped. Each user is different and will tolerate different levels of stress in their journey. Therefore, the LOC Analysis results should serve as a general guide rather than an absolute truth.

Table 2.5:
Enhanced Level of Comfort (LOC) Criteria to Assess Bicycling Conditions

Number of Travel Lanes	Traffic Volume (AADT)	Shared Street		
		<= 25 mph	30 mph	>= 35 mph
2 Lanes (residential)	No data	1	2	4
2 - 3 lanes	<=3k	1	2	4
	3k - 10k	2	3	4
	10k - 20k	3	4	4
	>20k	4	4	4
4 - 5 Lanes	<=3k	2	4	4
	3k - 10k	3	4	4
	10k - 20k	4	4	4
	>20k	4	4	4
6+ Lanes	All volumes	4	4	4



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Bicycle Level of Comfort Analysis

Level of Comfort 1 Only Network

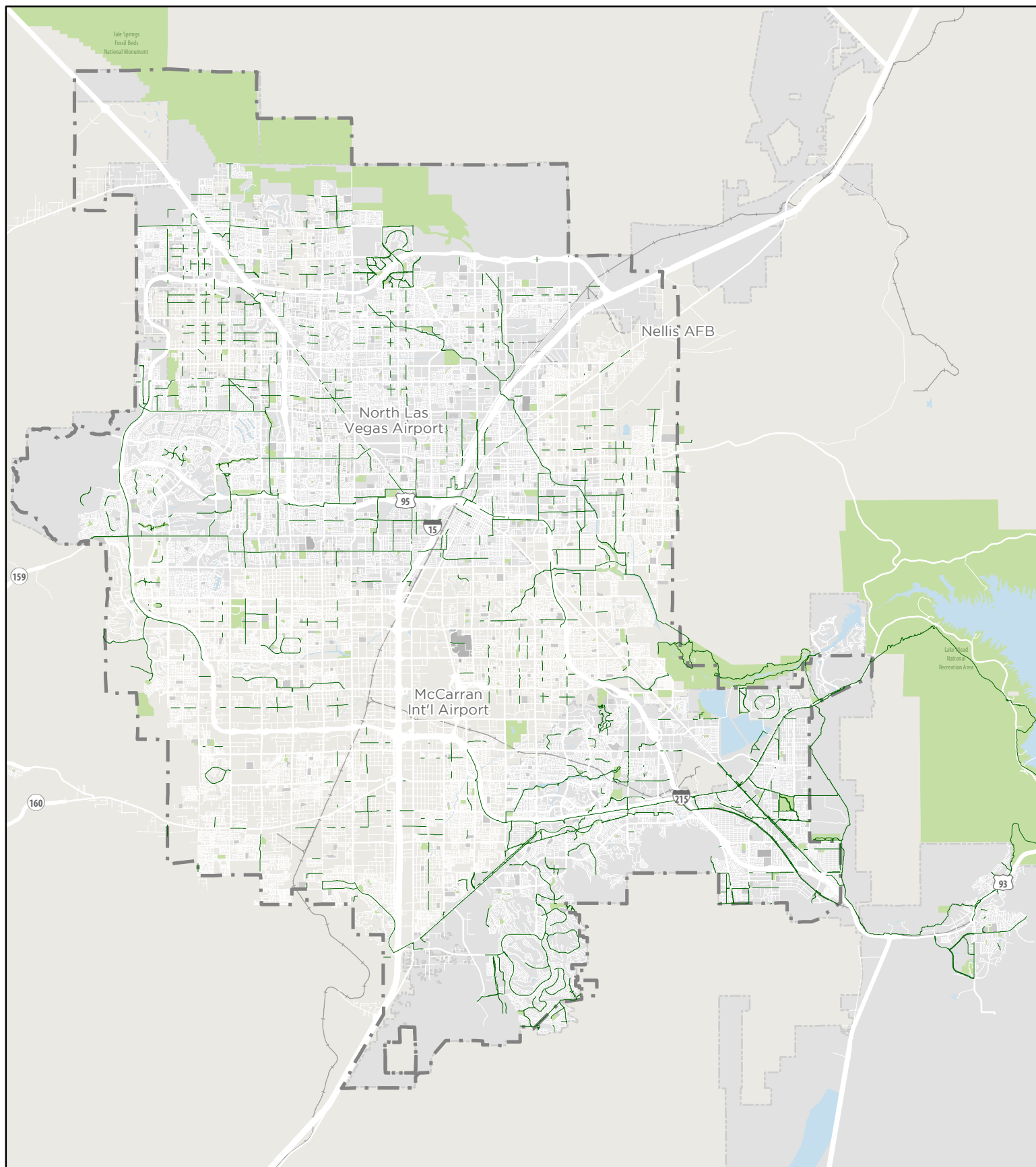
Most of the non-freeway roadway mileage in urbanized Clark County is LOC 1 (dark green), but most are local, internal neighborhood roads within isolated subdivisions that are not part of the regional bicycle facilities network.

These lack comfortable connections between clusters of LOC 1 roadways and to non-residential uses, which are typically divided by collectors, arterials, and larger roadways, creating a major deterrent to achieving broader and more common bicycling and walking activity.

In order to better demonstrate the level of comfort improvements needed in urbanized Clark County, the following maps will include LOC scores for only collectors, arterials, and higher roadway classifications.

Shared-use paths are included in these maps as LOC 1 because they function as low stress, high comfort connections even when nearby roadways are not comfortable for the average person to ride a bicycle.

10-12%
of Non-Freeway,
Collector and
Above Roadways
are LOC 1



Map 2.9
Regional Bicycle and Pedestrian Plan for
Southern Nevada

Existing Level of Comfort 1 Map (Collector and Arterial Roadways)

Data Source: Clark County, NDOT, and RTC GIS
Map Created: January 31, 2017
Map Produced By: Alta Planning + Design

Level of Comfort
Level 1 (Highest) & Shared-use Paths

- Park/Nat'l Area
- School
- College
- Municipality
- Southern Nevada Public Land Management Act Boundary

0 2 4 8 Miles



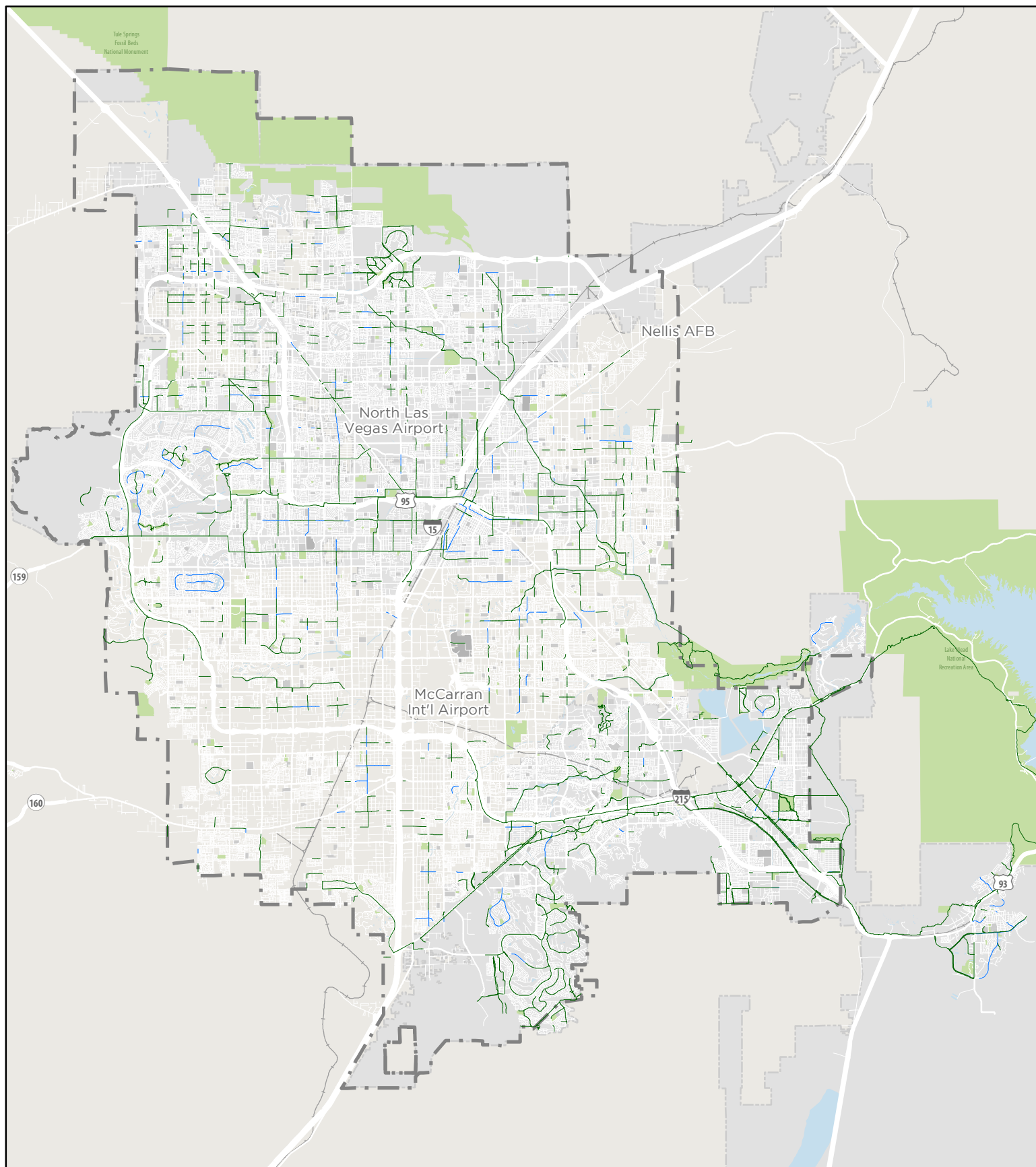
Bicycle Level of Comfort Analysis

Level of Comfort 1-2 Network

The following map adds LOC 2 roadways (blue) to the LOC 1 roadways from the previous map in order to show the higher comfort roadway connectivity region-wide: a network that is comfortable for most adults. LOC 2 roadways connect some residential street clusters to one another and provide some connectivity across major roadways and highways that did not exist in LOC 1 only. However, the network still remains disjointed and fragmented, especially on, across, and near most high speed, high traffic corridors.

For the most part, in downtown Las Vegas where the road network was built in a grid pattern, a lower stress, higher comfort network is accessible, albeit moderately disconnected, for people riding bicycles. Outside of this central core, however, many low-stress roads have been built without connectivity across major roadways, making travel between neighborhoods inaccessible to most people, regardless of age. Segments of some LOC 2 roads highlight a few of the region's most popular on-street bikeways such as Alta Dr, Gowan Dr, Oakley Blvd, and McLeod Dr.

4-5%
of Non-Freeway,
Collector and
Above Roadways
are LOC 2



Map 2.10

Regional Bicycle and Pedestrian Plan for
Southern Nevada

Existing Level of Comfort 1-2 Map (Collector and Arterial Roadways)

Data Source: Clark County, NDOT, and RTC GIS
Map Created: January 31, 2017
Map Produced By: Alta Planning + Design

Level of Comfort

- Level 1 (Highest) & Shared-use Paths
- Level 2

- Park/Nat'l Area
- School
- College
- Municipality
- Southern Nevada Public Land Management Act Boundary

0 2 4 8 Miles

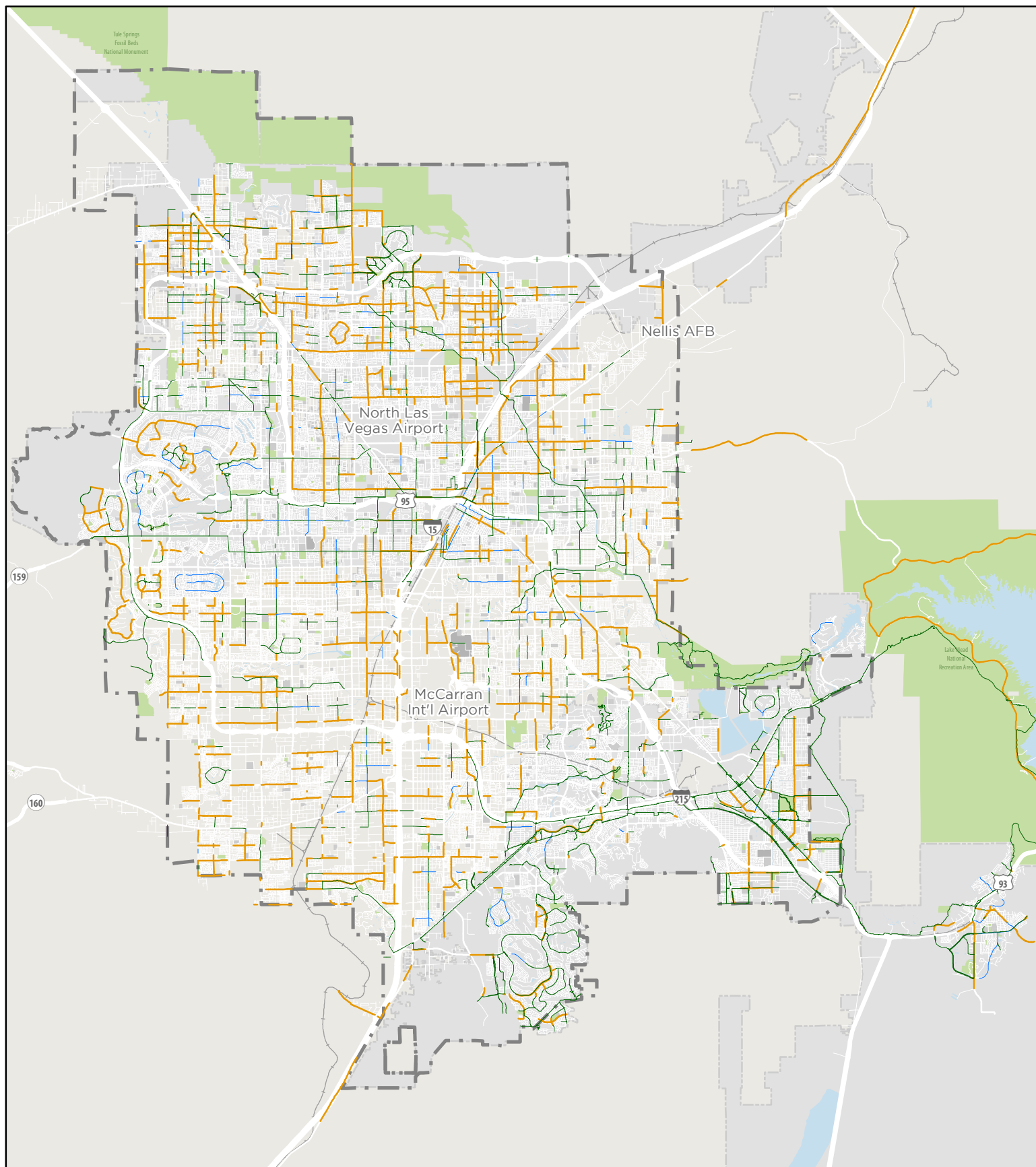


Bicycle Level of Comfort Analysis

Level of Comfort 1-3 Network

The orange lines in the following map represent LOC 3 roadways, or those with facilities or conditions that would allow or encourage the “enthused and confident” bicyclist to ride. These roads make up about one-third of the total non-freeway, collector and above roadway mileage. LOC 3 roads may have bike lanes, but they may also have adjacent fast or high motor vehicle traffic counts. LOC 3 roads may also have multiple lanes of traffic, higher traffic speeds, or higher traffic volumes.

34-35%
of Non-Freeway,
Collector and
Above Roadways
are LOC 3



Map 2.11
Regional Bicycle and Pedestrian Plan for
Southern Nevada

Existing Level of Comfort 1-3 Map (Collector and Arterial Roadways)

Data Source: Clark County, NDOT, and RTC GIS
Map Created: January 31, 2017
Map Produced By: Alta Planning + Design

Level of Comfort
 — Level 1 (Highest) & Shared-use Paths
 — Level 2
 — Level 3

Park/Nat'l Area
 School
 College
 Municipality
 Southern Nevada Public Land Management Act Boundary

0 2 4 8 Miles



Bicycle Level of Comfort Analysis

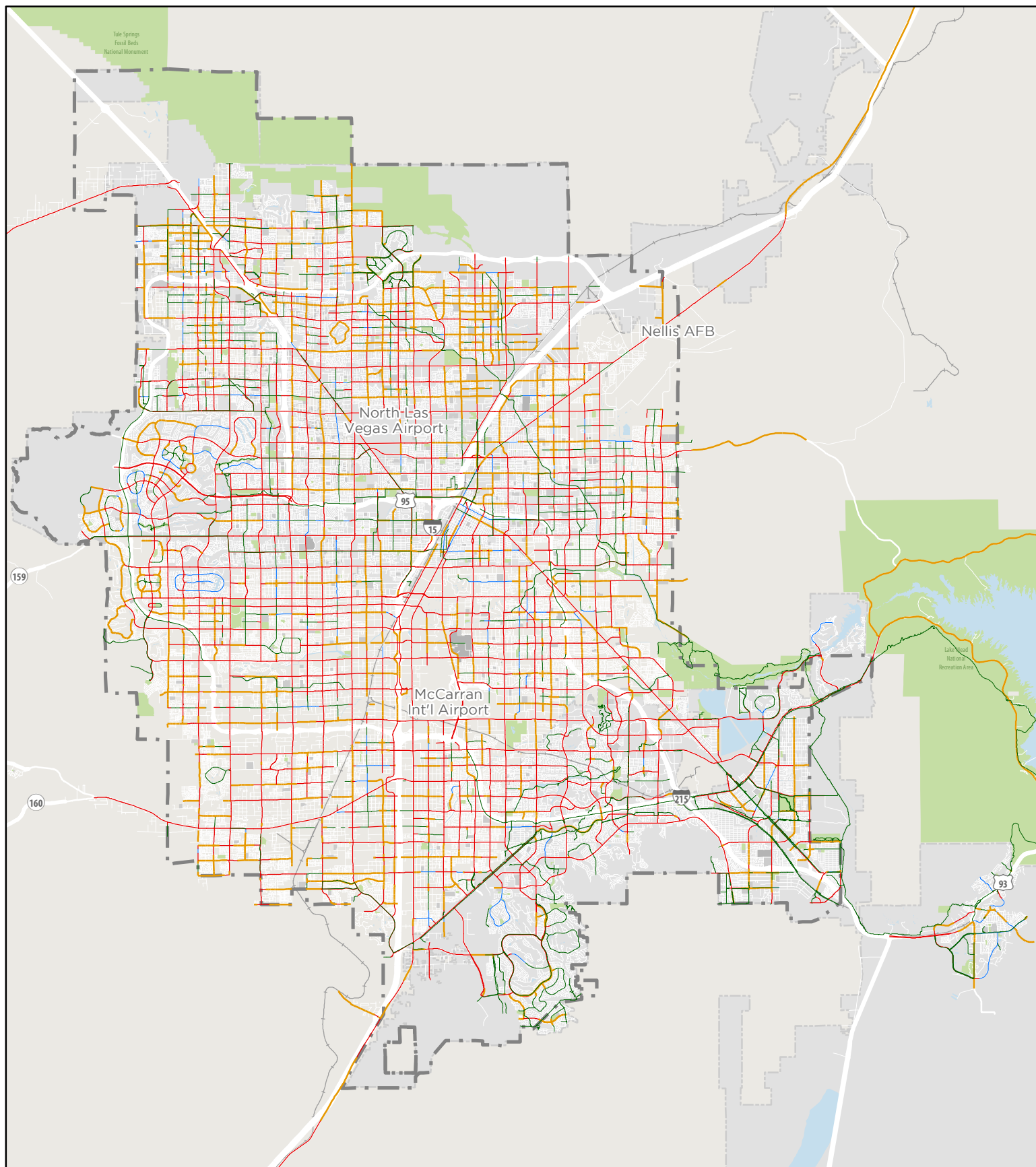
Level of Comfort 4 Network

This overall map (following page) adds LOC 4 roadways and illustrates the level of comfort of all non-highway, collector and above roadways.

Interstates are not shown because they do not allow bicyclists, but they were included in the analysis because they do influence roadways near and intersecting them. For example, a roadway that would otherwise be LOC 2 that intersects a freeway on-ramp may become an LOC 4 roadway. Therefore, reducing the conflict points and increasing the amount of space between bicyclists and motor vehicle traffic, especially in these situations, would improve the level of comfort along the roadway.

Nearly all of the region's major arterials are LOC 4 roadways and are therefore accessible to only "strong and fearless" bicyclists, if at all. For example, some roadways with adequate bicycle facilities may be included in the LOC 4 roadway scoring group because of other roadway attributes that, in terms of comfort for the bicyclists who are not strong and fearless, outweigh the benefits of a painted bike lane (i.e. Blue Diamond Rd/Hwy 160 due to high speed limit).

50%
of Non-Freeway,
Collector and
Above Roadways
are LOC 4



Map 2.12

Regional Bicycle and Pedestrian Plan for
Southern Nevada

Existing Level of Comfort Map (Collector and Arterial Roadways)

Data Source: Clark County, NDOT, and RTC GIS
Map Created: January 31, 2017
Map Produced By: Alta Planning + Design

Level of Comfort

- Level 1 (Highest) & Shared-use Paths
- Level 2
- Level 3
- Level 4 (Lowest)

- Park/Nat'l Area
- School
- College
- Municipality
- Southern Nevada Public Land Management Act Boundary

0 2 4 8 Miles



Opportunities & Constraints

Introduction

There are many types of opportunities and constraints in the project area that provide or inhibit the growth and refinement of the existing bicycling and walking system, respectively.

In this section, opportunities include washes, space within rights-of-way and roadways, transit corridors identified in *Southern Nevada Strong*, and corridors and intersections where crashes commonly occur.

Some constraints can limit or alter opportunities, like natural features (mountains or steep grades), protected lands (included in this section), or other man-made physical or jurisdictional limitations and restrictions (freeways, other busy roads, railroad tracks, and city limits). Many constraints, however, can also be opportunities, depending on context.

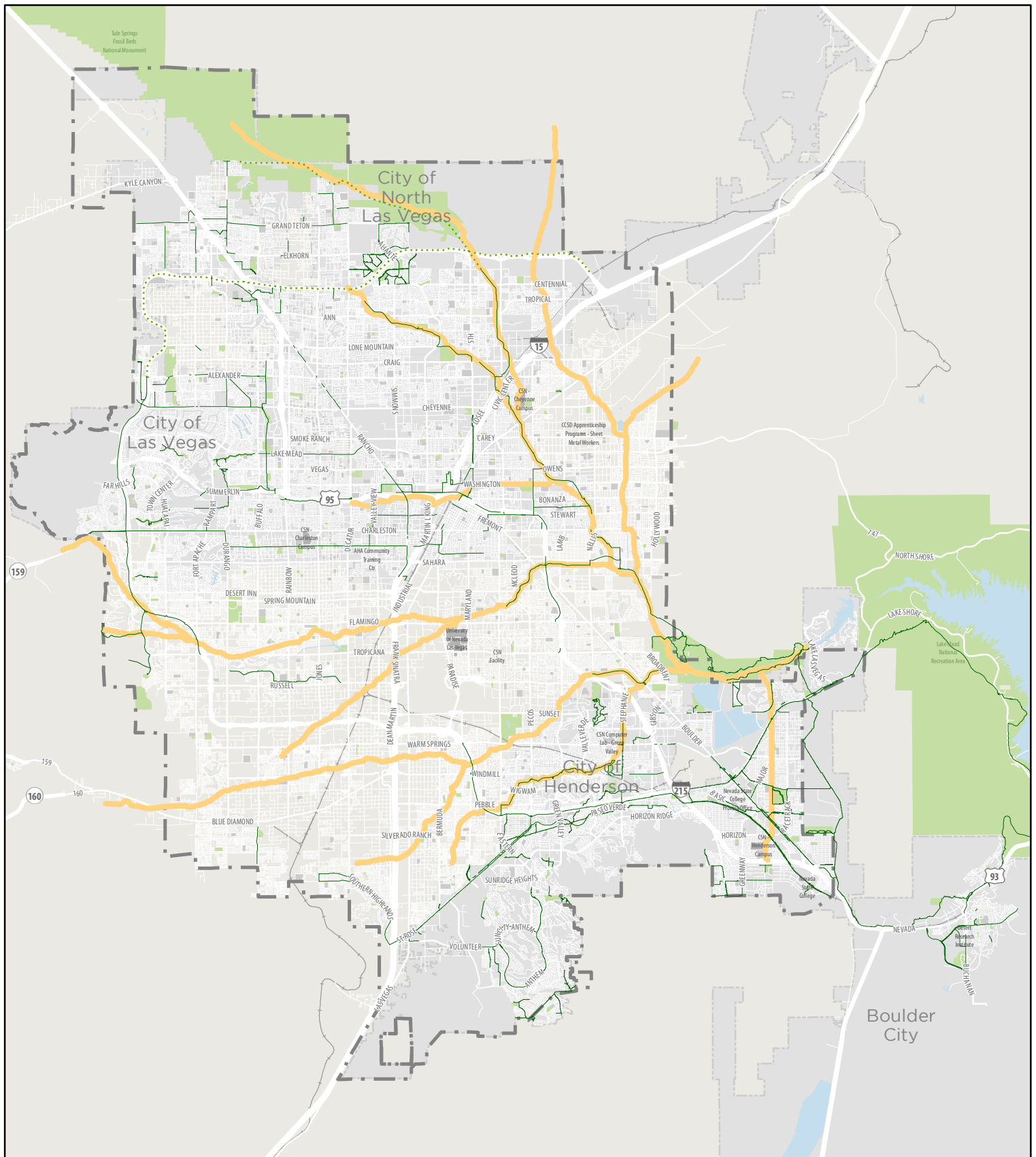
Opportunity: Possible Shared-use Path Corridors

The map on the following page identifies existing shared-use paths, high priority proposed (planned/future) shared-use paths identified in the Bicycle Network Gap Analysis document, and existing washes (drainage ways) where space for shared-use paths likely exists.

Some washes, like the Las Vegas Wash, already have shared-use paths along much of their mileage.

Figure 2.35:
Las Vegas Wash Trail





Map 2.13

Regional Bicycle and Pedestrian Plan for Southern Nevada

Possible Shared-use Path Corridors (Opportunities & Constraints) Map

Data Source: Clark County and RTC GIS
Map Created: March 2016
Map Produced By: Alta Planning + Design

Existing & Possible Shared-use Path Corridors

- Existing Shared-use Path
- High Priority Recommended Shared-use Path (Gap Analysis)
- USGS Wash

- Park/Nat'l Area
- School
- College
- Municipality
- Southern Nevada Public Land Management Act Boundary

0 2 4 8 Miles

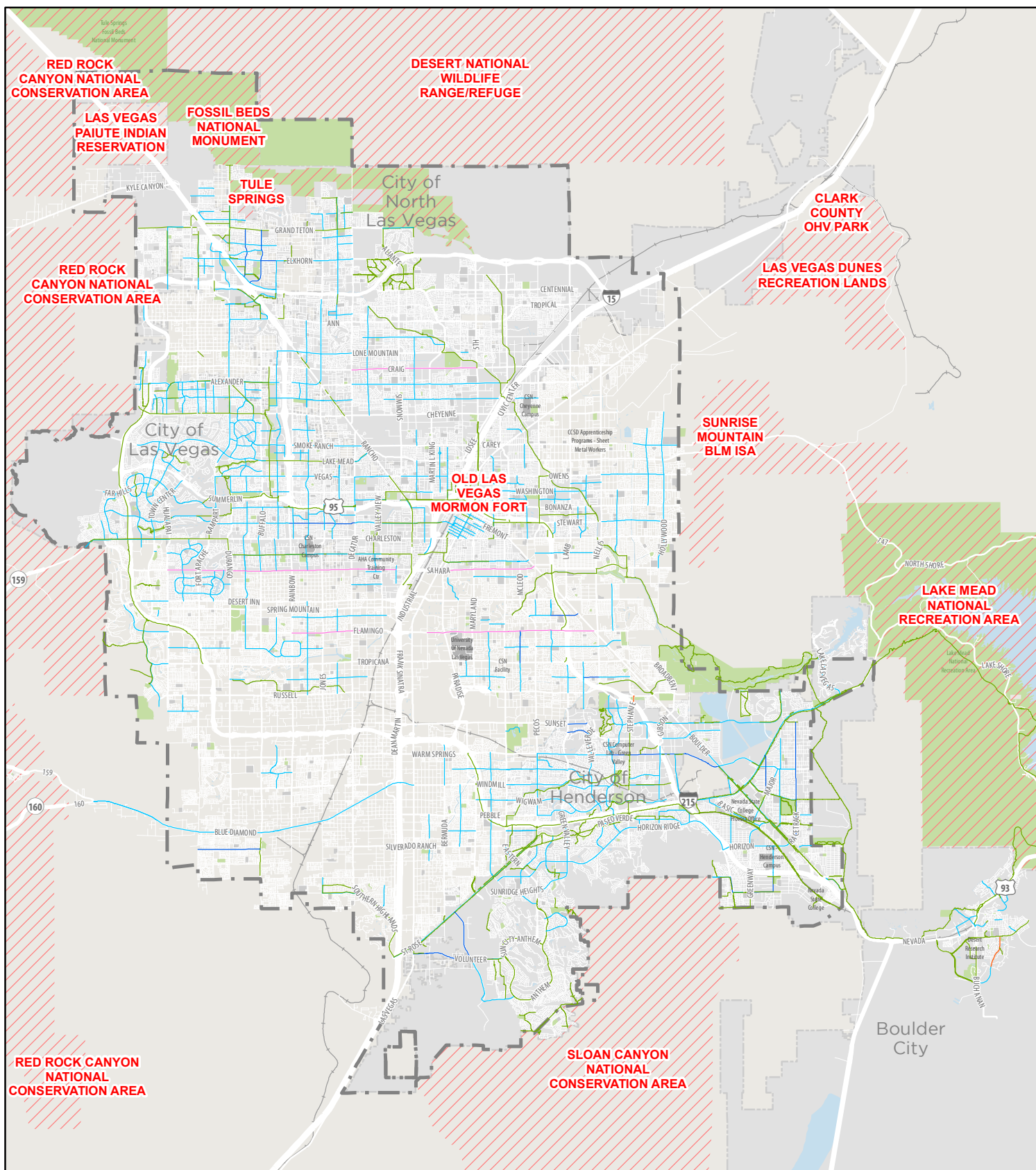


Opportunities & Constraints

Constraint: Protected Lands

While path, trail, and on-street facility development within protected lands is not always prohibited (see map for existing facilities within areas identified as protected lands), these restrictions or limitations may hinder project development.

Examples of protected lands in the project area include Red Rock Canyon National Conservation Area, Sloan Canyon National Conservation Area, and Las Vegas Paiute Indian Reservation.



Map 2.14

Regional Bicycle and Pedestrian Plan for Southern Nevada

Protected Lands (Opportunities & Constraints) Map

Data Source: Clark County and RTC GIS
Map Created: March 2016
Map Produced By: Alta Planning + Design

- Protected Lands
- Park/Nat'l Area
- School
- College
- Municipality
- Southern Nevada Public Land Management Act Boundary

- Existing Facilities**
- Separated Bike Lane
- Buffered Bike Lane
- Bike Lane
- Bus/Bike Lane
- Shared-use Path

0 2 4 8 Miles



Opportunities & Constraints

Opportunity: Road Diet Candidates

In a cost-saving effort, roads are often constructed in order to accommodate future, predicted traffic demand. However, overbuilt roads can have significant drawbacks for bicyclists and pedestrians, including increased crossing distances; poor visibility; high traffic speeds; narrow, unprotected, and/or unbuffered bicycling and walking facilities; among others.

The *RTC Complete Streets Design Guidelines* states that the number of motor vehicle lanes on a roadway can be reduced to two (one in each direction) or three (one in each direction with a center turn lane and/or median) if there are fewer than 15,000 cars in both directions per day. The maximum threshold for reducing the total number of travel lanes to four or five (one additional lane in each direction) is 30,000.

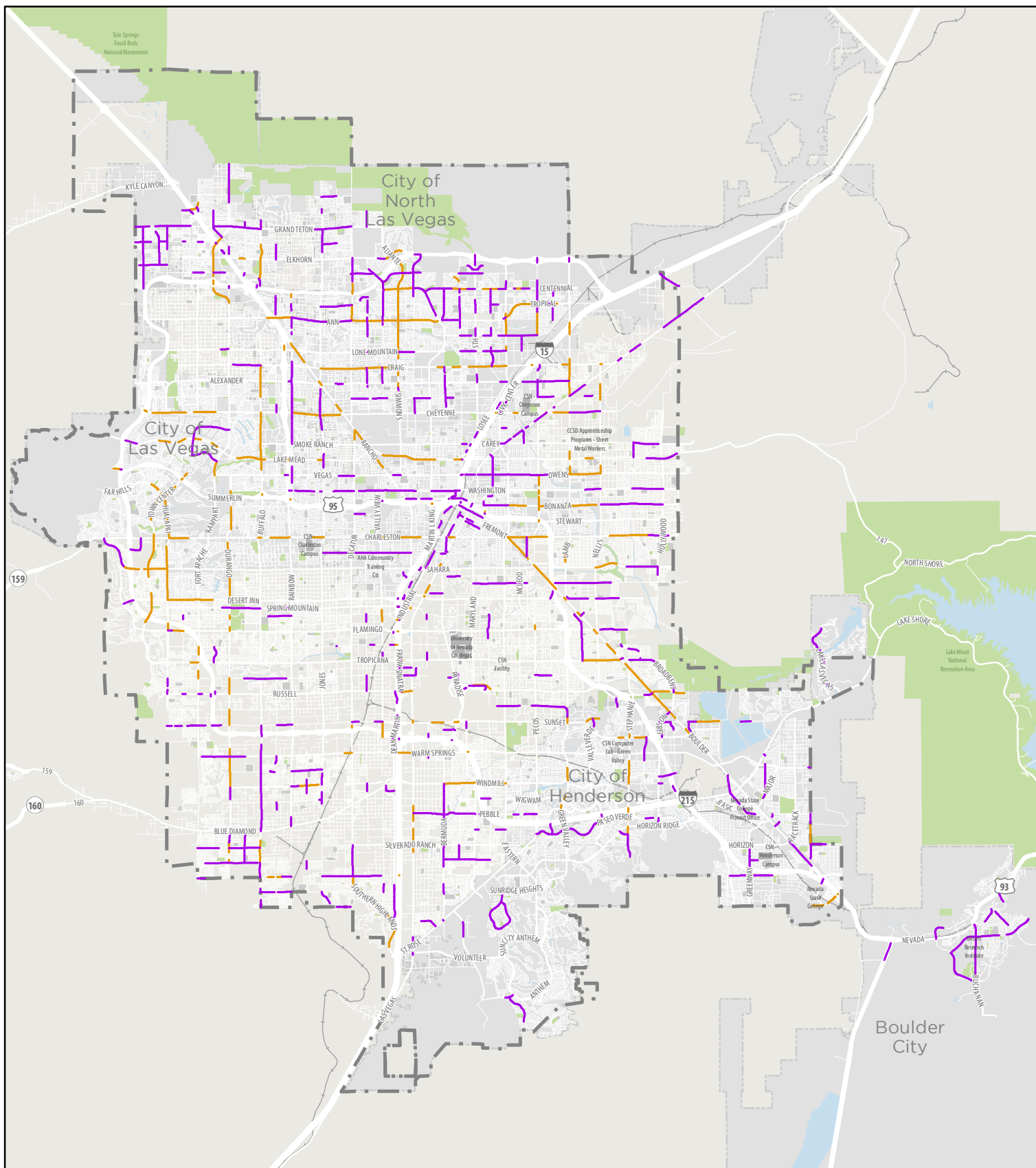
Roadways with fewer than 15,000 motor vehicles per day or average daily traffic (ADT) and with four or five motor vehicle lanes are identified as possible 4/5 to 3 Lane road diet candidates. Roadways with fewer than 30,000 motor vehicles per day (ADT) and with six or seven motor vehicle lanes are identified as possible 6/7 to 5 Lane road diet candidates.

Additional road diet opportunities outside these guidelines may also be possible.

Some of the significant potential candidates (part of, if not the whole, road) that are also identified as gaps in the Regional Bicycle Network Gap Analysis include:

- Southern Highlands Pkwy
- Boulder Hwy
- Bonanza Rd
- Sahara Ave
- Owens Ave
- Desert Inn Rd
- Rainbow Blvd
- Washington Ave
- Spring Mountain Rd
- Craig Rd
- Centennial Pkwy
- Shaumber Rd
- Buffalo Dr
- Oakey Blvd; and
- Vegas Valley Dr

Map 2.15 shows the road diets considered as part of the *Regional Bicycle Network Gap Analysis*. To view road diets needed to facilitate implementation of the proposed facilities recommended in the Regional Bicycle and Pedestrian Plan, see Map 7.8.



Map 2.15

Regional Bicycle and Pedestrian Plan for Southern Nevada

Road Diet Candidates (Opportunities & Constraints) Map

Data Source: Clark County and RTC GIS
Map Created: March 2016
Map Produced By: Alta Planning + Design

Road Diet Candidates
— 4/5 to 3 Lane Road Diet
— 6/7 to 5 Lane Road Diet

■ Park/Nat'l Area
■ School
■ College
■ Municipality
 Southern Nevada Public Land Management Act Boundary

0 2 4 8 Miles

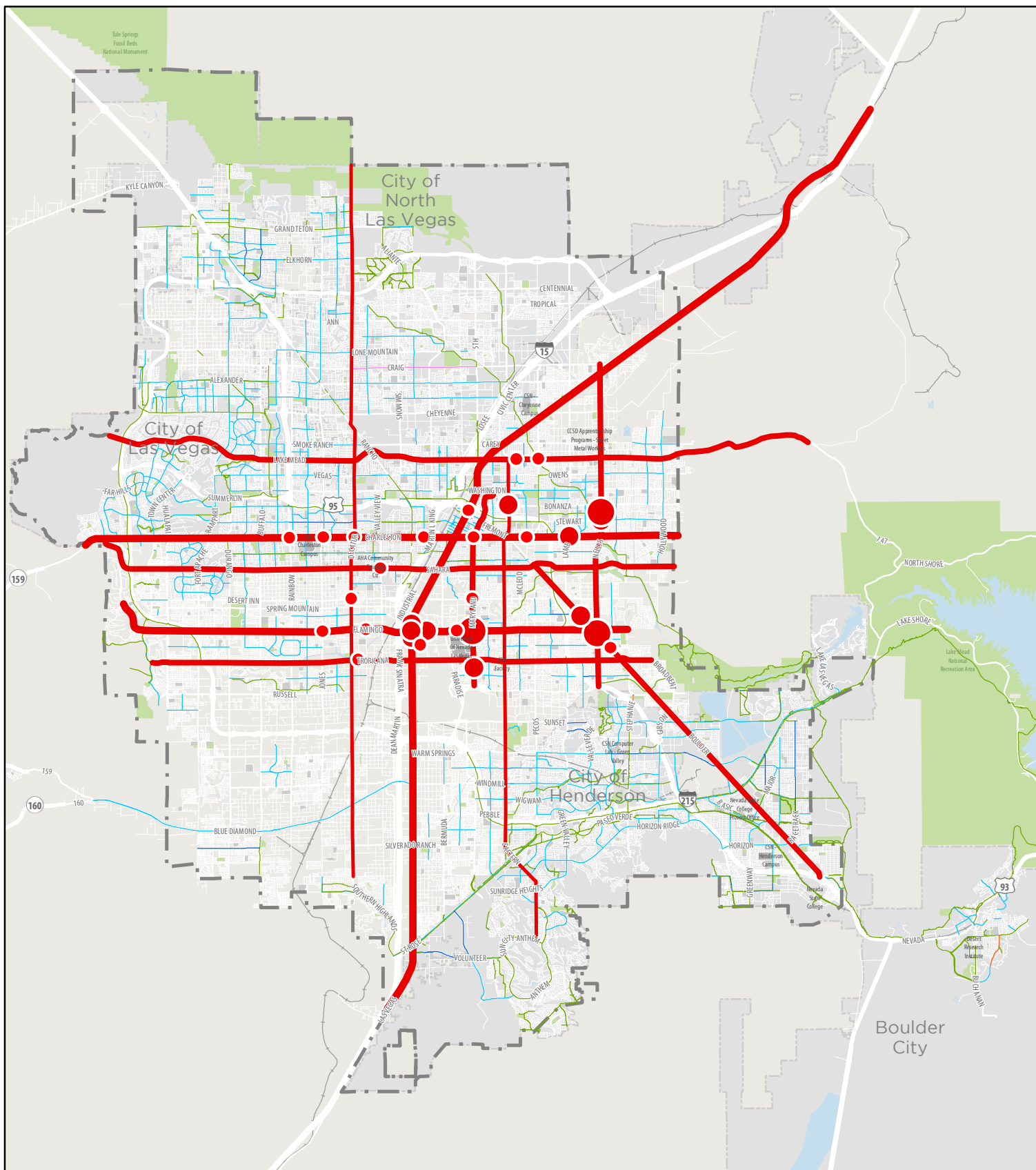


Opportunities & Constraints

Opportunity: Priority Crash Corridors & Intersections

Crash data often indicate opportunities for improvements to roadway and/or intersection designs or lighting, or adjacent bicycle and pedestrian facility quality.

The map on the following page illustrates the corridors and intersections with the most crashes involving bicyclists and/or pedestrians. The map was derived from Nevada Department of Transportation data of crashes involving people walking and bicycling between 2011 and 2015. Of these, Charleston Blvd, Flamingo Rd, Las Vegas Blvd, and Boulder Hwy are those that stand out the most.



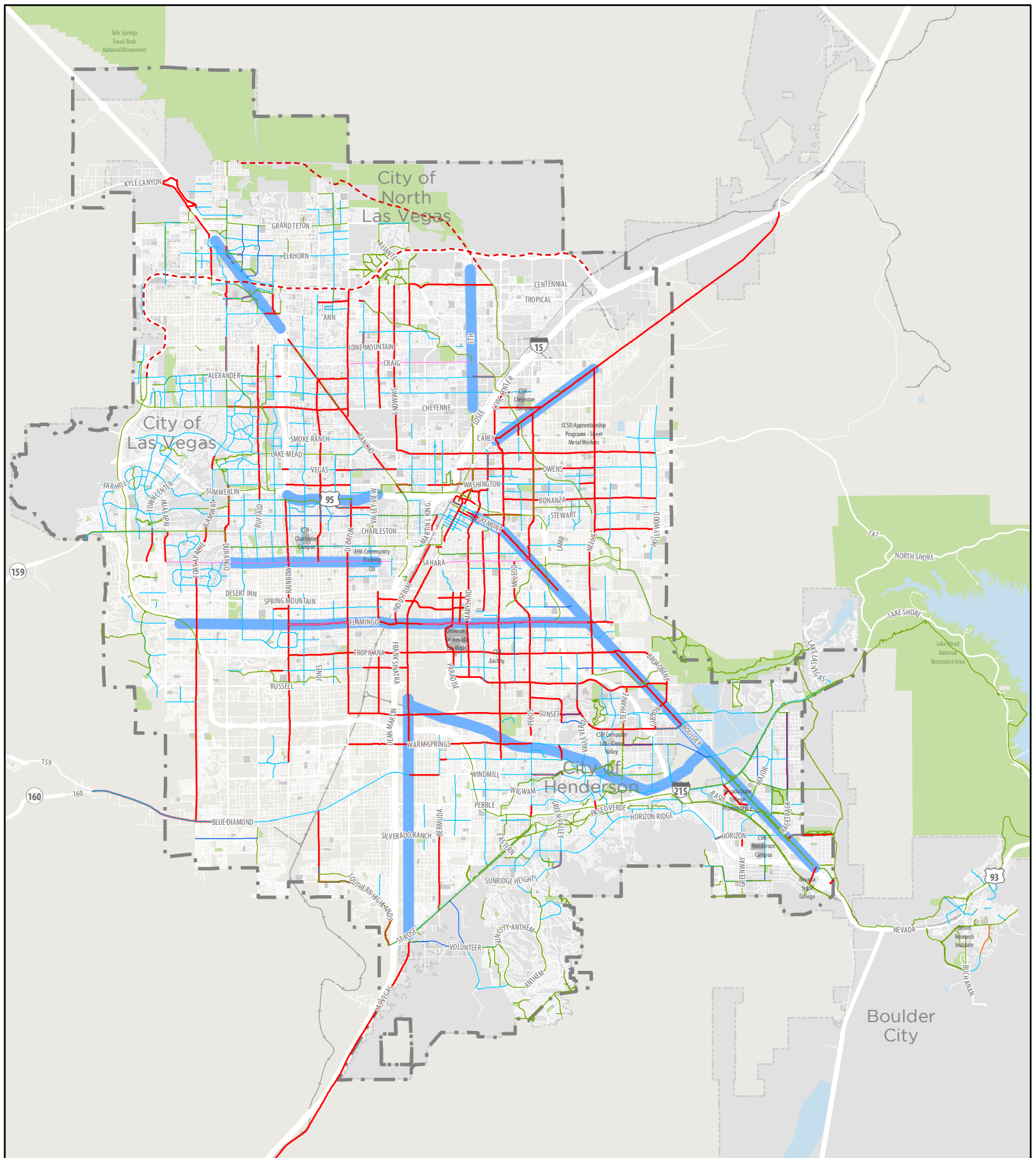
Opportunities & Constraints

Opportunity: Priority Transit Corridors

Southern Nevada Strong identifies existing and future “transit corridors” that should be considered a priority as future transit, other transportation, and land use development occurs.

It states that “redevelopment [will occur] along future transit corridors, including North 5th Street, Maryland Parkway, Flamingo Road, and Boulder Highway.” All transit corridors from the Vision Map are also shown on the following page.

These transit corridors are important to the development of the bicycling and walking network because nearly every transit trip begins as a walking and/or bicycling trip. Ensuring safe and comfortable connections between homes, destinations, and transit will likely translate to better and more frequent connections for people bicycling and walking, more people having access to transit, as well as fewer cars on the road.



Active Transportation & Health in Southern Nevada

Existing Health Conditions in Southern Nevada

Physical and programmatic improvements that encourage more walking and bicycling can provide a wide range of health benefits to a community, its residents, and visitors. Better active transportation facilities improve safety and encourage more people to walk and bike, which in turn improves health, creates a cleaner environment, and contributes to a better quality of life.

Regular physical activity is recognized as a critical component to good health. The Centers for Disease Control and Prevention (CDC) recommends 150 minutes of moderate physical activity per week for adults and 60 minutes each day for children. Unfortunately, many people do not meet these recommendations because they lack environments where they can be physically active. The CDC reports that “physical inactivity causes numerous physical and mental health problems, is responsible for an estimated 200,000 deaths per year, and contributes to the obesity epidemic.”

In Southern Nevada, 14.8 percent of high school students report being physically inactive¹³, which is defined as not participating in at least 60 minutes of physical activity in the past seven days. Similarly, 22 percent of adults in Southern Nevada report being physically inactive.¹⁴ Because the risk of chronic disease increases

significantly with sedentary lifestyles and with age, the public health burden associated with inactivity is substantial among middle-aged and older adults.

Having accessible walking and bicycling facilities available, such as bike lanes, paved trails and sidewalks, can help people more easily incorporate physical activity into their daily lives. Living close to parks and recreation facilities has also been linked to an increase in physical activity. Engaging in regular physical activity has numerous health benefits, including reducing the risk and severity of heart disease and diabetes, reducing the risk of some types of cancer, and reducing the risk of premature death.

Increasing the number of people walking and bicycling throughout the region will not only improve physical health, but environmental health as well. An increase in active transportation modes can result in a decrease in the volume of motor vehicle emissions, which leads to improved air and water quality. Cleaner air reduces the risk and complications of asthma, particularly for children, the elderly, and people with heart conditions or respiratory illnesses.

In Southern Nevada, over one quarter of adolescents have been diagnosed with asthma¹⁵, which “results in missed days of school, limitations on daily activities, emergency department visits for treatment of asthma symptoms, and

13 Healthy Southern Nevada: Community Dashboard. “Physical Inactivity among Adolescents. <http://www.healthysouthernnevada.org/index.php?module=indicators&controller=index&action=view&indicatorId=2921&localeId=1800>. Accessed February 28, 2017.

14 Healthy Southern Nevada: Community Dashboard. “Adults who are Sedentary”. <http://www.healthysouthernnevada.org/modules.php?op=modload&name=NS-Indicator&file=indicator&iid=17935169>. Accessed February 26, 2016.

15 Healthy Southern Nevada: Community Dashboard. “Asthma History among Adolescents. <http://www.healthysouthernnevada.org/modules.php?op=modload&name=NS-Indicator&file=indicator&iid=17436303>. Accessed February 26, 2016.

hospitalizations.” As children are particularly sensitive to poor air quality, reducing vehicle emissions around schools by increasing walking and bicycling is an effective strategy for improving air quality. Increasing the opportunities for students to bike and walk to school can be accomplished through the implementation of a Safe Routes to School (SRTS) Plan, which focuses on physical infrastructure, such as routes and connections to schools, while increasing community-wide education and encouragement programs that promote reductions in driving.

Along with physical infrastructure, encouragement and education programs are important mechanisms for increasing the number of people regularly engaging in walking and bicycling for active transportation. About half of all trips taken by car in the U.S. are three miles or less, equivalent to a 20-minute bike ride.

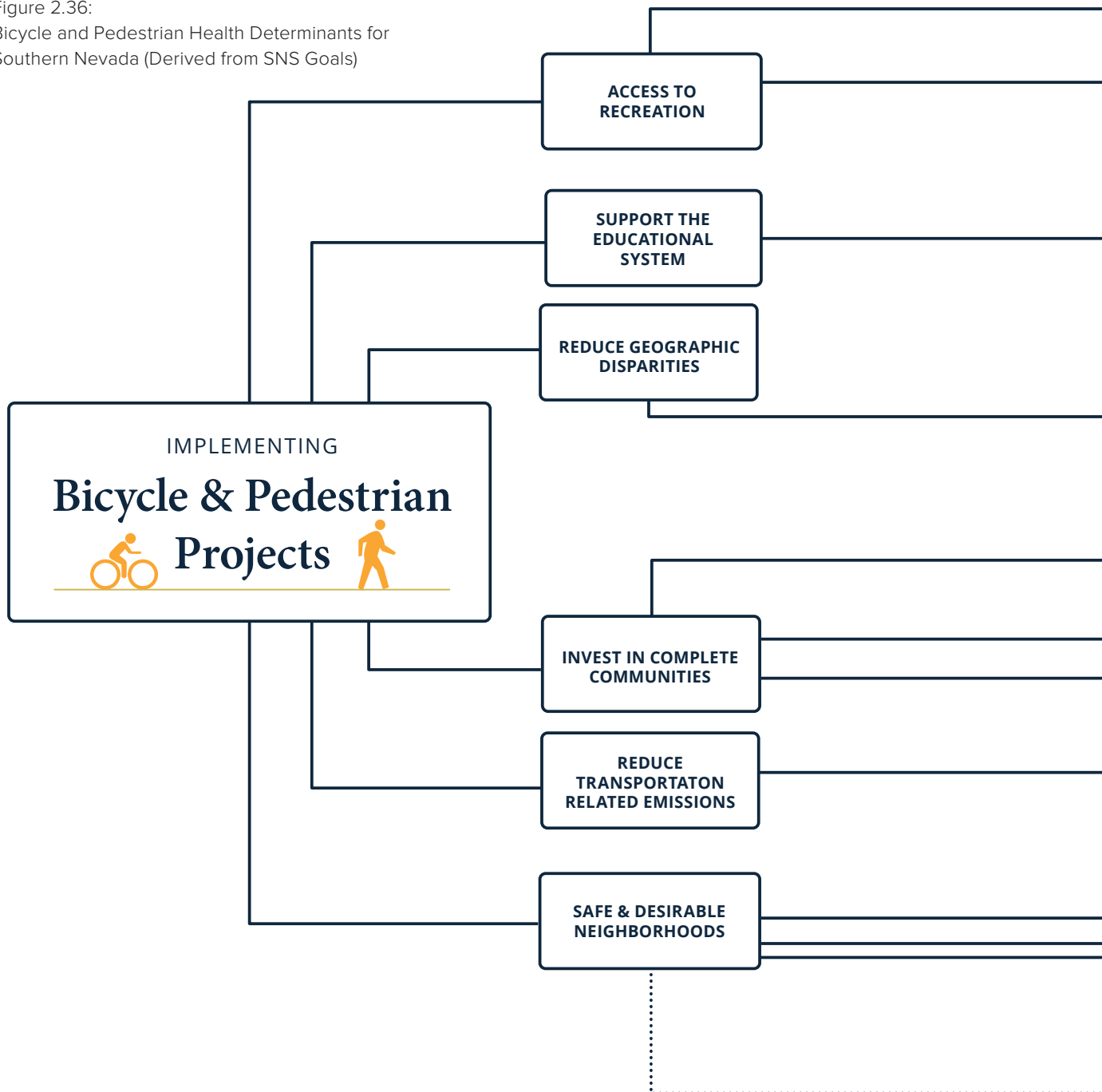
Increasing safety for all road users is an important health objective for all communities in the region. Infrastructure improvements for walking and bicycling, while creating safe places for active modes, have also been associated with an increase in safety for people driving. In Southern Nevada, the fatality rate due to motor vehicle collisions is 9.1 deaths per 100,000 people, and that number has been increasing steadily since 2005, up from 7.3. Traffic safety campaigns are an effective way to communicate to the public on issues of traffic laws and safety messaging.

Walking and bicycling are a low-cost transportation options for accessing everyday needs, such as employment, educational opportunities, health care providers, and social services. Investing in communities that have historically been underserved can have a positive impact on the daily lives of the people in those communities, as well as in communities with a higher percentage of the population who do not have access to a vehicle. In Southern Nevada, 8.5 percent of the population does not have access to a vehicle, which limits access to essential services. Additionally, the majority of above-average income households in Clark County have a car, while only half of low-income households do. Creating additional transportation options for those with the least options will improve the daily lives of people throughout the county.

In conclusion, bicycling and walking can have a significant impact on a variety of health issues in Southern Nevada. The Project Team screened existing Southern Nevada health issues via the health data website provided by the Southern Nevada Health District, available at <http://www.healthysouthernnevada.org>, for those that could be influenced by bicycling and walking improvements. The complete analysis of this effort can be found in Appendix B. This information was then filtered through the lens of Southern Nevada Strong goals and priorities and summarized on p. 32.

Existing Health Conditions in Southern Nevada

Figure 2.36:
Bicycle and Pedestrian Health Determinants for
Southern Nevada (Derived from SNS Goals)



Existing Education and Encouragement Programs

Existing Programs

To inform the program recommendations in the Plan, the project team circulated a survey to several program practitioners in Southern Nevada with the purpose of gathering information on existing programs. The survey responses included a wide range of programs, such as a

county-wide SRTS program, a senior pedestrian education program, and a commute trip reduction program. Table 2.6, below, provides brief descriptions of existing programs, organized by lead organization.

Table 2.6:
Existing Bicycle and Pedestrian Programs in Southern Nevada

	Program	Program description
SNHD	Walk Around Nevada	This online program and mobile application that encourages people to walk, bike, and engage in physical activity and log steps or miles.
	Neon to Nature	This online program and application identifies urban and rural trails and park paths within the region.
CLARK COUNTY SCHOOL DISTRICT SRTS	Nevada Moves Day	Nevada Moves Day is an annual statewide event to encourage walking and bicycling to/from school.
	Fire Up Your Feet	Fire Up Your Feet is a core program of the SRTS National Partnership. The program targets elementary and middle school students with the goal of increasing their physical activity before, during, and after school. Parents, teachers, and school staff can participate and earn cash awards.
	Thank You for Driving Safely Campaign	Thank You for Driving Safely (formerly Positive Presence) is a program where CCSD Police and SRTS staff give out cards to parents. The cards list Nevada statutes that apply to school zones and thanks parents for driving safely. Stickers are given to students practicing safe walking and bicycling during pick-up time.
	Safety Assemblies	Schools can request a 20-minute bicycle and pedestrian safety assembly for K-2 and 3-5 grade school students. SRTS staff conducts the safety assemblies.
	Bicycle and Ped. Safety Clinics	SRTS staff trains CCSD employees and interested community partners on how to conduct bike rodeos.
	Bike Rodeos	The SRTS program maintains a 15- to 20-unit bike fleet. People that have completed the Bicycle and Pedestrian Safety Clinic check out the bike trailer for a bike rodeo.
	Family and Community Engagement Services (FACES)	Engages families and works with CCSD SRTS through the University of Family Learning program to build parent support with: <ul style="list-style-type: none"> • Street Smarts - Encourages safe walking and bicycling to and from school through a 20-minute bicycle and pedestrian safety assembly for K-5 • Bicycle and Pedestrian Safety Clinic's "Train the Trainer" • Organizing a Walking School Bus or Bike Train at Your School • Active & Healthy Families - Special events/programs to boost physical activity

	Program	Program description
CLARK COUNTY SCHOOL DISTRICT SRTS	Bike Rodeo Fleet	Those who complete the Bicycle and Pedestrian Safety Clinic “Train the Trainer” course are eligible to check out the bike fleet for a bike rodeo.
	Walk to School Day	The intent behind International Walk to School Day is to encourage students and parents to walk (or bike) instead of drive to school. SRTS staff partners with Safe Kids Clark County and FedEx to provide incentives at the designated media school. CCSD Police assists at about eight schools. University Medical Center (UMC) Trauma and Family Resource Center, CCSD Police, Nevada Highway Patrol, parent organizations, and others partner with schools to hand out incentives. The event occurs on the first Wednesday of every October.
	Bike to School Day	Bike to School Day encourages bicycling to and from school. The SRTS staff partners with the RTC, local bike shops, and bike advocate groups to work with participating schools. Bike to School Day is the first Wednesday of every May.
	CCSD SRTS Achievement Level Program	The CCSD SRTS Achievement Level Program recognizes individual school efforts to improve and promote safe walking and bicycling. The Program is also a road map and an assessment tool. Schools plot steps to move their school forward and annually assess achievements. Participating schools are also eligible for school walk audits. It is the goal of the SRTS program for every elementary and middle school to reach the “First Step” level by having at least one walking or bicycling educational activity each year and put a walking and bicycling safety tip on the school website.
	Data Collection Program	CCSD SRTS is building a database framework that will include a “Who Does What Where” report. They are collecting information from all known government entities, nonprofit organizations, and advocates that provide bicycle and/or walking safety education to CCSD students. That information will be provided to the State SRTS Coordinator who will add statewide data and report to the State of Nevada Highway Safety Plan, Pedestrian Critical Emphasis Area committee to fulfill that committee’s “Strategy 2: Provide pedestrian safety education for pedestrians and motorists” evaluation requirement.
RTC	Club Ride	Club Ride is a free employer-based program of the RTC (i.e. promoted to employees of employers in Southern Nevada) designed to improve air quality and encourage the use of carpooling, vanpooling, riding transit, walking, bicycling, motorcycling, telecommuting, and compressed work weeks.
UNLV TRANS. RESEARCH	Senior Pedestrian Education	Two presentations are offered through retirement communities, public housing, and senior centers/service providers on being safer pedestrians and another on accessing your neighborhood walkability.
	Safe Key Presentations	Presentations on pedestrian and bicycle safety are given at two locations per week to elementary students enrolled in the Safe Key after school program.
	Pre-Drivers Ed	This is a presentation offered to middle school students that focuses on bikes as the first vehicle driven along with some pedestrian safety rules.

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CHAPTER 3

Stakeholder Participation Summary



Outreach Approach

Introduction

In order to determine the needs of current and future users of the walking and bicycling system, diverse public outreach efforts were conducted primarily between October 2015 and February 2016 to collect input from residents of, visitors to, and people who work in Southern Nevada. The methods utilized were: pop-up meetings at various locations and events, an online survey, and an online map tool. In total, there were more than 1,000 responses to the survey, nearly 1,200 map comments, and more than 300 people reached through 12 pop-up events throughout the region. In addition to these venues for input throughout the process, the Plan was reviewed by the public, each local jurisdiction, Clark County, the RTC, the SNHD, and other representative agencies before adoption in 2017.

As part of the Regional Transportation Commission of Southern Nevada's update to the Regional Bicycle and Pedestrian Plan, goals for diverse and inclusive public outreach were set by the client and consultant. The Stakeholder Participation Plan was designed with the expectation that Southern Nevada residents, bicycle organizations, pedestrian groups, and other groups who desired to participate in decisions about how resources would be applied to bicycle and pedestrian facilities had a seat at the table. Stakeholder input into the plan is critical for its acceptance and ultimate successful implementation.

Public Outreach Goals

The Stakeholder Participation Plan outlines goals of geographic and demographic diversity in public outreach. The RTC committed to an approach that:

- Reaches out to as many people as possible from different geographic areas of the region with special emphasis on low-income, minority populations that rely more on bicycling and walking as a primary means of transportation;
- Provides early and ongoing opportunities for stakeholders to raise issues and concerns that can be considered through equitable and constructive two-way communication between the RTC and the public;
- Encourages the participation of all stakeholders regardless of race, ethnicity, age, disability, income, or primary language by offering alternative accommodations, as needed (e.g. translation services, accessible meeting facilities);
- Promotes fair treatment so that no group of people (racial, ethnic, or a socioeconomic group) bears a disproportionate share of the negative environmental consequences resulting from a program or policy;
- Ensures that public contributions are considered in the decision making process and can influence the agency's decision; and
- Builds on information gathered through related planning processes and ensures effective coordination and consistency with those efforts.

The project team also conducted an equity analysis to promote equitable outreach. Based on a review of census tract data, the equity analysis presented an overview of demographics to identify concentrations of minority, low-income, younger and older/senior (under 18 and over 64 years of age respectively), and limited english proficiency (LEP) residents, who historically rely more heavily on bicycling and walking as their primary form of transportation.

Overview of Stakeholder Participation Plan

The Stakeholder Participation Plan, written in fall 2015, clearly defines the outreach approach that would be taken by the project team to provide opportunities for public involvement in the planning process. The plan defines the goals of public outreach, listed above, the decision making structure, the levels of participation, the audience and stakeholders that would be involved, and the participation tools and methods that would be utilized throughout the process.

Stakeholder Advisory Groups are comprised of four existing groups in Southern Nevada. Project staff regularly attended monthly meetings to provide project updates. In addition to monthly briefings, presentations on the project scope, draft goals and strategies, public feedback received, and the draft and final plan recommendations were made to Stakeholder Advisory Groups at key milestones in the project, including the following:

Figure 3.1: Public Outreach



Figure 3.2: Stakeholder Participation



Stakeholder Advisory Groups

- Regional Open Space and Trails Workgroup (ROST): a subcommittee of the Southern Nevada Regional Planning Coalition, received project presentations on November 17, 2015, April 19, 2016, August 23, 2016, and December 13, 2016, and March 21, 2017. Local jurisdiction members were regularly present in this workgroup.
- Southern Nevada Pedestrian Safety Education and Legislation Task Force: a non-profit advocacy group for pedestrian safety, received project presentations on October 21, 2015, April 20, 2016, August 17, 2016, December 14, 2016, and February 15, 2017
- Southern Nevada Bicycle Coalition (SNVBC): a regional bicycling advocacy group and a project of the 501(c)(3) nonprofit, Outside Las Vegas Foundation, received project presentations on October 21, 2015, April 20, 2016, December 14, 2016, and March 2, 2017.
- City of Henderson Bicycle Advisory Committee: established to promote the use of bicycles within the city as a viable commuter option as

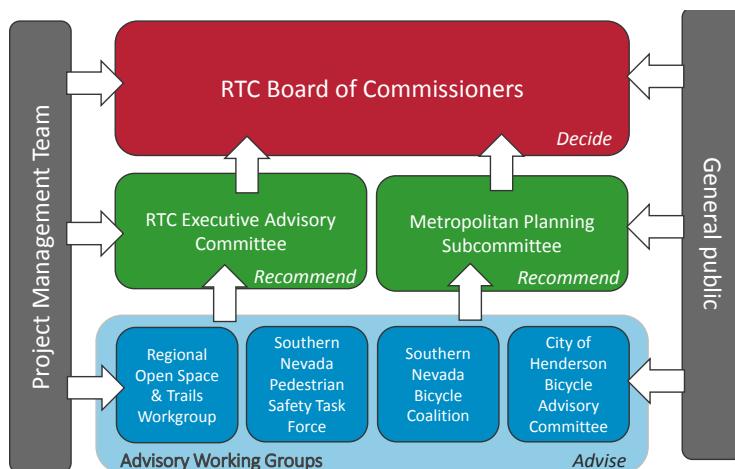
well as promote recreational riding throughout the city, received project presentations on October 15, 2015, April 21, 2016, August 18, 2016, December 15, 2016, and March 16, 2017.

The advisory groups provide input on a continuing, cooperative, and comprehensive manner consistent with the goals of the plan. Their primary responsibilities include providing input on draft deliverables and materials during key points of the planning process and serving as a voice for their community groups most affected by the Plan.

A special Charrette/Workshop with Stakeholder Advisory Groups was held on June 21, 2016. In addition to SAG attendees, local jurisdiction staff from planning, public works, and parks departments were invited to attend. Activities included a network mapping exercise to identify future routes and facility types, developing a prioritization strategy development, and policy refinement. Attendees also had the opportunity to comment on proposed programs.

Similarly, the RTC Executive Advisory Committee (EAC) and the Metropolitan Planning Subcommittee (MPS) were each briefed five times regarding the project purpose, equity analysis, outreach plan, public feedback, draft goals, and the draft plan. The EAC was briefed on June 15, 2015, December 17, 2015, April 28, 2016, August 25, 2016, and April 27, 2017. The MPS was briefed on July 14, 2015, November 10, 2015, May 10, 2016, September 13, 2016, and May 9, 2017. Both were given the opportunity to provide feedback and direction to the Project

Figure 3.3: Decision-making structure



Management Team.

Figure 3.3 illustrates the structure for public outreach and RTC review.

STAKEHOLDER INTERVIEWS

During the fall of 2015, project staff conducted eight stakeholder interviews with key bicycle and/or pedestrian staff to learn about their perceptions of the bicycle and pedestrian system throughout the region and opportunities, obstacles, and priorities moving forward.

Interviews were held with staff from the following organizations:

- City of Boulder City
- City of Henderson
- City of Las Vegas
- UNLV Transportation Research Center
- RTC Bicycle and Community Outreach
- City of Mesquite
- Clark County
- City of North Las Vegas

OUTCOMES OF STAKEHOLDER INTERVIEWS

During the fall of 2015 and 2016, and early 2017, interviews were held with public works departments from Clark County and the Cities of Las Vegas, Henderson, and North Las Vegas to help select corridors for the multi-modal level of service analysis. An additional three meetings were held with Clark County Public Works to review and receive input on draft recommendations.

Some key take-aways from the eight interviews held during the fall of 2015 are listed as bullets.

When asked to describe the opportunities that exist to strengthen bicycling and walking, stakeholders mentioned:

- Encouragement and education for biking and walking
- The desire for a wayfinding system
- Coordination with other cities in the region
- The creation of more Bicycle Advisory Committees throughout the region

When asked to name major obstacles or areas of concern in their community, stakeholders mentioned:

- Design speeds vs. actual speeds
- Lack of lighting
- Coordinated and integrated bike network across the Valley
- Lack of personnel for planning and delivering projects
- Lack of funding
- Right-of-way restrictions

Finally, when asked to list their top three priority projects, some of the projects listed included:

- Lighting- along high demand areas
- Connecting Charleston for pedestrians
- Completing the Beltway and Bonanza Trails for cyclists
- Installation of bicycle lanes in Downtown North Las Vegas
- Complete street design and improvement for Las Vegas Boulevard
- Development of Complete Street policies

Pop-up Meetings

With a focus on minority communities and hard-to-reach populations, the project team attended 15 total community events (12 initial pop-up meetings and three since then) and spoke to hundreds of residents about how to improve walking and biking in Southern Nevada. Pop-up meeting locations were held in different areas of the region, and were specifically chosen to focus outreach towards underserved and under-represented communities in Southern Nevada. An equity map (see adjacent page) was created to select locations based on these community demographics.

At each event, participants were given information about the project and asked to take the online community survey on iPads. Approximately 300 community members took the online survey at one of the 12 pop-up events held around the region between October 2015 and February 2016.

Advertising & Outreach

The pop-up meetings were announced and publicized in several ways, including:

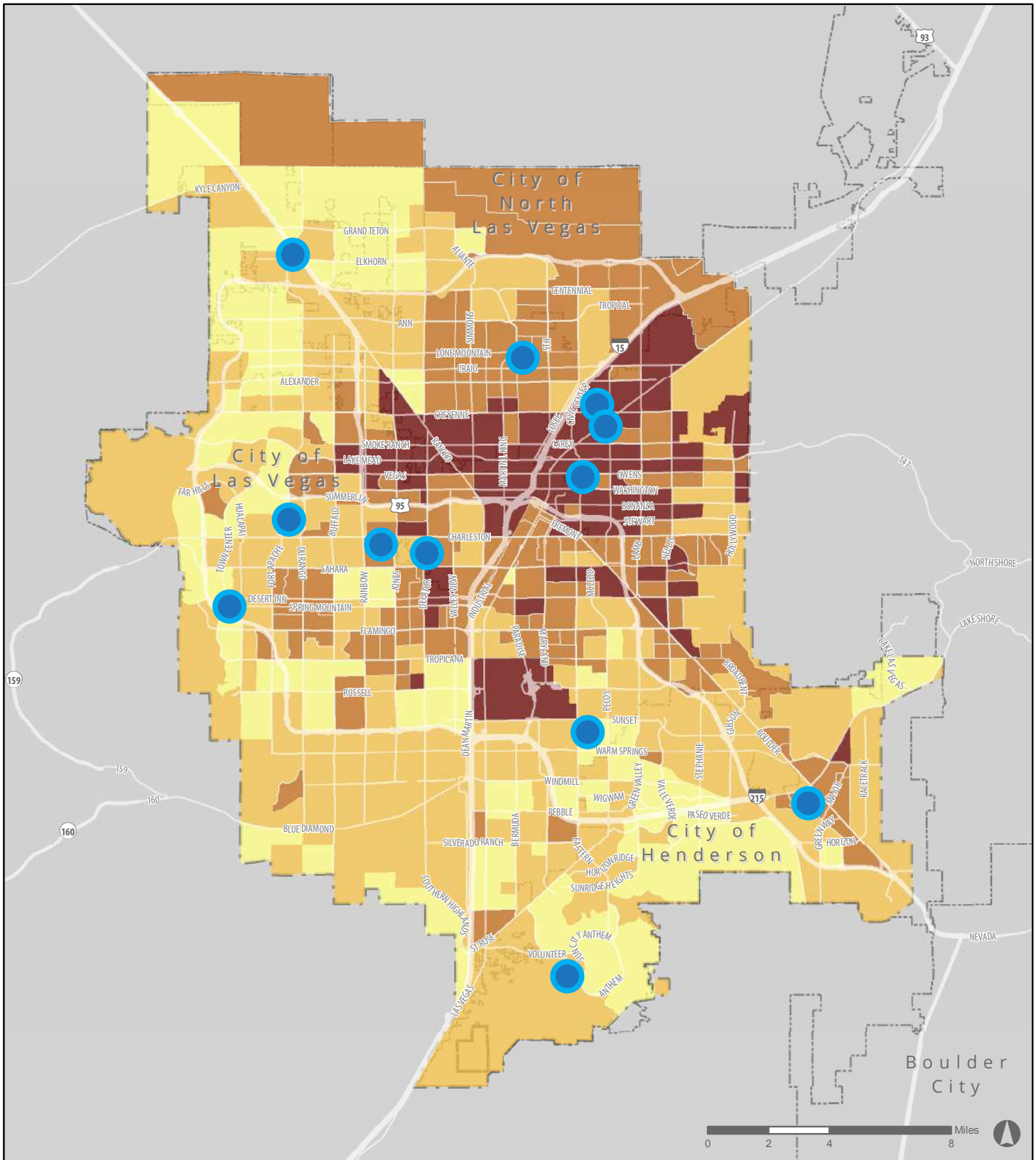
- Project website and email distribution list: The project website was updated to advertise the pop-up meetings being attended by project staff. Several emails were sent from October to February to those on a project distribution list, which started with over 400

interested parties and now includes 1,122 individuals.

- Social media: The RTC and City of Las Vegas advertised the online community survey on their Facebook and Twitter accounts from November to February.
- Stakeholder Advisory Committee: Members were asked to share information within their networks about opportunities to participate in the project. (e.g. blurbs in newsletters, flyers, facebook posts)

Format of Meetings

Pop-up events included farmers markets, community holiday festivals, flea/swap markets, and transit stations throughout the region, attended by diverse communities of color and socio-economic backgrounds. At each market, project staff set up a table with fliers and mapping tools. Boards were placed around the table to advertise the project. Staff attended and spoke with people who came to learn more about the project. Community members were encouraged to take the online community survey on iPads provided by staff. If a participant completed a survey, they were given a project bag with reflectors. If they rode a bike and stated that they did not own or wear a helmet, one was gifted to them, courtesy of NDOT. Staff handed out both adult and children sized bicycle helmets. At bicycle-centric events, a raffle was also held for gift certificates to local bicycle shops. Spanish translation services were provided at the pop-up meetings.



Map 3.1
Regional Bicycle and Pedestrian Plan for Southern Nevada

Outreach and Equity

Data Source: U.S. Census Bureau, Clark County, and RTC GIS
Map Created: March 2016
Map Produced By: Ch2m / Alta Planning + Design



Pop-up Meetings

Below is a table of the events attended and a short summary of outcomes.

Table 3.1:
Pop-Up Meetings Attended

Event attended	Date	Location	Surveys completed	Notes (demographics are based on survey and observations determinations)
1. Get Outdoors Nevada Day	10/20/2015	Sunset Park, Clark County	6 English	A pilot survey was administered, and then modified based on input and participant experience
2. Eastern Indoor Swapmeet	11/13/2015	City of Las Vegas	7 English / 15 Spanish	Outreach to many Latino families with young children
3. Henderson Stroll n' Roll	11/14/2015	City of Henderson	41 English / 1 Spanish	Mostly active families on bicycles or walking in neighborhood park
4. The Farms at Fantastic Swapmeet	12/11/2015	City of Las Vegas	9 English / 1 Spanish	Outreach during a day-time market; primarily met with older women and mothers
5. Henderson WinterFest	12/12/2015	City of Henderson	86 English	Largest turnout of families in Henderson during holiday season
6. Broadacres Marketplace	12/13/2015	North Las Vegas	26 English / 21 Spanish	Outreached to low-income, Spanish-speaking families
7. CSN Cheyenne Campus event	1/27/2016	North Las Vegas	22 English	Low-income, students of color were reached at college event
8. CSN Charleston Campus event	1/28/2016	City of Las Vegas	27 English	Low-income, students of color were reached at college event
9. fresh52 Farmers and Artisan Market	2/6/2016	Tivoli Village, City of Las Vegas	30 English	Interacted with more affluent, recreational cyclists
10. Centennial Hills Transit Center	2/10/2016	City of Las Vegas	12 English	Interacted with transit riders and transit-dependent community
11. On the Ranch Farmers and Artisan Market	2/21/2016	Craig Ranch Park, North Las Vegas	26 English	Attended by health-conscious residents
12. Las Vegas Farmers Market	2/18/2016	Gardens Park, Clark County	5 English	Attended by health-conscious residents
13. S. Nevada Health District	8/27/2016	City of Las Vegas	NA	Back to school immunization event; low-income attendees; collected 50 email addresses
14. Three Feet for Pete	9/17/2016	Clark County	NA	Interacted with recreational cyclists. Collected 140 email addresses
15. Get Outdoors Nevada Day	10/15/2016	Lorenzi Park, Las Vegas	NA	Large turnout of families, distributed more than 200 postcards

Online Community Survey Findings

The online community survey utilized for this Plan was made available between October 8, 2015 and February 29, 2016. The survey was placed on a website platform and people were able to take it from home, on their smart phones, or at any of the 12 pop-up meetings (iPads provided) the project team attended. The survey was available in both English and Spanish. A total of 1,076 surveys were completed. 38 surveys were filled out in Spanish. Of the total surveys, about 70 percent were collected online and 30 percent were collected at pop-up meetings.

Advertising & Outreach

The survey was announced and publicized in several ways, including:

- Project website and email distribution list: The project website was updated to advertise the online community survey and any upcoming pop-up meetings being attended by project staff. Several emails were sent from October to February to those on the project distribution list.
- Social media: The RTC advertised the online community survey on their Facebook and Twitter accounts from November to February.

Figure 3.4: Online Survey Interface

REGIONAL BICYCLE AND PEDESTRIAN PLAN FOR SOUTHERN NEVADA

Please answer the following questions about your travel habits in Southern Nevada.

1. Where do you live? Please provide your zip code.

2. How often do you walk for recreation or to get to work, school, or to do your shopping?

☐ Daily

☐ A few times a week

☐ Once a week

☐ Once a month

☐ A few times a year

☐ Never

3. How often do you ride a bicycle for recreation or to get to work, school, or to do your shopping?

☐ Daily

☐ A few times a week

☐ Once a week

☐ Once a month

☐ A few times a year

☐ Never

Online Community Survey Findings

- Targeted community leader outreach: Project staff sent targeted emails to members of the Stakeholder Advisory Groups to promote the survey and mapping activity within their organizations.

Format of Online Survey

The online survey had seven questions and took about 5-8 minutes to complete. There were also optional demographic questions at the end of the survey. Participants were asked about their walking and biking habits, challenges and opportunities for walking and biking in Southern Nevada, and about potential improvements to facilities.

Online Survey Results

In general, respondents who took the survey supported the plan and provided meaningful feedback. Coupled with the interactive mapping tool, the online results gave the RTC a better understanding of how biking and walking is seen throughout the region and what improvements might increase comfort, safety, and ease of use for all types of users, regardless of age or ability.

As is the case in most communities, people in Southern Nevada walk more frequently than they ride a bicycle, but by a small margin. Most respondents did state that they felt comfortable biking in some or most traffic situations.

There were also a few key themes in the open responses throughout the survey that are worth noting:

- Many respondents felt that the current state of existing walking and biking paths were badly maintained and needed more attention, like improving and smoothing the edges of the pavement, reducing road size, and adding or repairing lighting
- More and separated bike lanes were greatly wanted throughout the region. Respondents mentioned improving the connectivity of existing bike trails to increase safety throughout the entire region and adding bike lanes to continue to improve connectivity.
- Many would like to see even more separation between the road and off-street, paved, shared use paths to increase safety and allow residents of all ages to walk and bike.
- Most respondents felt that drivers were a large obstacle to biking and walking in the region. Many suggested a better awareness program to alert drivers to bicycle rights and how to interact and respect bicyclists and bicycle facilities.
- Theft seems to be a large obstacle to biking in the area. Respondents would like to see more and safer places to lock and leave bicycles.

Figure 3.5: Survey Results – Demographics

PUBLIC OUTREACH RESULTS

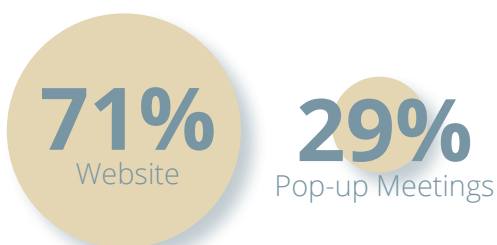
Participation

ONLINE SURVEY



1076
Responses

SOURCE OF SURVEY RESPONSES



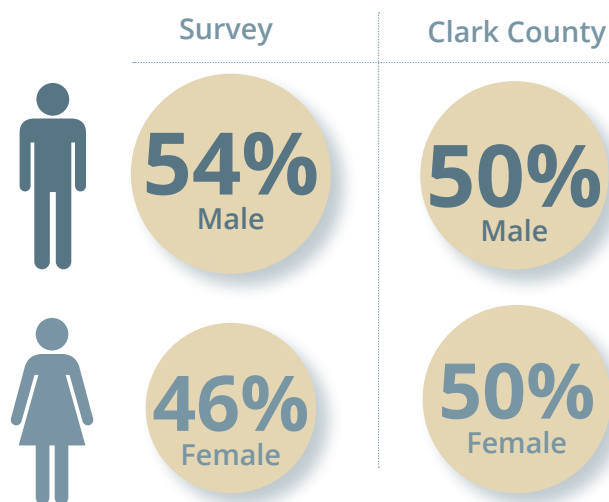
WIKIMAP PARTICIPATION



692
Wikimap responses

Demographic Analysis

GENDER BREAKDOWN



MOST COMMON AGE GROUP (51%)



35 - 44
Years of Age

RACE/ETHNICITY BREAKDOWN

Survey

68% White (non-Hispanic)
32% Non-white

Clark County

47% White (non-Hispanic)
53% Non-white

Figure 3.6: Survey Results – Income / Bicycling & Walking Habits

MOST COMMON **HOUSEHOLD INCOME**

Survey

\$100 - \$150k
Per Year

Clark County

\$50 - \$75k
Per Year

Walk & Bike Habits

77%

Walk at least one day a week
to get to work, school, shop,
or recreate



61%

Bike at least one day a week
to get to work, school, shop,
or recreate



LEVEL OF **COMFORT** RIDING A BICYCLE

10%



Don't ride a
bicycle

29%



Not comfortable
in traffic
situations

31%



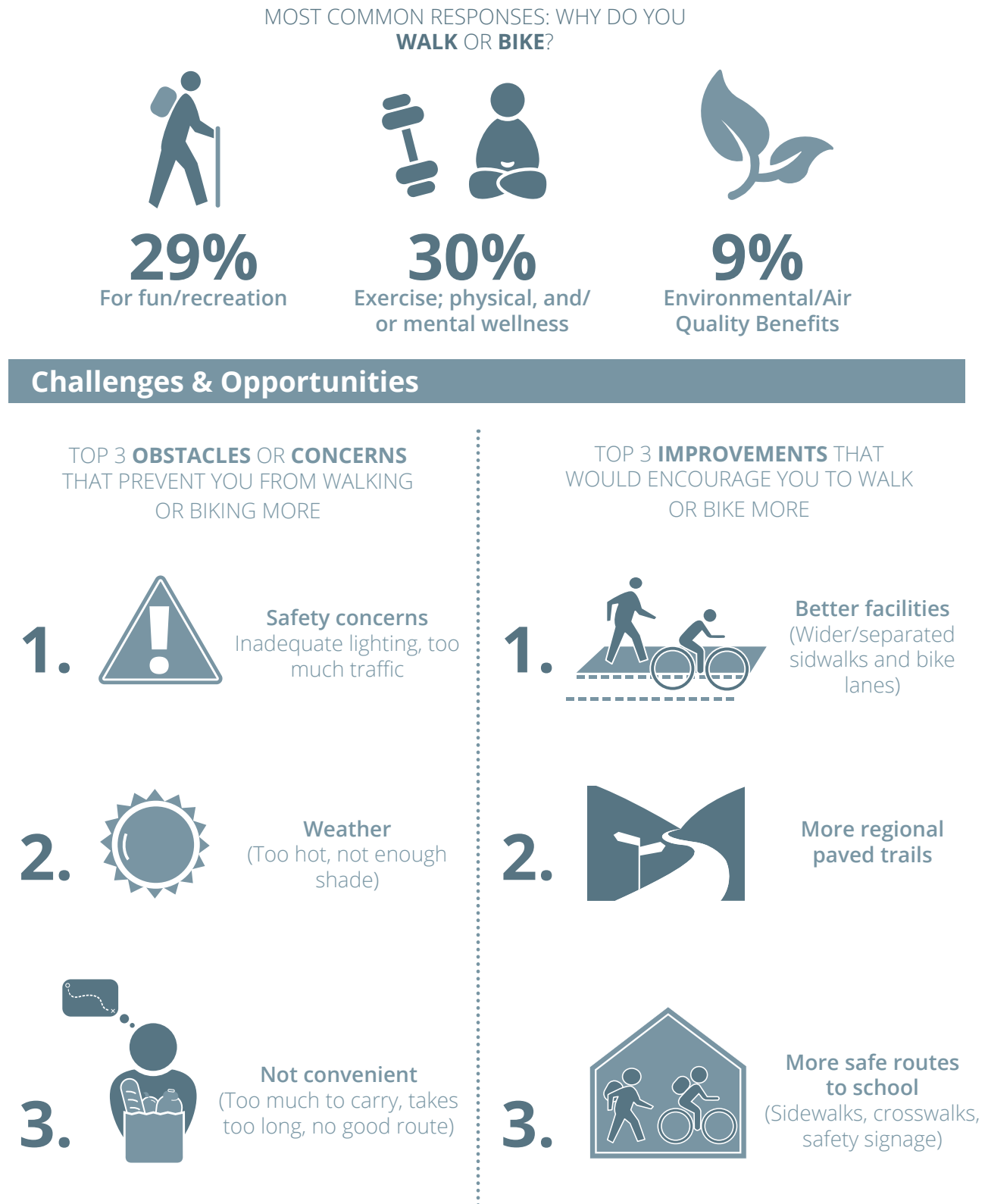
Comfortable
in some traffic
situations

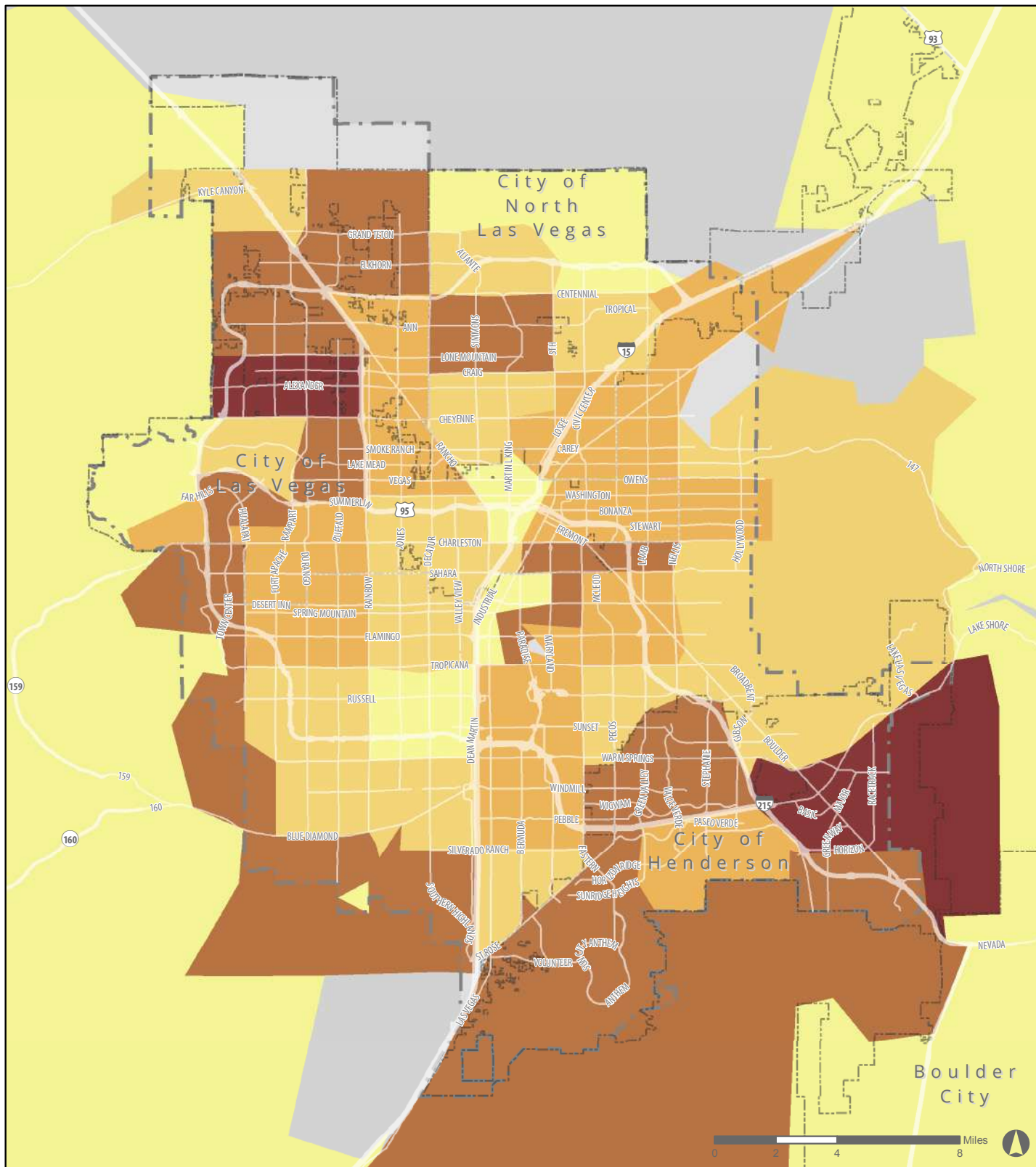
30%



Comfortable
in most traffic
situations

Figure 3.7:
Survey Results – Challenges & Opportunities



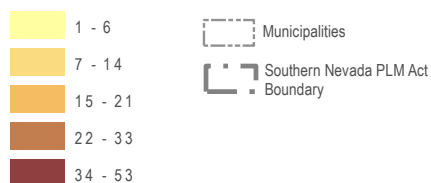


Map 3.2
Regional Bicycle and Pedestrian Plan for
Southern Nevada

Survey Responses by Zip

Data Source: U.S. Census Bureau, Clark County, and RTC GIS
Map Created: March 2016
Map Produced By: Ch2m / Alta Planning + Design

Survey Responses by Zip



Online Mapping Tool Results-Existing Conditions

An interactive online map that allowed users to analyze existing conditions was available alongside the online community survey from November 2015 to February 28, 2016. The maps gave participants the opportunity to draw routes they currently use or would like to use, and place dots at locations or places to which they would like to walk or bike. Respondents also had an opportunity to place dots at locations they thought needed improvement or at specific barriers that discouraged them or their families from walking and bicycling more. The tool received 691 responses: 432 describing linear facilities (roads, paths, sidewalks) and 259 spots (locations, gaps, and barriers).

Online mapping tool results support survey findings that indicated that most people rode for recreational, health, or environmental benefits. This was evidenced by:

- Qualitative content analysis of open-ended comments, with most respondents citing recreational use as their primary concern when including points and lines on the map.
- Comments were focused on popular recreational routes, like the Red Rocks Loop and the River Mountains Loop Trail.
- First-hand conversations with participants at pop-up events.

Figure 3.8:
Online Mapping Tool Interface - Existing Conditions Input



Online Mapping Tool Results- Existing Conditions

Advertising & Outreach

The online mapping tool was announced and publicized in several ways, including:

Project website and email distribution list: The project website was updated to advertise the online mapping tool and any upcoming pop-up meetings being attended by project staff. Several emails were sent from October to February to those on the project distribution list.

- *Social media: The RTC and City of Las Vegas advertised the online mapping tool on their Facebook and Twitter accounts from November to February.*
- *Targeted community leader outreach: Project staff sent targeted emails to the members of the Stakeholder Advisory Groups to share within their organizations.*

Existing Conditions Map

All responses to the existing conditions online mapping tool can be found in the following four maps:

- Map 3.3: “Walk/bike routes I currently use”
- Map 3.4: “Walk/bike routes I’d like to use”
- Map 3.5: “Places I’d like to walk/bike to”
- Map 3.6: “Barriers to walking/biking”

In each of these maps (included on the following pages), the thicker the line, the more responses that location or facility garnered. Places where participants put dots have been joined with a heat map to indicate locations with more popularity. For example, the most popular destination was the Union Pacific Railroad (UPRR) Trail in the City of Henderson, NV and the place where people would like to see the most improvements is Warm Springs.

POPULAR ROUTES

The five most common routes used by participants of the interactive mapping exercise (Map 3.3) were:

1. Union Pacific Railroad (UPRR) Trail
2. St. Rose Parkway Trail
3. Wetlands Park Trail
4. Las Vegas Wash Trail
5. Pittman-Wash Trail

Of the top twenty (20) most popular routes for current walking and bicycling, 50 percent were shared-use, off-street trails. Major streets (arterials) comprised an additional 25 percent of responses, and collector roads comprised 20 percent of responses. Local streets comprised the smallest share of responses at 5 percent.

BARRIERS AND GAPS

When asked to identify walking and bicycling routes they'd like to use (Map 3.4), respondents chose

1. Warm Springs
2. Blue Diamond SR-160
3. St. Rose Parkway Trail
4. Routes in the southern portion of the valley
5. Sahara Avenue, between W. Hualapai Way and E. Pecos Road

Of the top twenty (20) most popular routes that respondents indicated they'd like to walk and/or bike, the majority (35 percent) were shared-use, off-street routes such as the St. Rose Parkway Trail, Tropicana-Flamingo Trails, and Flamingo-Arroyo Trail. Major streets and collector streets comprised a quarter (25 percent) of responses each. Routes along local streets constituted the smallest share of survey responses (15 percent).

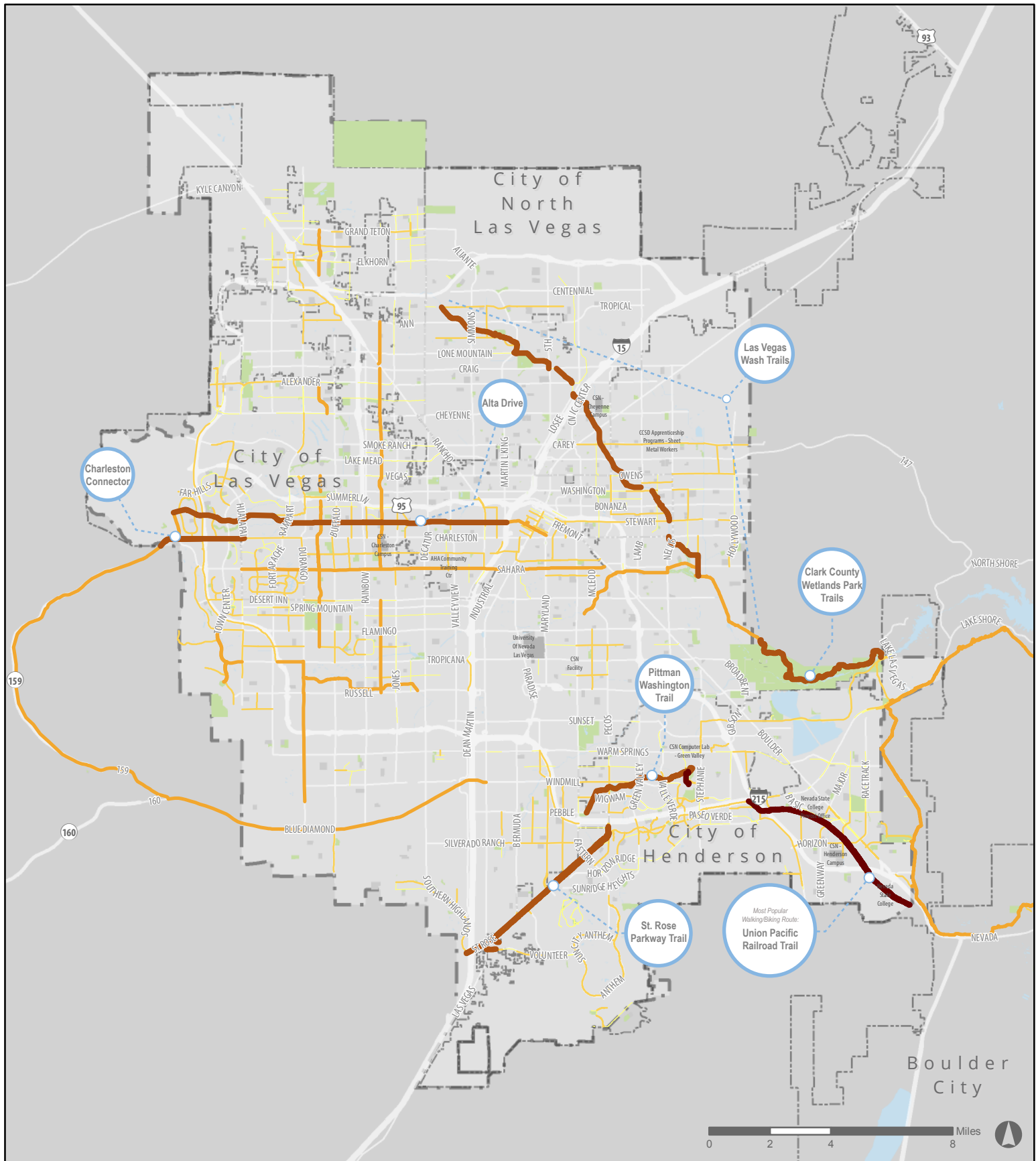
As for particular places that respondents would like to walk and/or bike to (Map 3.5), the top answers were:

1. University of Nevada, Las Vegas
2. Las Vegas Boulevard at Fremont St.
3. Blue Diamond SR-160 (presumably bike only)

Similarly, places where respondents felt there were barriers to walking and biking (Map 3.6) included:

1. The Las Vegas Strip
2. Connections to the Union Pacific Railroad Trail
3. Connections to Blue Diamond SR-160
4. Thunderbird Sports Complex on Ann and Durango

Overall, respondents were most interested in improving connections to existing walking and biking facilities throughout the region.

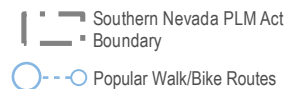
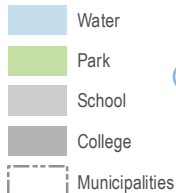
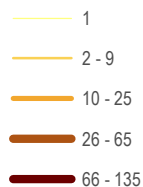


Regional Bicycle and Pedestrian Plan for
Southern Nevada

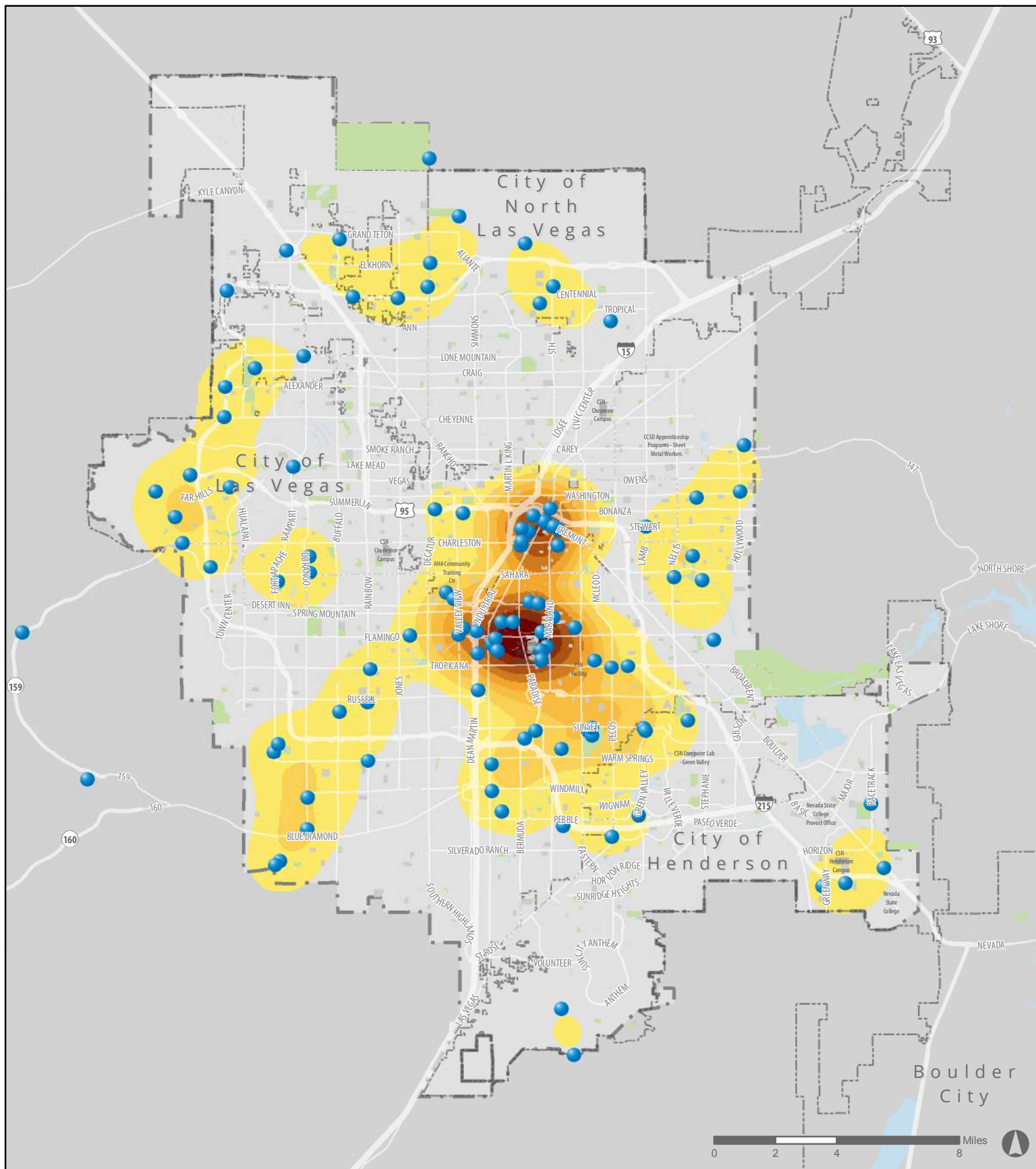
Map 3.3 Online Mapping Tool Results 'Walk/Bike Routes I Currently Use'

Data Source: U.S. Census Bureau, Clark County, and RTC GIS
Map Created: March 2016
Map Produced By: Ch2m / Alta Planning + Design

Number of Responses



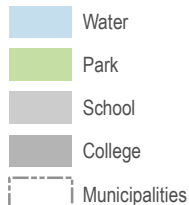
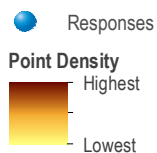




Regional Bicycle and Pedestrian Plan for
Southern Nevada

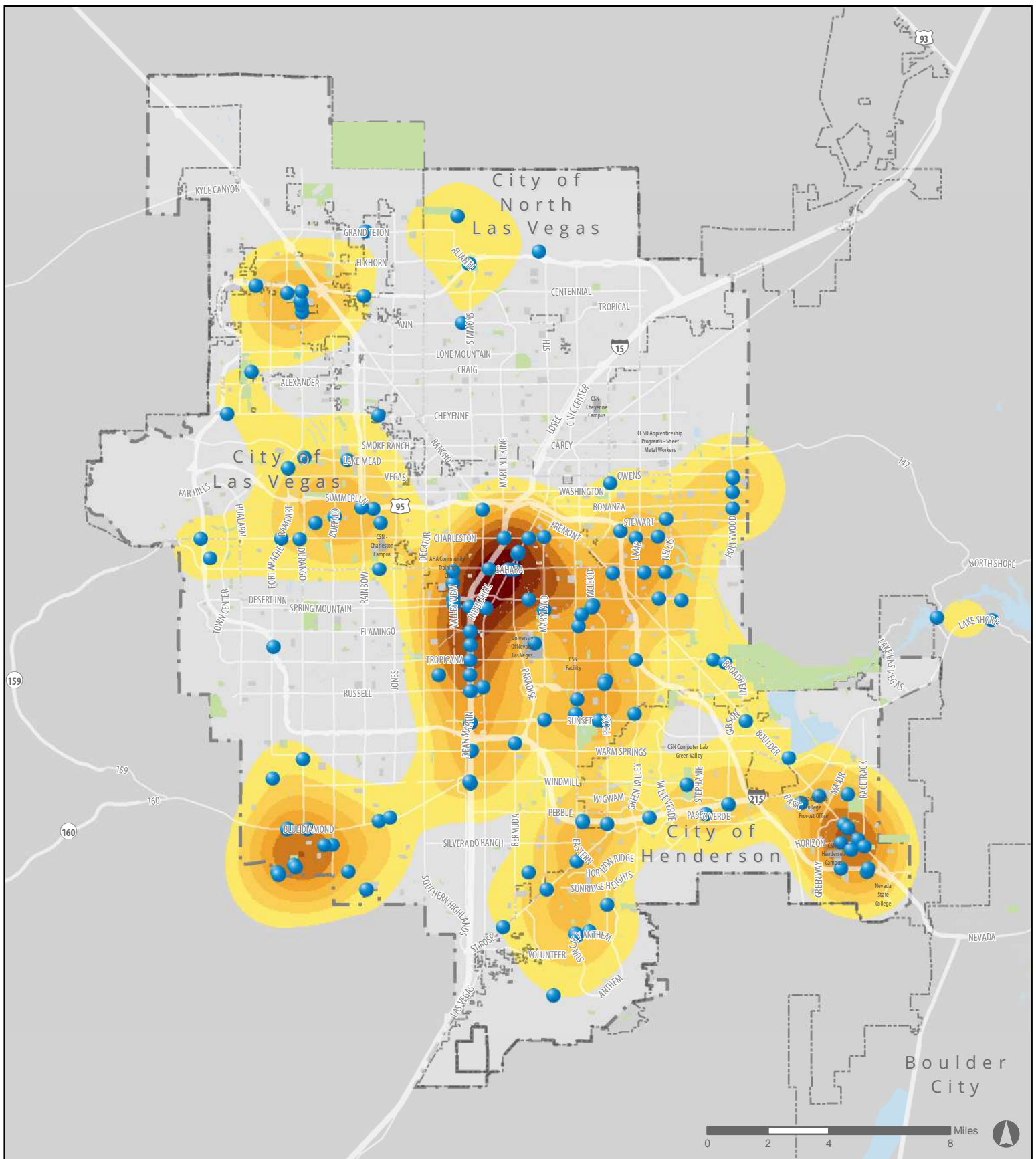
Map 3.5 Online Mapping Tool Results 'Places I'd Like to Walk/Bike to'

Data Source: U.S. Census Bureau, Clark County, and RTC GIS
Map Created: March 2016
Map Produced By: Ch2m / Alta Planning + Design



Southern Nevada PLM
Act Boundary





Regional Bicycle and Pedestrian Plan for
Southern Nevada

Map 3.6 Wikimapping Results 'Barriers to Walking/Biking'

Data Source: U.S. Census Bureau, Clark County, and RTC GIS
Map Created: March 2016
Map Produced By: Ch2m / Alta Planning + Design

● Responses

Point Density
Highest
Lowest

Water

Park

School

College

Municipalities

Southern Nevada PLM
Act Boundary



Online Mapping Tool Results-Recommended Facilities

Recommended Facilities Map

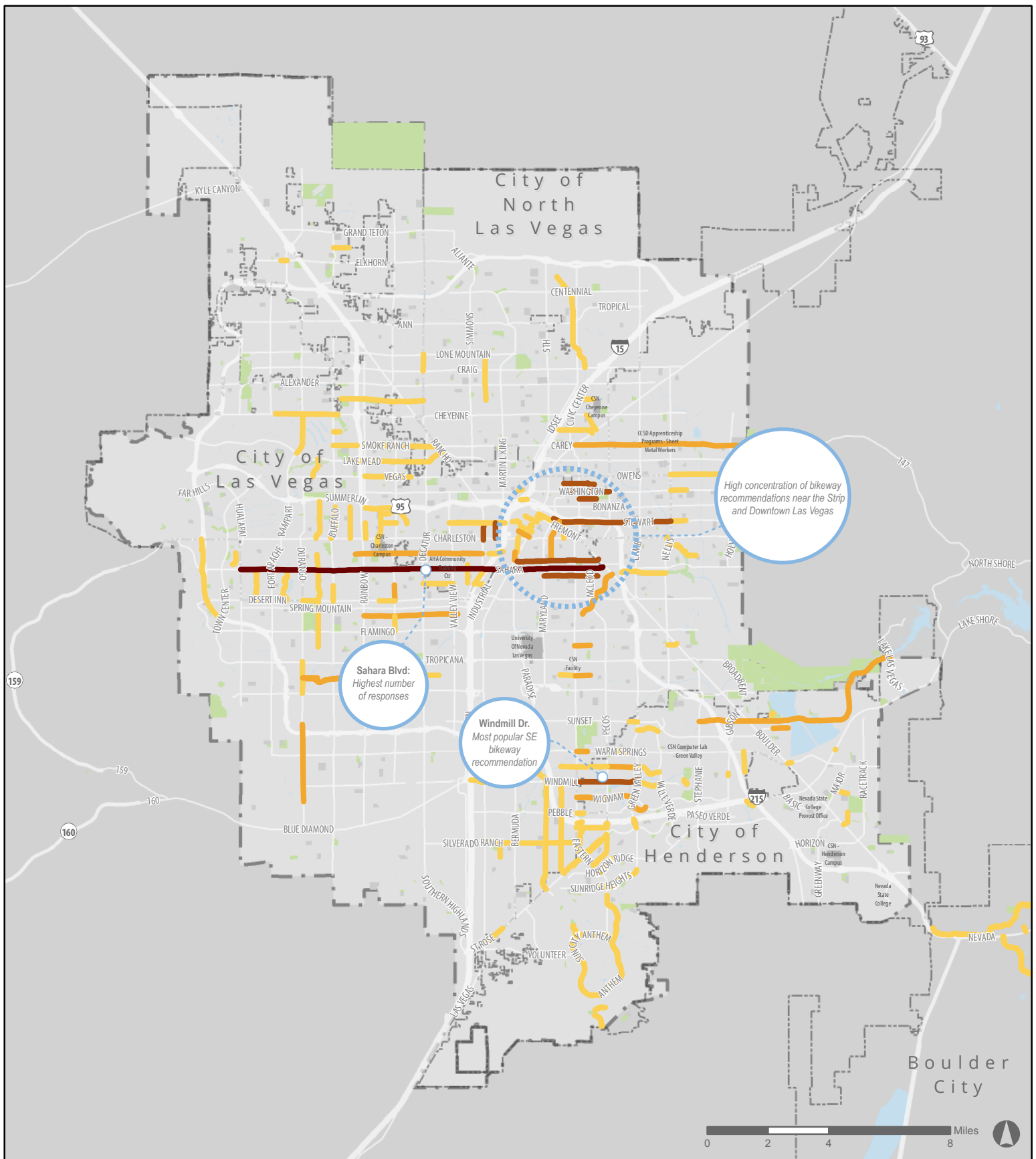
Similar to the existing conditions outreach, an interactive online mapping tool was used to gather public input on the draft recommended bicycling and pedestrian network and other draft plan elements, such as policies, programs, design guidelines, and metrics. Feedback was accepted between October 12 and November 30, 2016, totalling 495 total responses. Users were encouraged to highlight vote for to identify any desired routes that were not included in the draft recommendations (135 responses; Map 3.7). Users were also asked to vote for their "Top 3" projects that they would like to see prioritized for implementation (222 responses; Map 3.8). Another 138 sport comments were included by interactive map users.

Generally, the results showed that:

1. There is strong support for the completion of a valley-wide bikeway along the 215 corridor. Support for a 215 bikeway came from nearly every part of the valley, including Summerlin, Southern Highlands, Henderson, and N/NW Vegas;
2. East-west connections to and across Downtown and the Strip were cited repeatedly. There was a specific concern for getting across I-15 by bike; Recommendations to get across I-15 include bike/pedestrian bridges.
3. There was support for better connections to UNLV. Improved safety conditions along Maryland Parkway seem important. A safe connection from UNLV to Downtown was also mentioned;
4. Safe shared street facilities connecting to the Red Rock Loop/NRCA;
5. General support for east-west and north-south connections that provide safe crossings of dangerous arterials and highways;
6. General support for off-street trails.

Figure 3.9:
Online Mapping Tool Interface - Proposed Facilities Input



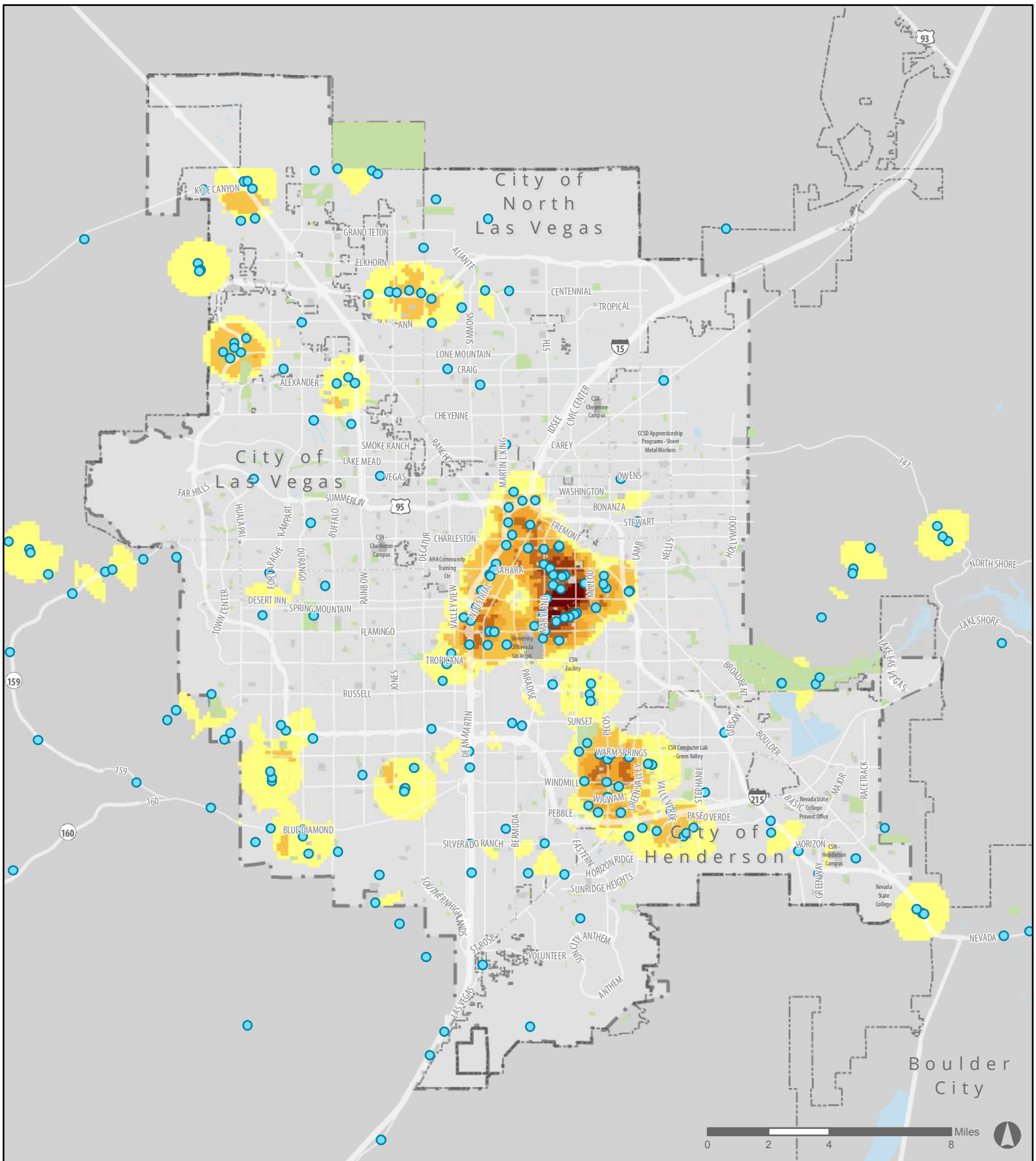


Map 3.7
Regional Bicycle and Pedestrian Plan for
Southern Nevada

Wikimapping Results 'Recommended New Bikeways'

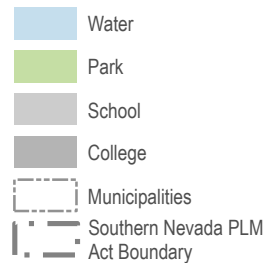
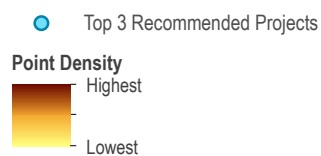
Data Source: U.S. Census Bureau, Clark County, and RTC GIS
Map Created: February 2017
Map Produced By: Ch2m / Alta Planning + Design





Map 3.8
Regional Bicycle and Pedestrian Plan for
Southern Nevada

Wikimapping Results 'Top 3 Recommended Projects'





CHAPTER 4

Goals and Objectives



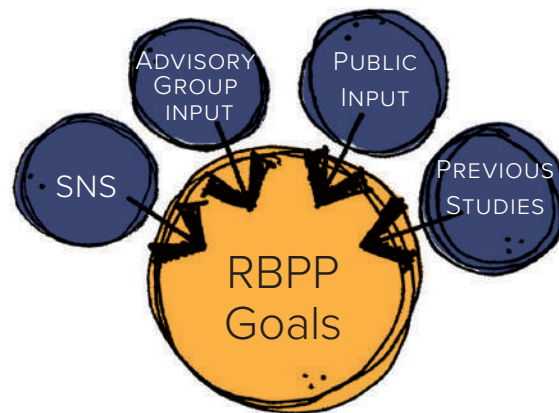
Goals and Objectives

Where Are We Going?

This Regional Bicycle and Pedestrian Plan for Southern Nevada will guide the development and implementation of the region's walking and bicycling environments for years to come. The foundation for recommendations and implementation strategies are directly informed by this RBPP's vision statement, goals, objectives, and policies.

- A vision statement is a broad inspirational statement for the desired future environment.
- Goals are general statements of what the plan hopes to achieve over time.
- Objectives are more specific statements that mark progress towards the goal.
- Policies are continual actions that guide decision-making to achieve the objectives and goals.

Figure 4.1:
RBPP goals



Vision Statement

- **Southern Nevada will develop a safe, connected, and convenient walking and bicycling system that serves as a viable transportation and recreation asset while advancing the region's economic, educational, health, and environmental goals.**

The Vision Statement, Goals, Objectives and Policies for the RBPP were developed through a collaborative process including the Stakeholder Advisory Groups, the RTC, and the Planning Team. SNS provided the overall framework for the development of goals, objectives and policies. These were further refined by suggested input from the public, local jurisdiction staff, Stakeholder Advisory Groups and previous planning studies such as the RTC Complete Streets Design Guidelines, RTC Complete Streets Policy, and Southern Nevada Traffic Safety Plan.



GOAL 1: COMFORT & SAFETY

DEVELOP COMPREHENSIVE FACILITIES THROUGHOUT SOUTHERN NEVADA THAT MAKE BICYCLING AND WALKING SAFE, COMFORTABLE AND CONVENIENT FOR ALL AGES AND ABILITIES

OBJECTIVES

Objective 1.1: Reduce the number of bicycle and pedestrian collisions, injuries, and fatalities

- **Policy 1.1.A:** *Develop a process to annually review bicycle and pedestrian crash data, including causes, to implement ongoing improvements throughout the transportation system*
- **Policy 1.1.B:** *Prioritize improvements at intersections and corridors with high numbers of bicycle and pedestrian crashes*
- **Policy 1.1.C:** *Develop an accurate and current regional traffic safety database that can be easily shared among jurisdictions*

Objective 1.2: Implement context-sensitive design standards and policies that emphasize safety and comfort for the most vulnerable road users

- **Policy 1.2.A:** *Utilize state of the practice and emerging designs including the RTC's Complete Street Design Guidelines and national manuals such as AASHTO and NACTO*

- **Policy 1.2.B:** *Promote the use of appropriate bicycle facility types in relation to roadway characteristics, land use, and context*

Objective 1.3: Develop supporting infrastructure to enhance the viability of bicycling and walking for recreation and transportation

- **Policy 1.3.A:** *Require or incentivize the implementation of facilities that support bicycling and walking with new development such as bicycle parking, changing rooms, or showers*



GOAL 1: COMFORT & SAFETY (CONTINUED)

SUPPORTING FRAMEWORK FROM PREVIOUS PLANS & RBPP OUTREACH

SNS Goal: Connect and enhance bike and pedestrian facilities throughout the region.

SNS Goal: Develop a safe, efficient road network that supports all transportation modes.

SNS Objective: Implement policies and design concepts that encourage safety and ease of movement for pedestrians and cyclists.

SNS Objective: Overhaul design standards to support multiple modes and support healthy lifestyles, with special attention to the region's extreme summer temperatures.


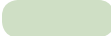

RTC RTP Strategy: Improve safety.

SNTPS: Zero fatalities, a goal that is consistent with the national strategy toward Zero Deaths and supporting Nevada's Strategic Highway Safety Plan goal of zero fatalities.

RTC Complete Streets Policy Goal: The livability of neighborhoods and commercial centers located along the region's transportation corridors will be enhanced by a safe and inviting pedestrian environment.

RBPP Public Outreach: "Better facilities" represented the most common improvement cited that would cause Southern Nevada residents to bike and walk more.

RBPP Public Outreach: "Safety concerns" represented the most common barrier cited by online survey respondents to increased biking or walking.

-  = Southern Nevada Strong
-  = Other RTC Plans
-  = RBPP Public Outreach



GOAL 2: ACCESS

IMPROVE BICYCLING AND WALKING ACCESS TO
COMMUNITY DESTINATIONS ACROSS SOUTHERN NEVADA
INCLUDING CONNECTIONS TO TRANSIT

OBJECTIVES

Objective 2.1: Plan, design, construct, and manage a transportation network that accommodates the needs of all mobility types, users, and ability levels.

- **Policy 2.1.A:** *Promote the adoption of policies by all RTC jurisdictions that lead to increased inclusion of pedestrian and bicycle facilities*
- **Policy 2.1.B:** *Review and revise policies and design standards to support multiple modes*
- **Policy 2.1.C:** *Facilitate cooperation on active transportation projects and improvements among different jurisdictions, especially across jurisdictional boundaries and within jurisdictional “islands”*

Objective 2.2: Promote bicycle and walking connectivity to Southern Nevada’s primary destinations

- **Policy 2.2.A:** *Prioritize implementation of pedestrian and bicycle infrastructure that connects to schools, parks, healthcare, and community services*

Objective 2.3: Seek to remedy or remove physical barriers to biking and walking throughout Southern Nevada

- **Policy 2.3.A** *Prioritize projects that close gaps in the existing bicycle and walking network*
- **Policy 2.3.B** *Actively seek to improve and retrofit auto-dependent corridors or areas*

Objective 2.4: Promote investments in bicycling and walking that improve access to transit

- **Policy 2.4.A:** *Prioritize projects that improve access to transit and offer first/last mile benefits*
- **Policy 2.4.B** *Prioritize and leverage improvements near priority transit corridors*

SUPPORTING FRAMEWORK FROM PREVIOUS PLANS & RBPP OUTREACH

SNS Goal: Match land use and transportation plans with regional economic development plans.

SNS Goal: Support the educational system and learning environments through thoughtful land-use and transportation planning.

SNS Goal: Develop a safe, efficient road network that supports all transportation modes.

SNS Goal: Support access to health-care, healthy food, parks, and community service.

SNS Objective: Prioritize access to parks, trails, open space, recreational facilities, and opportunities for physical exercise.

SNS Objective: Initiate redevelopment activities along transit corridors that enhance ridership, promote livability, and develop community character.

RTC Complete Streets Policy Goal:

Southern Nevada’s transportation network will be supported through a variety of feasible transportation choices, which allow for sustainable growth.

RTC 2017-2040 RTP Strategy: Enhance Multimodal Connectivity.



GOAL 3: EDUCATION & ENCOURAGEMENT

ENCOURAGE BROADER PARTICIPATION, APPRECIATION, AND AWARENESS OF WALKING AND BICYCLING THROUGH PROGRAM EFFORTS TARGETED AT ALL AGES AND ABILITIES

OBJECTIVES

Objective 3.1: Develop a variety of programs to encourage broader biking and walking activity across all demographics in Southern Nevada

- **Policy 3.1.A:** *Support and increase the existing capacity of Clark County School District's Safe Routes to School program*
- **Policy 3.1.B:** *Support and leverage existing encouragement and transportation demand management (TDM) programs to increase walking and bicycling activity*

Objective 3.2: Develop a comprehensive education program promoting awareness of bicycle and pedestrian laws and responsibilities geared towards all roadway users

- **Policy 3.2.A:** *Develop education campaigns to communicate the rights and responsibilities of bicyclists, pedestrians, and motorists*

Objective 3.3: Increase local capacity to execute and administer education and encouragement programs throughout Southern Nevada

- **Policy 3.3A:** *Provide agencies with technical resources or funding support to administer education and encouragement activities at the local level*

- = Southern Nevada Strong
- = Other RTC Plans

SUPPORTING FRAMEWORK FROM PREVIOUS PLANS & RBPP OUTREACH

SNS Goal: Match land use and transportation plans with regional economic development plans.

SNS Goal: Support the educational system and learning environments through thoughtful land-use and transportation planning.

SNS Goal: Develop a safe, efficient road network that supports all transportation modes.

SNS Goal: Support access to health-care, healthy food, parks, and community service.

SNS Objective: Prioritize access to parks, trails, open space, recreational facilities, and opportunities for physical exercise.

RTC Complete Streets Policy Goal: Southern Nevada's transportation network will be supported through a variety of feasible transportation choices, which allow for sustainable growth.

RTC RTP Strategy: Improve safety.

RTC RTP Strategy: Provide Accountable & Transparent Planning Process.



GOAL 4: EQUITY & HEALTH

RECOGNIZE THE TRANSPORTATION SYSTEM'S IMPACT ON AIR QUALITY AND COMMUNITY HEALTH WHILE PROVIDING LADDERS OF OPPORTUNITY TO UNDERSERVED NEIGHBORHOODS

OBJECTIVES

Objective 4.1: Invest in bicycling and walking in underserved neighborhoods

- **Policy 4.1.A:** *Develop funding criteria that prioritize projects and programs that serve underserved neighborhoods who rely on biking, walking, and transit as their sole or primary form of transportation*
- **Policy 4.1.B:** *Identify a comprehensive bicycling and walking system and suite of programs in underserved neighborhood*

Objective 4.2 : Improve air quality and community health by increasing the number of people walking and biking

- **Policy 4.2.A:** *Include air quality as an important metric in evaluating transportation investments*
- **Policy 4.2.B:** *Include health as an important metric in evaluating transportation investments.*

Objective 4.3: Improve bicycle and pedestrian access to resources that support health in Southern Nevada such as parks, open space, recreation centers, healthcare, and fresh food

- **Policy 4.3.A:** *Prioritize implementation of infrastructure or routes that connects to parks, open space, recreation centers, healthcare, and fresh food*

SUPPORTING FRAMEWORK FROM PREVIOUS PLANS & RBPP OUTREACH

SNS Goal: Support access to healthcare, healthy food, parks, and community service.

SNS Objective: Overhaul design standards to support multiple modes and support healthy lifestyles.

SNS Objective: Encourage development of design standards and land use policies that require investments in low-income or at-risk communities to promote walkability.

SNS Objective: Reduce transportation-related emissions of ozone and carbon monoxide.

SNS Objective: Prioritize access to parks, trails, open space, recreational facilities, and opportunities for physical exercise.




RTC RTP Strategy: Improve Public Health Related to Transportation.

RTC RTP Strategy: Conserve & Protect Natural Resources.

RTC RTP Strategy: Improve Access to Essential Services.

RTC Complete Street Guidelines Goal: Reduce greenhouse gas emissions and other air pollution.

Public Outreach: "Environmental benefits" represented the third most commonly cited reason for biking and walking.

-  = Southern Nevada Strong
-  = Other RTC Plans
-  = RBPP Public Outreach

Regional Performance Measurements

This section identifies ways to measure the RBPP's success. Metrics are grouped into four categories and described in further detail in the following pages. Lead and supporting agencies are identified, and suggestions for the frequency of evaluations and progress tracking are provided.



Comfort & Safety

- Reduce number of collisions, injuries, fatalities
- Context-sensitive design standards and policies
- Develop supporting infrastructure



Education & Encouragement

- Variety of programs to encourage walk/bike
- Education campaign, promote awareness of laws
- Increase local capacity to affect programs



Access

- Network accommodates needs of all users, types, abilities
- Connectivity to primary destinations
- Remedy or remove barriers in physical environment
- Promote investments that improve access to transit



Equity & Health

- Invest in underserved neighborhoods
- Improve air quality and comm. health by inc. walk/bike
- Improve access to health resources, parks, comm ctrs

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» NDOT; FARS; Southern Nevada Health District

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT

Annual Number and Location of Traffic-Related Major and Fatal Crashes

DEMONSTRATED NEED FOR MEASURE

Southern Nevada has one of the highest rates of pedestrian-automobile crashes for metropolitan areas in the United States.

DESCRIPTION

This measure will help identify trends in location, frequency, cause, and attributes of pedestrian-automobile and bicycle-automobile crashes year-to-year, with the goal of reducing overall number of major, life-altering and fatal crashes in the region.

BASELINE BENCHMARK

Crash analysis from RBPP; FARS; NDOT

TRACKING METHOD; SUGGESTED FREQUENCY

FARS and NDOT databases; annually

EXAMPLES

North Carolina Department of Transportation's Pedestrian and Bicycle Crash Analysis Tool software; NCDOT's Statewide Pedestrian & Bicycle Plan and the Strategic Highway Safety Plan

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» Municipal Public Works Departments; NDOT; RTC FAST

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT

Enhanced Intersections (countdown timers, lighting)

DEMONSTRATED NEED FOR MEASURE

Intersections are where the majority of traffic crashes involving bicyclists and pedestrians occur. Improving intersections for better perceived safety and comfort for people walking and bicycling through various measures will encourage greater use and reduce likelihood and severity of crashes.

DESCRIPTION

“Enhanced intersections” can include countdown timers, lighting, high-visibility crosswalks, signage, reduced crossing distance, continuous bike lanes, bike lane tracking, passive detection, and more. Measuring how many intersections and to what extent they have been improved will be the indicator for this performance measure.

BASELINE BENCHMARK

Baseline of zero as of adoption

TRACKING METHOD; SUGGESTED FREQUENCY

Track installation of intersection features; quarterly or when upgrades are completed

EXAMPLES

National Bicycle and Pedestrian Documentation Project; Mountainland Association of Governments (Utah) Murdock Canal Trail Counters

PERFORMANCE MEASUREMENT

Bicycling and Walking Delay

DEMONSTRATED NEED FOR MEASURE

Delay for people walking and bicycling, just like for those driving, often discourages use and increases frustration with the system. Ensuring that trip length (in minutes) is consistent and as low as possible will likely encourage more frequent active transportation use.

DESCRIPTION

Delays can be caused by signal timing being based on automobile (and not active transportation) speeds, lack of route directness, and lack of comfortable crossing opportunities.

BASELINE BENCHMARK

Traffic signal timing data and consideration of people walking and bicycling; multi-modal traffic counts; traffic/crossing gap analysis

TRACKING METHOD; SUGGESTED FREQUENCY

Video counters/traffic cameras, MMLOS, BLOS, and PLOS analyses; every 3-5 years and for select corridors at a time

EXAMPLES

Washington, D.C.; Boston, MA; New York City, NY

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» Municipal Public Works Departments; NDOT; RTC FAST

LEVEL OF EFFORT

» Medium

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» Municipal Public Works and Parks Departments; NDOT; RTC FAST

LEVEL OF EFFORT

» Medium

PERFORMANCE MEASUREMENT

Right of Way Space for Active Transportation Modes

DEMONSTRATED NEED FOR MEASURE

Many people do not feel comfortable walking and bicycling because of a perceived lack of safety, either because of how close active transportation facilities are to travel lanes on the roadway or because of the comfort of the facility itself (i.e. sidewalk without planting strip and next to traffic; narrow bike lanes without physical protection or too close to parking)

DESCRIPTION

Measure: Percentage of public right-of-way dedicated to pedestrians and bicyclists (area dedicated to use by these modes / the total area of public right-of-way). In order to encourage walking and bicycling, dedicated space should be proportional to active transportation mode share goals.

BASELINE BENCHMARK

Area dedicated to use by these modes / the total area of public right-of-way

TRACKING METHOD; SUGGESTED FREQUENCY

Street and active transportation system data; annually

EXAMPLES

NYC DOT's "Measuring the Street: New Metrics for 21st Century Streets"
Florida DOT

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» City of Henderson; Other RTC Municipalities (future); Bicycle Transit Systems (current operator)

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT**% of homes or jobs within 1/4 mile of a bike share station****DEMONSTRATED NEED FOR MEASURE**

Free, public bike share has already been implemented on a small scale in the master-planned community of Cadence in Henderson and in Downtown Las Vegas. As bike share begins in Downtown Las Vegas, growth of the overall system should be tracked in order to compare to previous years and peer cities and determine needs and opportunities.

DESCRIPTION

Although access to a bicycle is not a major deterrent to bicycling for transportation or recreation, ongoing maintenance and security of the vehicle prevent some from riding. Bike share stations within close proximity to homes or jobs encourage use and shorten the distance the user needs to walk before and after the bike share trip.

BASELINE BENCHMARK

Determine baseline after first downtown Las Vegas stations are installed

TRACKING METHOD; SUGGESTED FREQUENCY

Census and employment data; annually or when a significant change in the bike share system occurs

EXAMPLES

American Community Survey; parcel data; employment data

**PERFORMANCE MEASUREMENT****% of population served by high comfort walk/bike facilities****DEMONSTRATED NEED FOR MEASURE**

People will walk and ride a bike more if comfortable facilities are within walking or bicycling distance of their homes.

DESCRIPTION

This measure will determine what percentage of the region's residents are within 1/4 mile network distance (not as the crow flies) to an existing high comfort bicycling and/or walking facility. Using network distance and not buffer distance will provide a more accurate analysis of possible barriers between homes and facilities.

BASELINE BENCHMARK

Percentage determined by GIS model

TRACKING METHOD; SUGGESTED FREQUENCY

Census and employment data, active transportation system data; annually

EXAMPLES

U.S. Census data; existing roadway and active transportation network for region; City of Las Vegas' 98% goal to ensure almost every resident is within 1/4 mile of an on- or off-street facility.

LEAD AGENCY

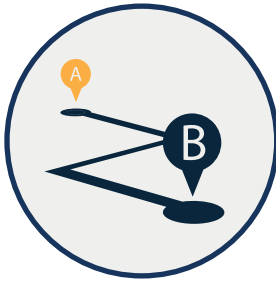
» RTC

SUPPORTING AGENCIES

» Municipal Public Works and Parks Departments; NDOT; RTC FAST

LEVEL OF EFFORT

» Low



LEAD AGENCY

» RTC

SUPPORTING AGENCIES

» Municipal Public Works and Parks Departments; NDOT; RTC FAST

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT

% of proposed regional network completed

DEMONSTRATED NEED FOR MEASURE

Completing proposed regional facilities will improve the regional connectivity between jurisdictions.

DESCRIPTION

Similar to the measure of miles and density of active transportation facilities, this measure tracks how much of the proposed facility network in the RTC Regional Bicycle and Pedestrian Plan (RBPP) has been completed since adoption.

BASELINE BENCHMARK

Baseline of zero as of adoption

TRACKING METHOD; SUGGESTED FREQUENCY

RBPP and existing active transportation system data; annually

EXAMPLES

RTC Regional Bicycle and Pedestrian Plan



LEAD AGENCY

» RTC

SUPPORTING AGENCIES

» RTC Municipalities

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT

% of transit stations with secure bicycle parking

DEMONSTRATED NEED FOR MEASURE

Measure will help identify stations that are still in need of secure bicycle parking.

DESCRIPTION

Improving the security and availability of bicycle parking at transit stations increases the reach of the transit system and vice versa. This measure can lead to a future performance measure which could determine how many people are using transit to lengthen the possible distance of a bike-only trip.

BASELINE BENCHMARK

Existing percentage of RTC transit stations with secure parking

TRACKING METHOD; SUGGESTED FREQUENCY

Count stations annually or when a significant change in parking at multiple stations occurs

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» Municipal Public Works and Parks Departments; NDOT; RTC FAST

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT**% of transit stops served by walk/bike facilities****DEMONSTRATED NEED FOR MEASURE**

More than 90% of transit stops begin and/or end as walking or bicycling trips. Improving access to transit using these modes will improve transit ridership and reduce congestion on roadways.

DESCRIPTION

Similar to the measure of percentage of population served by the active transportation network, this measure should utilize a 1/4 mile network distance to determine what percentage of RTC's bus stops, transit centers, hubs, and other access points are served by existing walking and bicycling system.

BASELINE BENCHMARK

Percentage determined by GIS model

TRACKING METHOD; SUGGESTED FREQUENCY

Transit systems data; annually

EXAMPLES

RTC transit stop data; existing roadway and active transportation network for region

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» Municipal Public Works and Parks Departments; Regional Open Space and Trails (ROST) Work Group; NDOT; RTC FAST

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT**Access to community destinations****DEMONSTRATED NEED FOR MEASURE**

Southern Nevada residents said that they would like to be able to walk or ride a bike to community destinations, like parks, civic centers, events, etc.

DESCRIPTION

Similar to the measure of percentage of transit stops served by the active transportation network, this measure should utilize average walking (0.5 miles) and bicycling (2.0 miles) trip distances to analyze what percentage of residents have access to community destinations via walking and bicycling. Staff should discern whether lack of facilities and crossing opportunities or the presence of barriers would also limit access to these destinations.

BASELINE BENCHMARK

Percentage determined by GIS model

TRACKING METHOD; SUGGESTED FREQUENCY

Active transportation system data, RBPP regional destinations; annually

EXAMPLES

WalkScore, BikeScore, Indianapolis MPO's Central Indiana Regional Bikeways Plan



LEAD AGENCY

» RTC

SUPPORTING AGENCIES

» Municipal Public Works and Parks Departments; NDOT; RTC FAST

LEVEL OF EFFORT

» Medium

PERFORMANCE MEASUREMENT

Access to jobs

DEMONSTRATED NEED FOR MEASURE

Even though only about 15% of all trips are commutes to work, improving access to jobs by bicycling and walking will help reduce congestion and improve air quality.

DESCRIPTION

Similar to the measure of percentage of community destinations served by the active transportation network, this measure should utilize average walking (0.5 miles) and bicycling (2.0 miles) trip distances to analyze what percentage of jobs are accessible via walking and bicycling. Staff should discern whether lack of facilities and crossing opportunities or the presence of barriers would also limit access to these destinations.

BASELINE BENCHMARK

Percentage determined by GIS model

TRACKING METHOD; SUGGESTED FREQUENCY

Census and employment data, active transportation system data; annually

EXAMPLES

New York City, NY's Regional Plan Association: <http://fragile-success.rpa.org/maps/jobs.html>



LEAD AGENCY

» RTC

SUPPORTING AGENCIES

» Municipal Public Works and Parks Departments; NDOT; RTC FAST

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT

Active transportation facility within 1/2 mile of healthcare facilities, healthy food, parks, and community services.

DEMONSTRATED NEED FOR MEASURE

One of the goals of Southern Nevada Strong plan is to improve access to these types of destinations.

DESCRIPTION

Currently, nearly all trips to these types of destinations are done by car. Improving access by walking and bicycling will not only reduce congestion and parking demand, but will also help transportation-limited populations to access healthy food and community services.

BASELINE BENCHMARK

Existing facilities within 1/2 mile of these destinations

TRACKING METHOD; SUGGESTED FREQUENCY

Healthcare facility, food, and destinations data, existing active transportation system data; annually

EXAMPLES

Southern Nevada Strong

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» City of Henderson; Other RTC Municipalities (future); Bicycle Transit Systems (current operator)

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT**Bike share trips per year per bike****DEMONSTRATED NEED FOR MEASURE**

Free, public bike share has already been implemented on a small scale in the master-planned community of Cadence in Henderson. As bike share begins in Downtown Las Vegas, growth of the overall system should be tracked in order to compare to previous years and peer cities and determine needs and opportunities.

DESCRIPTION

Although access to a bicycle is not a major deterrent to bicycling for transportation or recreation, ongoing maintenance and security of the vehicle prevent some from riding. Bike share is especially effective in downtowns where trip distances are short, parking is often more scarce, and the need to drive is lower.

BASELINE BENCHMARK

Determine baseline after first full year of the RTC bike share program

TRACKING METHOD; SUGGESTED FREQUENCY

Bike share system, station, and bike usage statistics; annually

EXAMPLES

Salt Lake City's GREENbike Annual Reports and Facebook page updates; New York City's Citibike

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» Municipal Public Works and Parks Departments; NDOT; RTC FAST

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT**Density of bicycling and/or walking facilities****DEMONSTRATED NEED FOR MEASURE**

Mileage alone does not tell the story of active transportation investment, especially within a network.

DESCRIPTION

Similar to miles of bicycling and/or walking facilities, but based instead on the total land square mileage of the jurisdiction in which projects are located. Increasing the density of the active transportation network, in addition to completing gaps in the network, will be essential to bringing facilities closer to persons' homes and destinations.

BASELINE BENCHMARK

Baseline facility density (centerline miles of existing facilities / centerline miles of existing roadways (for on-street) or / square mile for off-street) from RBPP

TRACKING METHOD; SUGGESTED FREQUENCY

Active transportation and roadway systems data; annually

EXAMPLES

RBPP



LEAD AGENCY

» RTC

SUPPORTING AGENCIES

» n/a

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT

Boardings by transit users with bicycles on RTC Transit

DEMONSTRATED NEED FOR MEASURE

People boarding RTC Transit services with bicycles are already being tracked. Continue to track this usage on the same and on additional routes, either existing or future.

DESCRIPTION

Improving the bicycle network increases the reach of the transit system and vice versa. This measure can determine how many people are using the bus to lengthen their possible trip distance.

BASELINE BENCHMARK

Existing RTC monthly bicycle boardings on transit data

TRACKING METHOD; SUGGESTED FREQUENCY

Bus operator counts; monthly

EXAMPLES

RTC's Bicycle Boarding Data



LEAD AGENCY

» RTC

SUPPORTING AGENCIES

» City of Henderson; Other RTC Municipalities; Chambers of Commerce; League of American Bicyclists (advocacy); Bicycle Benefits (private)

LEVEL OF EFFORT

» Medium

PERFORMANCE MEASUREMENT

Bicycle friendly businesses

DEMONSTRATED NEED FOR MEASURE

Besides educating about where bicycle-friendly businesses are, tracking how many businesses are friendly to bicyclists over time can highlight the effectiveness of the program and encourage others to be more accommodating.

DESCRIPTION

Retail locations are common destinations for anyone. Improving the accommodation of bicyclists at (or "bicycle-friendliness" of) businesses in Southern Nevada per the recommendations and criteria (i.e. secure bicycle parking, discounts for arriving by bike, amenities and end-of-trip facilities, etc.) established by the League of American Bicyclists (LAB) will encourage people to ride a bike instead of drive. This is also good for most businesses, as well, because as fewer parking spaces are required, more square footage can be dedicated to retail space and because people arriving by bike spend more overall than those who arrive by car. The City of Henderson has a streamlined program that businesses can apply for; thereafter, the City can help the business apply for a LAB designation.

BASELINE BENCHMARK

Existing businesses who have qualified as a BFB (under LAB's standards)

TRACKING METHOD; SUGGESTED FREQUENCY

League of American Bicyclists website; annually

EXAMPLES

League of American Bicyclists' Bicycle Friendly America program

City of Henderson Bicycle Friendly Business Program: <http://www.cityofhenderson.com/bike-henderson/bicycle-friendly-business>

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» Municipal Public Works and Parks Departments; NDOT; RTC FAST

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT**Miles of bicycling and/or walking facilities****DEMONSTRATED NEED FOR MEASURE**

Indicator of the accessibility and prevalence of the active transportation network; benchmark of the region's network-building process.

DESCRIPTION

Total mileage of walking and bicycling facilities in the region as a whole and broken down by jurisdiction. This measure will help the RTC and each municipality determine growth in the network and how it is related to other performance measures. RTC could develop a database that tracks new mileage built (by facility type) whenever a project is completed.

BASELINE BENCHMARK

Baseline miles of all facility types from RBPP

TRACKING METHOD; SUGGESTED FREQUENCY

Active transportation system data; annually

EXAMPLES

Atlanta, GA Regional Commission

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» Municipal Public Works Departments; NDOT; RTC FAST

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT**Number and comfort level of crossing opportunities****DEMONSTRATED NEED FOR MEASURE**

Because roadways, and especially wide roadways, often act as barriers to as much as facilitators of travel by walking and bicycling, improving and increasing high comfort crossing opportunities will improve system completeness and route directness

DESCRIPTION

Related to the route directness, system completeness, and delay, the availability, comfort, and frequency of cross opportunities are important to encouraging safe and predictable use of the existing and future active transportation networks and reducing conflicts between active transportation users and motor vehicles.

BASELINE BENCHMARK

Distances between any type of existing, legal, and marked crossing; number of crossings facilitating or continuing LOC 1 or 2 connectivity

TRACKING METHOD; SUGGESTED FREQUENCY

Active transportation system data; annually

EXAMPLES

moveDC Plan (Washington, D.C.)

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» RTC Municipalities;
Chambers of Commerce

LEVEL OF EFFORT

» Medium / High

PERFORMANCE MEASUREMENT**Retail sales tax receipts along proposed project corridors****DEMONSTRATED NEED FOR MEASURE**

Walking and bicycling make economic sense regionally and locally. Businesses along improved corridors usually see an increase in sales tax because people arriving on foot and by bike spend more overall than those who arrive by car even though they often spend less per trip.¹

DESCRIPTION

Sales tax data provide a consistent baseline for how much spending takes place within an area or along a particular street. Measuring sales before and after a project is constructed may help to understand how and how much active transportation investment impacted retail sales.

BASELINE BENCHMARK

Existing sales tax receipts along proposed project corridor before project construction begins

TRACKING METHOD; SUGGESTED FREQUENCY

Sales tax receipts along proposed project corridor several months and several years after completion

EXAMPLES

New York City, NY DOT report:

<http://www.nyc.gov/html/dot/downloads/pdf/dot-economic-benefits-of-sustainable-streets.pdf>

Salt Lake City, UT's 300 South separated bike lane parking and economic analysis

¹ *Consumer Behavior and Travel Choices: A Focus on Cyclists and Pedestrians*. Clifton, K., et. al. 2013.

PERFORMANCE MEASUREMENT**Route directness****DEMONSTRATED NEED FOR MEASURE**

People will be less likely to walk and bike and more likely to make their own paths (i.e. jaywalking, worn grass, trespassing) if they are required to take an alternate or parallel route or if there are not crossing opportunities near natural crossing locations along their route.

DESCRIPTION

This metric measures the most direct routes for walking and bicycling between two locations (i.e. homes, jobs, community destinations, shopping, existing and/or well-known active transportation facility). Active transportation routes should be as short and as direct as possible without sacrificing user comfort.

BASELINE BENCHMARK

GIS analysis of existing active transportation route directness

TRACKING METHOD; SUGGESTED FREQUENCY

Active transportation system data, census and employment data, RBPP regional destinations; biennially

EXAMPLES

Bellingham, WA

<https://www.cob.org/Documents/pw/transportation/i-5-bakerview-ijr/bham-bike-ped-analysis-presentation-may-2015.pdf>

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» Municipal Public Works and
Parks Departments; NDOT;
RTC FAST

LEVEL OF EFFORT

» Medium

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» Municipal Public Works and Parks Departments; NDOT; RTC FAST

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT**Overall and high comfort system completeness****DEMONSTRATED NEED FOR MEASURE**

When trying to encourage more people to walk and ride a bike more often, facilities are often only as useful and effective as the network of which they are a part.

DESCRIPTION

This measure will determine and track change in the percentage of the overall transportation system that is usable (dedicated facility present or level of comfort very high) by people walking or bicycling, both from overall system as well as a high comfort system perspectives.

BASELINE BENCHMARK

Existing system completeness; Level of Comfort analysis; % of network that is high comfort

TRACKING METHOD; SUGGESTED FREQUENCY

Active transportation system data; annually

EXAMPLES

The Level of Comfort (or Level of Traffic Stress) analysis can be a great starting point for determining existing system completeness

Central Indiana Regional Bikeways Plan

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» RTC Municipalities; Non-Profits; ROST

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT**Major active transportation promotion events every year****DEMONSTRATED NEED FOR MEASURE**

Promotion events let people know the how, where, and why of riding a bike or walking for transportation and recreation. Increasing the frequency and reach of this events can encourage more people to use active transportation.

DESCRIPTION

Promotion events let people know the how, where, and why of riding a bike or walking for transportation and recreation. Increasing the frequency and reach of this events can encourage more people to use active transportation.

BASELINE BENCHMARK

Determine baseline by counting 2017 events

TRACKING METHOD; SUGGESTED FREQUENCY

Count events annually

EXAMPLES

See encouragement programs and events from previous section on 5 E's



LEAD AGENCY

» RTC

SUPPORTING AGENCIES

» RTC Municipalities; Non-Profits; ROST

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT

Bicycling and walking mode shares

DEMONSTRATED NEED FOR MEASURE

Will help RTC and jurisdictions know, at least in part, how effective implemented projects have been in encouraging greater active transportation use.

DESCRIPTION

Measuring the overall change in walking and bicycling mode shares can be one of the most effective indications of whether infrastructure, programs, policies, and other efforts are effective over time. Because of likely small sample sizes and small percentages of walking and bicycling, at least at first, the margin of error should be considered, especially when comparing year-to-year changes. Trends in five year intervals may be more effective.

BASELINE BENCHMARK

ACS Commute to Work data; Regional Travel Survey data

TRACKING METHOD; SUGGESTED FREQUENCY

ACS Commute to Work data, Regional Travel Survey data; annually (ACS) or as soon as available (RTS)

EXAMPLES

American Community Survey, National Household Travel Survey, multi-modal traffic counts, regional travel surveys



LEAD AGENCY

» Clark County School District (CCSD)

SUPPORTING AGENCIES

» RTC; RTC Municipalities; Non-Profits; Clark County School District

LEVEL OF EFFORT

» Medium

PERFORMANCE MEASUREMENT

School participation in walk/bike programs

DEMONSTRATED NEED FOR MEASURE

Will help RTC and jurisdictions know, at least in part, how effective and far-reaching implemented education and encouragement programs have been in increasing walking and bicycling to schools.

DESCRIPTION

Data for this measure may be collected via simple hand tallies, parent surveys, school-wide surveys, administrator surveys, or other means. This measure will aim to determine the reach and effectiveness of programs.

BASELINE BENCHMARK

Tallies or surveys may be taken before any new programs are implemented

TRACKING METHOD; SUGGESTED FREQUENCY

Count participating schools / total schools eligible, and students participating / total student population; annually

EXAMPLES

National Center for Safe Routes to School, RTC Safe Routes to School Strategy



LEAD AGENCY

» RTC

SUPPORTING AGENCIES

» Municipal Public Works and Parks Departments; NDOT; RTC FAST

LEVEL OF EFFORT

» Low

PERFORMANCE MEASUREMENT

Permanent active transportation user count locations

DEMONSTRATED NEED FOR MEASURE

There is currently no consistent data source for tracking system usage by active transportation users. This measure will track how many locations have active counters so that data can become more diverse and representative of system usage.

DESCRIPTION

The RTC and individual jurisdictions can track their progress in providing facilities and encouraging use over time by tracking ridership at different locations with permanent counters and by publishing findings publicly in order to educate, encourage, and provide a basis for future evaluation. Permanent counters provide constant hour by hour data that can be used to determine where, when, and possibly why people are riding bikes or walking.

BASELINE BENCHMARK

Baseline of zero as of adoption

TRACKING METHOD; SUGGESTED FREQUENCY

Track installation of counters after every one is installed

EXAMPLES

National Bicycle and Pedestrian Documentation Project; Mountainland Association of Governments (Utah) Murdock Canal Trail Counters



LEAD AGENCY

» Clark County School District (CCSD)

SUPPORTING AGENCIES

» RTC; RTC Municipalities; Clark County School District

LEVEL OF EFFORT

» Medium / High

PERFORMANCE MEASUREMENT

Students walking or bicycling to school

DEMONSTRATED NEED FOR MEASURE

Will help RTC and jurisdictions know, at least in part, how effective implemented projects have been in encouraging greater active transportation use for students in getting to and from school safely and comfortably.

DESCRIPTION

Will help RTC and jurisdictions know, at least in part, how effective implemented projects have been in encouraging greater active transportation use for students in getting to and from school safely and comfortably.

BASELINE BENCHMARK

ACS Commute to Work data; Regional Travel Survey data; Safe Routes to School hand tallies and parent surveys

TRACKING METHOD; SUGGESTED FREQUENCY

Same method as baseline; annually

EXAMPLES

American Community Survey, National Household Travel Survey, multi-modal traffic counts, regional travel surveys, hand tallies, parent surveys

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» RTC; NDOT; Southern Nevada Health District

LEVEL OF EFFORT

» High

PERFORMANCE MEASUREMENT**ATG, VMT, SOV per capita****DEMONSTRATED NEED FOR MEASURE**

Reducing vehicle miles traveled and trips generated in general (especially short trips) will help improve air quality.

DESCRIPTION

This performance measure will not track active transportation data, but rather motor vehicle data. Reducing per-capita automobile trips generated (ATG), vehicle miles traveled (VMT), and single-occupancy vehicle (SOV) trips will hopefully be the result of increased active transportation and transit use.

BASELINE BENCHMARK

NDOT ATG, VMT, and SOV data

TRACKING METHOD; SUGGESTED FREQUENCY

Same method as baseline; annually

EXAMPLES

Nevada DOT

**LEAD AGENCY**

» Southern Nevada Health District

SUPPORTING AGENCIES

» RTC; RTC Municipalities; Non-Profits

LEVEL OF EFFORT

» Medium

PERFORMANCE MEASUREMENT**Minutes of physical activity from walking or bicycling****DEMONSTRATED NEED FOR MEASURE**

Too many Southern Nevadans do not meet physical activity requirements. Other health issues stem from this lack of exercise.

DESCRIPTION

Measure: Average minutes of physical activity attributable to active transportation per day. Improving access to walking and bicycling facilities and programs will help Southern Nevadans to meet physical activity and transportation needs simultaneously.

BASELINE BENCHMARK

Existing self-reported physical activity rates per Southern Nevada Health District

TRACKING METHOD; SUGGESTED FREQUENCY

Same method as baseline; biannually (BRFSS data release frequency)

EXAMPLES

Nashville Area MPO's Middle Tennessee Transportation and Health Study

**LEAD AGENCY**

» RTC

SUPPORTING AGENCIES

» Municipal Public Works and Parks Departments; NDOT; RTC FAST; Southern Nevada Health District

LEVEL OF EFFORT

» Medium

PERFORMANCE MEASUREMENT**Transportation-limited population served****DEMONSTRATED NEED FOR MEASURE**

The poor, young, elderly, or ethnic minority populations are also those who depend the most on non-motor vehicle transportation. Improving access for these people will improve their mobility, health, access to food and healthcare, and contribution to the regional economy.

DESCRIPTION

Percent of transportation-limited population within a 1/4 mile network distance (not as the crow flies) to an active transportation facility. Transportation-limited populations can be characterized by the factors included in the Equity Analysis in the RBPP.

BASELINE BENCHMARK

Percentage determined by GIS model

TRACKING METHOD; SUGGESTED FREQUENCY

RBPP regional destinations, existing active transportation system data, equity analysis, and census data on income; annually

EXAMPLES

RBPP; Evansville, IN's Bicycle and Pedestrian Connectivity Plan



CHAPTER 5

Recommended Policies and Programs



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5 E's Framework

Introduction

Improving bicycle and pedestrian connectivity and safety is a significant component of the RBPP, but creating a bicycle- and pedestrian-friendly community takes more than just new trails, bike lanes and sidewalks. In order to create significant and lasting change, the RBPP utilizes the 5 E's framework to establish bicycling and walking as comfortable, safe and convenient transportation choices for people of all ages and abilities. Initially developed by the League of American Bicyclists, the 5 E's framework consists of engineering, education, encouragement, enforcement, and evaluation tactics to support active transportation. This unique, holistic approach to community transformation addresses the physical, social, and policy environments that influence transportation decisions and behaviors, creating meaningful opportunities to build a culture that values and supports walking and bicycling. Whenever possible, programmed events should encourage public/private partnerships for funding and exposure.



Engineering

Engineering recommendations include general policies complementing defined routes or projects to help improve the physical environment for bicycling and walking in Southern Nevada.



Education

Education programs seek to equip people with the knowledge, skills and confidence to bike and walk.



Encouragement

Encouragement programs foster a culture that supports and encourages active transportation.



Enforcement

Enforcement efforts support safe, responsible behaviors on roadways and trails for both active transportation users and motorists.



Evaluation

Evaluation efforts seek to monitor progress, evaluate investments, and ultimately document and apply lessons-learned to continually improve active transportation efforts.

5 E'S Recommendations

IMPLEMENTATION REQUIREMENTS



RTC IMPLEMENTATION



LOCAL AGENCY (MUNICIPAL, NON-PROFIT) IMPLEMENTATION



CONTINUATION OF EXISTING PROGRAM

BICYCLE PARKING

ENGINEERING



POLICY RECOMMENDATION



Develop a Request-a-rack Program

NEED

Many existing businesses throughout Southern Nevada currently lack bicycle parking.

DESCRIPTION

A “Request-A-Rack” program can help address unmet demand for bicycle parking at existing businesses. Funding could be provided by the RTC through Passenger Enhancement funds (if within 3-miles of a transit stop) or through local funding.

EXAMPLES

- » **City of Tucson Bicycle Parking Distribution Policy**
https://www.tucsonaz.gov/files/bicycle/Bike_Rack_Distribution_Policy.pdf
- » **SFMTA Bicycle Parking Program**
<https://www.sfmta.com/services/streets-sidewalks/installation-requests/bicycle-racks-corrals>



POLICY RECOMMENDATION



Develop Bicycle Parking Requirements and Encourage End of Trip Facilities

NEED

Only North Las Vegas and Henderson currently require bicycle parking for new development. Clark County incentivizes bicycle parking and the inclusion of shower facilities by reducing vehicular parking requirements.

DESCRIPTION

Bicycle parking is an important component of the bicycle network. Southern Nevada jurisdictions should consider implementing the Association of Bicycle and Pedestrian Professionals’ (APBP) Bicycle Parking Guidelines into their respective development codes. Proper rack placement should include preferential spaces that are visible, well lit, and near entrances. Bike corrals can improve parking capacity in downtown areas with high bike demand as well as commercial shopping centers.

EXAMPLES

- » **Association of Pedestrian and Bicycle and Professionals’ Bicycle Parking Guidelines**
http://cymcdn.com/sites/www.apbp.org/resource/resmgr/bpg_exec_summary_4-21-10.pdf



POLICY RECOMMENDATION



Expand Bike Share to Other Jurisdictions and Areas Beyond the Initial Downtown Las Vegas Area

NEED

The rollout of bike share by the RTC in the Fall of 2016 has already generated interest from Southern Nevada jurisdictions and institutions regarding expansion of the system. In addition, free, public bike share has already been implemented on a small scale in the master-planned community of Cadence in Henderson; this model could also be helpful to smaller areas throughout the County.

DESCRIPTION

Bike share systems offer a number of benefits to the cities that choose to invest in them. Benefits can include getting more people on bicycles, improved community health, economic benefits, and synergies with public transit. Well-planned expansion can also lead to ridership increases and increased viability as a transportation option. Sponsorships are used to offset operating costs and private property owners can partner with the siting and installation of stations.

EXAMPLES

- » **Cadence Bike Share**
<https://cadence.socialbicycles.com/>



POLICY RECOMMENDATION



Encourage Formal Adoption of Complete Streets Policies or Ordinances for Local Jurisdictions

NEED

Although many of the jurisdictions within Southern Nevada support Complete Streets principles or have adopted policies, few have legally formalized this commitment with an approved and vetted Complete Streets ordinance.

DESCRIPTION

Locally adopted Complete Streets policies and ordinances ensure a consistent approach to street design that can endure changes in administration. In addition to standard elements, these policies and ordinances should include national accessibility and design standards, like PROWAG, MUTCD, and AASHTO. Local jurisdictions can join the nearly 900 state agencies, regional organizations, and municipalities to adopt a Complete Streets policy or ordinance.

EXAMPLES

- » **Smart Growth America Complete Streets Local Policy Workbook**
<http://www.smartgrowthamerica.org/guides/complete-streets-local-policy-workbook/>
- » **Wasatch Front Regional Council Complete Streets Workshops**
http://www.wfrc.org/Complete_The_Streets/Local%20Complete%20Streets%20Policy%20Workshop%20Flyer.pdf



POLICY RECOMMENDATION



Modify Standard Roadway Drawings to Support Complete Streets Goals

NEED

Roadway design in Southern Nevada has historically focused on the needs of the automobile.

DESCRIPTION

Revised roadway design guides (including the RTC Blue Book Standards) that focus on accommodating bicyclists and pedestrians can dramatically improve what can be built on Southern Nevada roadways.

EXAMPLES

- » **Smart Growth America Complete Streets Local Policy Workbook**
<http://www.smartgrowthamerica.org/guides/complete-streets-local-policy-workbook/>
- » **Wasatch Front Regional Council Complete Streets Workshops**
http://www.wfrc.org/Complete_The_Streets/Local%20Complete%20Streets%20Policy%20Workshop%20Flier.pdf



POLICY RECOMMENDATION



Develop a Routine Complete Streets Checklist

NEED

Checklists can help promote the accommodation of all modes of travel in planned transportation projects.

DESCRIPTION

Checklists that describe how bicycle and pedestrian accommodations were considered in the design of a transportation project can help prevent missed opportunities for improved facilities. Early consideration of all modes in the design process helps preserve accommodations for bicyclists and pedestrians and avoid costly retrofits in the future.

EXAMPLES

- » **MTC Complete Streets Checklist**
http://mtc.ca.gov/sites/default/files/Routine_Accommodation_checklist_FINAL.pdf



POLICY RECOMMENDATION



Update Share the Road Signage

NEED

Research has shown that Share the Road signs, though informative, do little to protect or educate people riding bicycles and may be a deterrent to bicycling activity, correct lane positioning by bicyclists, and safe passing by motor vehicles.

DESCRIPTION

As roadway-related projects occur, cities, NDOT, and Clark County should seek to implement newly recommended projects and/or replace outdated "Share the Road" signage with the MUTCD-approved "Bicycles May Use Full Lane" (BMUFL) signage (MUTCD R4-11) on streets with speed limits at or below 30 mph. On higher speed streets, consider replacing "Share the Road" plaque with a "Bicyclists on Roadway".

EXAMPLES

- » **MUTCD Chapter 9B. Signs.**
<http://mutcd.fhwa.dot.gov/hm/2009/part9/part9b.htm>



POLICY RECOMMENDATION



Develop a policy for accommodating pedestrians in rural preservation areas near schools

NEED

Due to a lack of required pedestrian accommodations, students living in rural preservation zones in Southern Nevada are sometimes forced to walk to school on the shoulder or road

DESCRIPTION

Develop a policy to require pedestrian accommodations in rural preservation zones near schools and retrofit areas that lack adequate facilities.

EXAMPLES

- » **Small Town and Rural Multimodal Networks**
https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/small_towns/



POLICY RECOMMENDATION



Develop pedestrian plans or walk audits focusing on high demand areas

NEED

Some areas of Southern Nevada lack sufficient pedestrian infrastructure such as crosswalks, sidewalks, countdown timers, and other accommodations.

DESCRIPTION

Pedestrian plans or walk audits focused on neighborhoods with high pedestrian demand could identify needed pedestrian improvements in areas such as UNLV, downtown Las Vegas, the Las Vegas Strip, and downtown Henderson.

EXAMPLES

- » **Clark County Pedestrian Study: Las Vegas Boulevard to Russel Road**
http://www.clarkcountynv.gov/blob/public_communications/pedestrianstudykha2012.pdf
- » **Seattle Pedestrian Master Plan**
<http://www.seattle.gov/transportation/pedMasterPlan.htm>
- » **USDOT Pedestrian and Bicyclist Road Safety Assessments**
https://www.fhwa.dot.gov/environment/bicycle_pedestrian/resources/assessments/assessments.pdf



POLICY RECOMMENDATION



Require Pedestrian Connectivity Through the End of Cul-de-sacs

NEED

Cul-de-sacs contribute to increased travel times and distances.

DESCRIPTION

Requiring pedestrian connectivity through the end of cul-de-sacs can shorten trip distances for walking and bicycling.

EXAMPLES

» Networks of Complete Streets

<http://www.smartgrowthamerica.org/documents/cs/factsheets/cs-networks.pdf>



POLICY RECOMMENDATION



Develop Pedestrian-Friendly Block Length Standards

NEED

Maximum block lengths vary widely among Southern Nevada jurisdictions from 400' to 1600'.

DESCRIPTION

Requiring new developments to have block sizes below 400' increases the pedestrian connectivity and allows for more mobility for cyclists and pedestrians. Traffic capacity also increases when a community has more connected street networks. Large block sizes do not support active transportation.

EXAMPLES

» Networks of Complete Streets

<http://www.smartgrowthamerica.org/documents/cs/factsheets/cs-networks.pdf>



POLICY RECOMMENDATION



Develop a Connectivity Retrofit Plan

NEED

Existing neighborhoods with poor connectivity can inhibit biking and walking for decades unless renovations to the transportation network are made.

DESCRIPTION

The RTC could develop a study calculating the potential benefits of improved street connectivity such as enhanced bike and walk-sheds, improved emergency response times, reduced congestion and other potential benefits. Street retrofit strategies could also be identified to assist local jurisdictions in implementation efforts.

EXAMPLES

» America Walks

<http://americawalks.org/charlotte-retrofit-street-connectivity>

» Roadway Connectivity from the Victoria Transport Policy Institute

<http://www.vtpi.org/tdm/tdm116.htm>



POLICY RECOMMENDATION



Develop Specific Connectivity Standards for New Development

NEED

Most Southern Nevada communities' development codes do not require the implementation of a highly connected street system.

DESCRIPTION

A Connectivity Index can be used to quantify how well a roadway network connects destinations. Several different methods can be used. Currently, the City of Las Vegas and the City of Henderson are the only Southern Nevada jurisdictions that require a connectivity index of new development. Metrics can measure both motorized and non-motorized connectivity.

EXAMPLES

- » **City of Las Vegas Street Connectivity Standards (Title 19.04.40; 9)**
<https://www.lasvegasnevada.gov/cs/groups/public/documents/document/dhn0/mdax/edisp/tst001734.pdf>
- » **City of Henderson Street Connectivity Index**
<http://www.cityofhenderson.com/docs/default-source/community-development-docs/checklists-and-handouts---dsc/street-connectivity-index503b6fb7172867948ddbff0a00c21263.pdf?sfvrsn=4>

SAFE ROUTES TO SCHOOLS

ENGINEERING



POLICY RECOMMENDATION



Consistent School Zone Placement and Timing

NEED

Signage of school zones is inconsistent valley-wide and does not always follow best practices or comply with standards.

DESCRIPTION

"School Zones should be established and signed per MUTCD Section 7B.09, which specifies that the beginning point of a reduced school speed limit zone should be at least 200 feet in advance of the school grounds, a school crossing, or other school related activities (more if the reduced school speed limit is 30 mph or higher; MUTCD Section 7B.15)."

Additional placement-specific recommendations related to schools are also found in the RTC Regional Schools Multimodal Transportation Access Study.

EXAMPLES

- » **Manual on Uniform Traffic Control Devices Chapter 7**
<http://mutcd.fhwa.dot.gov/pdfs/2009/part7.pdf>
- » **RTC Regional Schools Multimodal Transportation Access Study**
http://www.rtcsonv.com/wp-content/uploads/2012/06/SchoolAccessStudyReport_2015-06-30.pdf
- » **NJ School Zone Design Guide:**
<http://www.state.nj.us/transportation/community/srts/pdf/schoolzonedesignguide2014.pdf>



POLICY RECOMMENDATION



Require All Schools Provide a Walking Route

NEED

Current sidewalk widths are insufficient for the large volume of pedestrians accessing schools during drop-off and pick-up periods.

DESCRIPTION

Require all school properties provide a min 8', 10' preferred, sidepath along all property frontages, either through design and construction processes at CCSD or working with municipality or county to provide facilities. Crossings within school zones should utilize enhanced pedestrian and bicycle features, such as curb extensions, accessible curb ramps, median refuge islands, active warning or pedestrian beacons, pelican crossings and/or high-visibility marked crosswalks, as described in Chapter 5. Additional placement-specific recommendations related to schools are also found in the RTC Regional Schools Multimodal Transportation Access Study.

EXAMPLES

- » FHWA's Course on Bicycle and Pedestrian Transportation recommends 8' near schools
http://safety.fhwa.dot.gov/ped_bike/univcourse/pdf/swless13.pdf
- » RTC Regional Schools Multimodal Transportation Access Study
http://www.rtcnv.com/wp-content/uploads/2012/06/SchoolAccessStudy_Report_2015-06-30.pdf



POLICY RECOMMENDATION



Convene an inter-agency school crossing guard coalition to collaborate on the allocation, funding, and liability issues surrounding crossing guards

NEED

Various complexities exist in the funding and allocations of school crossing guards. Inter-agency coordination is needed to determine a workable solution on a regional scale.

DESCRIPTION

Criteria for allocating crossing guards and the agency responsible for implementation varies widely throughout Southern Nevada. There is consensus between CCSD, the RTC, and most jurisdictions that additional crossing guards are needed however the complexities of raising additional funding, allocating crossing guards, and assuming liability has been an impediment to progress. The RTC could convene a crossing guard coalition to promote inter-agency coordination and explore solutions to these issues.

EXAMPLES

- » RTC Regional Schools Multimodal Transportation Access Study
http://www.rtcnv.com/wp-content/uploads/2012/06/SchoolAccessStudy_Report_2015-06-30.pdf



POLICY RECOMMENDATION



Develop a Consistent and Intuitive On- and Off- Street Regional Wayfinding System

NEED

Most of Southern Nevada lacks adequate wayfinding signage geared towards bicyclists and pedestrians.

DESCRIPTION

The inclusion of distance and travel time on wayfinding signage can encourage travel to local destinations or services by non-motorized modes. The Regional Open Space and Trails (ROST) workgroup is developing Trail Signage Guidelines in 2017 and work on this policy recommendation should coincide with what is already being proposed.

EXAMPLES

- » **Valley Path Wayfinding Guidelines, Phoenix, AZ**
https://www.azmag.gov/Documents/BaP_2015-05-26_Valley-Path-Brand-and-Wayfinding-Signage-Guidelines.pdf



POLICY RECOMMENDATION



Regional Bike-Ped Count Program and Bike-Ped Counter Loan Program

NEED

One of the most persistent challenges facing the bicycle and pedestrian planning is the lack of usage and demand documentation. Without accurate and consistent count data, it is difficult to measure the positive benefits of investments in these forms of transportation, especially when compared to other modes, such as the automobile.

DESCRIPTION

The RTC could establish and coordinate a regional count program to be executed by jurisdictional staff and/or volunteers. The RTC could coordinate, provide training on the counting methodology, compile results, and serve as the clearinghouse for results. Counts of bicyclists and pedestrians could be done manually or via the use of automatic counters that the RTC could loan out to jurisdictions on a rotating basis. Manual counts provide additional metrics such as youth/child, helmet/no helmet, and wrong way bicycle use, which can aid in evaluating effectiveness of outreach education programs. Counts should include AM/PM peak hour for all modes at key intersections, like City of Las Vegas's current program.

EXAMPLES

- » **Mid-Ohio Regional Planning Commission Complete Streets Equipment Library**
<http://morpc.org/transportation/complete-streets/equipment-library/index>
- » **FHWA Fastlane Blog: Bike-Ped Counts**
<https://www.transportation.gov/fastlane/when-it-comes-bike-ped-data-you-can-count-fhwa>



POLICY RECOMMENDATION

RTC

Automatic Counters in New Active Transportation Projects

NEED

Bicycle and pedestrian counters can provide valuable insights on long-term active transportation trends at the corridor level.

DESCRIPTION

An automatic counter loan program offering devices to each of the region's communities can increase data collection. A centralized agency for tracking data for the region can improve access to data.

Additionally, automatic bicycle and pedestrian counters can often be included in active transportation projects, typically at a nominal cost relative to overall project budgets.



POLICY RECOMMENDATION

RTC

Require Pre- and Post- Evaluation Bicycle and Pedestrian Counts for RTC Funded Projects

NEED

Pre- and post-implementation bicycle and pedestrian counts can help identify usage trends and confirm the success of project corridors or areas.

DESCRIPTION

Before and after bicycle and pedestrian counts can help give credibility to Complete Streets efforts while promoting a better understanding of the impact different types of infrastructure improvements can have on bicycling and walking rates. The RTC could require pre- and post-implementation counts as part of certain funding programs they distribute.



POLICY RECOMMENDATION

RTC

LOCAL

Develop the Use of Other Metrics Beyond Vehicular LOS to Analyze Proposed Transportation Improvements

NEED

Traditional transportation planning metrics only consider automobile congestion and delay.

DESCRIPTION

A context-sensitive approach to measure the level of service should be provided for all users: pedestrians, motorists, bicyclists. Municipalities should consider the use of alternative metrics to Level of Service (LOS) such as bicycle level of service (BLOS), pedestrian level of service (PLOS), and multi-modal level of service (MMLOS).

EXAMPLES

- » **National Association of City Transportation Officials (NACTO) Performance Measures**
<http://nacto.org/publication/urban-street-design-guide/design-controls/performance-measures/>



POLICY RECOMMENDATION

RTC

Develop a Centralized Crash and Safety Database

NEED

Bicycle and pedestrian crash data in Southern Nevada currently takes months to process and geo-code. Crash data is primarily available by request through NDOT, the Fatality Analysis Reporting System (FARS), UNLV Center for Traffic Research, trauma centers, and other organizations. A series of Fact Sheets are available through www.zerofatalitiesnv.com and include summarized information on the the number of fatalities and serious injuries and critical emphasis areas.

DESCRIPTION

Up-to-date and easily accessible crash data can help transportation planners and engineers make better and more timely decisions. The RTC and/or NDOT may collaborate to provide easily accessible and well-maintained crash data.

EXAMPLES

- » The Utah Department of Transportation maintains a robust online crash and safety database that is frequently updated. Crashes can be filtered by a number of criteria such as time of day, manner of collision, or bicyclist/pedestrian involved crashes. Data trends are easily interpretable through numerous visual aids.

<https://udot.numetric.com/#/>



POLICY RECOMMENDATION

LOCAL

Target Mode-Share Based Funding Policy

NEED

Funding for active transportation often does not keep pace with existing, let alone target, bicycling and walking mode shares.

DESCRIPTION

SNS outlined a clear need for a walkable and bikeable Southern Nevada. Funding allocations directly associated with a specific target mode share for bicycling and walking indicates a meaningful and strategic approach to achieving defined mode share goals.

EXAMPLES

- » San Luis Obispo Bicycle Funding Policy
<http://www.bikewalkalliance.org/blog/535-how-san-luis-obispo-just-established-the-most-powerful-bike-funding-policy-in-the-nation>



POLICY RECOMMENDATION

RTC

Development of an Annual Report Highlighting Economic Benefits and Progress of Regional Active Transportation Efforts

NEED

Agencies and jurisdictions often do not evaluate the important economic impacts of active transportation improvements.

DESCRIPTION

Tracking and celebrating economic benefits from active transportation improvements can make the case for increased investment. The RTC can develop an annual report identifying progress on the regional performance metrics identified in this plan.

EXAMPLES

- » Salt Lake City 300 S Protected Bike Lane Progress Report
<http://www.slcdocs.com/transportation/Project/300South/300SouthProgressReport.pdf>



PROGRAM

RTC LOCAL

Regional Active Transportation Safety Campaign

NEED

As shown in crash data, Southern Nevada had an annual average of 163 total bicycle and pedestrian-involved crashes in the five-year period of 2011-2015. This underscores the serious need for an educational safety campaign.

DESCRIPTION

The RTC, NDOT, the UNLV Transportation Research Center (TRC), Zero Fatalities, and other agencies will conduct a review of past, current, and planned regional safety campaigns to identify opportunities for future efforts. Based on the outcome of this review, the RTC could coordinate a proactive and ongoing regional safety campaign to primarily target driver behaviors. The campaign could also target pedestrian and bicyclist behaviors.

EXAMPLES

- » Watch for Me NC
<http://watchformenc.org/>



PROGRAM



Bicycle Safety Classes

NEED

The Southern Nevada Transportation Safety Plan cites young bicyclists (2%), improper crossings (2%), and motor vehicles turning right (1%) as several factors contributing to bicyclist collisions. Bicycle safety classes can reduce crashes and improve safety by providing people with knowledge and skills to safely operate bicycles among mixed traffic.

DESCRIPTION

Safety classes could be offered to a variety of groups (e.g. women, families, children, and employees) by a variety of organizations (e.g. SNVBC, YMCA, CCSD, League of American Bicyclists) and instructors (League-certified instructors [LCIs]). Safety topics can cover the rules of the road, signaling, safety, maintenance, and equipment. Classes can be offered as a brown-bag lunch event or on an ongoing basis.

EXAMPLES

- » City of Portland, OR
<https://www.portlandoregon.gov/transportation/44099>



PROGRAM



Zero Fatalities

NEED

Comprehensive programs that address roadway design, human error, and policy are needed to reduce crashes.

DESCRIPTION

This comprehensive statewide transportation safety program focuses on achieving the goal of zero fatalities on roadways. The program reaches Southern Nevada residents through different forms of media, including billboards, social media, events, television, and radio.

LEAD AGENCY

- » Nevada Department of Transportation (NDOT)

EXAMPLES

- » Zero Fatalities - NDOT
<http://www.zerofatalitiesnv.com/>
- » UNLV TRC - Vulnerable Road Users Project
<http://www.trc.unlv.edu/projects.html>



PROGRAM



Bicycle Safety Education Activities

NEED

Bicycle safety classes can reduce crashes and improve safety by providing people with knowledge and skills.

DESCRIPTION

The RTC leads a number of bicycle safety efforts including a Traffic Skills 101 course, Saturday Clinics, League Cycling Instructor certification course, bicycle safety classes for boy scouts, social rides and events (e.g., bike swaps and April Fools ride), and educational bike videos. The RTC also participates in CCSD bike rodeos. Recently, RTC has been leading workshops with professional drivers, including bus drivers, to train them on how to interact with bicyclists on the road. Partnerships with existing local organizations, such as bicycle clubs, advocacy groups and parent-teacher organizations (PTOs) and partnerships with business sponsors are highly encouraged.

EXAMPLES

- » Cycling - Regional Transportation Commission (RTC)
<http://www.rtcnv.com/cycling/rtc-bike-center/>

LEAD AGENCY

- » Advocacy organizations, Regional Transportation Commission (RTC), local jurisdictions, and local businesses



PROGRAM



Safe Key Presentations

NEED

As children mature and gain more independence, they should know how to walk and bike safely.

DESCRIPTION

Presentations on pedestrian and bicycle safety are given at two locations per week to elementary students enrolled in the Safe Key after school program. The Clark County School District (CCSD) partners with recreation departments to provide before and after care for elementary school students at recreation facilities near schools. The program helps working families fill critical gaps in childcare schedules. Safekey coordinates with other organizations to enhance their curriculum. The UNLV Transportation Research Center staff educate Safekey students on pedestrian and bicycle safety.

LEAD AGENCY

- » University of Nevada, Las Vegas (UNLV) (Transportation Research Center)



PROGRAM



RTC Bicycling Webpage

NEED

There's a lack of easy to access, all-in-one place information on bicycling in the region, as well as a centralized location for reporting maintenance needs.

DESCRIPTION

The new website page will gather bicycle-related information such as regional maps, education efforts, events and bicycling amenities. It can also host surveys regarding active transportation in the region, as well as interactive maps, where residents can share their thoughts on improvements and successes, and report maintenance needs.

EXAMPLES

- » **Bike SLC**
<http://www.bikeslc.com/>



PROGRAM



Senior Pedestrian Education

NEED

As people age they may no longer be able to drive. Helping seniors walk safely is essential to maintaining their independence.

DESCRIPTION

Two presentations are offered through retirement communities, public housing, and senior centers/service providers on being safer pedestrians and another on accessing your neighborhood walkability.

LEAD AGENCY

- » **University of Nevada, Las Vegas (UNLV) (Transportation Research Center)**



PROGRAM



Safety Assemblies

NEED

As children mature and gain more independence, they should know how to walk and bike safely.

DESCRIPTION

Schools request a 20-minute bicycle and pedestrian safety assembly for K-2 and 3-5 grade school students. CCSD Safe Routes to School (SRTS), Look Out Kids About, and North Las Vegas Police Department staff conduct the safety assemblies at CCSD schools.

LEAD AGENCY

- » **CCSD SRTS Program**

**PROGRAM**

RTC

Comprehensive Online Trip Planner & Data Collection**NEED**

The RTC's current trip planner offers transit directions, but does not offer the capability to plan last-mile routes. For example, if someone lives a mile or two from their bus stop, a comprehensive trip planner would allow them to find the safest route to that bus stop. The trip planner could also allow the person to choose the quickest trip, the trip with fewest transfers, or the maximum time they are willing to walk or bike before accessing transit.

DESCRIPTION

The RTC could enhance the existing trip planner or develop a new comprehensive regional trip planner with the capability to plan trips by bike, foot, and transit and combinations of the three. The RTC could prioritize a trip planner that offers opportunities to collect data and allows users to plan trips that prioritize specified criteria such as the healthiest or most environmentally-friendly options.

LEAD AGENCY

» RTC

SUPPORTING AGENCY

» Jurisdictions

EXAMPLES

» GoLA, Los Angeles, CA
<http://golaapp.com/>

**PROGRAM**

LOCAL

Printed and Online Maps of Municipalities, Suggested Tours and Trips**NEED**

By helping people understand where they can walk and bike comfortably and safely, more people may be encouraged to use active transportation.

DESCRIPTION

Maps of local jurisdictions could show safe bike routes, caution areas, local destinations like parks and services, and bike parking locations. Maps could be offered on each jurisdiction's website and made available at local destinations. Maps could also show recommended rides and walking routes for recreation, shopping, or tourism.

LEAD AGENCY

» Jurisdictions

SUPPORT AGENCY

» RTC

EXAMPLES

» City of San Antonio, TX
<http://www.sanantonio.gov/SABikes/MapsAndTrails.aspx>



PROGRAM

C

Neon to Nature

NEED

By helping people understand where they can walk and bike comfortably and safely, more people may be encouraged to use active transportation.

DESCRIPTION

This online program and application identifies urban and rural trails and park paths within the region with details such as photos, trail length and amenities. A mapping tool can create a custom map identifying trails within specified miles from an address, including queries such as trail difficulty, surface type, and amenities.

LEAD AGENCY

» Southern Nevada Health District (SNHD)

EXAMPLES

» Neon to Nature
<http://www.getthehealthyclarkcounty.org/neon2nature/>

BUILD COMPETENCY AND A CULTURE OF BICYCLING

EDUCATION



PROGRAM

LOCAL

Bike Maintenance Education

NEED

Concerns about bike maintenance, such as flat tires, can be a barrier to riding a bike. By teaching people how to maintain and fix their bike, they can feel more self-reliant and may be more willing to bike.

DESCRIPTION

Bike maintenance classes could be offered to community members to teach basic repairs such as fixing a flat, oiling a chain, and pumping a tire. Local bike shops and the RTC Bike Center currently offer bike maintenance classes.

LEAD AGENCY

» Advocacy organizations/Jurisdictions

EXAMPLES

» Cycles of Change, Classes & Resources, Minneapolis, MN
<http://cyclesforchange.org/classes-and-educational-resources/>



PROGRAM



Bike Co-ops

NEED

Bike co-ops can offer services at free or reduced prices compared to for-profit bike shops.

DESCRIPTION

Bike co-ops are typically non-profit or volunteer organizations that offer a centralized location for bike maintenance, safety education, information, and culture.

LEAD AGENCY

» Advocacy Organizations/Non-Profits

EXAMPLES

» Reno Bike Project, Reno, NV
<http://renobikeproject.org/>



PROGRAM



Achievement Level Program

NEED

Achievement tracking is an important method to help schools stay on track to accomplish goals and plan for the future.

DESCRIPTION

The Clark County School District (CCSD) Safe Routes to School (SRTS) Achievement Level Program recognizes individual school efforts to improve and promote safe walking and bicycling. The Program is also a roadmap and an assessment tool. Schools plot steps to move their school forward and annually assess achievements.

LEAD AGENCY

» CCSD SRTS

SUPPORTING AGENCY

» RTC

EXAMPLES

» CCSD SRTS Achievement Level Program
<http://ccsd.net/community/partnership/resources/SRTSAchievementLevelProgramPackage.pdf>

**PROGRAM****Local Bicycle and Pedestrian Coordinator Program****NEED**

While some jurisdictions in Southern Nevada have staff that coordinate active transportation programs on a local level, there are no staff members solely dedicated to programmatic work.

DESCRIPTION

The RTC could implement an application process for jurisdictions to apply to receive 2-3 year funding for a full-time Bicycle and Pedestrian or Transportation Options Coordinator position.

LEAD AGENCY

» RTC

SUPPORTING AGENCIES

» Jurisdictions

EXAMPLES

» **Example bicycle/pedestrian coordinator position description:**
<http://www.ridethecity.com/jobs/bicyclepedestrian-coordinator>

**PROGRAM****Safe Routes to School (SRTS) Expansion****NEED**

Currently, the Clark County School District (CCSD) SRTS program only has capacity to give personal attention to about 20 schools per year out of 217 elementary schools and 59 middle schools in the district, with eight elementary schools opening in August 2017.

DESCRIPTION

The CCSD SRTS program could expand in the areas of in-school education, infrastructure planning and design, data collection, and administrative and financial management.

Additional placement-specific recommendations related to schools are also found in the RTC Regional Schools Multimodal Transportation Access Study.

LEAD AGENCY

» CCSD

SUPPORTING AGENCIES

» RTC

EXAMPLES

» **Regional Safe Routes to School Implementation - San Diego, CA**
<http://www.sandag.org/index.asp?projectId=404&fuseaction=projects.detail>

» **RTC Regional Schools Multimodal Transportation Access Study**
http://www.rtcnv.com/wp-content/uploads/2012/06/SchoolAccessStudy_Report_2015-06-30.pdf

**PROGRAM**

C

Program Coordination Tracking

NEED

Throughout the Las Vegas Valley numerous agencies are providing programs that educate and encourage residents regarding active transportation.

DESCRIPTION

Clark County School District (CCSD) Safe Routes to School (SRTS) is building a database framework that will include a “Who Does What Where” report. They are collecting information from all known government entities, non-profit organizations, and advocates that provide bicycle and/or walking safety education to CCSD students.

LEAD AGENCY

» CCSD SRTS

**PROGRAM**

C

Annual School Audits

NEED

Analysis of mode and traffic operations around schools in order to improve infrastructure for safe access.

DESCRIPTION

This program audits traffic and mode operations for two schools per council ward every year (12 audits annually). Its goal is implementation of short range improvements while using medium and long range improvements to apply for grants or seek general funds for CIP allocations.

LEAD AGENCY

» City of Las Vegas

**PROGRAM**

C

Senior Apartment Walk Audits

NEED

Analysis of mode share and traffic operations near senior living areas in order to improve infrastructure for safer access.

DESCRIPTION

This program audits the walking routes within a one-mile radius of residents at senior apartment complexes. Like the annual school audits program, it will seek to implement short term project while seeking funding for projects in the medium to long term ranges.

LEAD AGENCY

» City of Las Vegas



PROGRAM



Club Ride Expansion of School Coordination and Business Promotional Efforts

NEED

Drive-alone trips taken by school employees and parents/guardians cause traffic and poor air quality. A partnership between CCSD SRTS and Club Ride would mutually benefit the active transportation goals of both organizations. Club Ride staff are also regularly in communication with regional employers and can promote the League of American Bicyclists Bicycle Friendly Business certification program.

DESCRIPTION

Club Ride could expand the school-related services to encourage school employees and parents/guardians and their children to use active and shared transportation to get to school. Club Ride could also consider expanding the program to reach the general public and providing support to the Bicycle Friendly Business certification program.

LEAD AGENCY

» RTC Club Ride

SUPPORTING AGENCIES

» Jurisdictions

EXAMPLES

» Club Ride
<http://www.rtcnv.com/club Ride/>



PROGRAM

C

Helmet Giveaway

NEED

Providing people with helmets free of charge at convenient locations can encourage people to be safe while biking.

DESCRIPTION

Helmets are offered free of charge to children and adults at community events.

EXAMPLES

» Free Helmets Promote Safe Bike Riding - Las Vegas, NV

<http://www.reviewjournal.com/news/las-vegas/free-helmets-promote-safe-bike-riding-photos>

LEAD AGENCY

» Nevada Department of Transportation (NDOT)



PROGRAM

LOCAL

Bike Friendly Communities, Businesses, and Universities

NEED

Encouraging people to bike can create a more lively street scape, increase employee productivity, and free up parking spaces for those who must drive.

DESCRIPTION

Through the League of American Bicyclists (LAB), businesses can be recognized for creating a more welcoming atmosphere for bicycling employees, customers, and the community. Local efforts can also be established, following the example of City of Henderson, which implemented a more accessible version of the LAB program and provides assistance to businesses applying for the LAB designation. LAB also has a Bike Friendly Universities program. UNLV's main campus is interested in pursuing designation and other campuses such as Nevada State College and College of Southern Nevada provide great opportunities to enhance biking on campus through pursuit of a Bike Friendly University designation.

LEAD AGENCY

» Jurisdictions/ Advocacy Organizations

SUPPORTING AGENCIES

» Club Ride

EXAMPLES

» Bike Friendly Business

<http://bikeleague.org/business>

» Bike Friendly Community

<http://www.bikeleague.org/community>

» Bike Friendly University

<http://www.bikeleague.org/university>



PROGRAM



Bike Month

NEED

Bike month is a marketing method to encourage people to ride bikes. Rather than one event, there are engaging activities throughout the month, providing people with multiple opportunities and incentives to try biking.

DESCRIPTION

Bike activities are hosted throughout the month of May to encourage community members to bike for transportation. Activities can include free breakfast for bicyclists, safety workshops, Bike to Work Day, and free bike maintenance.

LEAD AGENCY

» Jurisdictions

SUPPORTING AGENCY

» RTC

EXAMPLES

- » Salt Lake City's sponsorship of Bicycle Commuter Pit Stops
<http://www.slcgov.com/ride-may-bike-month-means-commuter-pit-stops-chalk-safety-messages-and-mayors%E2%80%99-bike-work-day>
- » League of American Bicyclists' Bike Month webpage
<http://www.bikeleague.org/content/bike-month-dates-events-0>



PROGRAM



Earn-a-Bike Programs

NEED

Earn-a-Bike programs remove the cost barrier to bicycle ownership, therefore encouraging bicycle use.

DESCRIPTION

Earn a bike programs teach participants how to repair a bicycle and safely ride. At the end of the program, participants are able to keep the bicycle they repaired.

LEAD AGENCY

» Advocacy organizations/Non-profits

EXAMPLES

- » Community Cycling Center, Earn-a-Bike Program, Portland, OR
<http://www.communitycyclingcenter.org/community/earn-a-bike/>



PROGRAM

LOCAL

Open Streets

NEED

Open streets events bring communities together in celebration of active and healthy lifestyles. By creating a positive environment around biking and walking, people will be encouraged to incorporate these modes into their daily lives.

DESCRIPTION

Jurisdictions and/or Clark County could organize Open Streets events. These events temporarily close a route of streets to motorized traffic and open them to walking, bicycling, and playing. Parks along the route can host food, vendors, activities, and entertainment. Events are an opportunity to highlight health benefits of walking and biking and help people envision healthier lifestyles that include active transportation. Typically, events feature an iconic street with connectivity to community destinations like retail, libraries, and parks. Open Streets events are designed to be inclusive of people of all ages and abilities and be free and open to the public.

LEAD AGENCY

» Jurisdictions (e.g. City of Las Vegas), Clark County

SUPPORTING AGENCIES

» RTC

EXAMPLES

» Open Streets Project
<http://openstreetsproject.org/>



PROGRAM

LOCAL

Organized Walks and Bike Rides

NEED

Walks and bike rides allow people to try walking and biking in a positive environment and encourage them to incorporate these modes into their daily lives.

DESCRIPTION

These events invite community members to attend an organized group walk or bike ride. The walk or ride can be social, recreational, or educational.

LEAD AGENCY

» Advocacy Organizations

EXAMPLES

» Just Walk Salem Keizer, Salem, OR
<http://www.iustwalksalem.com/>



PROGRAM

C

Nevada Moves Day

NEED

As children mature and gain more independence, they should know how to walk and bike safely.

DESCRIPTION

Nevada Moves Day is an annual statewide event to encourage walking and bicycling to/from school. Participating schools organize group walks to and from school, as well as prizes for students that arrive to school on foot or by bike.

LEAD AGENCY

» Clark County School District (CCSD) Safe Routes to School (SRTS)

EXAMPLES

» Nevada Moves Day
<http://nevadapta.org/nevada-moves-day/>



PROGRAM

C

Fire Up Your Feet

NEED

As children mature and gain more independence, they should know how to walk and bike safely.

DESCRIPTION

Fire Up Your Feet is a core program of the Safe Routes to School (SRTS) National Partnership. The program targets elementary and middle school students with the goal of increasing their physical activity before, during, and after school. Parents, teachers, and school staff can participate and earn cash awards for tracking their walking and biking activity.

LEAD AGENCY

» Clark County School District (CCSD) Safe Routes to School (SRTS)

EXAMPLES

» Fire Up Your Feet
<http://fireupyourfeet.org/>



PROGRAM

C

Walking School Bus or Bicycle Trains

NEED

As children mature and gain more independence, they should know how to walk and bike safely.

DESCRIPTION

Local parents and volunteers organize and supervise groups of children walking or bicycling from their neighborhoods to school. Parents rotate and share responsibility for walking and bicycling groups during the week.

LEAD AGENCY

» Local Parent Teacher Organizations and other groups

EXAMPLES

» Walking School Bus Trailing Guide, Santa Clarita, California
<http://www.altaprojects.net/files/1712/6662/3993/SC%20WSB%20Training%20Guidebook%20WEB.pdf>



PROGRAM

C

Club Ride

NEED

Commute trip reduction programs can reduce congestion and pollution and increase employee productivity and retention.

DESCRIPTION

Club Ride is a free program of the RTC designed to improve air quality and encourage the use of carpooling, vanpooling, riding transit, walking, bicycling, motorcycling, telecommuting, and compressed work weeks. Club Ride works with employers and commuters in Southern Nevada to establish custom commute programs and offer incentives.

LEAD AGENCY

» RTC

EXAMPLES

» Club Ride
<http://www.rtcnv.com/club Ride/>



PROGRAM

C

Henderson Stroll 'n Roll

NEED

Open streets events bring communities together in celebration of active and healthy lifestyles. By creating a positive environment around biking and walking, people will be encouraged to incorporate these modes into their daily lives.

DESCRIPTION

Streets are temporarily closed to motorized traffic, allowing the community to gather and enjoy the streets on bicycles, skates, skateboards, or on foot. Family-friendly entertainment, foot, and vendors are along the route. This event is currently occurs once annually, but could expand to two annual events.

LEAD AGENCY

» City of Henderson

SUPPORTING AGENCY

» Current partners

EXAMPLES

» Eugene Sunday Streets, Eugene, OR
<https://www.eugene-or.gov/2741/Sunday-Streets-2016>



PROGRAM

C

Bike to School Day

NEED

As children mature and gain more independence, they should know how to bike safely.

DESCRIPTION

Bike to School Day encourages bicycling to and from school. Clark County School District (CCSD) SRTS staff can partner with the RTC, local bike shops, and bike advocacy groups to work with participating schools. Bike to School Day is celebrated at schools across the country on the first Wednesday of every May.

LEAD AGENCY

» Clark County School District (CCSD) Safe Routes to School (SRTS)

EXAMPLES

» Walk Bike to School
<http://www.walkbiketoschool.org/>



PROGRAM

C

Walk to School Day

NEED

As children mature and gain more independence, they should know how to walk safely.

DESCRIPTION

International Walk to School Day encourages students and parents to walk (or bike) instead of drive to school. SRTS staff partners with Safe Kids Clark County and FedEx to provide incentives at the designated media schools.

LEAD AGENCY

» Clark County School District (CCSD) Safe Routes to School (SRTS)

SUPPORTING AGENCY

» Jurisdictions

EXAMPLES

» Walk Bike to School
<http://www.walkbiketoschool.org/>

**PROGRAM**

C

Walk Around Nevada**NEED**

Walking and biking can increase physical activity, lowering risks of obesity and heart disease. Participants are eligible for prizes based on their logged activities.

DESCRIPTION

An online program and mobile app that encourages people to walk, bike, and engage in physical activity and log steps or miles.

LEAD AGENCY

» Southern Nevada Health District (SNHD)

EXAMPLES

» **Walk Around Nevada**
http://www.getthehealthyclarkcounty.org/walk_new/en/index.php

**PROGRAM**

C

Enforcement Sting Operations**NEED**

Motorists' failure to yield to crossing bicyclists and pedestrians can lead to crashes and injuries.

DESCRIPTION

Police monitor intersections and crosswalks known for traffic violations. Drivers who fail to yield the right-of-way to pedestrians and bicyclists are cited and provided with safety information. Enforcement stings are promoted in local media as they raise general awareness about crossing laws. The Las Vegas Metropolitan Police Department partners with the Vulnerable Road Users Program at UNLV's Transportation Research Center to conduct sting operations and issue citations to drivers who fail to yield to pedestrians in the crosswalk. These events are typically coordinated with a holiday and include Leprechaun, Valentine, or Santa at the Crosswalk, for example.

LEAD AGENCY

» Local Police Depts.

SUPPORTING AGENCY

» Jurisdictions

EXAMPLES

» **Santa in the Crosswalk, Las Vegas**
<http://www.reviewjournal.com/news/las-vegas/you-better-watch-out-santa-claus-crosswalk>

» **City of Chicago**
http://www.cityofchicago.org/city/en/depts/cdot/provdrs/ped/svcs/crosswalk_enforcementinitiatives.html



PROGRAM

C

Thank You For Driving Safely Campaign

NEED

The distribution of safety information and laws is essential to spreading safety awareness.

DESCRIPTION

Clark County School District (CCSD) Police and Safe Routes to School (SRTS) staff give out "Thank You for Driving Safely" cards to parents. The cards list Nevada statutes that apply to school zones. Stickers are given to students practicing safe walking and bicycling during pick-up time.

LEAD AGENCY

» CCSD SRTS Program

SUPPORTING AGENCY

» CCSD Police

IMPROVE LEGISLATION TO PROTECT BICYCLISTS & PEDESTRIANS

ENFORCEMENT



POLICY RECOMMENDATION

RTC

Revise Legislation Requiring Motorists to "Stop" for Pedestrians within Crosswalks

NEED

According to Smart Growth America's Dangerous by Design Report ranked Las Vegas the 8th highest region in the country for pedestrian deaths. Currently regulations only require drivers to yield, not stop, for pedestrians in a crosswalk.

DESCRIPTION

Legislation requiring motorists to "stop" for pedestrians in crosswalks would bring additional attention to pedestrians. Nine other states in the US have adopted similar legislation for bicycling and walking indicates a meaningful and strategic approach to achieving defined mode share goals.

LEAD AGENCY

» University of Nevada, Las Vegas (UNLV) Transportation Research Center (TRC)
Vulnerable Road Users Program

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River Mountains Loop Trail



CHAPTER 6

Design Guidance



Nevada Moves Day

Introduction to Design Guidance

Guidance

The sections that follow serve as an inventory of bicycle design treatments and provide guidelines for their development. These treatments and design guidelines are important because they represent the tools for creating communities that are friendly, safe, and accessible for people walking and bicycling. The guidelines are not, however, a substitute for a more thorough evaluation by a landscape architect or engineer upon implementation of facility improvements.

The following standards and guidelines are referred to in this guide.

NATIONAL GUIDANCE

American Association of State Highway and Transportation Officials (AASHTO) **Guide for the Development of Bicycle Facilities** (2013), updated in June 2012 provides guidance on dimensions, use, and layout of specific bicycle facilities.

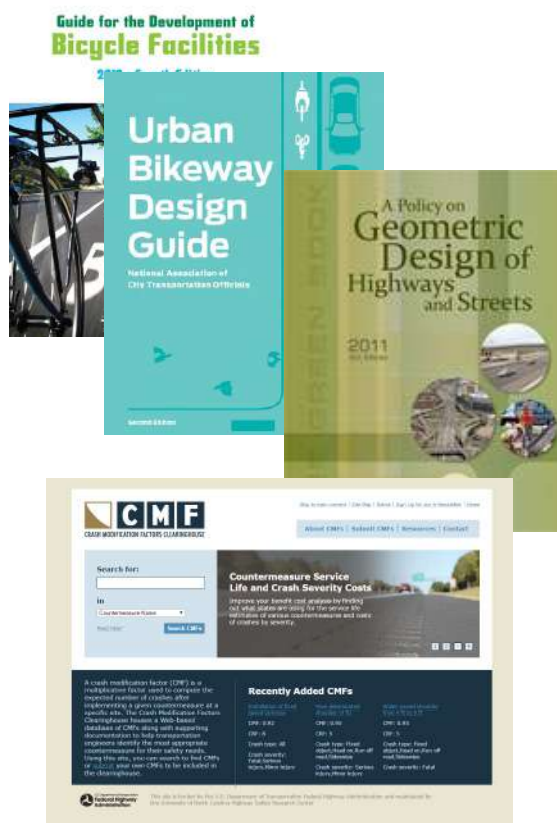
The National Association of City Transportation Officials' (NACTO) **Urban Bikeway Design Guide** (2012) is the newest publication of nationally recognized bikeway design standards, and offers guidance on the current state of the practice designs.

The AASHTO **Policy on Geometric Design of Highways and Streets** (2011) commonly referred to as the “Green Book,” contains the current design research and practices for highway and street geometric design.

IMPACT ON SAFETY AND CRASHES

The presence of bicycle facilities significantly can improve roadway user safety. The Federal Highway Administration's (FHWA) **Crash Modification Factor Clearinghouse** (<http://www.cmfclearinghouse.org/>) is a web-based database of Crash Modification Factors (CMF) to help transportation engineers identify the most appropriate countermeasure for their safety needs. Where available and appropriate, CMFs or similar study results are included for each treatment.

Figure 6.1:
National Design Guidance Manual Covers



STATE GUIDANCE

The **Nevada Department Of Transportation (NDOT) Road Design Guide** (2010) establishes uniform design criteria and interpretation of the AASHTO Green Book's geometric design elements.

The **NDOT Standard Plans for Road and Bridge Construction** (undergoing update) include CAD drawings of street design cross sectional elements and details.

The **NDOT Standard Specifications for Road and Bridge Construction** (2014) include important details for contractor processes and standards in the design and construction of roads.

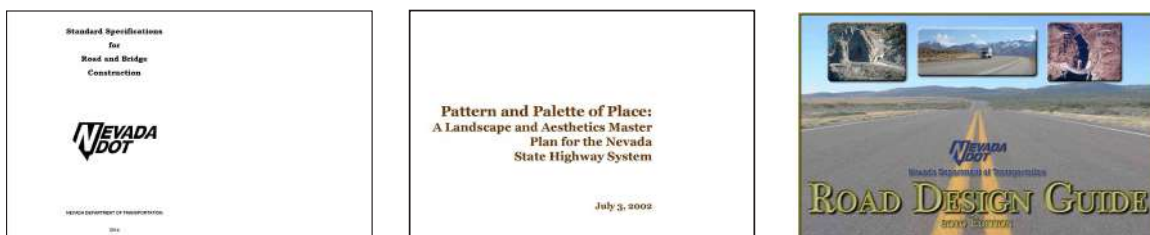
The **NDOT Landscape and Aesthetics Master Plan** (2002) established policies, procedures, standards, and guidelines for landscape and aesthetic treatments on Nevada's roads and highways.

REGIONAL GUIDANCE

The **RTC Policy for Complete Streets (and corresponding Complete Streets Design Guidelines for Livable Communities)** establishes the broad framework and goals for accommodating all modes, including bicyclists and pedestrians throughout Southern Nevada. These policies and guidelines were used as a foundation for this document.

The policy established goals to support transportation choices; livable neighborhoods and commercial centers located along the region's transportation corridors; and multimodal roadway design that will not compromise the needs of larger vehicles such as transit vehicles, fire trucks, and freight delivery trucks. The inclusion of Complete Streets design elements will allow for design flexibility on different street functions and neighborhood contexts. Additionally, complete-streets designs will improve the integration of land use and transportation, while encouraging economic revitalization through infrastructure improvements. **The RTC provides Uniform Standard Drawings as design guidance for roadway projects.**

Figure 6.2:
State Design Guidance Manual Covers



Bicycle Facility Selection

Selecting the most appropriate bicycle facility type for a given roadway can be challenging, due to the range of factors that influence bicycle users' comfort and safety. There is a significant impact on bicycling comfort when the speed differential between bicyclists and motor vehicle traffic is high and/or motor vehicle traffic volumes are high.

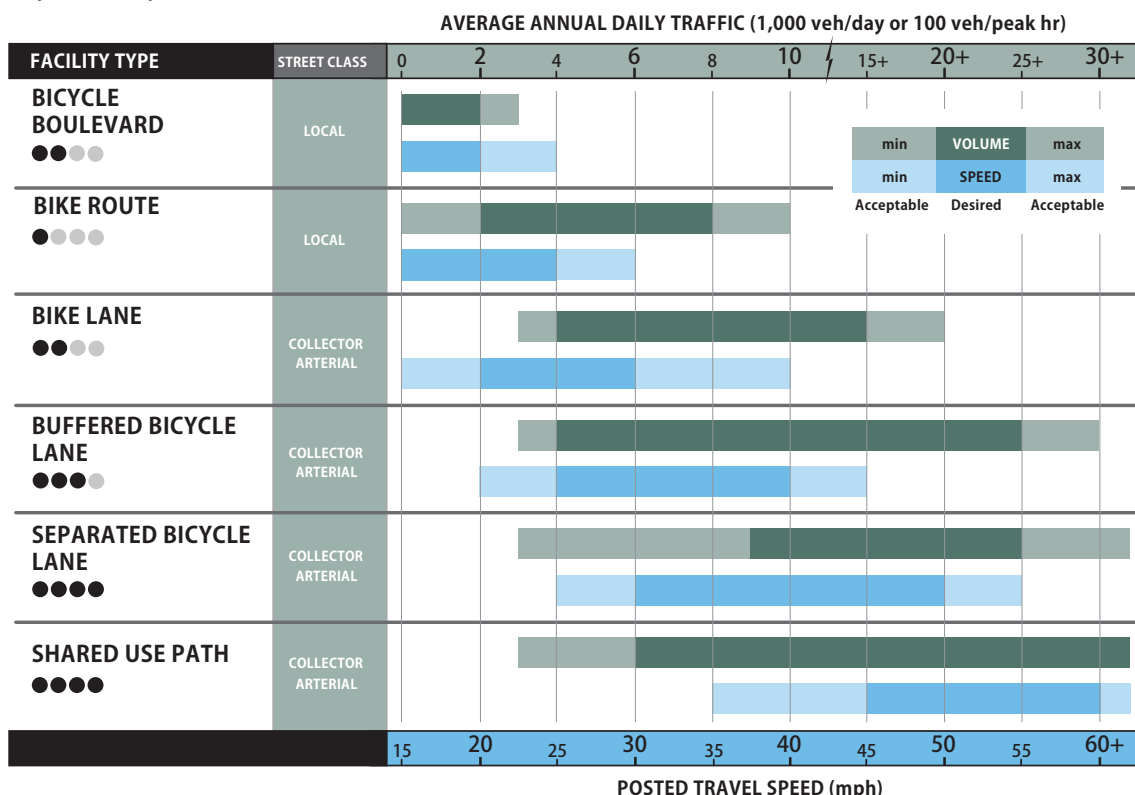
FACILITY SELECTION

As a starting point to identify a preferred facility, the chart below provides guidance on selecting the recommended type of bikeway to be provided in particular roadway based on speeds and volumes.

To use this chart, identify the appropriate daily traffic volume and travel speed on the existing or proposed roadway, and then locate the facility types indicated by those key variables.

Other factors beyond speed and volume that affect facility selection include traffic mix of automobiles and heavy vehicles, the presence of on-street parking, intersection density, surrounding land use, and roadway sight distance. These factors are not included in the facility selection chart below, but should always be considered in the facility selection during the design process. The table in Figure 6.3 serves as a guide and starting point for facility selection but is not a substitute for engineering judgment.

Figure 6.3:
Bicycle Facility Selection Guidance Table



Bicycle User Type

The current AASHTO Guide for the Development of Bicycle Facilities encourages designers to identify their typical rider type based on the trip purpose (recreational vs transportation) and on the level of comfort and skill of the typical rider (casual vs. experienced). A user-type framework for understanding a potential rider's willingness to ride a bike is illustrated in Figure 6.4. Developed by planners in Portland, OR and supported by research, this classification identifies four distinct types of bicyclists.

FOUR TYPES OF TRANSPORTATION BICYCLISTS

Strong and Fearless (1% of population) – Characterized by those that will typically ride anywhere regardless of roadway conditions or weather. These bicyclists can ride faster than other user types, prefer direct routes and will typically choose roadway connections – even if shared with vehicles – over separate bicycle facilities such as shared-use paths.

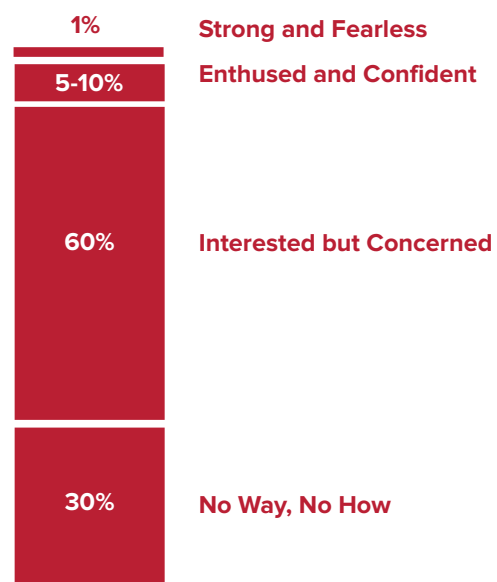
Enthusied and Confident (5-10% of population) – This user group encompasses people who are fairly comfortable riding on all types of bikeways but usually choose low traffic streets or shared-use paths when available. These bicyclists may deviate from a more direct route in favor of a preferred facility type. This group includes all kinds of current commuter, recreational, racer, and utilitarian bicyclists.

Interested but Concerned (60% of population) – This type of person comprises the bulk of the population and represents people who typically

only ride a bicycle on low traffic streets or shared-use paths under favorable weather conditions, if at all. They perceive significant barriers to their bicycling more, specifically traffic and other safety issues. These people may become “Enthusied and Confident” with encouragement, education, and experience. Improvements to the network to attract this category of rider has the largest potential to increase ridership.

No Way, No How (30% of population) – Persons in this category are not bicyclists, and perceive severe or insurmountable safety issues with riding a bicycle. Some people in this group may eventually become more regular riders with time and education. A significant portion of these people will not ride a bicycle under any circumstances.

Figure 6.4:
Typical Distribution of Bicyclist Types



Pedestrian Crossing Location and Facility Selection

The specific type of treatment at a crossing may range from simple, marked crosswalks to full traffic signals or grade separated crossings. Crosswalk lines should not be used indiscriminately, and appropriate selection and implementation of crossing treatments should be evaluated by an engineer or an engineering study before installation. Many of the factors in Figure 6.6 should be considered, including the number of lanes, the presence or lack of a median, the distance from adjacent signalized intersections, the pedestrian volumes and delays, the average daily traffic (ADT), the posted or statutory speed limit and the 85th-percentile speed, the roadway geometry of the location, the possible consolidation of multiple crossing points, the availability of street lighting, and other appropriate factors.

Figure 6.5:
Pedestrian Crossing at a Roundabout



MIDBLOCK CROSSINGS

Midblock crossings are an important street design element for pedestrians. They can provide a legal crossing at locations where pedestrians want to travel, and can be safer than crossings at intersections because traffic is only moving in two directions. Locations where midblock crossings should be considered include:

- Long blocks (longer than 600 feet) with destinations on both sides of the street.
- Locations with heavy pedestrian traffic, such as schools, shopping centers.
- Midblock transit stops, where transit riders must cross the street on one leg of their journey. The table in Figure 6.6 serves as a guide and starting point for crossing treatment selection but is not a substitute for engineering judgment.

Figure 6.6:
Crossing Treatment Selection Guidance

PEDESTRIAN CROSSING CONTEXTUAL GUIDANCE At unsignalized locations		Local Streets 15-25 mph		Collector Streets 25-30 mph			Arterial Streets 30-45 mph							
FACILITY TYPE		2 lane	3 lane	2 lane	2 lane with median refuge	3 lane	2 lane	2 lane with median refuge	3 lane	4 lane	4 lane with median refuge	5 lane	6 lane	6 lane with median refuge
1	Crosswalk Only (high visibility)	✓	✓	EJ	EJ	X	EJ	EJ	X	X	X	X	X	X
2	Crosswalk with warning signage and yield lines	EJ	✓	✓	✓	✓	EJ	EJ	EJ	X	X	X	X	X
3	Stop Sign Controlled	✓	✓	EJ	EJ	EJ	EJ	EJ	EJ	X	X	X	X	X
4	Active Warning Beacon (RRFB)	X	EJ	✓	✓	✓	✓	✓	✓	X	✓	X	X	X
5	Hybrid Beacon	X	X	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓	✓	✓
6	PELICAN Signal	X	X	X	EJ	X	X	✓	X	X	✓	X	X	✓
7	Full Traffic Signal	X	X	EJ	EJ	EJ	EJ	EJ	EJ	✓	✓	✓	✓	✓
8	Grade separation	X	X	EJ	EJ	EJ	X	EJ	EJ	✓	✓	✓	✓	✓

LEGEND	
Most Desirable	✓
Engineering Judgement	EJ
Not Preferred	X

Figure 6.7:
Examples of Crossing Treatments



1. Marked Crosswalk



2. Crosswalk with Warning Signage



3. Stop Sign Controlled



4. Active Warning
Beacon (RRFB)



5. Pedestrian Hybrid Beacon



6. Full Traffic Signal /
7. PELICAN



8. Grade Separation

Pedestrian Facilities

Sidewalk Zones and Widths

Sidewalks are the most fundamental element of the walking network, as they provide an area for pedestrian travel separated from vehicular traffic. Providing adequate and accessible facilities can lead to increased numbers of people walking, improved safety, and the creation of social space.

TYPICAL APPLICATION

- Sidewalks should be provided on both sides of urban commercial streets, and should be required in areas of moderate residential density (1-4 dwelling units per acre).
- When retrofitting gaps in the sidewalk network, locations near transit stops, schools, parks, public buildings, and other areas with high concentrations of pedestrians should be the highest priority.

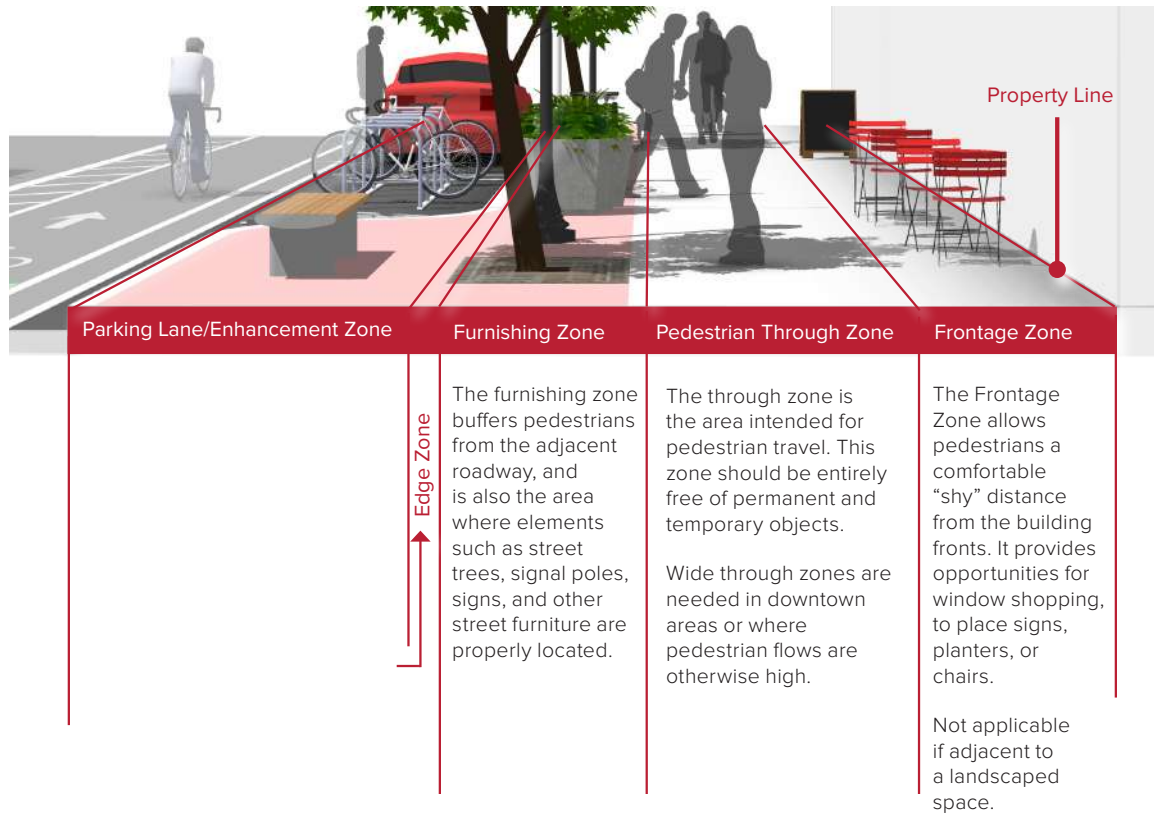
DESIGN FEATURES

- It is important to provide adequate width along a sidewalk corridor. A pedestrian through zone width of six feet enables two pedestrians (including wheelchair users) to travel side-by-side, or to pass each other comfortably.
- In areas of high demand, sidewalks should contain adequate width to accommodate high volumes and different walking speeds of pedestrians. For example, a minimum 8' wide sidewalk, 10' preferred, is recommended adjacent to schools.

Figure 6.8:
Sidewalk Near School In Boulder City



Figure 6.9:
Sidewalk Zones and Widths



Street Classification	Parking Lane/Enhancement Zone	Furnishing Zone	Pedestrian Through Zone	Frontage Zone	Total
Local Streets	Varies	2 - 5 feet	5 - 6 feet	N/A	7 - 11 feet
Commercial Areas	Varies	4 - 6 feet	6 - 12 feet	2.5 - 10 feet	12.5 - 28 feet
Arterials and Collectors	Varies	4 - 6 feet	6 - 8 feet	2.5 - 5 feet	12.5 - 19 feet

Accessible Curb Ramps

Curb ramps are the design elements that allow all users to make the transition from the street to the sidewalk and vice-versa. There are a number of factors to be considered in the design and placement of curb ramps at corners. Properly designed curb ramps ensure that the sidewalk is accessible from the roadway. A sidewalk without a curb ramp can be useless to someone in a wheelchair or other mobility disabilities, forcing them out into the street and back to a driveway for access.

TYPICAL APPLICATION

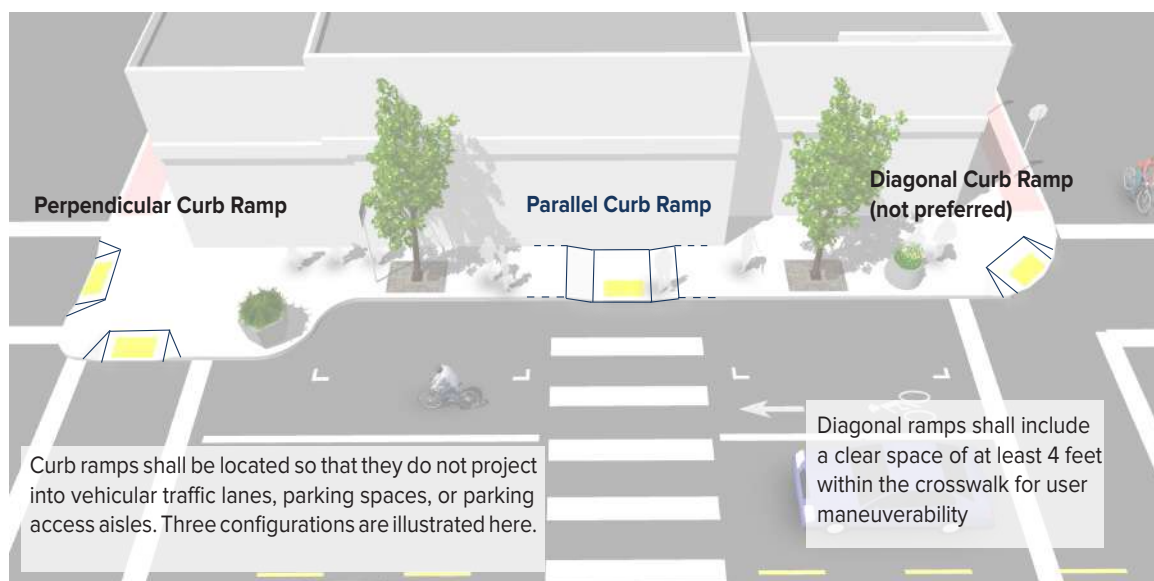
- Curb ramps are used to assist people with mobility devices or disabilities to cross the street at intersections. They also accommodate individuals with bicycles, carts, and strollers.

- ADA requires all new and rebuilt curb ramps to provide accessibility for people with disabilities, including blind pedestrians.

DESIGN FEATURES

- The landing at the top of a ramp shall be at least 4 feet long and at least the same width as the ramp itself.
- The ramp shall slope no more than 1:12, with a maximum cross slope of 2.0%.
- If the ramp runs directly into a crosswalk, the landing at the bottom will be in the roadway.
- If the ramp lands on a dropped landing within the sidewalk or corner area where someone in a wheelchair may have to change direction, the landing must be a minimum of 5 feet long and at least as wide as the ramp, although a width of 5 feet is preferred.

Figure 6.10:
Curb Ramp Variants



Crosswalk spacing not to scale. For illustration purposes only.

Curb Extensions

Curb extensions minimize pedestrian exposure during crossing by shortening crossing distance and giving pedestrians a better chance to see and be seen before committing to crossing.

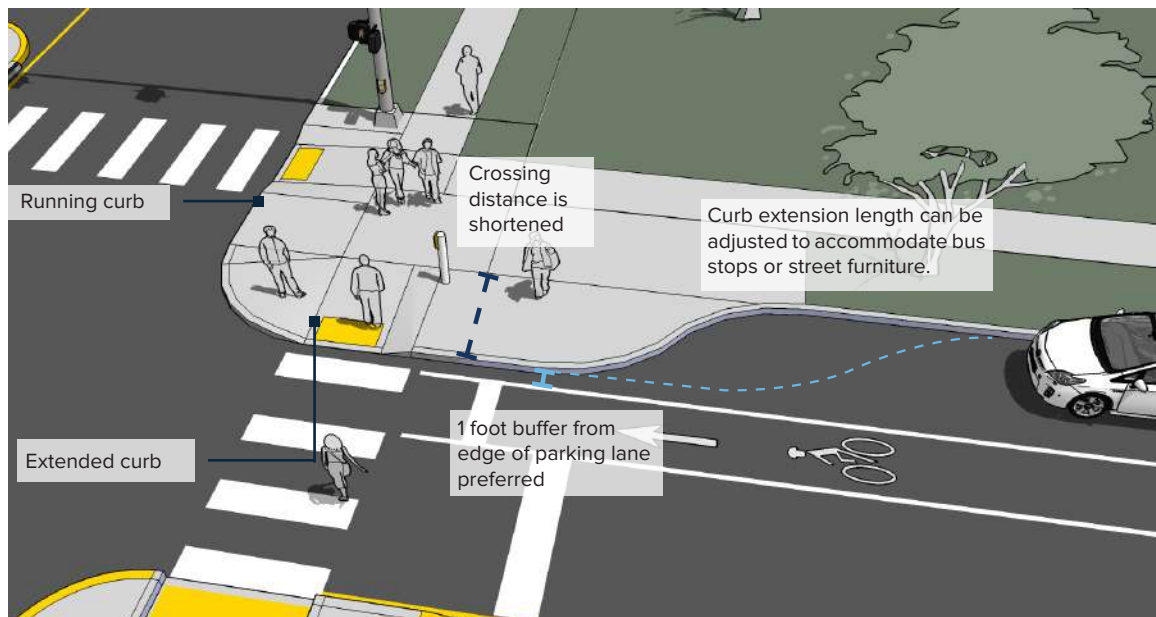
TYPICAL APPLICATION

- Within parking lanes appropriate for any crosswalk where it is desirable to shorten the crossing distance and there is a parking lane adjacent to the curb.
- May be possible within non-travel areas on roadways with excess space.
- Particularly helpful at midblock crossing locations.

DESIGN FEATURES

- For purposes of efficient street sweeping, the minimum radius for the reverse curves of the transition is 10 feet and the two radii should be balanced to be nearly equal.
- When a bike lane is present, the curb extensions should terminate one foot short of the parking lane to maximize bicyclist safety.
- Planted curb extensions may be designed as a bioswale for stormwater management.

Figure 6.11:
Typical Features of Curb Extensions



Green Infrastructure

Green infrastructure treats and slows runoff from impervious surface areas, such as roadways, sidewalks, and buildings. Sustainable stormwater strategies may include bioretention swales, rain gardens, tree box filters, and pervious pavements (pervious concrete, asphalt and pavers). Bioswales are natural landscape elements that manage water runoff from a paved surface, reducing the risks of erosion or flooding of local streams and creeks, which can threaten natural habitats. Plants in the swale trap pollutants and silt from entering a water system and provide an attractive streetscape enhancement.

TYPICAL APPLICATION

- Install in areas without conventional stormwater systems that are prone to flooding to improve drainage and reduce costs compared to installing traditional gutter and drainage systems.
- Use green infrastructure to provide an ecological and aesthetic enhancement of traditional traffic speed and volume control measures, such as along a bicycle boulevard corridor.
- Bioswales and rain gardens are appropriate at curb extensions and along planting strips.

- Street trees and plantings can be placed in medians, chicanes, and other locations.
- Pervious pavers can be used along sidewalks, street furniture zones, parking lanes, gutter strips, or entire roadways where landscaping is less desired or feasible.

DESIGN FEATURES

- Bioswales are shallow depressions with vegetation designed to capture, treat, and infiltrate stormwater runoff by reducing velocity and purifying the water while recharging the underlying groundwater table.
- Pervious pavement can also effectively capture and treat stormwater runoff. The desired storage volume and intended drain time is determined by the depth of the pervious layer, void space, and the infiltration rate of underlying soils. An underdrain system must be used to treat overflow, or drain excess runoff to the municipal sewer system, and allow the facility to drain within 48 hours.

Figure 6.12:
Streetscape with Green Infrastructure



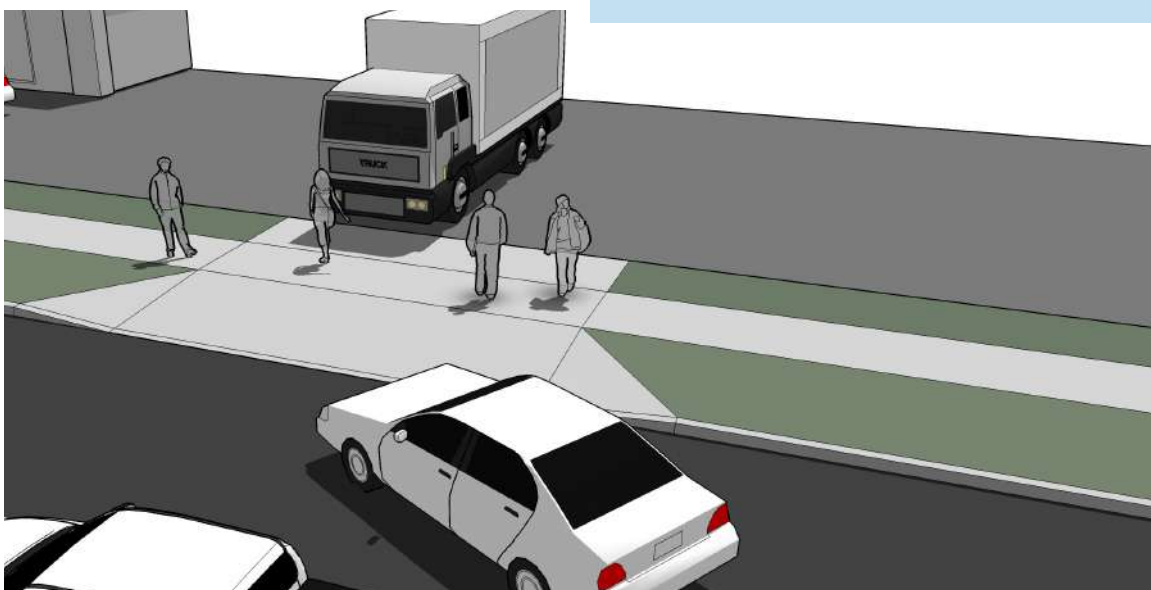
Driveways

Driveways provide automobile access to private property but can also cause conflicts with pedestrians using the sidewalk at that location. There are generally two types of driveway designs: intersection-type and commercial-type. Commercial-type driveways maintain the sidewalk across the intersection which compels motorists to slow down before crossing. Intersection-type driveways do not maintain the sidewalk through the intersection and can compromise pedestrian safety and comfort due to the ability for motorists to negotiate turns at higher speeds and the lack of defined right-of-way.

TYPICAL APPLICATION

- Appropriate for all private accessways that cross sidewalks.
- Ideal for commercial business districts with high pedestrian activity and slower travel lanes.

Figure 6.13:
Example of Commercial-type Driveway



- Right-in/right-out restrictions reduce points of conflict between modes.
- Traffic signals may be considered where turning movements are very high.

COMMERCIAL-TYPE DESIGN FEATURES

- Sidewalk maintains grade and material across the driveway to reinforce pedestrian right-of-way. Cross slope (driveway grade) should be no greater than 2.0%.
- Increase curb radius to reduce vehicle speeds and pedestrian crossing distance (10-25 feet recommended based on site activity and street context).
- Minimize driveway widths to reduce crossing distance and accommodate entering and exiting vehicles.
- Where turning volumes are high, right-turn channelization removes slower turning vehicles from main flow of traffic, improving motorist yield compliance.

Pedestrian Facilities at Intersections

Marked Crosswalks

A marked crosswalk signals to motorists that they must stop for pedestrians and encourages pedestrians to cross at designated locations. Installing crosswalks alone will not necessarily make crossings safer, especially on multi-lane roadways. At mid-block locations, crosswalks can be marked where there is a demand for crossing and there are no nearby marked crosswalks.

TYPICAL APPLICATION

All crosswalks should be marked at signalized intersections. At unsignalized intersections, crosswalks may be marked under the following conditions:

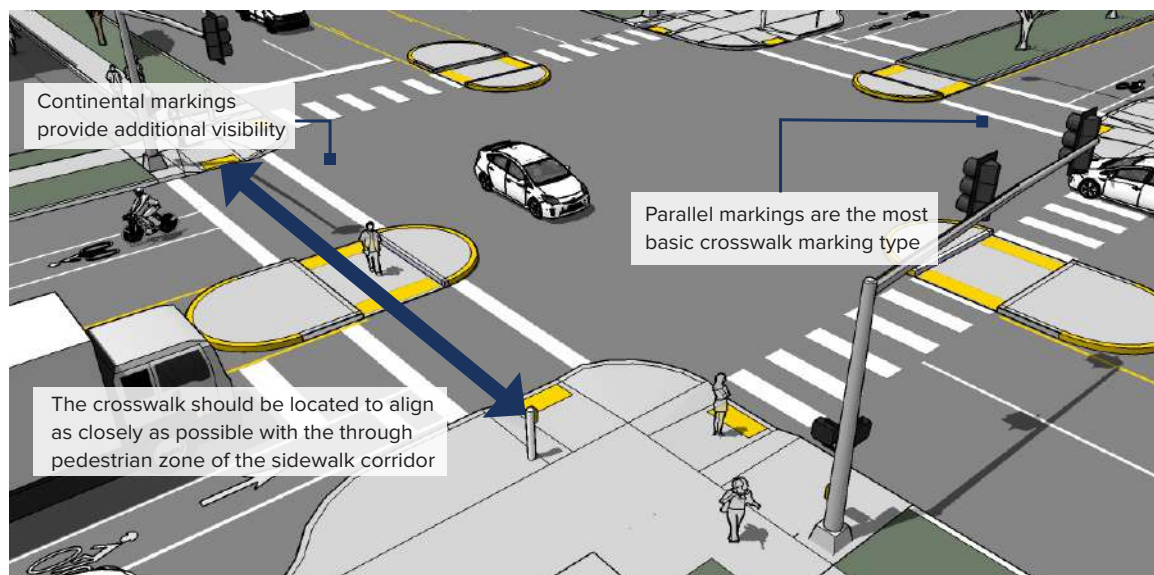
- At a complex intersection, to orient pedestrians in finding their way across.
- At an offset intersection, to show pedestrians the shortest route across traffic with the least exposure to vehicular traffic and traffic conflicts.

- At an intersection with visibility constraints, to position pedestrians where they can best be seen by oncoming traffic.
- At an intersection within a school zone on a walking route.

DESIGN FEATURES

- The landing at the top of a ramp shall be at least 4 feet long and at least the same width as the ramp itself.
- The ramp shall slope no more than 8.33% with a maximum cross slope of 2.0%.
- If the ramp runs directly into a crosswalk, the landing at the bottom will be in the roadway.
- If the ramp lands on a dropped landing within the sidewalk or corner area where someone in a wheelchair may have to change direction, the landing must be a minimum of 5 feet long and at least as wide as the ramp itself.

Figure 6.14:
Variants of Marked Crosswalk



Median Refuge Islands

Median refuge islands are located at the mid-point of a marked crossing and help improve pedestrian safety by allowing pedestrians to cross one direction of traffic at a time. Refuge islands minimize pedestrian exposure by shortening crossing distance and increasing the number of available gaps for crossing.

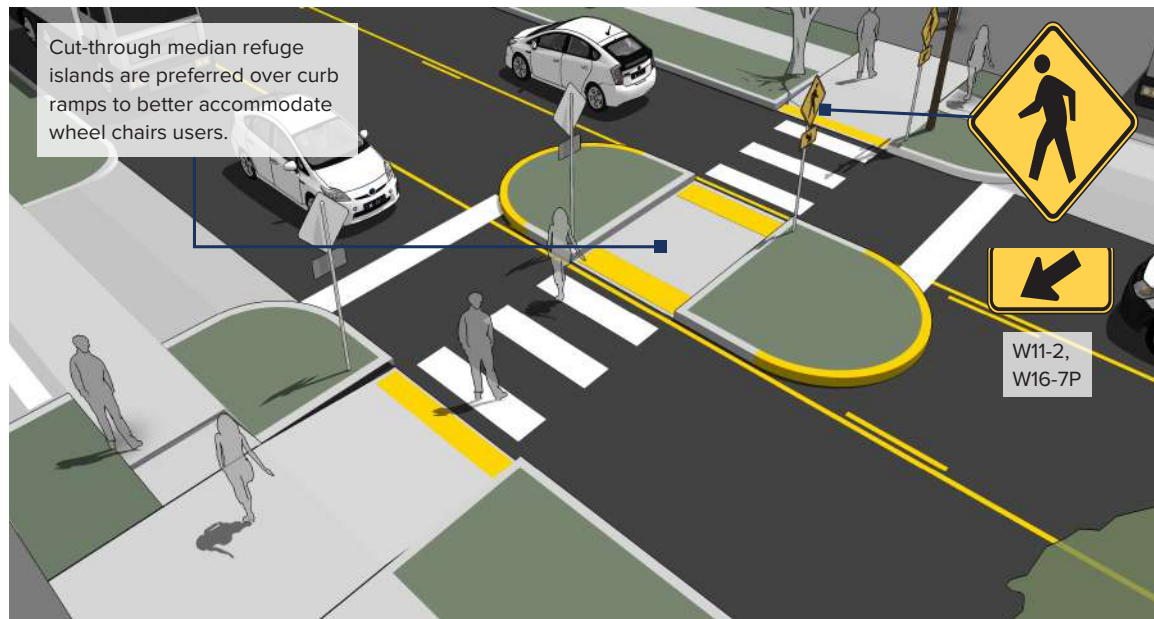
TYPICAL APPLICATION

- Can be applied on any roadway with a left turn center lane or median that is at least 6 feet wide.
- May be appropriate on multi-lane roadways depending on speeds and volumes. Consider configuration with active warning beacons for improved yielding compliance.
- Appropriate at signalized or unsignalized crosswalks.

DESIGN FEATURES

- The island must be accessible, preferably with at-grade passage through the island rather than ramps and landings. Detectable warning surfaces must be full-width and 3 feet deep to warn blind pedestrians (DIB 82-05, 2013).
- Requires 6 feet width between travel lanes (8-10 feet preferred to accommodate bikes with trailers and wheelchair users) and 20 feet length (40 feet preferred). Clear width of 4 feet required, but preferably same width as crosswalk.
- On streets with speeds higher than 25 mph, there should also be double centerline marking, reflectors, and “KEEP RIGHT” signage.

Figure 6.15:
Example of Median Refuge Island



Active Warning Beacons

Active warning beacons are user-actuated illuminated devices designed to increase motor vehicle yielding compliance at crossings of multi lane or high volume roadways.

Types of active warning beacons include conventional circular yellow flashing beacons, in-roadway warning lights, or Rectangular Rapid Flash Beacons (RRFB). Rectangular rapid flash beacons elicit the highest increase in compliance of all the warning beacon enhancement options.

TYPICAL APPLICATION

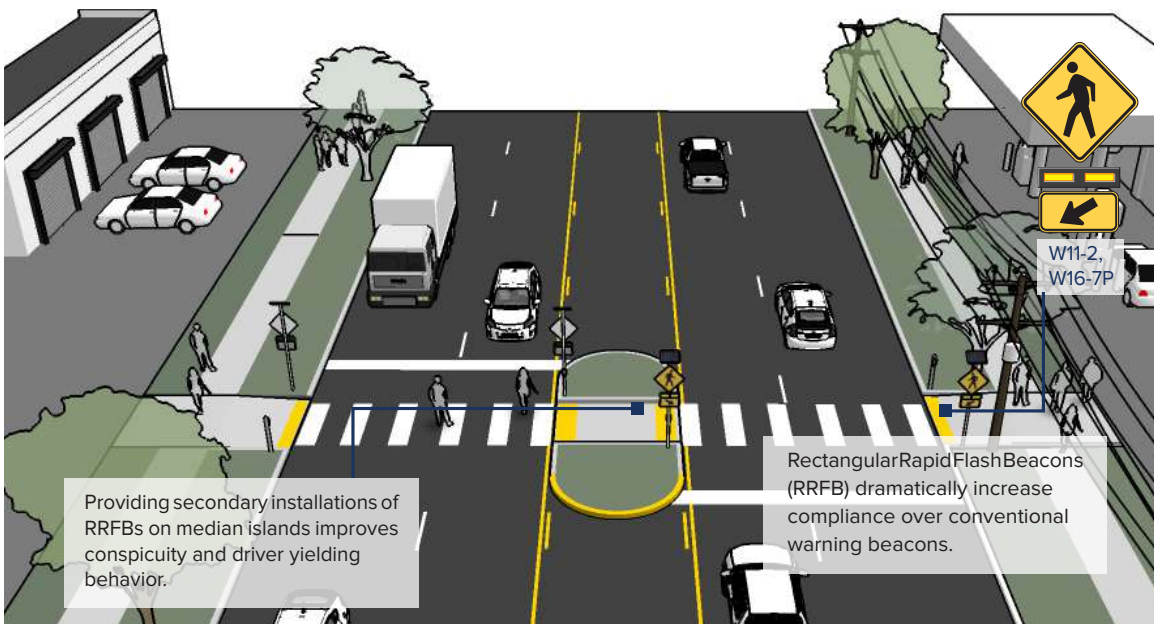
- Suitable for collector and arterial streets where speeds are 25-45 mph and there are two to three total lanes (or four lanes with a median refuge).

- Implemented at high-volume pedestrian crossings where a signal is not warranted or desired, including midblock locations.
- Typically activated by pedestrians manually with a push button, or can be actuated automatically with passive detection systems.

DESIGN FEATURES

- Warning beacons shall not be used at crosswalks controlled by YIELD signs, STOP signs or traffic signals.
- Warning beacons shall initiate operation based on pedestrian or bicyclist actuation and shall cease operation at a predetermined time after actuation, or with passive detection after the pedestrian or bicyclist clears the crosswalk.
- Median refuge islands provide added comfort and can be angled to direct users to face oncoming traffic.

Figure 6.16:
Example of Active Warning Beacon



Pedestrian Hybrid Beacons

A hybrid beacon, formerly known as a High-intensity Activated Crosswalk (HAWK), consists of a signal-head with two red lenses over a single yellow lens on the major street, and pedestrian and/or bicycle signal heads for the minor street. There are no signal indications for motor vehicles on the minor street approaches. Hybrid beacons are used to improve non-motorized crossings of major streets in locations where side-street volumes do not support installation of a conventional traffic signal or where there are concerns that a conventional signal will encourage additional motor vehicle traffic on the minor street. Hybrid beacons may also be used at mid-block crossing locations.

TYPICAL APPLICATION

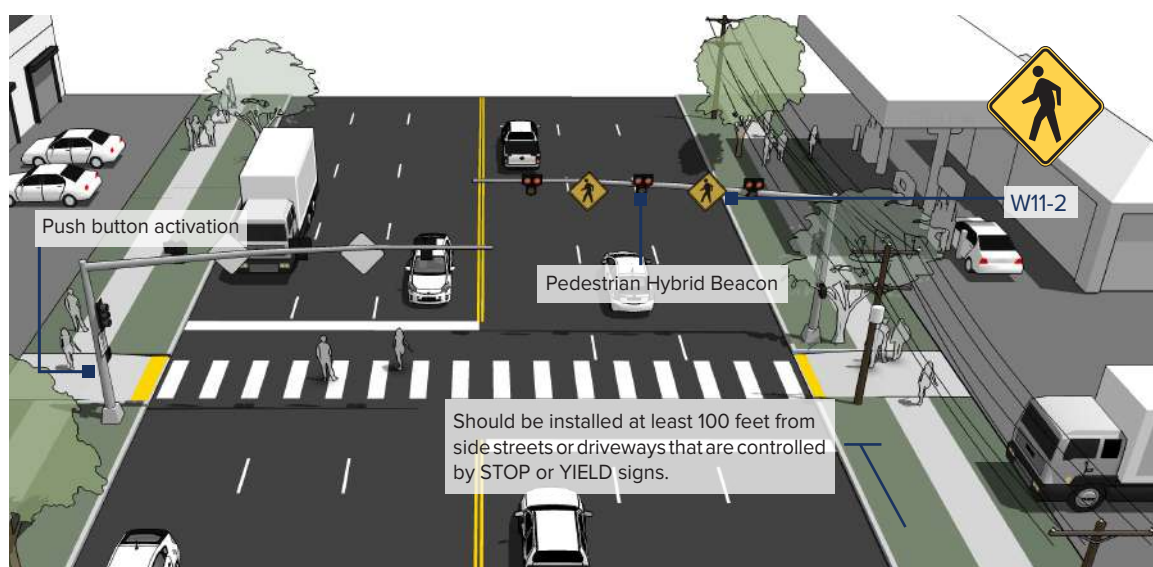
- Suitable for arterial streets where speeds are 30-45 mph and there are three or more lanes of traffic in each direction (or two lanes with a median refuge).

- Where off-street bicycle facilities intersect major streets without signalized intersections.
- At intersections or midblock crossings where there are high pedestrian volumes.

DESIGN FEATURES

- Hybrid beacons may be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable pedestrian crossings.
- If installed within a signal system, signal engineers should evaluate the need for the hybrid signal to be coordinated with other signals.
- Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk to provide adequate sight distance.

Figure 6.17:
Example of Pedestrian Hybrid Beacon



“Pelican” Crossing

The “Pelican”, or Pedestrian Light Control Activation, system is similar to a Pedestrian Hybrid Beacon but is specifically designed to provide a two-stage crossing for pedestrians and bicyclists. The “Pelican” crossing requires the use of a median island to provide non-motorized users a refuge between the two crossing stages.

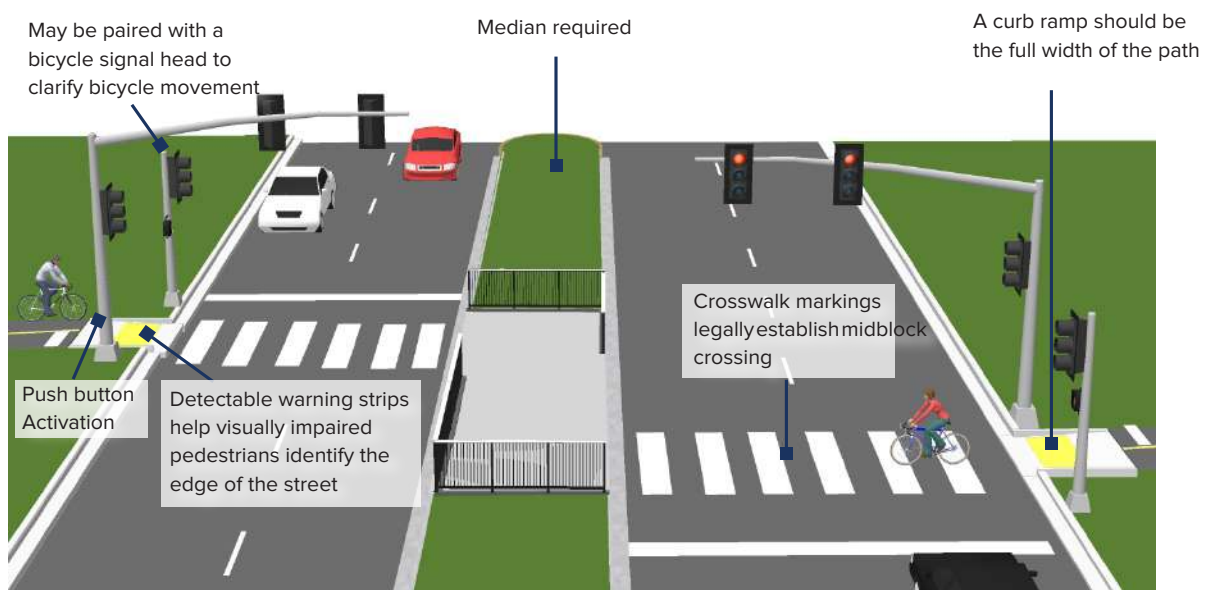
Typically located at mid-block on roadways with two or more lanes in each direction, the “Pelican” crossing reduces the number and length of potential stops and stop time (delay) by separating any pedestrian crossing into two phases. The user desiring to cross activates the first of two signals by push button. Once there is a red indication for roadway traffic, a “Walk” symbol indicates to the pedestrian or bicyclist that the first phase has begun. The user walks to and along the median to activate the second signal by pressing its push button. The second

phase begins shortly thereafter with the same indications and timing as the first. The “Pelican” uses a standard red-yellow-green signal for motorists and, like the Pedestrian Hybrid Beacon, remains green (or blank in the case of the latter) unless activated by a user desiring to cross. Bicyclists should yield to pedestrians in the crossing and the median, dismounting if necessary.

DESIGN FEATURES

- May be installed without meeting traffic signal control warrants if roadway speed and volumes are excessive for comfortable pedestrian crossings.
- Required a median to produce a two-stage crossing.
- Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk to provide adequate sight distance.

Figure 6.18:
Example of Pelican Crossings



Scramble Crosswalk

A scramble crosswalk, also known as exclusive pedestrian phase (EPP) or Barnes Dance, is a signal phasing type in which pedestrians are permitted exclusive use of the intersections in all directions, potentially including diagonal crossings.

TYPICAL APPLICATION

There are no formally established warrants for a full exclusive pedestrian scramble. Traffic engineers should balance the demand for green time between pedestrian volume and vehicle volume. While an exclusive pedestrian phase will traditionally increase delay for motor vehicles (by eliminating vehicle green time for a phase) at high pedestrian volumes an exclusive phase may actually reduce vehicle delay by providing unobstructed access through the intersection.

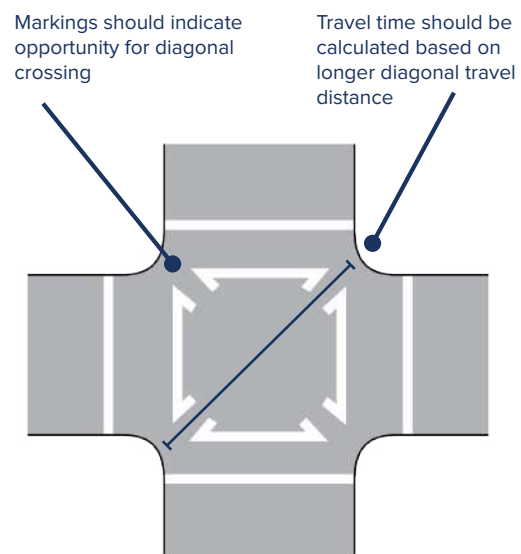
The AASHTO Pedestrian Guide 2004 indicates that exclusive/scramble phases work best when:

- Pedestrian volume exceeds 1200 pedestrians per day
- Street widths are narrow (less than 60 ft), and
- Trough movement volume is low

DESIGN FEATURES

- Crosswalk markings should clearly indicate the opportunity and intent to support diagonal crossings.
- At diagonal crossings, the walking time should be calculated to serve the longer diagonal travel distances. The MUTCD recommends a walking speed of 3.5 ft/s.
- Where an exclusive pedestrian phase is not feasible, a 3 second Leading Pedestrian Interval may provide some of the benefits while minimizing impacts to motor vehicles.

Figure 6.19:
Example of Scramble Crosswalk



Bicycle Facilities

Bicycle Parking

Bicyclists expect a safe, convenient place to secure their bicycle when they reach their destination. This may be short-term parking of 2 hours or less, or long-term parking for employees, students, residents, and commuters.

TYPICAL APPLICATION

- Short-term parking should consist of approved standard racks, with appropriate location and placement to serve nearby uses.
- Bike corrals consist of bicycle racks grouped together in a common area. These can be implemented by converting motor vehicle parking spaces into on-street bicycle parking, or as part of a curb extension for off-street bicycle parking. Each motor vehicle parking space can be replaced with approximately 6-10 bicycle parking spaces.

- Bicycle lockers are intended to provide long-term bicycle storage while protecting entire bicycle against theft and inclement weather. Lockers should be placed in visible, easily accessible locations while maintaining security.

DESIGN FEATURES

Bike Racks

- 2 ft min. from the curb face to avoid 'dooring.' 4 ft between racks to provide maneuvering room. 50 ft max. distance from main building entrance. Min. clear distance of 6 ft property line.

Bike Corrals

- 5-6 ft entrance width from the roadway. Can be used with parallel or angled parking.

Bike Lockers

- Min. dimensions: 2.5 ft W; 4 ft H; 6 ft D. Four ft side clearance and 6 ft end clearance. Seven ft min. distance between facing lockers.

Figure 6.20:
Examples of Bicycle Parking



TYPICAL APPLICATION

- ## DESIGN FEATURES

- Figure 6.21:
Example of Shared Roadway



Bicycle Boulevards

Bicycle boulevards are low-volume, low-speed streets modified to enhance bicyclist comfort by using treatments such as signage, pavement markings, traffic calming and/or traffic reduction, and intersection modifications. These treatments allow through movements of bicyclists while discouraging similar through-trips by non-local motorized traffic.

TYPICAL APPLICATION

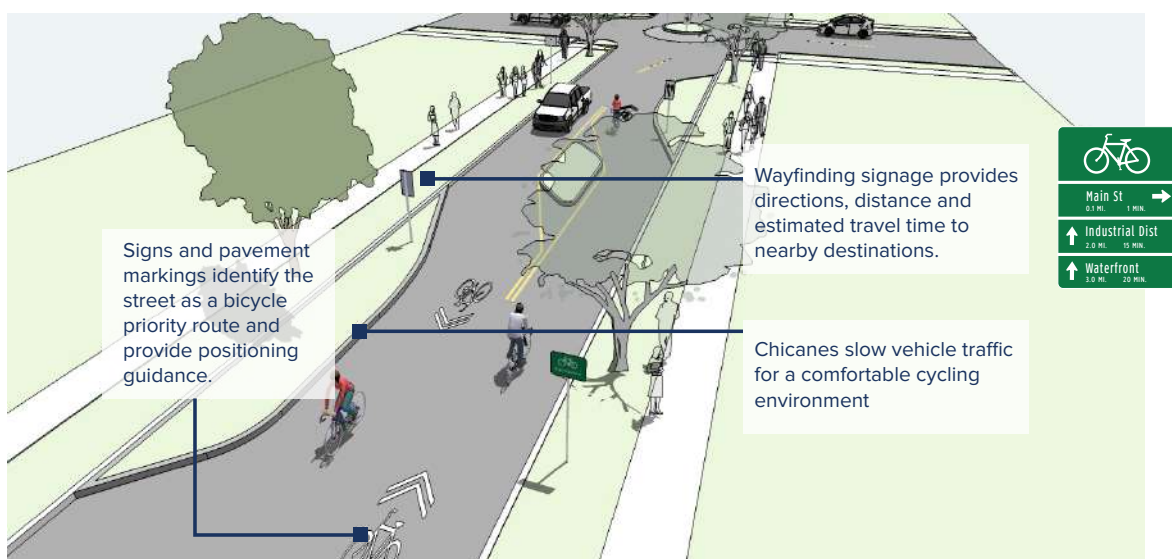
- Parallel with and in close proximity to major thoroughfares (1/4 mile or less).
- Follow a desire line for bicycle travel that is ideally long and relatively continuous (2-5 miles).
- Avoid alignments with excessive zigzag or circuitous routing. The bikeway should have less than 10% out of direction travel compared to shortest path of primary corridor.

- Streets with travel speeds at 25 mph or less and with traffic volumes of fewer than 3,000 vehicles per day. These conditions should either exist or be established with traffic calming measures.

DESIGN FEATURES

- Signs and pavement markings are the minimum treatments necessary to designate a street as a bicycle boulevard.
- Maximum posted speed of 25 mph. Utilize reduced speed limits or horizontal or vertical deflection strategies to maintain an 85th percentile speed less than 22 mph.
- Implement volume control treatments based on the context of the bicycle boulevard, using engineering judgment. Target motor vehicle volumes should be 3,000 vehicles per day or below.
- Intersection crossings should be designed to enhance safety and minimize delay for bicyclists (see pages 42-43).

Figure 6.22:
Example of Bicycle Boulevard



On-Street Bicycle Lanes

On-street bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signage. The bike lane is located directly adjacent to motor vehicle travel lanes and is used in the same direction as motor vehicle traffic. Bike lanes are typically on the right side of the street, between the adjacent travel lane and curb, road edge, or parking lane.

TYPICAL APPLICATION

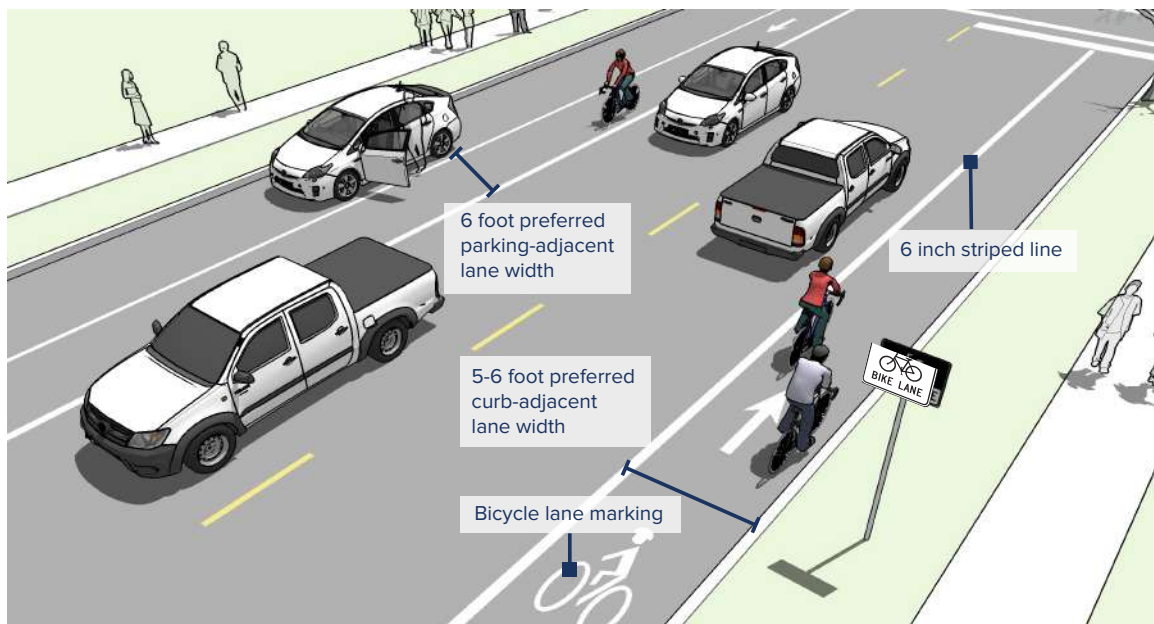
- Bike lanes may be used on any street with adequate space, but are most effective on streets with moderate traffic volumes (between 4,000 and 15,000 ADT).
- Bike lanes are most appropriate on streets with moderate speeds of approx. 20-30 mph.
- Appropriate for skilled adult riders on most streets.

- May be appropriate for children when configured as 6+ foot wide lanes on lower-speed, lower-volume streets with one lane in each direction.

DESIGN FEATURES

- Mark the inside line with a 6 inch stripe. Indicate a parking lane with a 4 inch line or mark individual parking spaces with 4 inch wide lines in a 12 inch by 12 inch crosshair or 12 inch by 6 inch "T" marker.
- Include a bicycle lane marking (at the beginning of blocks and at regular intervals along the route).
- 6 foot width preferred adjacent to on-street parking, (5 foot min.)
- 5–6 foot preferred adjacent to curb and gutter (4 foot min.) or 4 feet more than the gutter pan width.

Figure 6.23:
Example of On-Street Bicycle Lane



Buffered Bicycle Lanes

Buffered bike lanes are conventional bicycle lanes paired with a designated, painted buffer space, separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane.

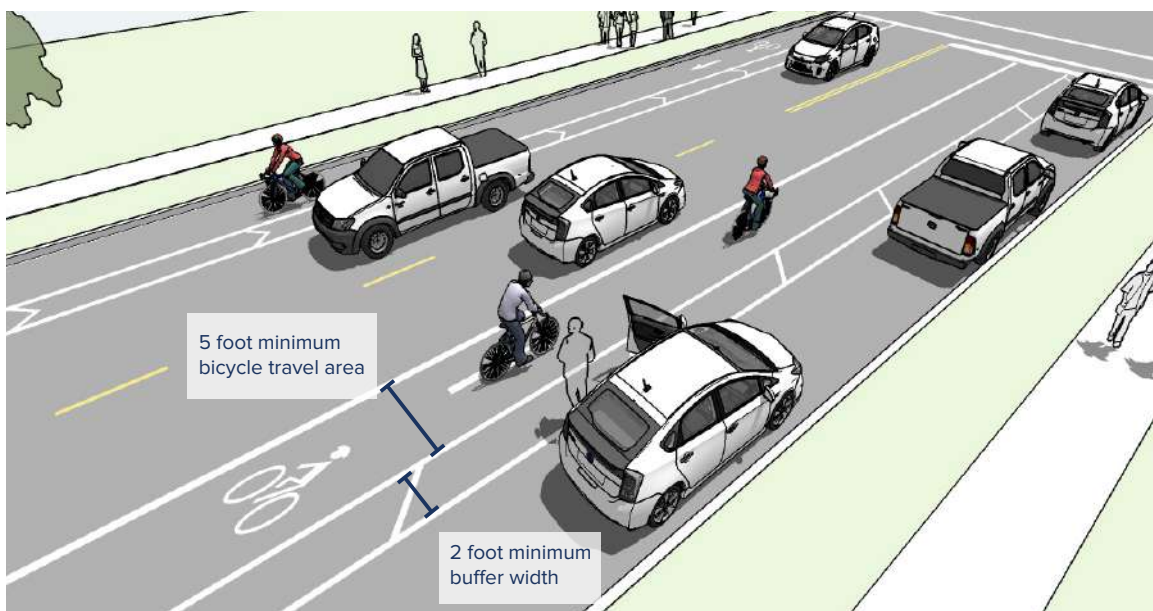
TYPICAL APPLICATION

- Anywhere a conventional bike lane is being considered.
- On streets with relatively higher speeds (25 to 40 mph) and automobile or truck volumes (4,000 to 25,000 AADT).
- On streets with extra lanes or lane width.
- Appropriate for skilled adult riders on most streets.
- In areas with high parking turnover, such as in front of schools, the bike lane may be placed adjacent to the curb with a buffer between the bike lane and the parking lane.

DESIGN FEATURES

- The minimum bicycle travel area (not including buffer) is 5 feet wide.
- Buffers should be at least 18 inches wide. If buffer area is 3 feet or wider, white chevron or diagonal markings should be used.
- Consider a dotted line for clarity at driveways or minor street crossings.
- There is no standard for whether the buffer is configured on the parking side, the travel side, or a combination of both.

Figure 6.24:
Example of Buffered Bike Lane



One-Way Separated Bike Lanes

One-way separated bicycle lanes are on-street bikeway facilities that are separated from vehicle traffic. Protection for separated bicycle lanes is provided through physical barriers between the bike lane and the vehicular travel lane. These barriers can include bollards, concrete or plastic mounds, flexible posts, planters, medians, extruded curbs, jersey barriers, bike racks, on-street parking, or a combination of these. If possible, the barrier should allow standard street sweeping equipment to maintain the bike lane while still providing separation for people on bicycles. Separated bike lanes using these barrier elements typically share the same elevation as adjacent travel lanes, but the bike lane could also be raised above street level, either below or equivalent to sidewalk level.

TYPICAL APPLICATION

- Along streets on which conventional bicycle lanes would cause many bicyclists to feel stress because of factors such as multiple lanes, high bicycle volumes, high motor traffic volumes

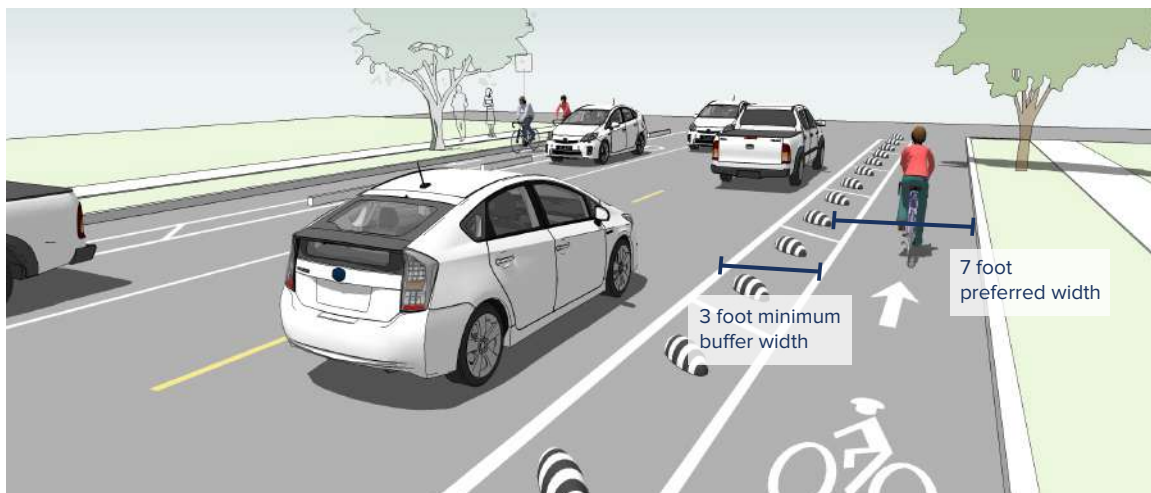
(preferably 9,000-30,000 ADT), higher traffic speeds (30+ mph), high incidence of double parking, higher truck traffic (10% of total ADT), and high parking turnover.

- Along streets for which conflicts at intersections can be effectively mitigated using parking lane setbacks, bicycle markings through the intersection, and other signalized intersection treatments.

DESIGN FEATURES

- Pavement markings, symbols and/or arrow markings must be placed at the beginning of the separated bike lane and at intervals along the facility based on engineering judgment.
- 7 foot width preferred in areas with high bicycle volumes or uphill sections to facilitate safe passing behavior (5 foot minimum).
- 3 foot minimum buffer width adjacent to parking lines (18 inch minimum adjacent to travel lanes), marked with 2 solid white lines.

Figure 6.25:
Example of One-Way Separated Bike Lane



Two-Way Separated Bike Lanes

Two-way Separated Bike Lanes are bicycle facilities that allow bicycle movement in both directions on one side of the road. Two-way separated bike lanes share some of the same design characteristics as one-way separated bicycle lanes, but may require additional considerations at driveway and side-street crossings.

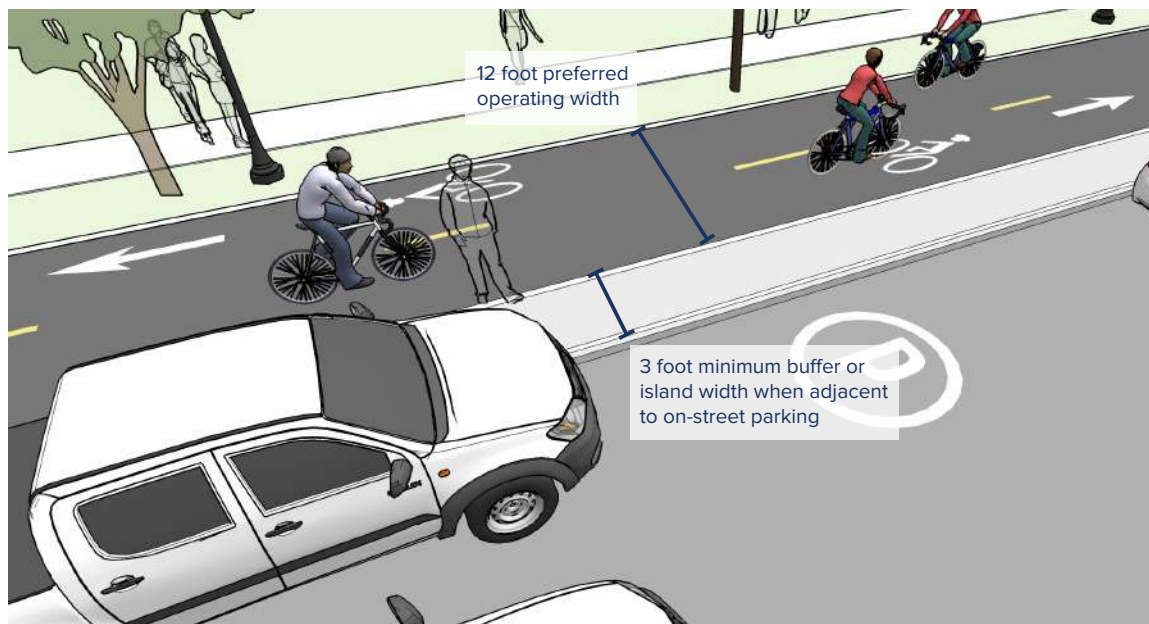
TYPICAL APPLICATION

- Works best on the left side of one-way streets.
- Streets with high motor vehicle volumes and/or speeds (similar to one-way).
- Streets with high bicycle volumes.
- Streets with a high incidence of wrong-way bicycle riding.
- Streets with few conflicts, such as driveways or cross-streets, on one side of the street.
- Streets that connect to shared use paths.

DESIGN FEATURES

- 12 foot operating width preferred (10 feet minimum) width for two-way facility. In constrained areas, an 8 foot minimum operating width may be considered.
- Adjacent to on-street parking a 3 foot minimum width channelized buffer or island shall be provided to accommodate opening doors.
- Separation narrower than 5 feet may be permitted if physical barrier separation is present.

Figure 6.26:
Example of Two-Way Separated Bike Lane



Shared Use Paths

Typical Shared Use Paths

A shared use path can provide a desirable facility, particularly for recreational users and people of all skill levels preferring separation from traffic. Paths should generally provide directional travel opportunities not provided by existing roadways.

TYPICAL APPLICATION

- Commonly established in natural greenway corridors, utility corridors, or along abandoned and converted rail corridors.
- May be established as short accessways through neighborhoods or to connect to cul-de-sacs.
- May be established along roadways as an alternative to on-street bicycle riding. This configuration is called a sidepath and is discussed further on the next page.

DESIGN FEATURES

- Recommended 10 feet width to accommodate moderate usage (12 feet preferred for heavy use). Minimum 8 feet width for low traffic situations only or in constrained areas.
- Minimum 2 feet shoulder width on both sides of the path, with an additional foot of lateral clearance as required by the MUTCD for the installation of signage or other furnishings.
- Recommended 10 feet clearance to overhead obstructions (8 feet minimum).
- When striping is required, use a 4 inch dashed yellow centerline stripe with 4 inch solid white edge lines. Solid centerlines can be provided on tight or blind corners, and on the approaches to roadway crossings.

Figure 6.27:
Example of Shared Use Path



Shared Use Paths Along Roadways

Shared use paths can be located along roadways (also called sidepaths). These facilities are bidirectional shared use paths located immediately adjacent and parallel to a roadway, when an independent right of way is not available. Sidepaths can offer a high-quality experience for users of all ages and abilities.

TYPICAL APPLICATION

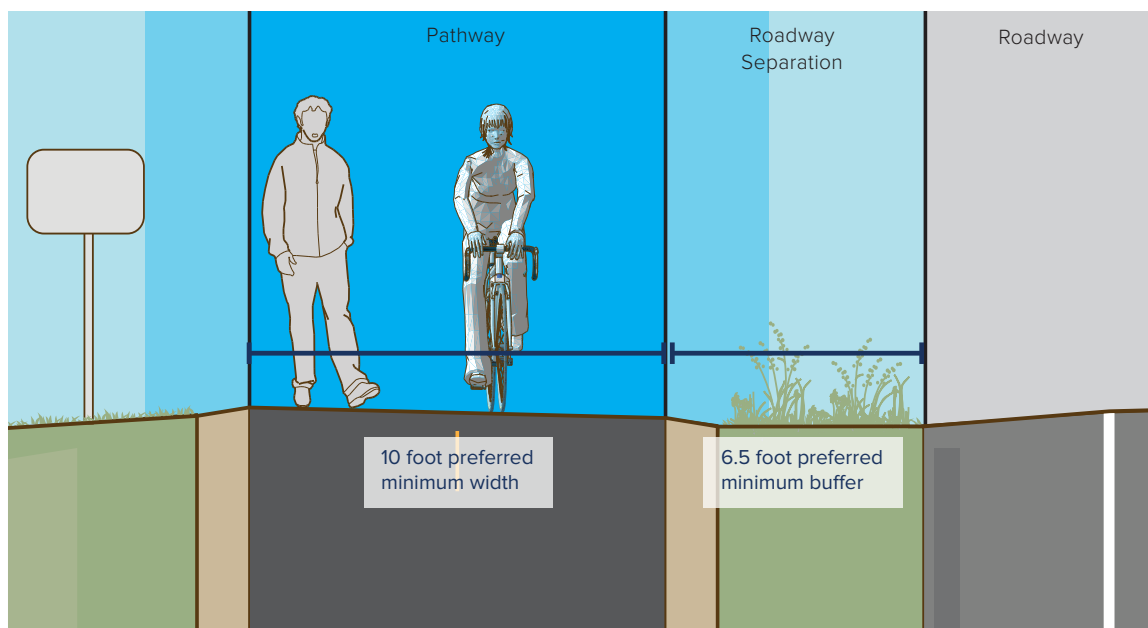
- For completing networks where existing roads are the only corridors available.
- To connect sections of independent paths or low-stress local routes such as shared use paths and bicycle boulevards.
- Adjacent to freeways where bicyclists are prohibited from using the roadway facility.
- Work best on roadways with high operating speeds and/or high motor vehicle volumes.

- Work best on roadways with fewer than 12 driveways or 6 intersections per mile.

DESIGN FEATURES

- Preferred minimum pathway width for two-way shared use is 10 feet. In low volume or constrained situations, 8 feet minimum may be adequate. A minimum 2-foot clear space should be provided on both sides of the path.
- Preferred minimum roadway separation width is 6.5 feet, with an absolute minimum separation width of 5 feet per AASHTO guidelines. Minimum dimension separation is only appropriate on lower speed roadways. (≤ 45 mph).
- Separation narrower than 5 feet is not recommended (AASHTO min.), although may be accommodated with the use of a physical barrier between the sidepath and the roadway.

Figure 6.28:
Example of Shared Use Paths Along Roadway



Shared Use Path Crossings

At-grade roadway crossings can create potential conflicts between path users and motorists. However, well-designed crossings can mitigate many operational issues and provide a higher degree of safety and comfort for path users.

The approach to designing path crossings of streets depends on an evaluation of vehicular traffic, line of sight, pathway traffic, use patterns, vehicle speed, road type, road width, and other safety issues such as proximity to major attractions.

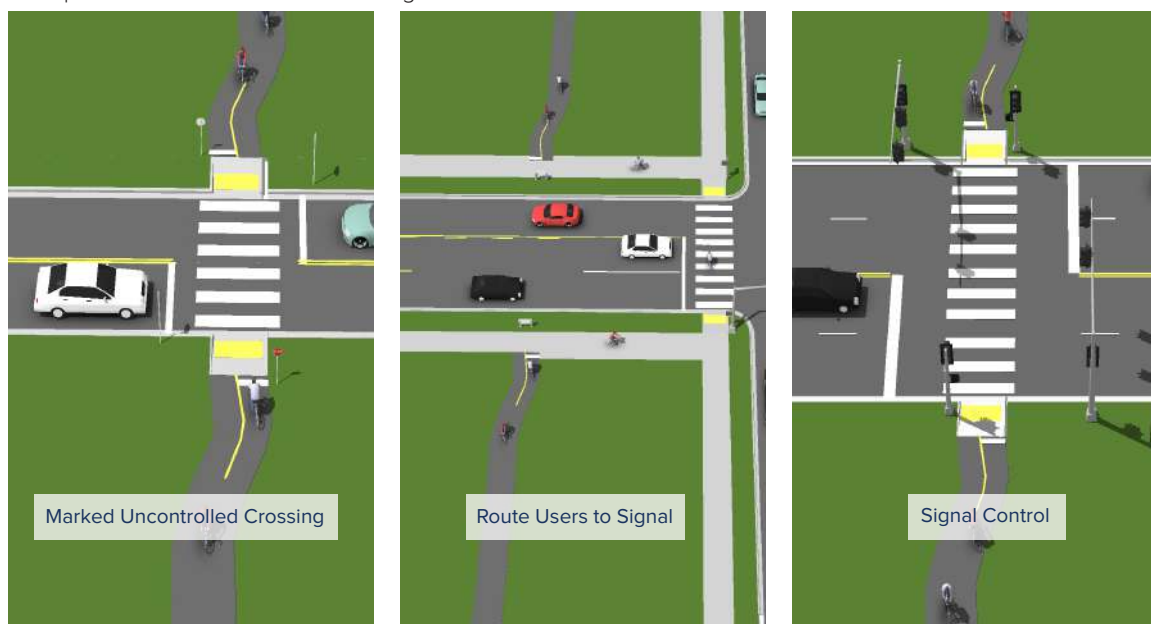
TYPICAL APPLICATION

- Unsignalized marked crossings are appropriate on two lane roads with $\leq 9,000$ -12,000 Average Daily Traffic (ADT) volumes, and speeds below 35 mph. Crossings of streets

with higher speeds, higher volumes, and additional lanes require additional enhancements such as median islands, active warning beacons, or signals.

- In most cases, path crossings should not be provided within approximately 400 feet of an existing signalized intersection. If possible, route the path directly to the signal. Barriers, signing, and sidepaths may be needed to direct shared use path users to the signalized crossings
- At signal-controlled crossings, full traffic signal installations must meet MUTCD pedestrian, school, or modified warrants. Signalized crossings should be located more than 400 feet from an existing signalized intersection, and include push button actuation for shared use path users. The maximum delay for activation of the signal should be two minutes.

Figure 6.29:
Examples of Shared Use Path Crossings



Grade-Separated Crossings

Grade-separated crossings provide critical non-motorized system links by joining areas separated by barriers such as railroads, waterways, and highway corridors. In most cases, these structures are built in response to user demand for safe crossings where they previously did not exist. There are no minimum roadway characteristics for considering grade separation. Depending on the type of facility or the desired user group, grade separation may be considered in many types of projects.

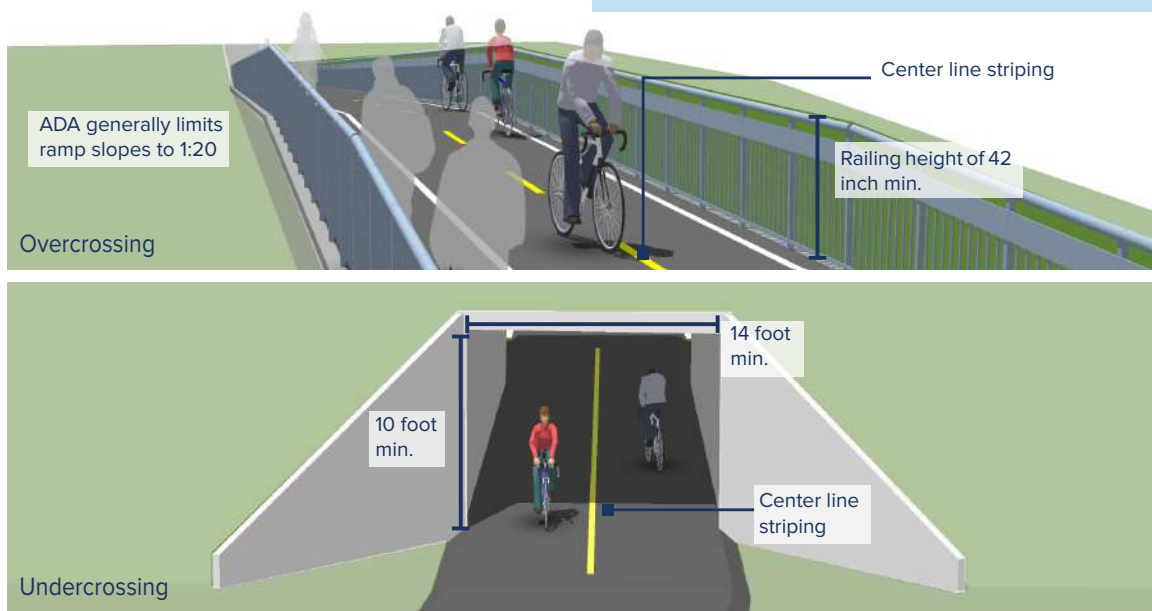
TYPICAL APPLICATION

- Where shared-use paths cross high-speed and high-volume roadways where an at-grade signalized crossing is not feasible or desired, or where crossing railways or waterways.

DESIGN FEATURES

- Overcrossings require a minimum of 17 feet of vertical clearance to the roadway below (versus a minimum elevation differential of around 12 feet for an undercrossing). They can require greater elevation differences and much longer ramps for users to negotiate. Overcrossings typically fall under the Americans with Disabilities Act (ADA), which strictly limits ramp slopes to 5% (1:20) with landings every 400 feet, or 8.33% (1:12) with landings every 30 feet. They should be at least 10 feet wide (14 feet preferred) and additional width provided at scenic viewpoints
- Undercrossings should be a minimum 10 feet high and 14 feet wide.
- To mitigate safety concerns, an undercrossing should be designed to be spacious, well-lit, equipped with emergency call boxes at each end and completely visible for its entire length from end to end.

Figure 6.30:
Example of Grade-Separated Crossings



Bicycle Facilities at Intersections

Bike Box

A bike box is a designated area located at the head of a traffic lane at a signalized intersection that provides bicyclists with a safe and visible space to get in front of queuing traffic during the red signal phase. Motor vehicles must queue behind the white stop line at the rear of the bike box. On a green signal, all bicyclists can quickly clear the intersection.

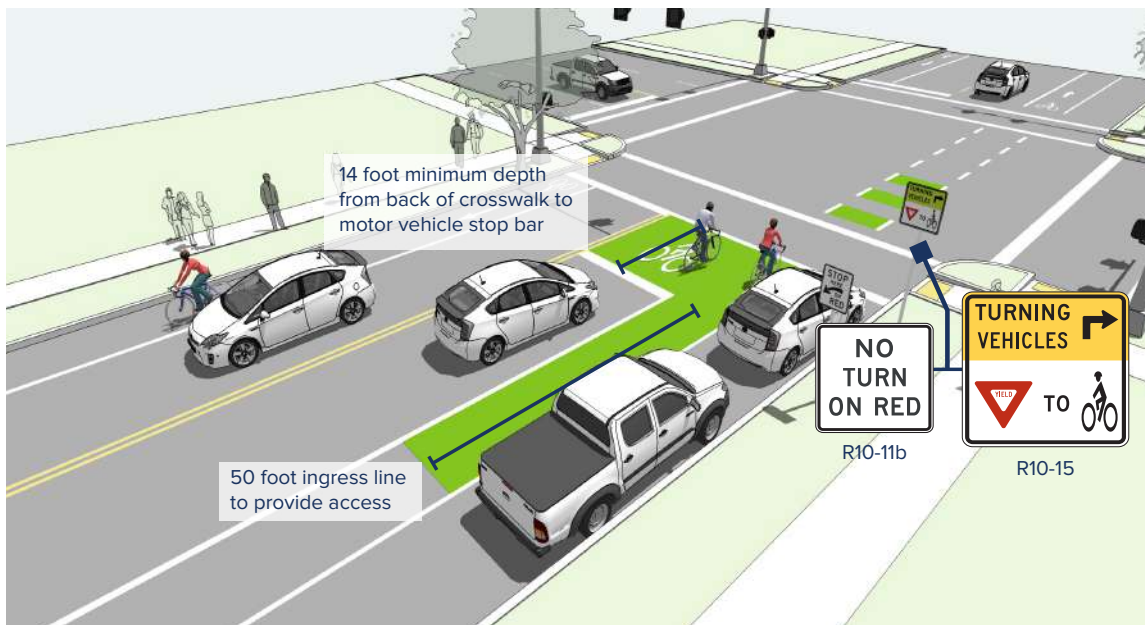
TYPICAL APPLICATION

- At potential areas of conflict between bicyclists and turning vehicles, such as a right or left turn locations.
- At signalized intersections with high bicycle volumes.

DESIGN FEATURES

- 14 foot minimum depth from back of crosswalk to motor vehicle stop bar.
- A “No Turn on Red” or “No Right Turn on Red” sign shall be installed overhead to prevent vehicles from entering the Bike Box. A “Stop Here on Red” sign should be post mounted at the stop line to reinforce observance of the stop line.
- A 50 foot ingress lane should be used to provide access to the box.
- Use of green colored pavement is optional.

Figure 6.31:
Example of Bike Box



Two-Stage Turn Boxes

Two-stage turn boxes offer bicyclists a safe way to make left turns at multi-lane signalized intersections from a physically separated or conventional bike lane. On physically separated bike lanes, bicyclists are often unable to merge into traffic to turn due to the physical separation, making two-stage turn boxes critical.

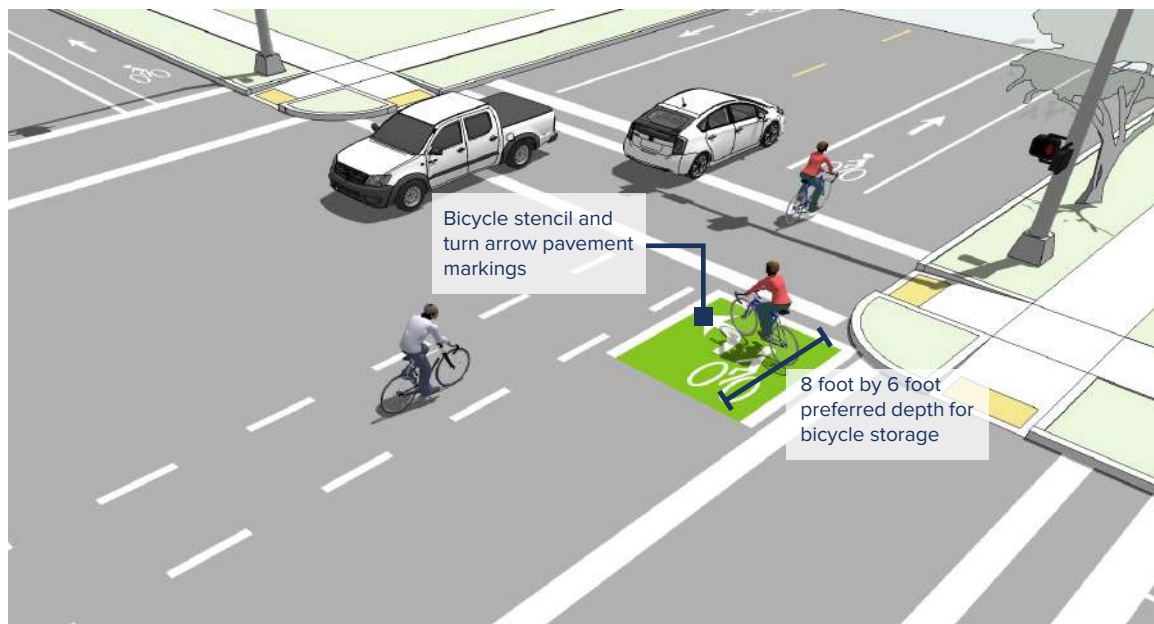
TYPICAL APPLICATION

- Streets with high vehicle speeds and/or traffic volumes.
- At intersections with multi-lane roads with signalized intersections.
- At signalized intersections with a high number of bicyclists making a left turn from a right side facility.

DESIGN FEATURES

- The two-stage turn box shall be placed in a protected area. Typically this is within the shadow of an on-street parking lane or protected bike lane buffer area and should be placed in front of the crosswalk to avoid conflict with pedestrians.
- 8 foot x 6 foot preferred depth of bicycle storage area (6 foot x 3 foot minimum).
- Bicycle symbol and turn arrow pavement markings shall be used to indicate proper bicycle direction and positioning.

Figure 6.32:
Example of Two-Stage Turn Box



Bike Lanes at Added Right Turn Lanes

The appropriate treatment at right turn only lanes is to introduce an added turn lane to the outside of the bicycle lane. The conflict area where people driving must cross the bicycle lane should be marked with dotted lines and dotted green pavement to identify the potential conflict areas. Signage should indicate that motorists must yield to bicyclists through the conflict area.

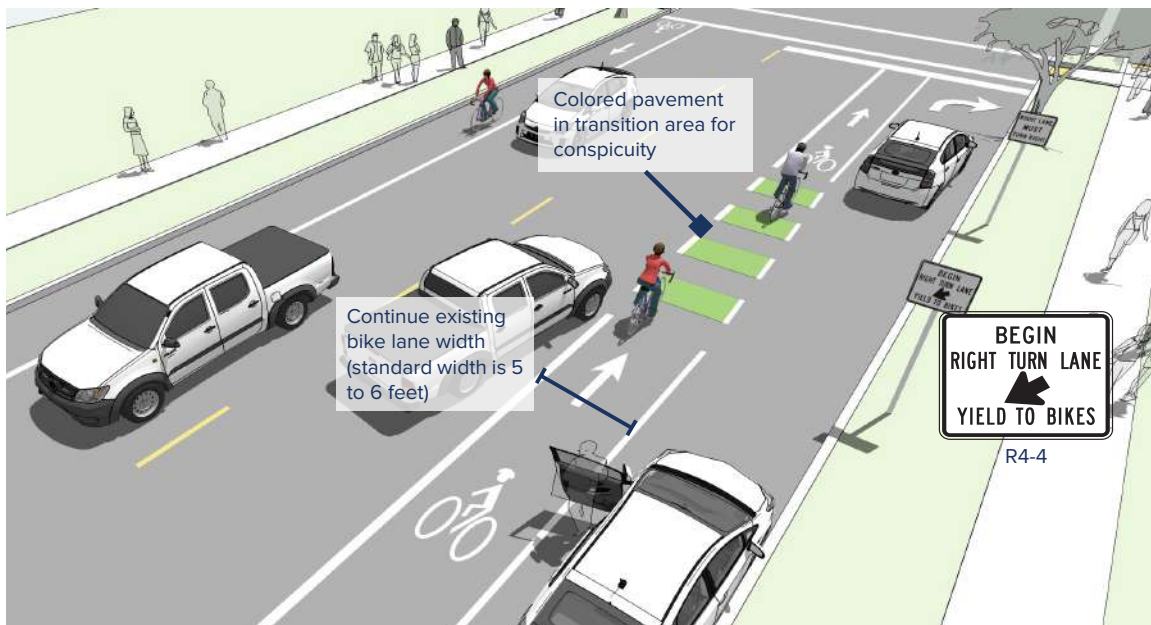
TYPICAL APPLICATION

- Streets with right turn lanes and right side bike lanes.
- Streets with left turn lanes and left side bike lanes.

DESIGN FEATURES

- Mark inside line with 6 inch stripe.
- Continue existing bike lane width; standard width of 5 to 6 feet (4 feet in constrained locations.)
- Use R4-4 BEGIN RIGHT TURN LANE YIELD TO BIKES signage to indicate that motorists should yield to bicyclists through the conflict area.
- Consider using colored pavement in the conflict areas to promote visibility of the dashed conflict area.

Figure 6.33:
Example of Bike Lanes at Added Right Turn Lanes



Bike Lanes at Through Lane to Right Turn Lane Transition

When a through lane transitions directly into a right turn only lane, bicyclists traveling in a curbside bike lane must move laterally to the left of the right turn lane. Designers should provide the opportunity for bicyclists to utilize gaps in traffic and smoothly transition to the intersection.

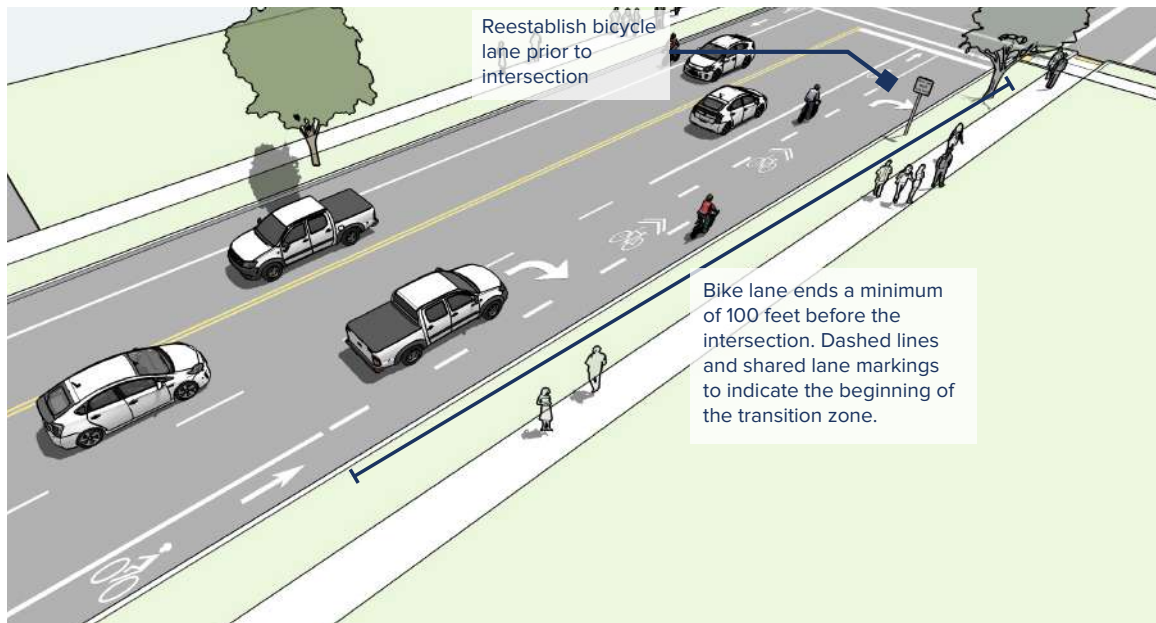
TYPICAL APPLICATION

- Streets with curbside bike lanes where a moderate to high speed (≥ 30 mph) through travel lane transitions into a right turn only lane.
- This treatment functions for skilled riders, but is not appropriate for riders of all ages and abilities. If a low stress crossing is desired in these locations, consider a Protected Bicycle Signal Phase.

DESIGN FEATURES

- End the curbside bike lane with dashed lines at least 100 feet in advance of the intersection to indicate to bicyclists to enter the general purpose travel lane.
- Use shared lane markings to raise awareness of the presence of bicyclists in the travel lanes during the transition segment.
- Reestablish a standard or wide bicycle lane to the left of the right turn only lane.
- The transition area should be a minimum of 50 feet long, or a minimum of 100 feet long along higher speed or higher volume roadways (MUTCD, NACTO).

Figure 6.34:
Example of Bike Lanes at Through Lane to Right Turn Lane Transition



Combined Bike Lane/Turn Lane

Where there isn't room for a conventional bicycle lane and turn lane, a combined bike lane/turn lane creates a shared lane where bicyclists can ride and turning motor vehicles yield to through traveling bicyclists. The combined bike lane/turn lane places shared lane markings within a turn only lane.

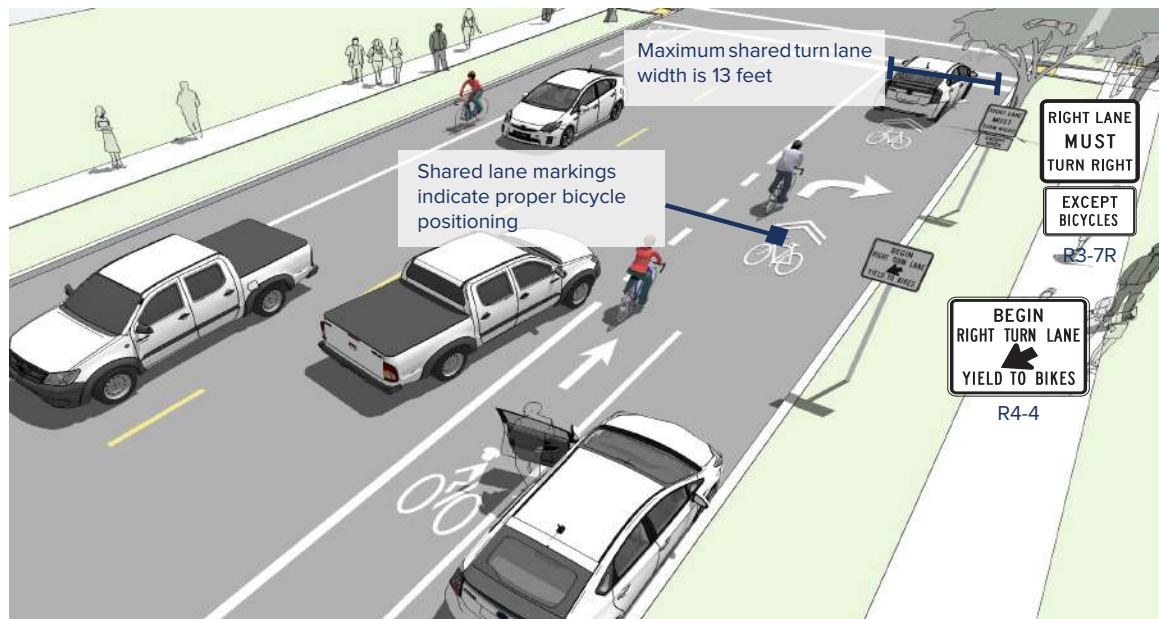
TYPICAL APPLICATION

- Most appropriate in areas with lower posted speeds (30 mph or less) and with lower traffic volumes (10,000 ADT or less).
- May not be appropriate for high speed arterials or intersections with long right turn lanes.
- May not be appropriate for intersections with large percentages of right-turning heavy vehicles.

DESIGN FEATURES

- Maximum shared turn lane width is 13 feet; narrower is preferable (NACTO, 2012).
- Shared lane markings should indicate preferred positioning of bicyclists within the combined lane.
- A "RIGHT LANE MUST TURN RIGHT" sign with an "EXCEPT BIKES" supplemental plaque may be needed to permit through bicyclists to use a right turn lane.
- Use an R4-4 "BEGIN RIGHT TURN LANE YIELD TO BIKES" sign to indicate that motorists should yield to bicyclists through the conflict area.

Figure 6.35:
Example of Combined Bike Lane/Turn Lane



Intersection Crossing Markings

Bicycle pavement markings through intersections guide bicyclists on a safe and direct path through the intersection and provide a clear boundary between the paths of through bicyclists and vehicles in the adjacent lane.

TYPICAL APPLICATION

- Streets with conventional, buffered, or separated bike lanes.
- At direct paths through intersections.
- Streets with high volumes of adjacent traffic.
- Where potential conflicts exist between through bicyclist and adjacent traffic.

DESIGN FEATURES

- Intersection markings should be the same width and in line with the leading bike lane.
- Dotted lines should be a minimum of 6 inches wide and 4 feet long, longitudinally spaced every 12 feet.
- All markings should be white, skid resistant, and retro reflective.
- Green pavement markings may also be used.

Figure 6.36:
Example of Intersection Crossing Markings



Mixing Zone

A mixing zone creates a shared travel lane where turning motor vehicles yield to through traveling bicyclists. Geometric design is intended to slow motor vehicles to bicycle speed, provide regulatory guidance to people driving, and require all users to negotiate conflicts upstream of the intersection.

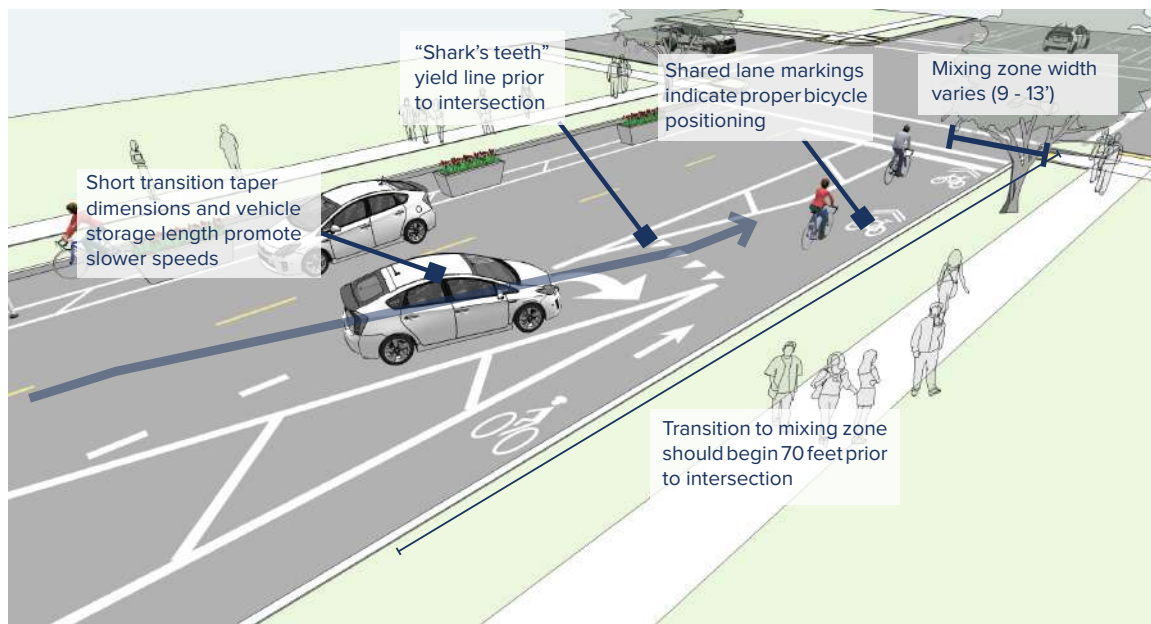
TYPICAL APPLICATION

- Most appropriate in areas with low to moderate right turning vehicular volumes.
- Streets with a right turn lane but not enough width to have a standard width bicycle lane at the intersection.

DESIGN FEATURES

- Use short transition taper dimensions and short storage length to promote slow motor vehicle travel speeds.
- The width of the mixing zone should be 9 feet minimum and 13 feet maximum.
- The transition to the mixing zone should begin 70 feet in advance of the intersection.
- Shared lane markings should be used to illustrate bicyclists' position within the zone.
- A yield line should be used in advance of the intersection.

Figure 6.37:
Example of Mixing Zone



Detection and Signal Timing for Bicyclists

Loop Detectors. Bicycle-activated loop detectors installed in the roadway trigger a change in the traffic signal, allowing the bicyclist to stay within the travel or bike lane without having to maneuver to the roadside to push a button. Loops that are sensitive enough to detect bicycles should be supplemented with pavement markings to instruct bicyclists how to trip them.

Video Detection Cameras. These systems use digital image processing to detect an image change at a location. These can be calibrated to detect bicycles.

Remote Traffic Microwave Sensor Detection (RTMS). Uses frequency-modulated continuous wave radio signals to detect objects in the roadway, which marks the detected object with a time code to determine its distance from the sensor. The RTMS system is unaffected by temperature and lighting, which can affect standard video detection.

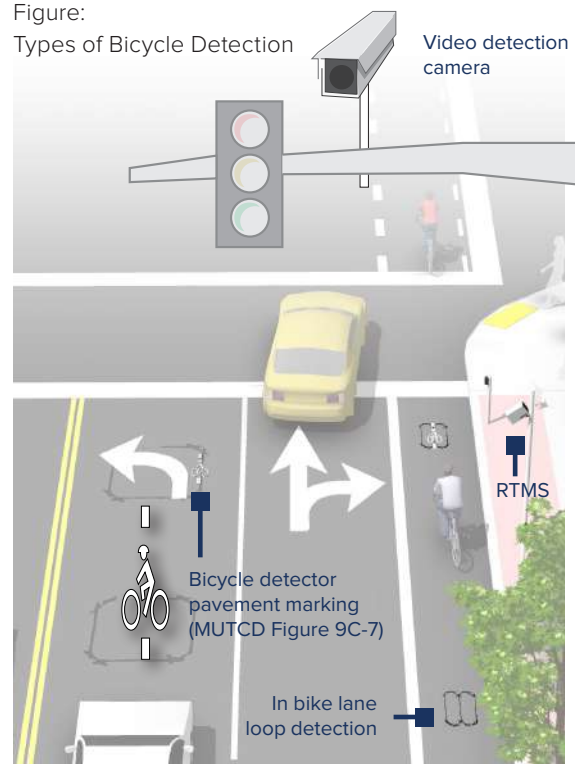
TYPICAL APPLICATION

- Signalized intersections and where bicyclists require crossing of a major street with high vehicle speeds and/or traffic volumes where a signal either exists or is needed.
- Where bicyclists are not currently detected or where detection, actuation, or timing is inadequate to provide a safe and comfortable crossing for users of all ages and abilities.
- Where bicycle ridership data needs to be collected.

DESIGN FEATURES

- Recommend a minimum green time for streets that do not possess bicycle detection that accommodates bicyclists traveling at the 15th percentile speed using the formula: minimum green time = $3 + (\text{width} / 14 \text{ ft/s})$
- Shorter minimum green times should only be utilized only when bicycle detection is available, but not activated by a bicyclist. This may improve capacity and reduce unnecessary wait times in some scenarios.

Figure:
Types of Bicycle Detection



Protected Bicycle Signal Phase

Protected bicycle lane crossings through signalized intersections can be accomplished through the use of a bicycle signal phase which reduces conflicts with motor vehicles by separating bicycle movements from any conflicting motor vehicle movements, especially turns. Bicycle signals are traditional three-lens signal heads with green, yellow, and red bicycle stenciled lenses.

TYPICAL APPLICATION

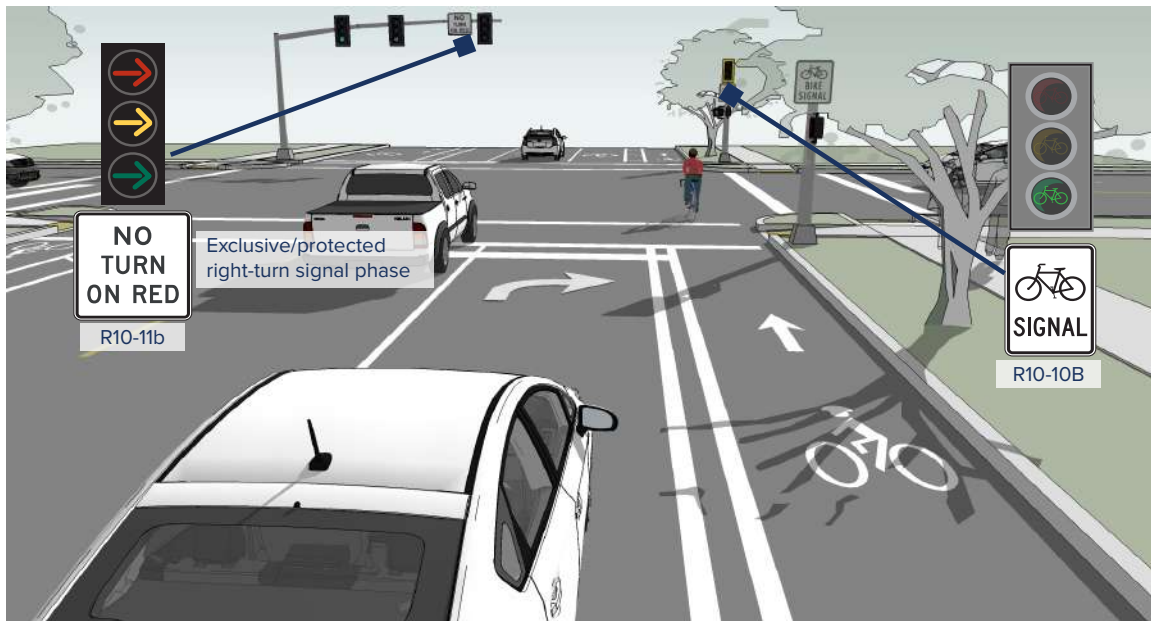
- Two-way separated bike lanes where contra-flow bicycle movement or increased conflict points warrant protected operation.
- Bicyclists moving on a green or yellow signal indication in a bicycle signal shall not be in conflict with any simultaneous motor vehicle movement at the signalized location.

- Right (or left) turns on red should be prohibited in locations where such operation would conflict with a green bicycle signal indication.

DESIGN FEATURES

- An additional “Bicycle Signal” sign should be installed below the bicycle signal head.
- Designs for bicycles at signalized crossings should allow bicyclists to trigger signals and safely maneuver the crossing.
- On bikeways, signal timing and actuation shall be reviewed and adjusted to consider the needs of bicyclists.

Figure 6.39:
Example of Protected Bicycle Signal Phase



Bike Lanes at Channelized Turn Lanes

Bicycle-friendly channelized turn lanes can reduce the risk of potential conflicts between bicyclists and turning vehicles by improving sight lines of turning vehicles, slowing turning vehicle speed, and reminding users of bicycle priority in conflict areas.

TYPICAL APPLICATION

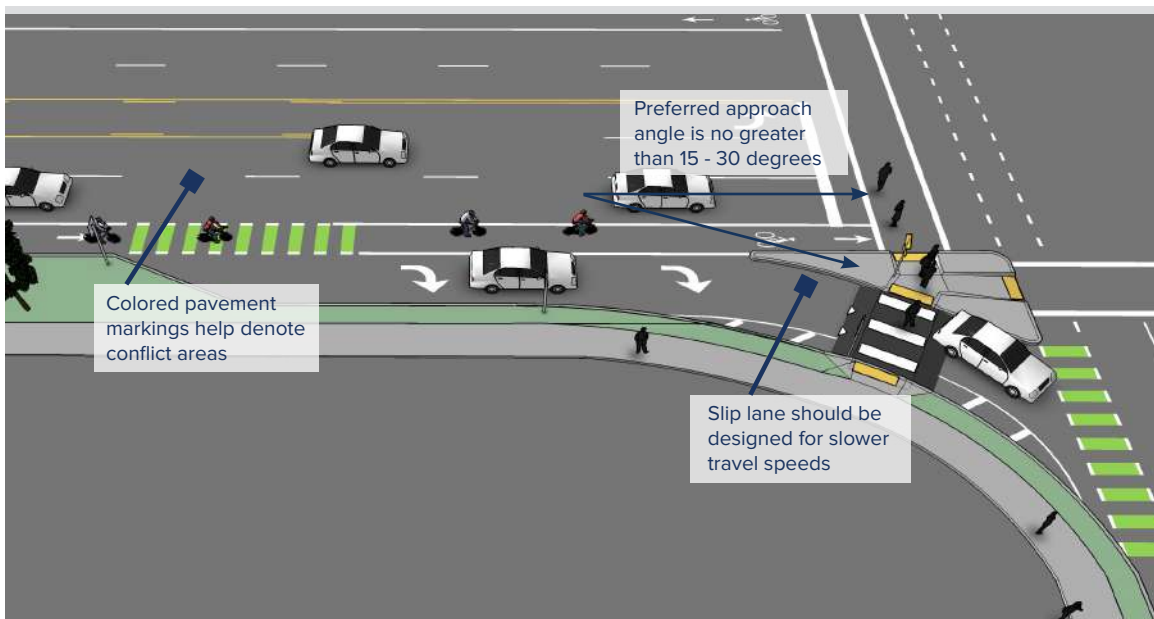
- At signalized intersections.
- Intersections with high right turn traffic volumes, and very low levels of pedestrian activity.
- Increase intersection efficiency for vehicles and reduce delay at areas with high right-turn traffic volumes.

- Wide streets with long crossing distances; transition across bike lane should be as short as possible to reduce bicyclist exposure.
- As an improvement to intersections with an existing traditional channelized right-turn lane.

DESIGN FEATURES

- The preferred angle of approach is no more than 15-30 degrees.
- Design the turn radius of the right turn lane to encourage appropriate deceleration in preparation for yielding to crossing pedestrians.
- Colored pavement markings should be used at locations where motor vehicles are directed to cross bicycle lanes.

Figure 6.40:
Example of Bike Lanes at Channelized Turn Lanes



Bike Lanes at Entrance and Exit Ramps

Some arterials may contain high speed free-way-style designs such as merge lanes and exit ramps, which can create difficulties for people on bicycles. The entrance and exit lanes typically have intrinsic visibility problems because of low approach angles and high speed differentials between bicyclists and motor vehicles. Strategies to improve safety focus on increasing sight distances, creating formal crossings, and minimizing crossing distances.

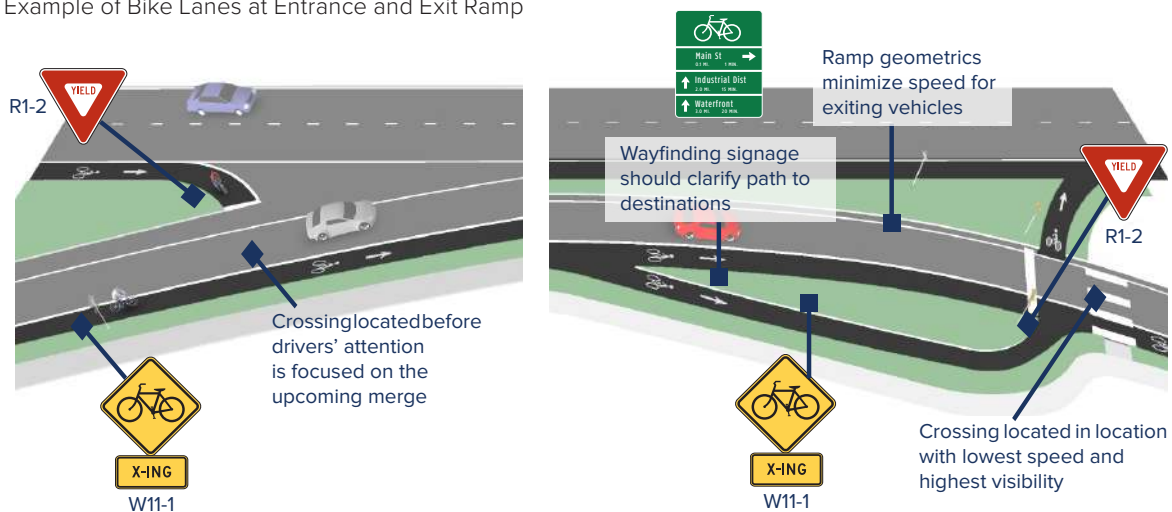
TYPICAL APPLICATION

- Streets with high speed freeway style merge lanes.
- Where users are skilled adult riders.
- Design strategies differ for low-speed and high-speed configurations.

DESIGN FEATURES

- On low-speed entrance ramps (≤ 35 mph), the bike lane should travel straight through the merge area. Use dotted lines, colored pavement, and signs to define bicyclist priority over merging traffic.
- At high-speed entrance ramps (≥ 40 mph), with dedicated receiving lanes, bicyclists should be encouraged to yield to merging traffic and cross when safe. Angle the bike lane to increase the approach angle with entering traffic and position the crossing before the drivers' attention is focused on the upcoming merge.
- On low-speed exit ramps (≤ 40 mph), the bike lane should travel straight through the merge area. Use dotted lines, colored pavement, and signs to define bicyclist priority.
- On high-speed exit ramps (≥ 45 mph), use a 45 foot (35 foot minimum) jug handle turn to bring bicyclists to a visible location with exiting traffic and a 45 foot (35 foot minimum) taper from roadway.

Figure:
Example of Bike Lanes at Entrance and Exit Ramp



“Toucan” Signal

“Toucan” crossings of streets are a type of signal configuration that provides minor street or mid-block signal indication for bicyclists and pedestrians, but not for motor vehicles, so that “two can” cross the major street.

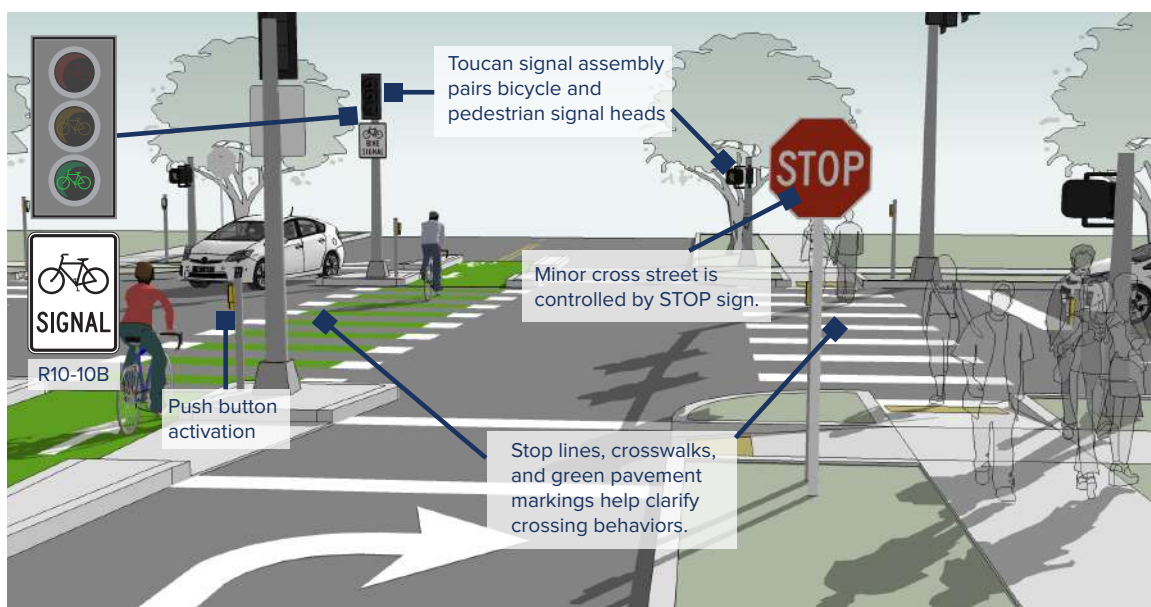
TYPICAL APPLICATION

- Appropriate at mid-block or carefully designed intersection locations.
- Across higher traffic streets where pedestrians and bicyclists are crossing together.
- Across higher traffic streets where a conventional traffic signal or pedestrian hybrid beacon is considered to assist in pedestrian and bicyclist crossings.

DESIGN FEATURES

- A toucan signal assembly may be created by pairing a bicycle signal head with a pedestrian signal head.
- If located at an intersection, the major street receives standard traffic signal control, and the minor cross street has a STOP sign to control motor vehicle traffic. The design may be paired with access management or other measures to reduce potential motor vehicle-bicycle and motor vehicle-pedestrian conflicts.
- The walking and bicycling phase is typically activated by a push button or by passive detection.
- Stop lines, high visibility crosswalk markings, and bicycle lane dotted line extensions should be used to clarify crossing expectations.
- Green colored pavement may be used to highlight the bike lane crossing.

Figure 6.42:
Example of “Toucan” Signal



Protected Intersections

A protected intersection uses a collection of intersection designs that maximize user comfort within the intersection and promote a high rate of yielding to people bicycling. The design is based on a setback bikeway crossing using physical separation within the intersection to define the turning paths of motor vehicles, slow motor vehicle turning speed, and offer a comfortable refuge for people bicycling and walking while waiting at a red signal.

TYPICAL APPLICATION

- At signalized intersections along streets with separated bicycle lanes.
- At signalized intersections along streets with other bikeway types, provided that the bikeway transitions into a separated bicycle lane just upstream of the intersection.
- Connecting two or more appropriate Regional Active Transportation Network facilities.
- Along crossings of major or minor streets to slow vehicles and increase yielding.
- At corner locations where pedestrian curb extensions are desired.

DESIGN FEATURES

- Setback bicycle crossing of 20 feet allows for one passenger car to queue while yielding. A larger setback is desired in high speed areas (> 35 mph). Smaller setback distance is possible in slow-speed, constrained conditions.
- Corner safety island with a 15-20 foot corner radius slows motor vehicle speeds. Larger radius designs may be possible when paired with a deeper setback or a protected signal phase.
- A forward stop bar should indicate the area for people bicycling to wait at a red signal.
- If a permissive left turn is allowed, a median island extending into the intersection should be used to channelize and direct left turning motor vehicles.
- Intersection crossing markings should be used to identify the bicycle crossing. Consider green pavement to highlight the crossing area.

Figure 6.43:
Example of Protected Intersection



Single Lane Roundabouts

In single lane roundabouts it is important to indicate to motorists, bicyclists and pedestrians the right-of-way rules and correct way for them to circulate, using appropriately designed signage, pavement markings, and geometric design elements.

TYPICAL APPLICATION

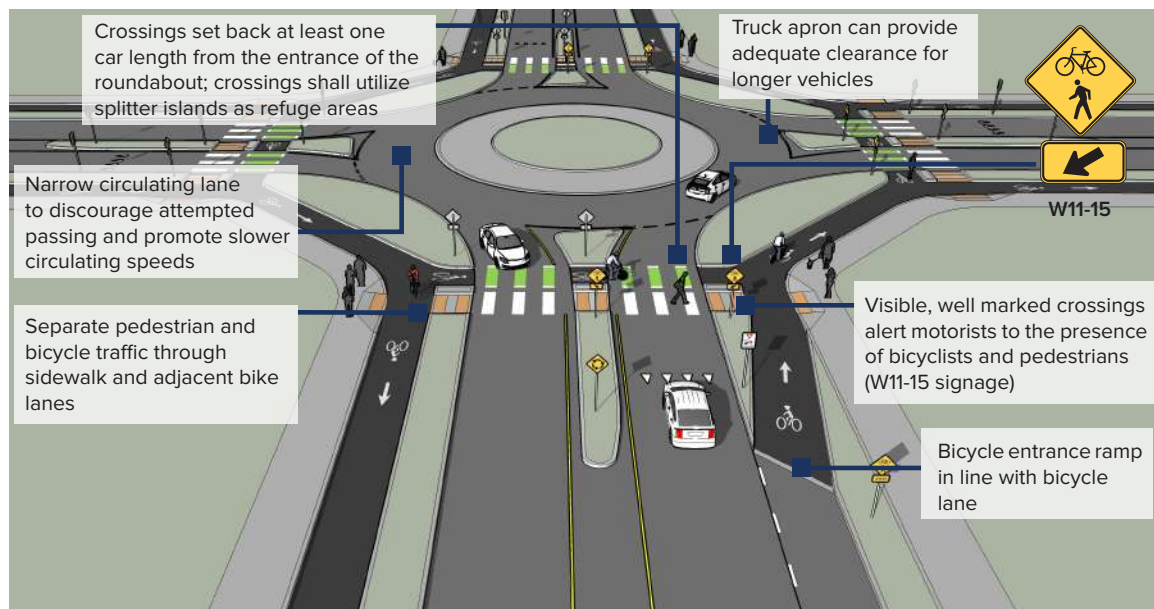
- Where a bike lane or separated bikeway approaches a single-lane roundabout.

DESIGN FEATURES

- 25 mph maximum circulating design speed
- Design approaches/exits to the lowest speeds possible.
- Encourage bicyclists navigating the roundabout like motor vehicles to “take the lane.”
- Maximize yielding rate of motorists to pedestrians and bicyclists at crosswalks.
- Provide separated facilities for bicyclists who prefer not to navigate the roundabout on the roadway.

Figure 6.44:

Example of Single Lane Roundabout with Bicycle and Pedestrian Crossings & Infrastructure



Minor Bicycle Boulevard Intersections

Treatments at minor roadway intersections are designed to improve the visibility of a bicycle boulevard, raise awareness of motorists on the cross-street that they are likely to encounter bicyclists, and enhance safety for all road users.

Stop signs increase bicycling time and energy expenditure, frequently leading to non-compliance by bicyclists and motorists, and/or use of other less desirable routes. Bicycle boulevards should have fewer stops or delays than other local streets. A typical bicycle trip of 30 minutes can increase to 40 minutes if there is a STOP sign at every block (see *Berkeley Bicycle Boulevard Design Tools and Guidelines*). If several stop signs are turned along a corridor,

speeds should be monitored and traffic-calming treatments used to reduce excessive vehicle speeds on the bicycle boulevard.

DESIGN FEATURES

- The majority of intersections with minor roadways should have stop-control for cross traffic to minimize bicyclist delay and maximize bicyclist efficiency.
- Traffic circles are a type of horizontal traffic calming that can be used at minor street intersections. Traffic circles reduce conflict potential and severity while providing traffic calming to the corridor.
- If a stop sign is present on the bicycle boulevard, a second stop bar for bicyclists can be placed closer to the centerline of the cross street than the motorists' stop bar to increase the visibility of bicyclists waiting to cross the street.
- Curb extensions can be used to move bicyclists closer to the centerline to improve visibility and encourage motorists to let them cross.
- Vegetation in traffic circles and curb extensions should be regularly trimmed to maintain visibility and attractiveness. Repaint bicycle stop bars as needed.

Figure 6.45:
Examples of Minor Bicycle Boulevard Intersections



Stop Signs on Cross-Street



Traffic Circles



Bicycle Forward Stop Bar



Curb Extension

Major Bicycle Boulevard Intersections

The quality of treatments at major street crossings can significantly affect a bicyclist's choice to use a bicycle boulevard, as opposed to another road that provides a crossing treatment.

Maintain signs, markings, and other treatments and replace as needed. Monitor intersections for bicyclist delay to determine if additional treatments are warranted.

TYPICAL APPLICATION

- Bicycle boulevard retrofits to local streets are typically located on streets without existing signalized accommodation at crossings of collector and arterial roadways. Without

treatments for bicyclists, these intersections can become major barriers along the bicycle boulevard and compromise safety.

DESIGN FEATURES

- Bike boxes increase bicyclist visibility to motorists and reduce the danger of right “hooks” by providing a space for bicyclists to wait at signalized intersections.
- Median islands provided at uncontrolled intersections of bicycle boulevards and major streets allow bicyclists to cross one direction of traffic at a time as gaps in traffic occur.
- Hybrid beacons, active warning beacons and bicycle signals can facilitate bicyclists crossing a busy street on which cross-traffic does not stop.
- Select treatments based on engineering judgment; see National Cooperative Highway Research Program (NCHRP) Report # 562 Improving Pedestrian Safety at Unsignalized Crossings (2006) for guidance on appropriate use of crossing treatments. Treatments are designed to improve visibility and encourage motorists to stop for pedestrians; with engineering judgment many of the same treatments are appropriate for use along bicycle boulevards.

Figure 6.46:
Examples of Major Bicycle Boulevard Intersections



Bike Box



Median Island



Hybrid Beacon (HAWK)



Rectangular Rapid Flash Beacon (RRFB)



CHAPTER 7

Infrastructure and Implementation



Proposed Walking & Bicycling Network

Introduction & High Comfort Network

High comfort walking and bicycling facilities, like separated bike lanes and buffered bike lanes (shown in maps as enhanced bicycle facilities), bicycle boulevards, and shared-use paths, appeal to a more diverse cross section of the public than conventional, on-street facilities like bike lanes. They are considered high comfort because of physical protection or separation from traffic or the use of low volume, low speed streets (in the case of bicycle boulevards).

Many Southern Nevadans would like to walk or ride bicycles more but are discouraged from doing so by perceived safety concerns, lack of facilities, or a lack of knowledge about where the appropriate facilities are located. National surveys indicate that 50-60% of people say they would ride a bicycle more (or start riding if they do not already) if they had access to facilities

that provided more separation from traffic, lower traffic speeds, and/or lower traffic volumes.

The proposed facilities shown on maps and in figures in this chapter attempt to identify the most appropriate facility for a given street while also taking into consideration multiple other factors such as feasibility, network density, and cost. Further study, engineering judgment, and prioritization will often be required by jurisdictions prior to implementation.

IMPROVEMENTS FOR UNDERSERVED POPULATIONS

Underserved, minority, poor, old, and young populations often bear a disproportionate transportation burden because of where housing and jobs available to them are located. The active transportation network recommended by this plan specifically seeks to provide high comfort biking and walking options for these demographic groups due to their dependency on biking, walking, and transit as primary modes of transportation. Additionally, the prioritization methodology developed by this plan recognizes facilities that serve these traditionally under-served populations.

BENEFITS

Separated or traffic-calmed on-street facilities for people riding bicycles also create a better pedestrian experience by reducing traffic speeds or, in the case of separated bike lanes, increasing the distance and physical separation

Figure 7.1:
Wide Sidewalk Allowing Walking Six Abreast



between pedestrian zones and active motor vehicle travel lanes. Additionally, evidence has shown that communities with higher bicycling rates tend to have lower bicycle crash rates by benefiting from the effect of “safety in numbers”.¹

In addition to safety benefits, high comfort facilities can improve retail sales in commercial areas, contribute to higher property values², and provide more transportation choices to the average person. The latter, in turn, often leads to a more balanced mode share between different transportation modes, contributing to improved air quality, improved health outcomes, more diversified transportation investment, and greater network resiliency and effectiveness.

1 Marshall, W., and N. Garrick, 2011 - Evidence on why bike-friendly cities are safer for all road users, *Environmental Practice*, 13, 1.

2 “Omaha Recreational Trails: Their Effect on Property Values and Public Safety”. Rivers and Trails Conservation Assistance, National Park Service. Donald L. Greer, 2000; “Nebraska Rural Trails: Three Studies of Trail Impact”. Rivers and Trails Conservation Assistance, National Park Service. Donald L. Greer, 2001.

SOUTHERN NEVADA STRONG (SNS)

Southern Nevada's guiding planning document states that "the vision shows a possible future... in which walking, biking and transit are available, safe, and convenient." Several SNS goals also support the development of a high comfort walking and bicycling network. Goal 3, for example, states that Southern Nevada should "develop a safe, efficient road network that supports all transportation modes." Additionally, SNS includes this nod to connectivity and reliability: "Non-motorized mode facilities need the same continuity and connectivity in order to provide a reliable network of infrastructure for non-motorized options", including walking and bicycling.

The next section focuses on high comfort facility types. Descriptions of other facility types, such as standard bike lanes, that are included in the analysis and maps in this chapter can be found in Chapters 2 and 6.

Proposed Walking & Bicycling Network

High Comfort Facilities

ENHANCED BICYCLE FACILITIES

Enhanced bicycle facilities consist of two distinct bicycle facilities: buffered bike lanes and separated bike lanes. Both facilities are described below and provided "enhanced" bicycle comfort beyond traditional bike lanes. In most cases, future engineering review by the jurisdictions will be needed to determine which facility type to implement on a given roadway based on a variety of factors including traffic speeds and volume, driveway frequency, presence or absence of on-street parking, drainage, and maintenance resources.

Separated Bike Lanes

In many cases, separated bike lanes, which are typically about 8-12' (one-way) or 12-16' (two-way) wide, including the physical separation, can be implemented in underutilized parking or travel lanes. They may be implemented at roadway level, separated by parking, planters, curbs, or trees, or raised between the roadway and the sidewalk.

Figure 7.2:
Stephanie Street Separated Bike Lane, Henderson



Separated bike lanes have been implemented in 34 states in the U.S., including about one mile each in both Henderson and Boulder City. Separated bike lanes are approved and encouraged by FHWA, NACTO, and AASHTO. 96 percent of bicyclists surveyed on separated bike lanes say that they improve perceived safety and are more enjoyable to use than other facility types, like bike lanes.

Although separated bike lanes and buffered bike lanes are grouped together under the "enhanced bicycle facility" classification, it should be noted that separated bike lanes provide a higher level of comfort. A preliminary network of separated bike lanes has been recommended in Map 7.2 but should be vetted through future review or engineering studies prior to implementation.

Buffered Bicycle Lanes

Buffered bicycle lanes add a painted buffer to a conventional bike lane (described in previous sections) but do not have the physical buffer or separation of a separated bike lane. The painted

Figure 7.3:
Buffered Bike Lane



Facility Types

buffer provides additional space between the bike lane and travel lane and/or parking lane. In some cases, buffered bike lanes are an effective tool to discourage motorists from driving or parking in a bike lane that would otherwise be excessively wide (i.e. where the bike lane has replaced a parking lane or a wide shoulder).

BICYCLE BOULEVARDS

Bicycle boulevards are a type of shared roadway. They are implemented on low-volume, low-speed streets and enhance comfort for bicyclists as well as residents and pedestrians. They utilize a variety of treatments, such as signage, pavement markings, traffic calming, and/or traffic diversion and intersection modifications, to create a calm street that also benefits neighbors, schools, and other roadway users. Bicycle boulevards have also been shown to have a positive impact on property values.¹

Figure 7.4:
Bicycle Boulevard Traffic Calming and Diversion



¹ Rice, E., 2008 - Valuing Bike Boulevards in Portland Through Hedonic Regression, USP 570 Analytical Term Paper

Specific calming techniques and intersections are not included in the proposed facilities maps because they will depend on conditions at each intersection. Some intersections may not need any modifications to be comfortable for use by people on bikes. Typically, local streets with vehicle speeds at or below 25 miles per hour and vehicle volumes at or below 3,000 vehicles per day (with 1,500 vehicles per day preferred) are the most appropriate for bicycle boulevards.

SHARED-USE PATHS & SIDEPATHS

Shared-use paths are facilities separated from roadways for use by bicyclists, pedestrians, and other non-motorized users (i.e. Las Vegas Wash Trail or River Mountains Loop Trail). They are frequently built along railroads, utility corridors, and waterways, but can also exist within street or highway rights-of-way (called sidepaths) with adequate separation. Due to their proximity to traffic, sidepaths requires additional safety considerations, especially at intersections and driveways.

Figure 7.5:
River Mountains Loop Trail near Lake Mead NRA



Proposed Walking & Bicycling Network

Recommended Regional Facilities

TOTAL BUILDOUT

This plan's 1,336 newly identified miles of paths, bike lanes, and bicycle boulevards (181.3 miles of which will replace existing facilities; Figure 7.8; Appendix E) will bring the total future walking and bicycling network to approximately 2,023 miles.

The future, built out network would be predominantly high comfort (72.6%, 1,468.6 miles), as evidenced by Map 7.1 as well as the Level of Comfort maps later in this chapter, Figures 7.8 and 7.9, and the following analysis.

Map 7.2 identifies where separated bike lanes may be appropriate. It is included for reference in order to show where separated bike lanes may be appropriate. Other maps show separated and buffered bike lanes in once category called “enhanced bicycle facilities”. Proposed separated bike lanes, as with all infrastructure recommendations, should be further evaluated prior to implementation.

Figure 7.6:
Makeup of the Total Study Area Buildout (Existing + Proposed) Bicycling and Walking Facility Mileage

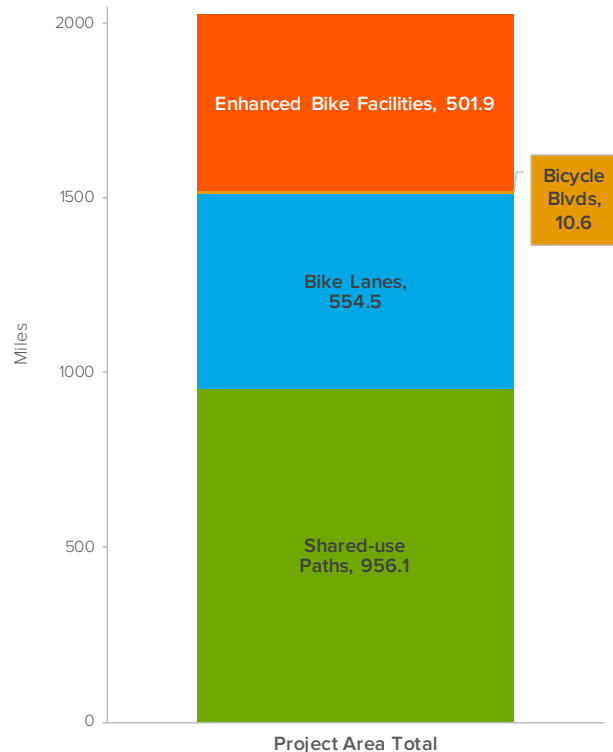
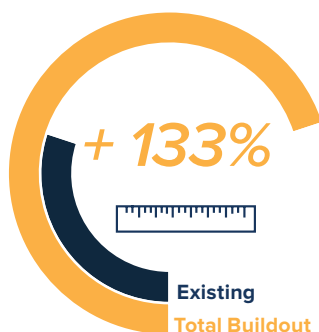


Figure 7.7:
System Mileage Increases and Future High Comfort Share (Entire Study Area)

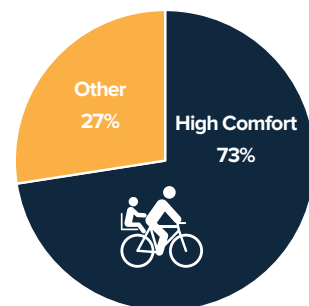
Total Facility Mileage

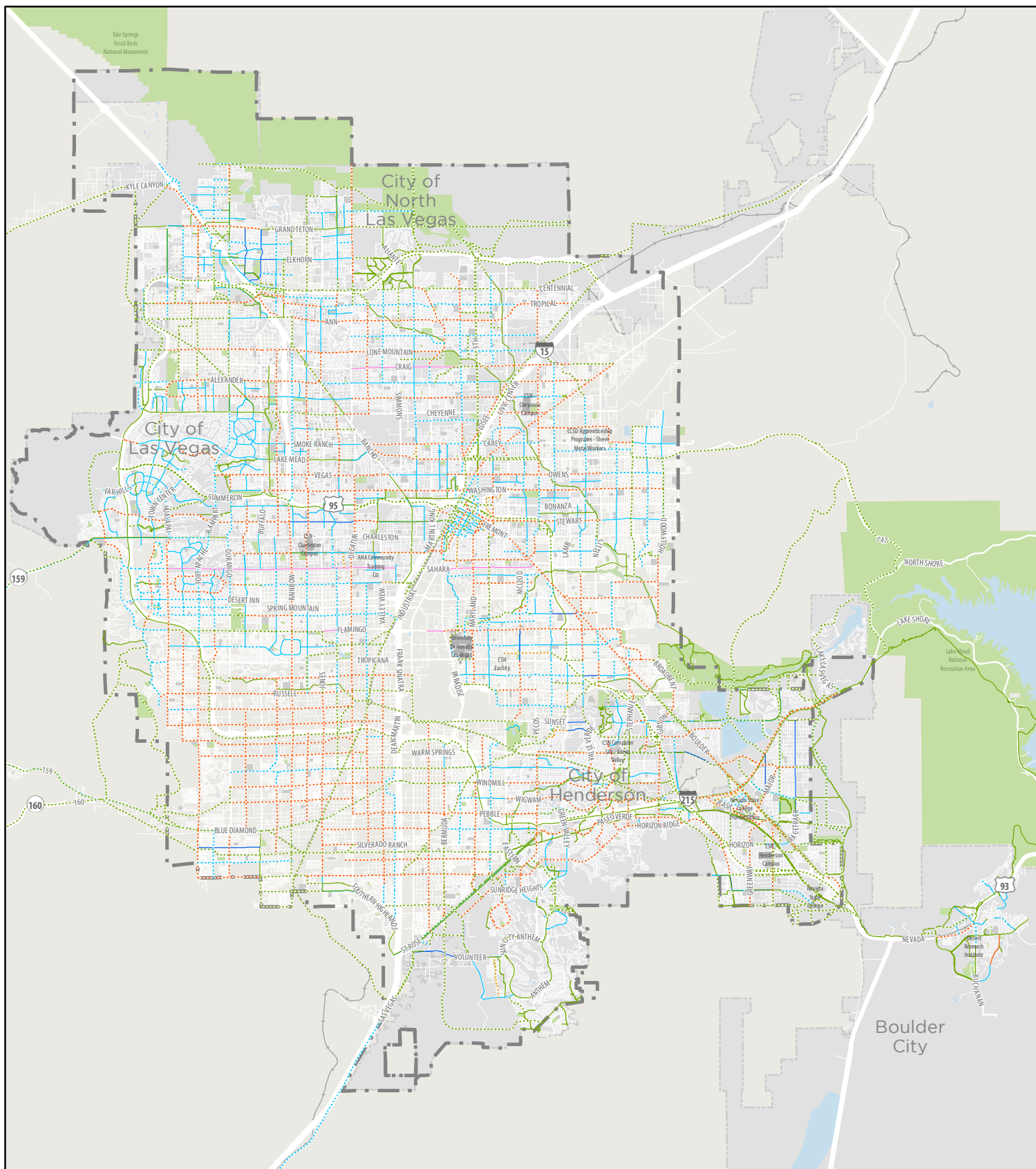


High Comfort Facilities



% of High Comfort Facilities





Map 7.1
Regional Bicycle and Pedestrian Plan for
Southern Nevada

Existing & Proposed Facilities Map

Data Source: Clark County and RTC GIS; 2011 North Las Vegas
Comprehensive Bikeway and Trails Plan, 2014 Regional Bicycle
Gap Analysis, 2016 Las Vegas Mobility Master Plan
Map Created: April 13, 2017
Map Produced By: Alta Planning + Design

- Proposed Facilities**
(New or Previously Planned)
- Enhanced Bicycle Facility
(Separated or Buffered Bike Lane)
 - Bike Lane
 - Bicycle Boulevard
 - Shared-use Path

- Existing Facilities**
- Separated Bike Lane
 - Buffered Bike Lane
 - Bike Lane
 - Bus/Bike Lane
 - Shared-use Path

- Park/Nat'l Area
- School
- College
- Municipality
- Southern Nevada Public
Land Management Act
Boundary

Note: This map of existing and proposed facilities was developed to achieve the goals of the Regional Bicycle and Pedestrian Plan. Additional review and analysis of proposed facilities may be required prior to implementation. Additionally, when both are present, proposed facility linework obscures existing facilities in some cases.

0 2 4 8 Miles



Figure 7.8:
Existing and Proposed Bicycling and Walking Facilities in RTC Project Area Municipalities

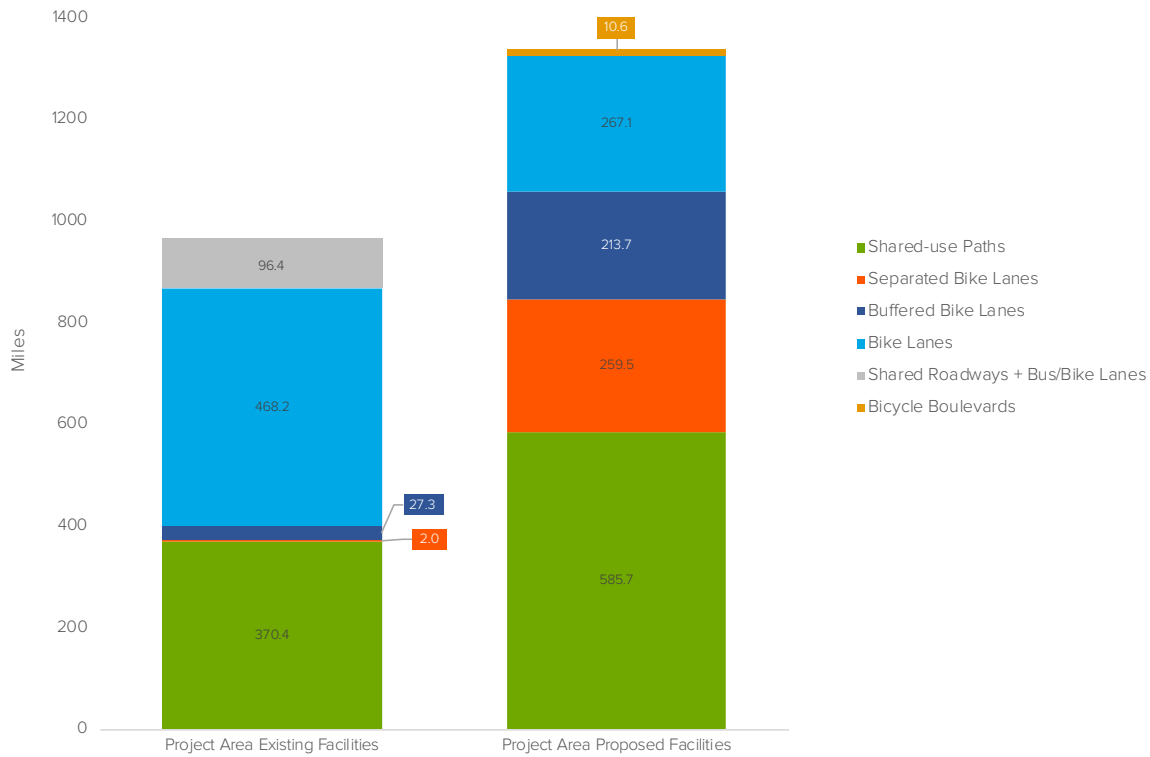
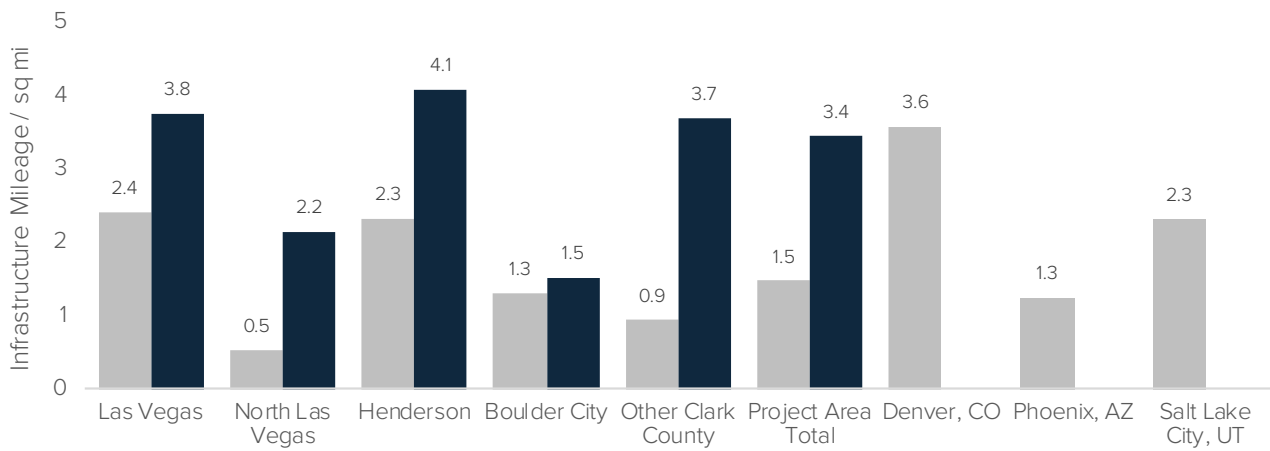
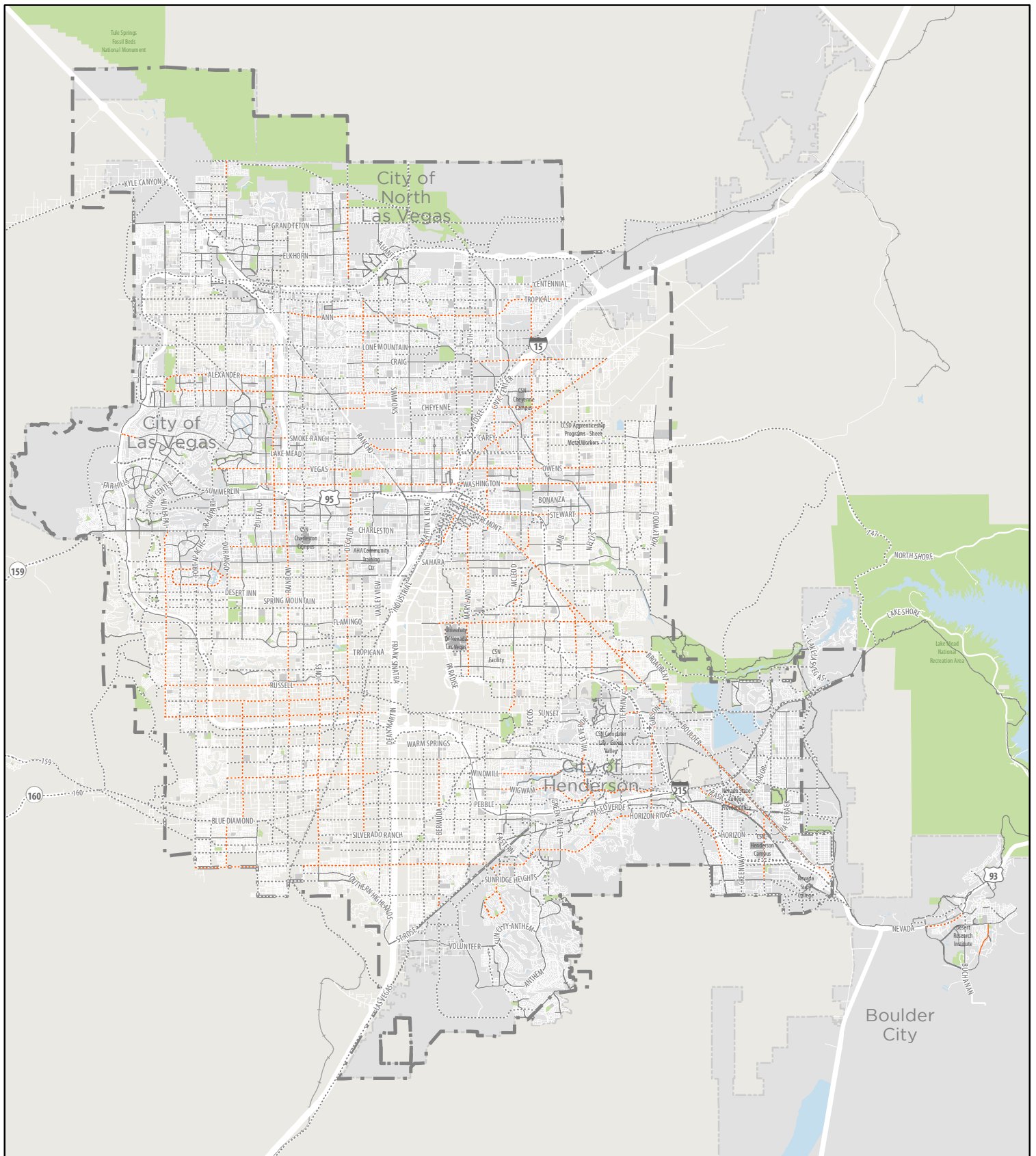


Figure 7.9:
Existing and Proposed Total Buildout's Bicycling and Walking Facility Density for RTC Project Area Municipalities & Similar Cities in the Western U.S.





Map 7.2
Regional Bicycle and Pedestrian Plan for
Southern Nevada

Existing & Proposed Separated Bike Lane Map

Data Source: Clark County and RTC GIS; 2011 North Las Vegas
Comprehensive Bikeway and Trails Plan, 2014 Regional Bicycle
Gap Analysis, 2016 Las Vegas Mobility Master Plan
Map Created: April 13, 2017
Map Produced By: Alta Planning + Design

Proposed Facilities
(New or Previously Planned)
----- Separated Bike Lane
----- All Other Proposed Facilities

Existing Facilities
----- Separated Bike Lane
----- All Other Existing Facilities

■ Park/Nat'l Area
■ School
■ College
■ Municipality
--- Southern Nevada Public
Land Management Act
Boundary

Note: This map of existing and proposed facilities was developed
to achieve the goals of the Regional Bicycle and Pedestrian Plan.
Additional review and analysis of proposed facilities may be
required prior to implementation. Additionally, when both are
present, proposed facility linework obscures existing facilities
in some cases.

0 2 4 8 Miles

Proposed Walking & Bicycling Network

Recommended Las Vegas Facilities

TOTAL BUILDOUT

Should all of Las Vegas' proposed facilities be implemented, Las Vegas' walking and bicycling facilities will total more than 500 miles, 59.8% of which will be high comfort. Although this is the lowest share of high comfort facilities in the region, many of Las Vegas' traditional bike lanes provide comfortable bicycling conditions due to their location on collector streets. Nearly 70 of the 217.5 miles of bike lanes are recommended to be upgraded to wider bike lanes or enhanced bicycle facilities once the proposed network is implemented. Additional and more detailed comparison of the existing and the proposed networks is found in Appendix E.

Figure 7.10:

Makeup of the Total Buildout (Existing + Proposed) Bicycling and Walking Facility Mileage (Las Vegas)

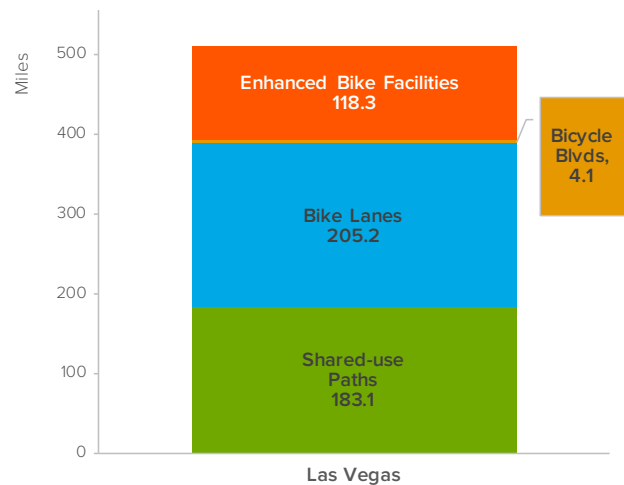
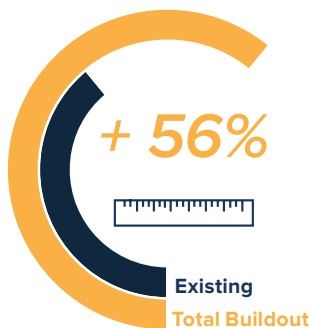


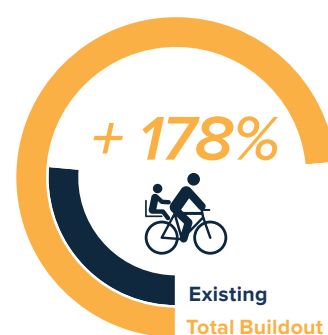
Figure 7.11:

System Mileage Increases and Future High Comfort Share (Las Vegas)

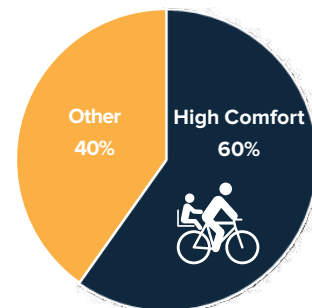
Total Facility Mileage

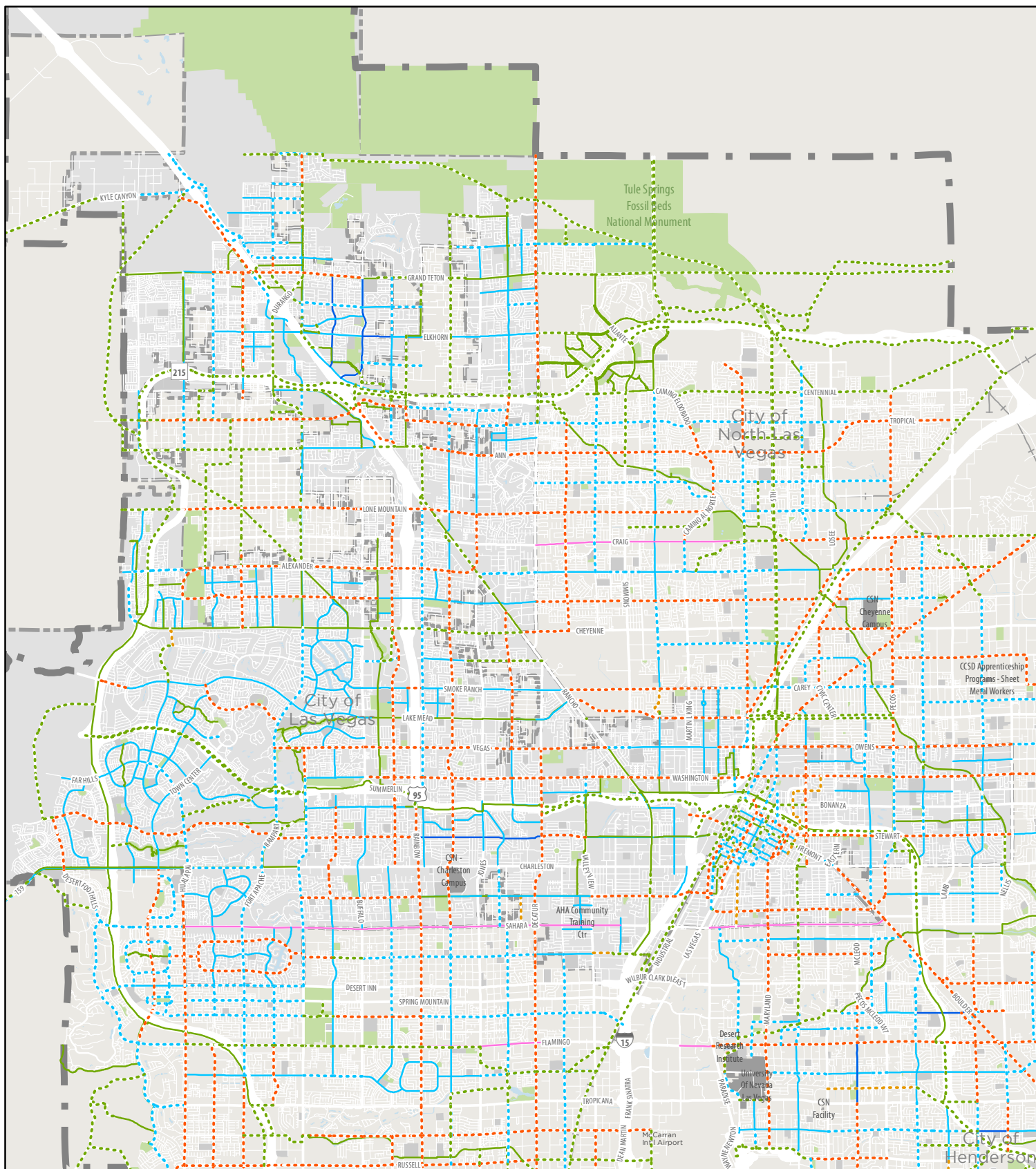


High Comfort Facilities



% of High Comfort Facilities





Map 7.3

Regional Bicycle and Pedestrian Plan for Southern Nevada

Existing & Proposed Facilities Map (Las Vegas)

Data Source: Clark County and RTC GIS; 2011 North Las Vegas Comprehensive Bikeway and Trails Plan, 2014 Regional Bicycle Gap Analysis, 2016 Las Vegas Mobility Master Plan
Map Created: April 13, 2017
Map Produced By: Alta Planning + Design

Proposed Facilities
(New or Previously Planned)

- Enhanced Bicycle Facility (Separated or Buffered Bike Lane)
- Bike Lane
- Bicycle Boulevard
- Shared-use Path

Existing Facilities

- Separated Bike Lane
- Buffered Bike Lane
- Bike Lane
- Bus/Bike Lane
- Shared-use Path

Park/Nat'l Area
School
College
Municipality
Southern Nevada Public Land Management Act Boundary

Note: This map of existing and proposed facilities was developed to achieve the goals of the Regional Bicycle and Pedestrian Plan. Additional review and analysis of proposed facilities may be required prior to implementation. Additionally, when both are present, proposed facility linework obscures existing facilities in some cases.

0 1 2 4 Miles



Proposed Walking & Bicycling Network

Recommended North Las Vegas Facilities

TOTAL BUILDOUT

North Las Vegas is planned to achieve the greatest increase in overall bicycling and walking facility mileage (302%) compared to its existing network. Nearly half of all future facilities will be shared-use paths, which will not only improve recreational opportunities but will also provide high comfort connections to open space, regional destinations, and surrounding communities. Additional and more detailed comparison of the existing and the proposed networks is found in Appendix E.

Figure 7.12:

Makeup of the Total Buildout (Existing + Proposed) Bicycling and Walking Facility Mileage (North Las Vegas)

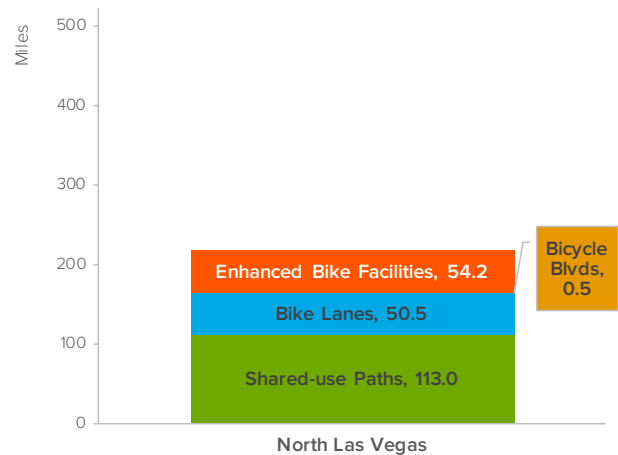
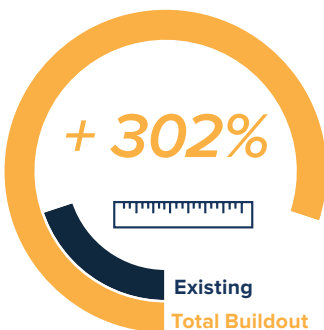


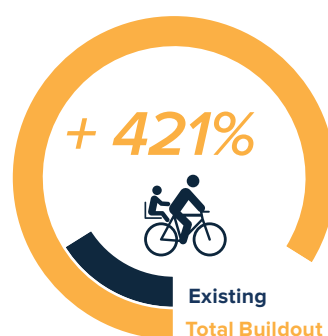
Figure 7.13:

System Mileage Increases and Future High Comfort Share (North Las Vegas)

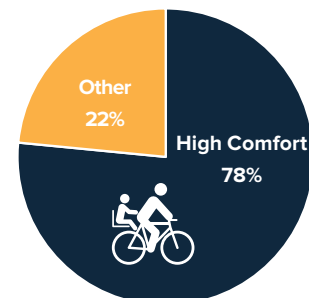
Total Facility Mileage

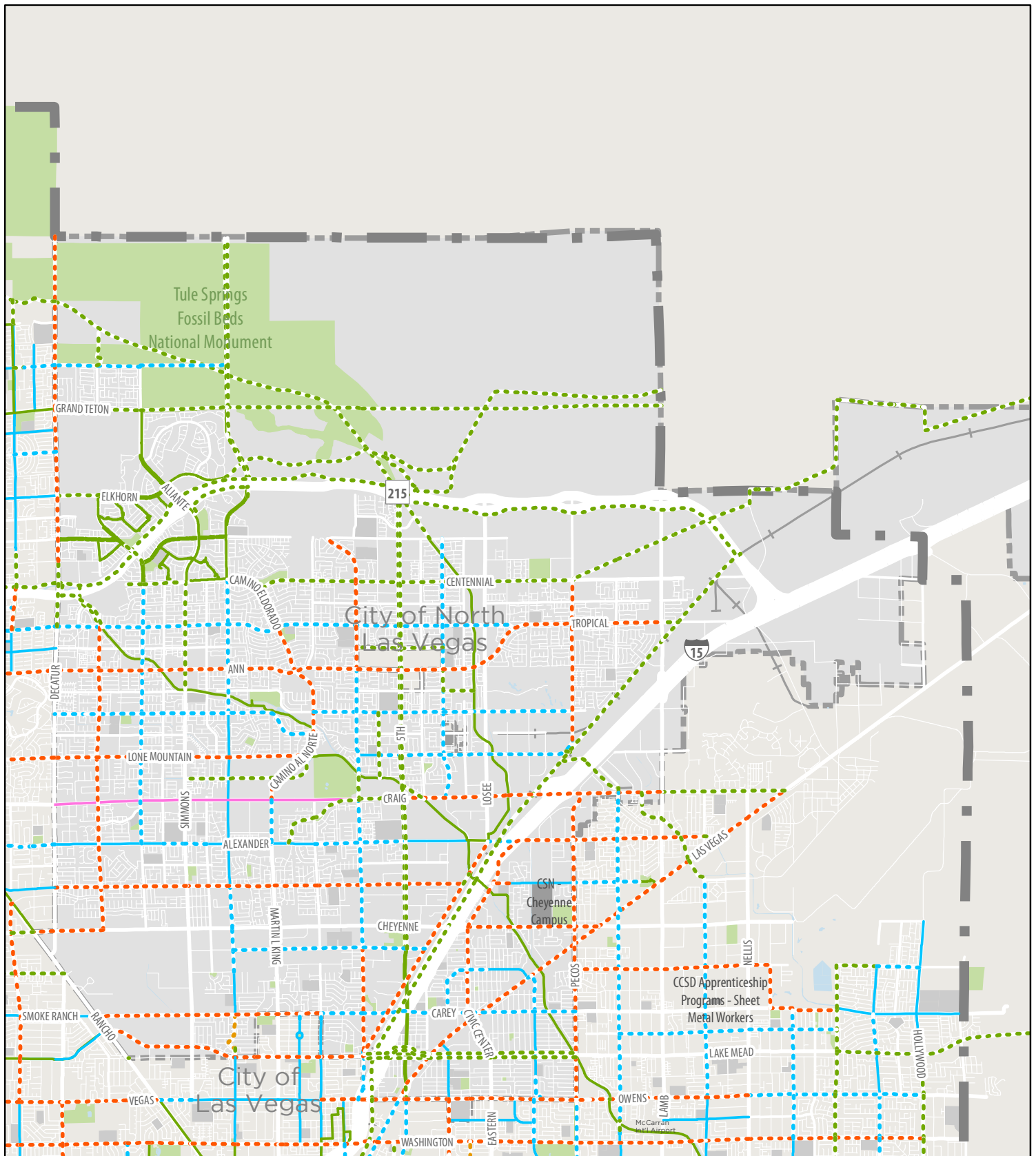


High Comfort Facilities



% of High Comfort Facilities





Map 7.4
Regional Bicycle and Pedestrian Plan for
Southern Nevada
**Existing & Proposed Facilities
Map (North Las Vegas)**

Data Source: Clark County and RTC GIS; 2011 North Las Vegas
Comprehensive Bikeway and Trails Plan, 2014 Regional Bicycle
Gap Analysis, 2016 Las Vegas Mobility Master Plan
Map Created: April 13, 2017
Map Produced By: Alta Planning + Design

**Proposed Facilities
(New or Previously Planned)**

- Enhanced Bicycle Facility
(Separated or Buffered Bike Lane)
- Bike Lane
- Bicycle Boulevard
- Shared-use Path

Existing Facilities

- Separated Bike Lane
- Buffered Bike Lane
- Bike Lane
- Bus/Bike Lane
- Shared-use Path

- Park/Nat'l Area
- School
- College
- Municipality
- Southern Nevada Public
Land Management Act
Boundary

Note: This map of existing and proposed facilities was developed
to achieve the goals of the Regional Bicycle and Pedestrian Plan.
Additional review and analysis of proposed facilities may be
required prior to implementation. Additionally, when both are
present, proposed facility linework obscures existing facilities
in some cases.

0 0.5 1 2 Miles



Proposed Walking & Bicycling Network

Recommended Henderson Facilities

TOTAL BUILDOUT

Should all of Henderson's proposed facilities be implemented, Henderson would surpass Las Vegas as the Southern Nevada community with the densest walking and bicycling facility network (existing 2.3 miles of facilities per square mile; future 4.1 miles per square mile). Henderson's future network of facilities will also be nearly 86% high comfort (compared to the study area-wide share of 72.6%). Additional and more detailed comparison of the existing and the proposed networks is found in Appendix E.

Figure 7.14:

Makeup of the Total Buildout (Existing + Proposed) Bicycling and Walking Facility Mileage (Henderson)

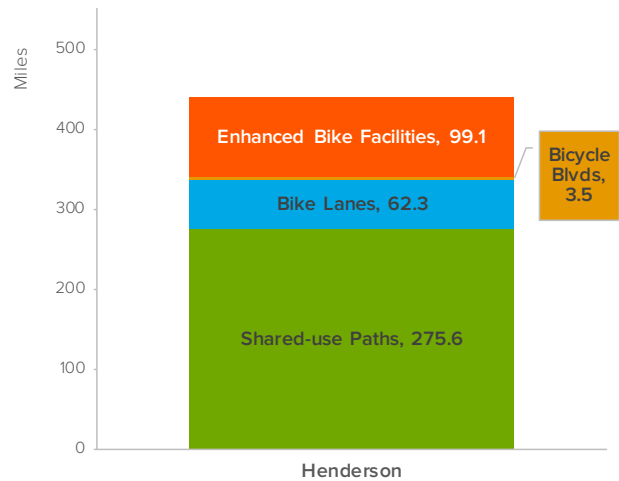
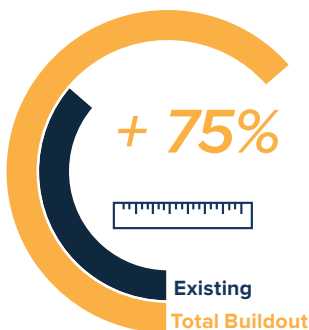


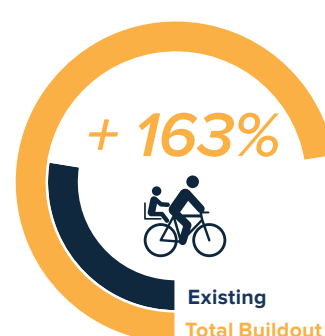
Figure 7.15:

System Mileage Increases and Future High Comfort Share (Henderson)

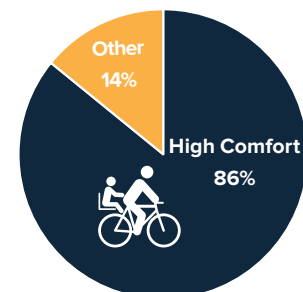
Total Facility Mileage

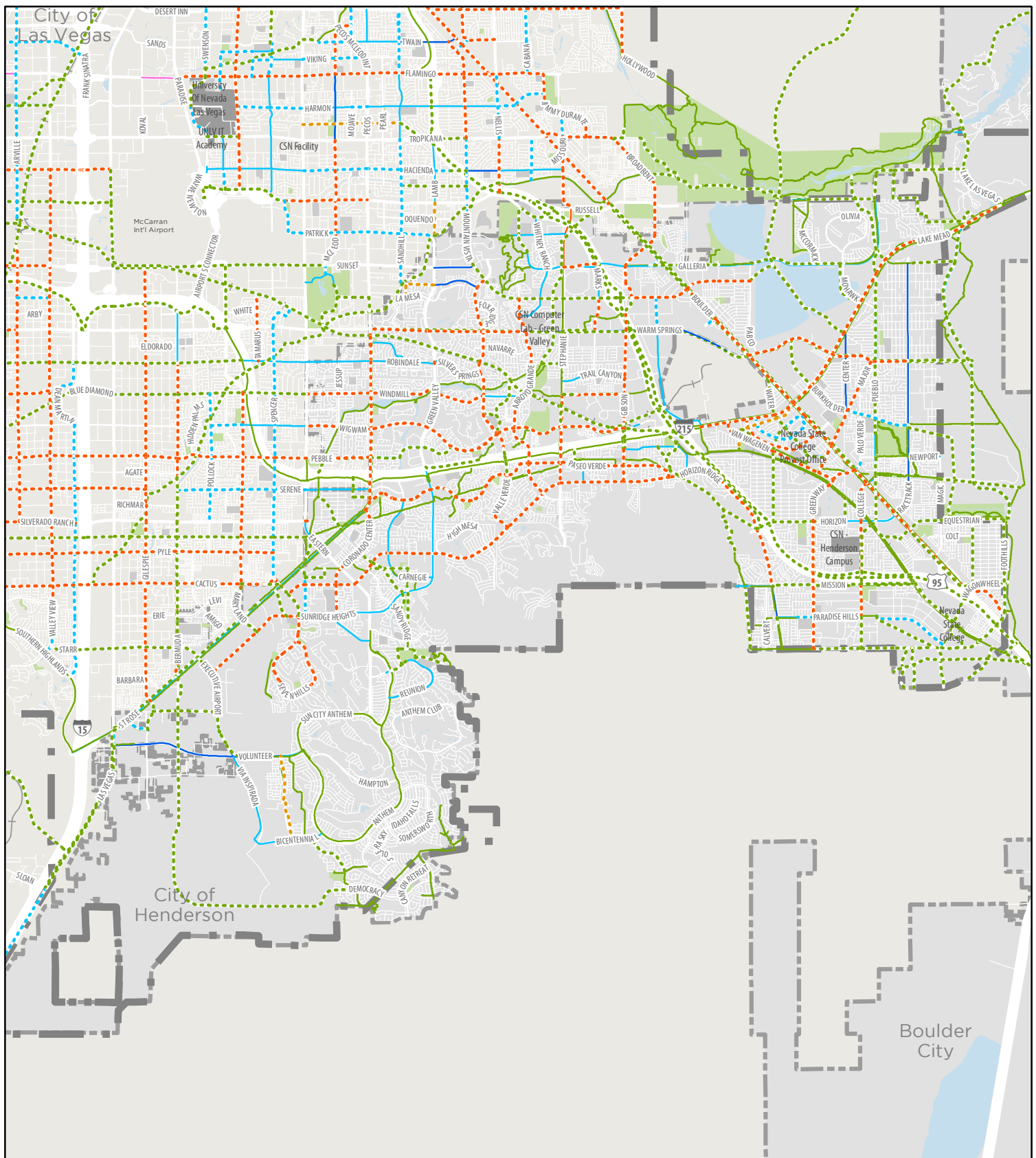


High Comfort Facilities



% of High Comfort Facilities





Map 7.5

Regional Bicycle and Pedestrian Plan for Southern Nevada

Existing & Proposed Facilities Map (Henderson)

Data Source: Clark County and RTC GIS; 2011 North Las Vegas Comprehensive Bikeway and Trails Plan, 2014 Regional Bicycle Gap Analysis, 2016 Las Vegas Mobility Master Plan
Map Created: April 13, 2017
Map Produced By: Alta Planning + Design

Proposed Facilities
(New or Previously Planned)

- Enhanced Bicycle Facility (Separated or Buffered Bike Lane)
- Bike Lane
- Bicycle Boulevard
- Shared-use Path

Existing Facilities

- Separated Bike Lane
- Buffered Bike Lane
- Bike Lane
- Bus/Bike Lane
- Shared-use Path

- Park/Nat'l Area
- School
- College
- Municipality
- Southern Nevada Public Land Management Act Boundary

Note: This map of existing and proposed facilities was developed to achieve the goals of the Regional Bicycle and Pedestrian Plan. Additional review and analysis of proposed facilities may be required prior to implementation. Additionally, when both are present, proposed facility linework obscures existing facilities in some cases.

0 1 2 4 Miles

Proposed Walking & Bicycling Network

Recommended Boulder City Facilities

TOTAL BUILDOUT

Boulder City is linked to the main urbanized area of Clark County by the River Mountains Loop Trail to the west and to the northeast. Additional connections within Boulder City will enable an effective extension of the regional trail system into town. Following the construction of the new I-11 freeway south of the developed area of the city, US-93 may be converted into a more typical "Main Street". Appropriate recommendations for when this change occurs are made as part of this plan. Additional and more detailed comparison of the existing and the proposed networks is found in Appendix E.

Figure 7.16:

Makeup of the Total Buildout (Existing + Proposed) Bicycling and Walking Facility Mileage (Boulder City)

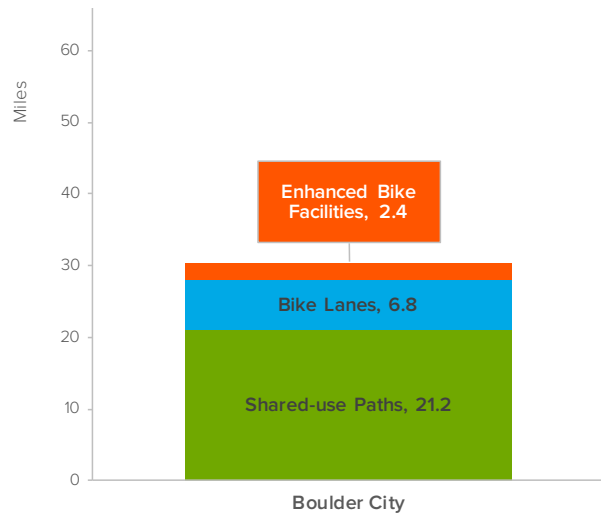
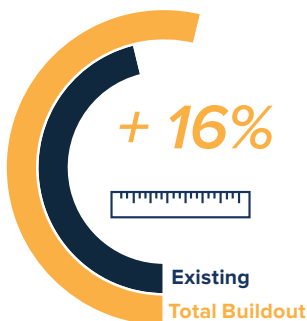


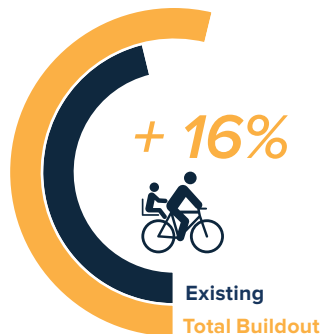
Figure 7.17:

System Mileage Increases and Future High Comfort Share (Boulder City)

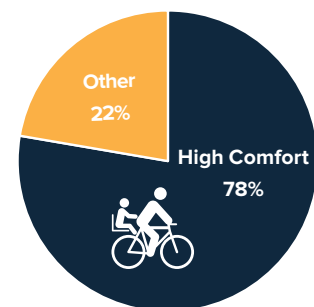
Total Facility Mileage

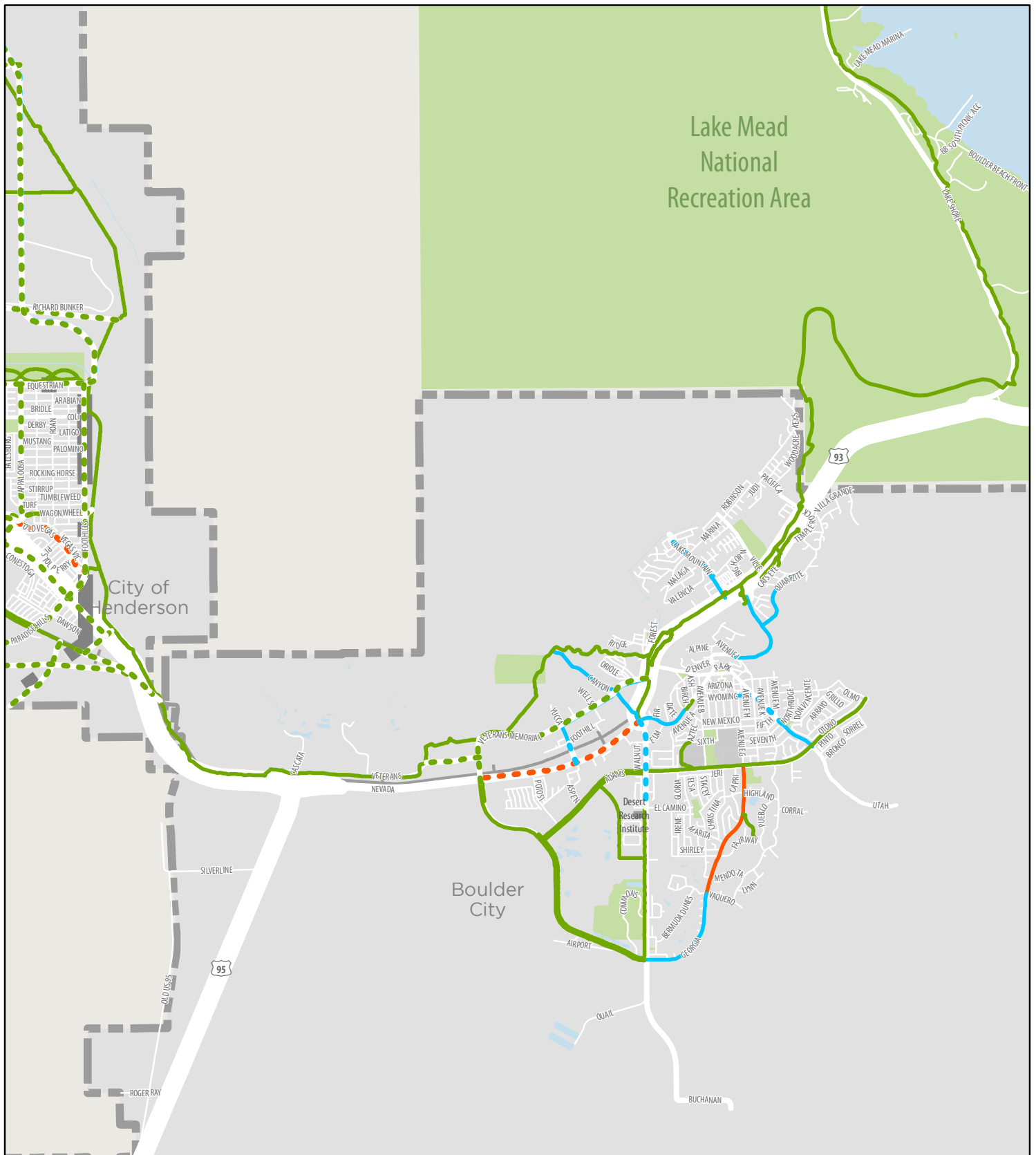


High Comfort Facilities



% of High Comfort Facilities





Map 7.6
Regional Bicycle and Pedestrian Plan for
Southern Nevada
**Existing & Proposed Facilities
Map (Boulder City)**

Data Source: Clark County and RTC GIS; 2011 North Las Vegas Comprehensive Bikeway and Trails Plan, 2014 Regional Bicycle Gap Analysis, 2016 Las Vegas Mobility Master Plan
Map Created: February 2, 2017
Map Produced By: Alta Planning + Design

- Proposed Facilities
(New or Previously Planned)**
- Enhanced Bicycle Facility
(Separated or Buffered Bike Lane)
 - Bike Lane
 - Bicycle Boulevard
 - Shared-use Path

- Existing Facilities**
- Separated Bike Lane
 - Buffered Bike Lane
 - Bike Lane
 - Bus/Bike Lane
 - Shared-use Path

- Park/Nat'l Area
- School
- College
- Municipality
- Southern Nevada Public Land Management Act Boundary

Note: This map of existing and proposed facilities was developed to achieve the goals of the Regional Bicycle and Pedestrian Plan. Additional review and analysis of proposed facilities may be required prior to implementation. Additionally, when both are present, proposed facility linework obscures existing facilities in some cases.



Proposed Walking & Bicycling Network

Recommended Clark County Facilities

TOTAL BUILDOUT

With more than 110 miles of newly proposed separated bike lanes in unincorporated areas of Clark County (0 miles currently) and a total of 593.5 miles of high comfort facilities after total buildout of the proposed network, areas that are not within Las Vegas, North Las Vegas, Henderson, or Boulder City limits have the highest increase in high comfort facility mileage (530%) in the project area. This is, in part, due to many roadways not being completely built out, offering opportunities to implement separated bike lanes. Additional and more detailed comparison of the existing and the proposed networks is found in Appendix E.

Figure 7.18:

Makeup of the Total Buildout (Existing + Proposed) Bicycling and Walking Facility Mileage (Clark County)

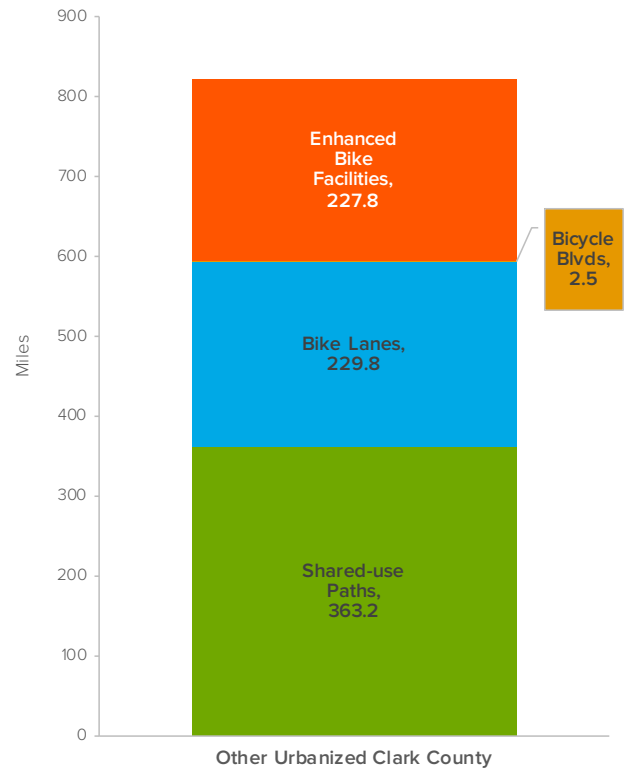
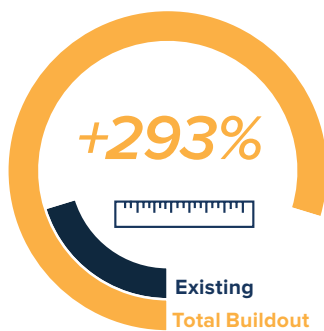


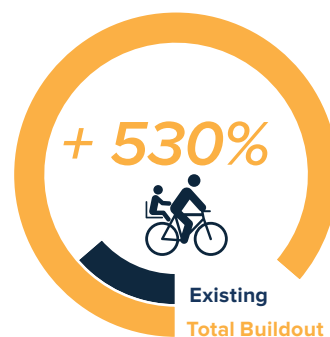
Figure 7.19:

System Mileage Increases and Future High Comfort Share (Clark County)

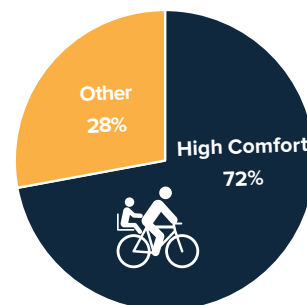
Total Facility Mileage

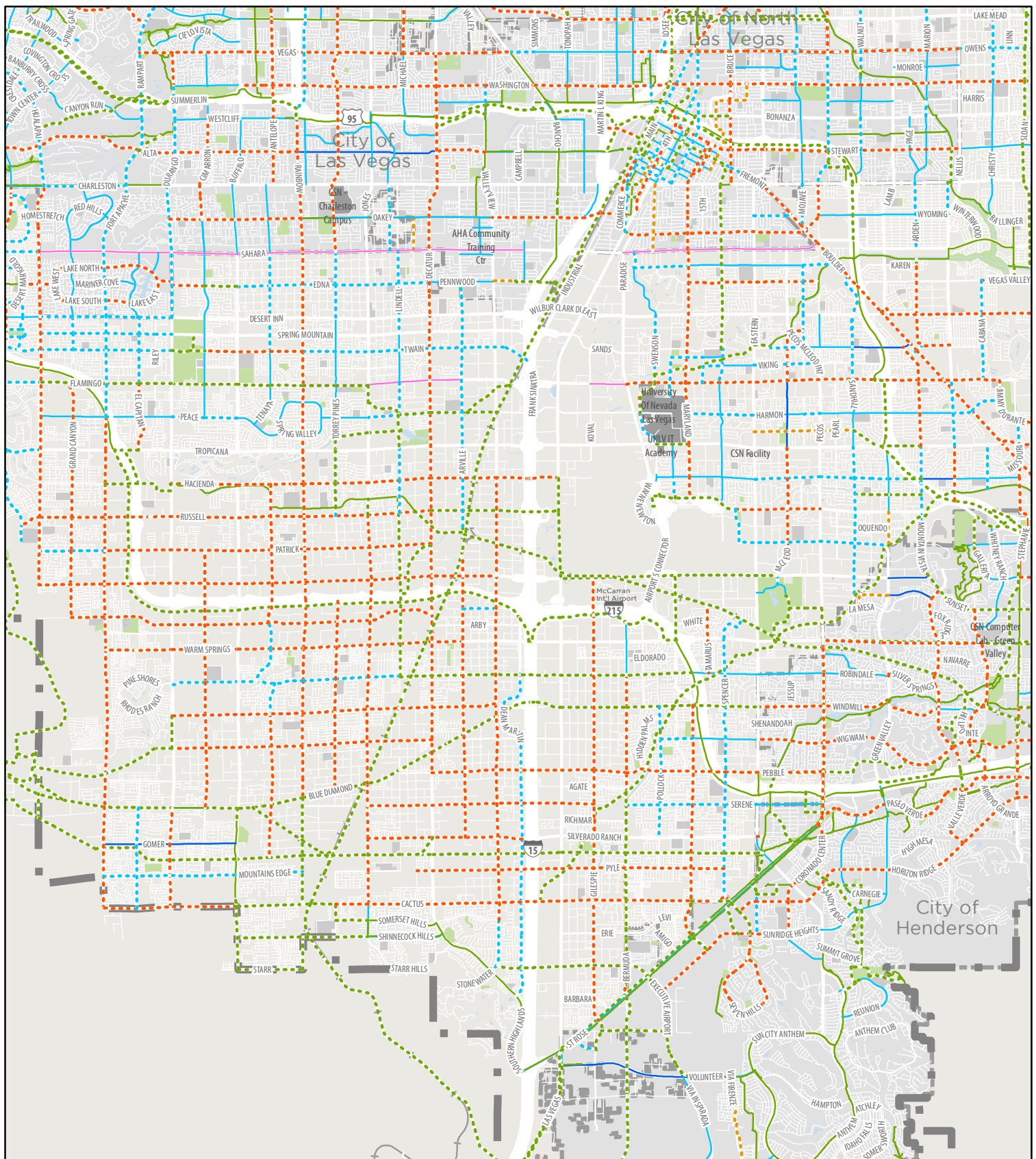


High Comfort Facilities



% of High Comfort Facilities





Map 7.7

Regional Bicycle and Pedestrian Plan for Southern Nevada

Existing & Proposed Facilities Map (Clark County)

Data Source: Clark County and RTC GIS; 2011 North Las Vegas Comprehensive Bikeway and Trails Plan, 2014 Regional Bicycle Gap Analysis, 2016 Las Vegas Mobility Master Plan
Map Created: April 13, 2017
Map Produced By: Alta Planning + Design

**Proposed Facilities
(New or Previously Planned)**

- Enhanced Bicycle Facility
(Separated or Buffered Bike Lane)
- Bike Lane
- Bicycle Boulevard
- Shared-use Path

Existing Facilities

- Separated Bike Lane
- Buffered Bike Lane
- Bike Lane
- Bus/Bike Lane
- Shared-use Path

Park/Nat'l Area
School
College
Municipality
Southern Nevada Public Land Management Act Boundary

Note: This map of existing and proposed facilities was developed to achieve the goals of the Regional Bicycle and Pedestrian Plan. Additional review and analysis of proposed facilities may be required prior to implementation. Additionally, when both are present, proposed facility linework obscures existing facilities in some cases.

0 0.75 1.5 3 Miles



Implementation Considerations

On-Street Implementation

Although opportunities to add on-street bike-ways through roadway widening may exist in some locations, many major streets have physical and other constraints that would require street retrofit measures within existing curb-to-curb widths. As a result, much of the guidance provided in this section focuses on effectively reallocating existing street space through striping modifications. Ideally bike space can be provided without reducing roadway or parking capacity; however, it is often necessary to balance the needs of multiple roadway users.

PARKING REMOVAL

Separated, buffered, or conventional bike lanes can replace one or more on-street parking lanes on streets where excess parking exists and/or the importance of bike lanes outweighs parking needs. This occurs often in Southern Nevada including places where on-street parking is provided adjacent to surface parking lots or where on-street parking exists adjacent to subdivision walls or fences. In some cases, parking may be needed on only one side in order to meet demand. Eliminating or reducing on-street parking also improves sight distances for bicyclists in bike lanes and for motorists on side streets and driveways.

LANE NARROWING

Some roadways in Southern Nevada have 12' or wider travel lanes. Maintaining excessively wide lanes sometimes results in a lack of roadway space for bicycle facilities. National standards

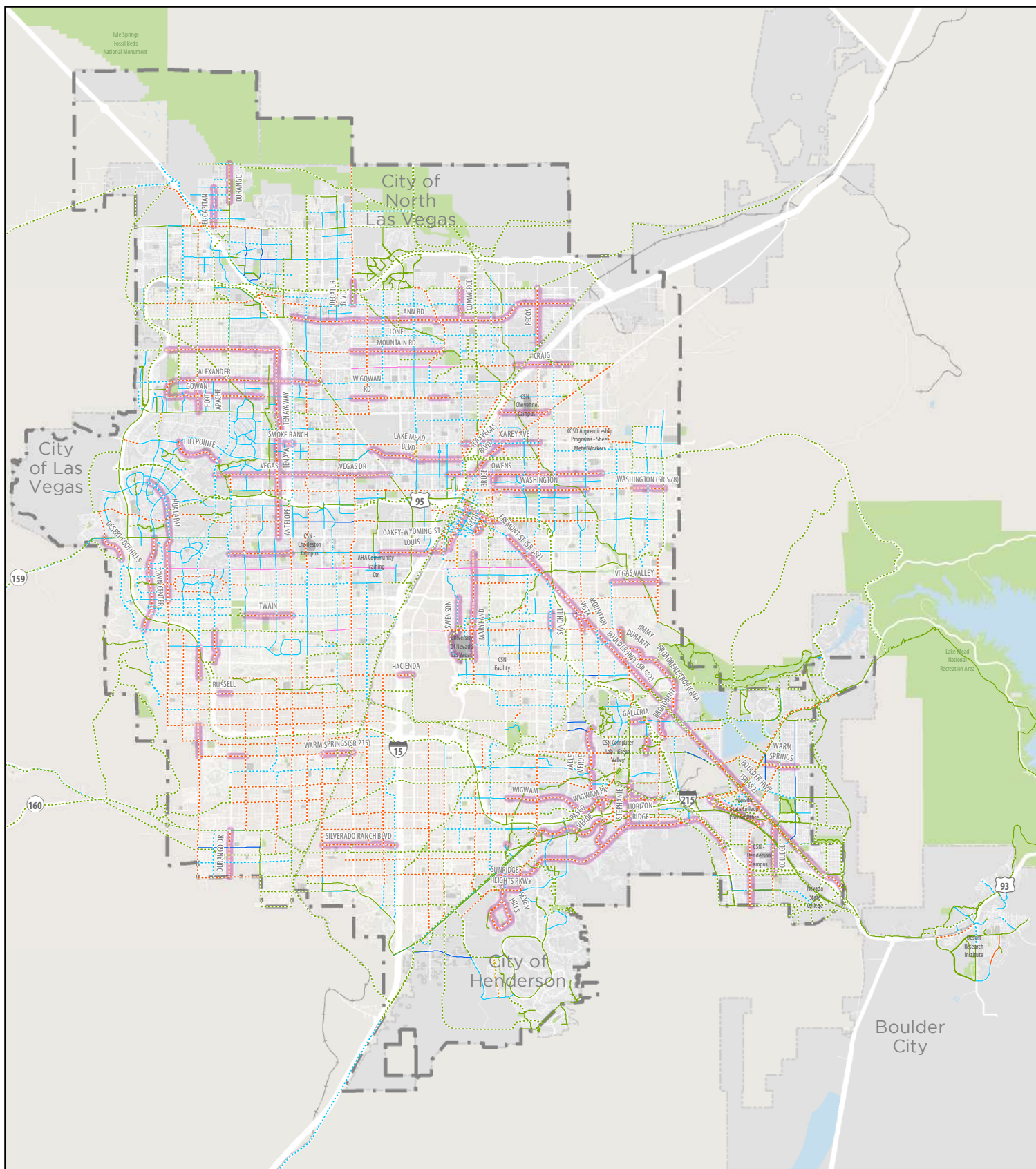
and federal guidance (from AASHTO, USDOT, and FHWA) and the *RTC Complete Streets Design Guidelines* allow for the use of 10' or 11' lanes.

ROAD DIETS (LANE REMOVAL)

As described in Chapter 2, the *RTC Complete Streets Design Guidelines* allows removing lanes on roadways with excess capacity. Removing lanes does not necessarily mean decreased mobility. By dedicating extra space to active transportation, the region's transportation system would be more diversified, in addition to creating safer and more protected spaces for people both bicycling and walking.

For planning purposes this study has assumed that motor vehicle lanes can be reduced to two (one lane in each direction) or three total (one lane in each direction with a center turn lane and/or median) if there are fewer than 15,000 cars total in both directions per day. The maximum threshold for reducing the total number of travel lanes to four or five (one additional motor vehicle lane in each direction than the previous example) has been established at 30,000. These thresholds are consistent with *RTC Complete Streets Design Guidelines*.

Many high comfort facilities in the Regional Bicycle and Pedestrian Plan were made possible through the recommendations of road diets (where supported by local agencies). Map 7.8 illustrates areas where road diets may be needed to accommodate the proposed bicycle or pedestrian recommendation.



Map 7.8

Regional Bicycle and Pedestrian Plan for Southern Nevada

Existing & Proposed Facilities Map w/ Road Diets Highlighted

Data Source: Clark County and RTC GIS; 2011 North Las Vegas Comprehensive Bikeway and Trails Plan, 2014 Regional Bicycle Gap Analysis, 2016 Las Vegas Mobility Master Plan
Map Created: April 13, 2017
Map Produced By: Alta Planning + Design

- Proposed Facilities
(New or Previously Planned)**
- Enhanced Bicycle Facility (Separated or Buffered Bike Lane)
 - Bike Lane
 - Bicycle Boulevard
 - Shared-use Path
 - Projects Requiring Road Diets

- Existing Facilities**
- Separated Bike Lane
 - Buffered Bike Lane
 - Bike Lane
 - Bus/Bike Lane
 - Shared-use Path

- Park/Nat'l Area
- School
- College
- Municipality
- Southern Nevada Public Land Management Act Boundary

Note: This map of existing and proposed facilities was developed to achieve the goals of the Regional Bicycle and Pedestrian Plan. Additional review and analysis of proposed facilities may be required prior to implementation. Additionally, when both are present, proposed facility linework obscures existing facilities in some cases.

0 2 4 8 Miles

Implementation Considerations

On-Street Implementation

MULTI-MODAL LEVEL OF SERVICE

A multi-modal level of service (MMLOS) analysis was developed for five recommended facilities requiring road diets in order to determine any impacts on people driving, bicycling, walking, and taking transit. The intention was to quantify the impact that removing travel lanes would have on all modes for the corridor.

LOS, which is measured in terms of person delay on an A to F scale, was compared between three scenarios:

- Today, without a high comfort facility
- 2035 without a high comfort facility
- 2035 with a high comfort facility

For more detailed analysis of the multi-modal level of service benefits and impacts for these five selected corridors, please see the complete memo in Appendix C.

Table 7.1:
Multi-modal Level of Service Analysis Results Summary

	Start	End	Length (mi)	Jurisdiction	Proposed	Results from 2035 with High Comfort Facility
Horizon Ridge Parkway	Seven Hills Drive	Mission Drive	9.51	Henderson	Road diet with “enhanced” bicycle facilities, such as separated or buffered bicycle lanes	Almost no change in bus, motor vehicle, or pedestrian level of service. Bicycle level of service improved from “D” to “C” in 10 out of the 28 segments
Lake Mead Boulevard	Rancho Drive	Losee Road	3.06	North Las Vegas	Road diet with on-street bicycle lanes and on-street parking	Little change in bus, motor vehicle, and pedestrian level of service while bicycle level of service improved across all 15 segments
Carey Avenue	Commerce Street	Nellis Boulevard	4.43	North Las Vegas	Replace on-street parking with on-street bicycle lanes	Slight decrease in bus and pedestrian level of service along select segments, but also saw improved motor vehicle and bicycle level of service along 7 of its 22 segments
Oakey Boulevard	Durango Drive	Rainbow Boulevard	2.04	Las Vegas	Road diet with separated bicycle lanes and continuous sidewalks	Little change in bus, motor vehicle, and bicycle levels of service, while pedestrian level of service increased at 6 of its 10 segments
Hualapai Way	Patrick Lane	Town Center Drive	7.03	Las Vegas	Road diet with separated bicycle lanes	Little change in bus and motor vehicle levels of service, slight improvement in pedestrian level of service, and bicycle level of service increased along 20 of its 25 segments.

Off-Street Implementation

Implementation of off-street facilities, like shared-use paths, involves almost entirely different stakeholders than on-street facilities. Instead of Public Works and Streets Departments, paths and trails often involve Parks Departments, flood control districts and other riparian corridor-related departments, or non-profit trails groups, like the Outside Las Vegas Foundation.

In addition to working with different agencies, the opportunities to implement facilities vary in diverse ways.

RAIL TO TRAIL

Many shared-use paths are made possible because of the conversion of a rail line from active to inactive. Former rail corridors often already have street crossings and land uses typically build around, instead of within, them. These paths are typically straight and can be located within or outside of developed areas.

Figure 7.20:
Denver & Rio Grande Western Rail Trail, Utah



RAIL WITH TRAIL

Similar to "rail to trail", rail with trail projects are implemented along side but still within the corridor of an active or inactive rail line. The Henderson UPRR Trail is one such example. An extension of this trail from Henderson into unincorporated Clark County, tying into a north-south proposed trail along another UPRR corridor are the two most significant "rail with trail" projects in this plan. Typically, rail with trail projects require appropriate setback from the edge of the tracks (minimum of 20') and fencing.

The FHWA Rails-with-Trails:¹ Lessons Learned report is a valuable resource for implementing this type of project, from data collection, process, and liability, to literature reviews, case studies, and corridor acquisition.

UTILITY CORRIDORS

Power line and other utility corridors present opportunities for trail development, as well. Land within these corridors and beneath power lines is typically either undeveloped or underutilized. If and when development occurs, RTC cities and Clark County should seek to work with developers to ensure that shared-use paths and other trails are proposed within these easements.

Other utility corridors, such as water lines and other subterranean utilities, also present opportunities for trail development.

¹ https://www.fhwa.dot.gov/environment/recreational_trails/publications/rwt/page00.cfm

Implementation Considerations

Off-Street Implementation

CLARK COUNTY FLOOD CONTROL DISTRICT

This plan recommends extensions of and additions to the shared-use path network found within or adjacent to the County's Flood Control District facilities (washes, canals, etc.).

Some washes, like the Las Vegas Wash, already have shared-use paths along much of their mileage. Gaps and key connections to and between the Las Vegas Wash Trail and other wash trails are recommended in this plan. Several canals, like the Duck Creek Canal, present opportunities for shared-use path development.

Accommodations for establishing trails within canal corridors can fall under two scenarios:

- Trails can be implemented over top of canals that have been piped for security or

maintenance reasons. Benefits may include shared maintenance or transfer of liability.

- Trails can also be implemented with open canals. Canal companies can benefit from shared or limited maintenance of canal access roads in exchange for non-motorized public use of the corridor.

Public trails along drainage ways offer several potential benefits to agencies, including:

- Liability being carried by the City or County due to public use
- Potential reduction in dumping or other vandalism. Would-be vandals or dumpers would run an increased risk of being seen with a developed trail compared to current circumstances
- Trails can be built to a standard to support maintenance vehicles improving access and ease of maintenance for drainage way agencies
- City or County Parks Departments can perform maintenance, including weed abatement and mowing.
- Canal trail construction projects may provide opportunities for cost sharing or other improvements to drainage way function.
- Interpretive signage detailing the history of the drainage way and the importance to the community could foster stewardship of the drainage way and legacy for the drainage way agencies.

Figure 7.21:
Las Vegas Wash Trail



Level of Comfort

Existing vs. Future LOC Analysis

A common theme throughout the plan has been providing high comfort facilities both on- and off-street that appeal to the broadest range of ages, abilities, and socioeconomic levels as possible.

The level of comfort that people feel when bicycling on the road is measured in this plan using a level of comfort (LOC) analysis, which combines data including speed limit, number of lanes, presence and quality of bicycle infrastructure, and traffic signals to determine how comfortable roadways in Southern Nevada are.

Road segments are classified into one of four levels of comfort (LOC) based on these factors.

LOC 1, the highest level of comfort, is assigned to roads that would be tolerable for most children to ride and to shared-use paths;

LOC 2 roads are those that could be comfortably ridden by the mainstream adult population;

LOC 3 is the level assigned to roads that would be acceptable to current “enthused and confident” bicyclists;

LOC 4 is assigned to segments that are only acceptable to “strong and fearless” bicyclists, who will tolerate riding on roadways with higher motorized traffic volumes and speeds.

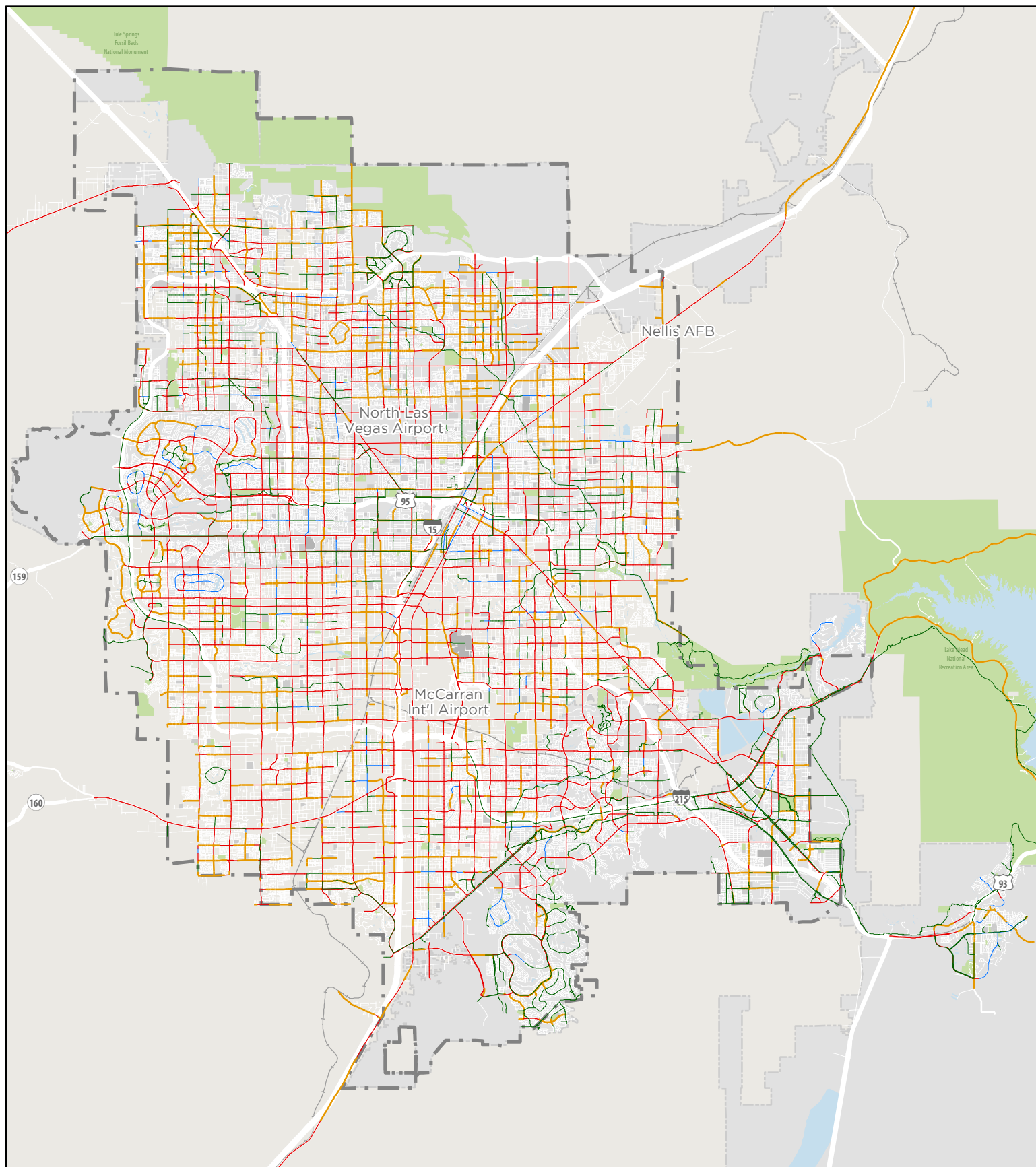
Every Southern Nevada resident is different and will tolerate different levels of stress in their journey. Therefore, the LOC Analysis results should serve as a general guide rather than an absolute truth.

Maps 7.9 (identical to Map 2.12 from Chapter 2) and 7.10 show the change in roadway level of comfort for all collector and arterial roadways for existing conditions (the former) and future conditions, assuming the proposed facilities in Map 7.1 are implemented as recommended.

Currently,
15%
of non-freeway, collector
and above roadways are
LOC 1 or 2



Post-
implementation,
46%
of non-freeway,
collector and
above roadways
will be LOC 1 or 2



Map 7.9
Regional Bicycle and Pedestrian Plan for
Southern Nevada

Existing Level of Comfort Map (Collector and Arterial Roadways)

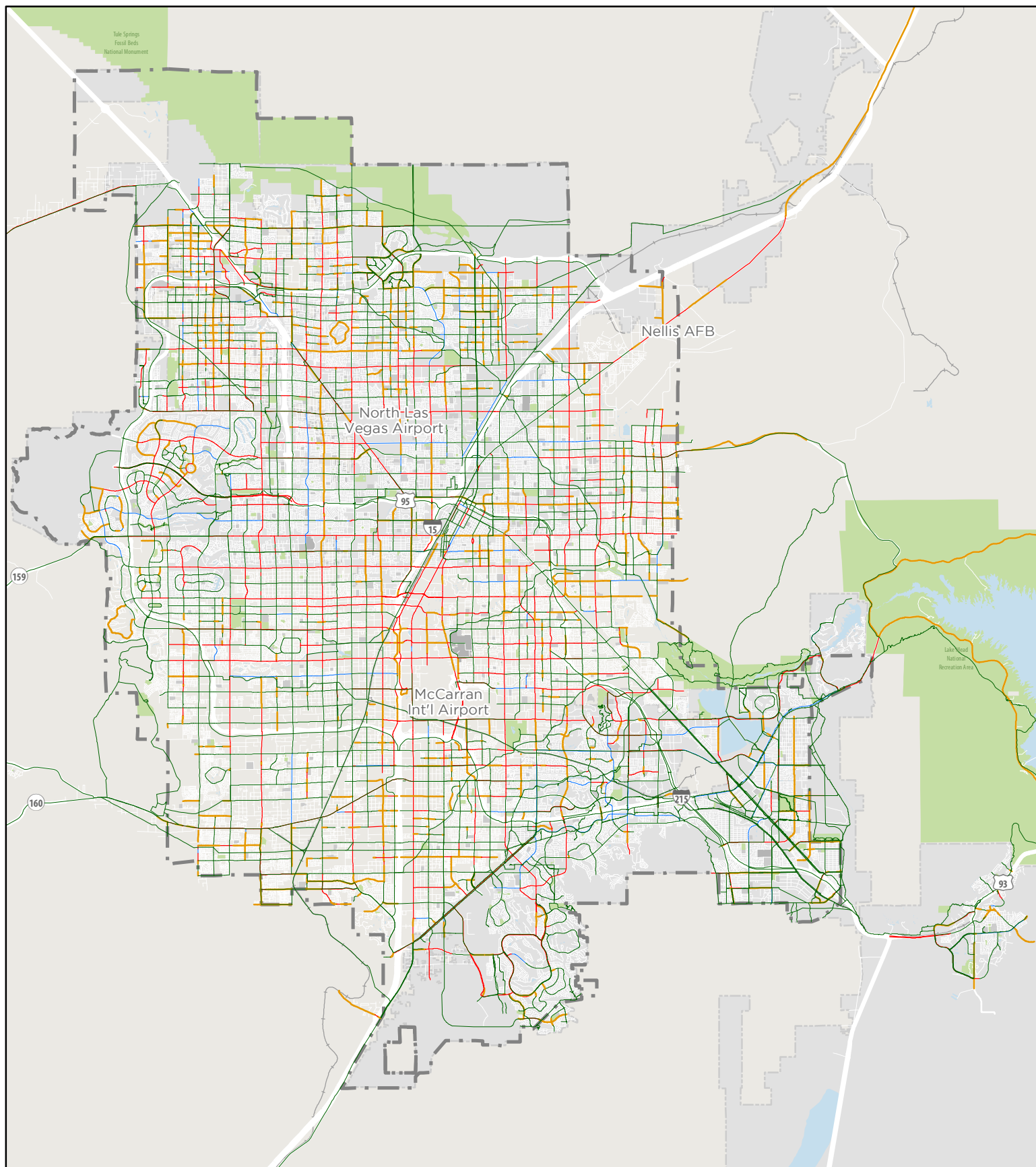
Data Source: Clark County, NDOT, and RTC GIS
Map Created: January 31, 2017
Map Produced By: Alta Planning + Design

Level of Comfort
 — Level 1 (Highest) & Shared-use Paths
 — Level 2
 — Level 3
 — Level 4 (Lowest)

Park/Nat'l Area
 School
 College
 Municipality
 Southern Nevada Public Land Management Act Boundary

0 2 4 8 Miles





Map 7.10

Regional Bicycle and Pedestrian Plan for
Southern Nevada

Future Level of Comfort Map (Collector and Arterial Roadways)

Data Source: Clark County, NDOT, and RTC GIS
Map Created: January 31, 2017
Map Produced By: Alta Planning + Design

Level of Comfort

- Level 1 (Highest) & Shared-use Paths
- Level 2
- Level 3
- Level 4 (Lowest)

- Park/Nat'l Area
- School
- College
- Municipality
- Southern Nevada Public Land Management Act Boundary

0 2 4 8 Miles



Prioritization Criteria and Scoring

Methodology

In order to assist municipalities in determining phasing and priority for the 1,300 new miles of facilities, criteria were established to score projects based upon the plan goals and other factors such as regional significance and feasibility.

Complete results of the prioritization scoring process can be found in Appendix D: Project Tables and Prioritization Scoring.

GOAL 1: COMFORT & SAFETY

These projects will help make bicycling and walking feel safer and more comfortable for all ages and abilities. Any project that improved conditions within 800 feet of a serious crash involving a person walking or bicycling in the last five years and/or that improved a roadway to an LOC 1 or 2 or that provided a high comfort facility (including enhanced bicycle facilities and shared-use paths) received the sub-criteria score.

GOAL 2: ACCESS

Improving access to transit and completing network gaps between existing infrastructure are important to people in urbanized Clark County. Proposed facilities within 800 feet of a bus stop or transit station and/or those that were identified by the RTC's Bike Gap Analysis received full points.

GOAL 4: EQUITY/HEALTH

As evidenced by the equity analysis in Chapter 2, low equity areas in the project area are also disproportionately lacking comfortable

bicycle and pedestrian infrastructure. Projects within the areas with the most equity concerns received points. In addition to equity concerns, projects that are within zip codes with high or abnormal rates of serious diseases associated with inactivity are also prioritized.

REGIONAL SIGNIFICANCE






The overall intent of the Regional Bicycle and Pedestrian Plan is to implement infrastructure that creates a high comfort, regional network, connecting municipalities and regionally-significant destinations. Projects that cross or connect jurisdiction boundaries, projects that provide direct access to (within 800' of) bike share stations, and those that reflect the intent of and recommendations from previous active transportation planning efforts receive points.

FEASIBILITY

Project feasibility is a core requirement in getting projects implemented, especially in the short term. Projects within 800' of a publicly-requested or supported change, offered an opportunity for construction synergy with other upcoming projects, and/or those that could be completed in the near term and/or inexpensively received points for this criteria.

Methodology

Table 7.2:
Criteria and Sub-Criteria Weights and Scores

	Overall Criteria Weight	Sub-Criteria	Sub-Criteria Score	Description
 Comfort & Safety	8	Addresses Bicycle/Pedestrian Crashes	5	Project will address corridors and intersections with high rates of bicycle or pedestrian crashes
		Provides a high comfort facility	3	Project provides a facility of high comfort that appeals to users of all ages and abilities (LOC 1 or 2)
 Access	5	Provides access to transit	2	Project improves direct access to transit
		Addresses a network gap	3	Project was identified as a high priority project in the RTC Bike Gap Analysis
 Equity / Health	3	Serves areas with low equity / high inequality	2	Project serves areas with low equity, high inequality (orange or red on "Equity" map)
		Addresses populations with health issues	1	Project addresses areas with high age-adjusted death rates due to heart disease, stroke, diabetes, or certain cancers
 Regional Significance	5	Connects multiple jurisdictions with biking or walking facilities	2	Project connects multiple jurisdictions
		Connects to bike share station	1	Project improves direct access to a bike share station and provides a route for users to use
		Consistency with local and regional plans	2	Project supports recommendations from other local and regional planning efforts
 Feasibility	4	Public support	2	Project received a high level of public support throughout the planning process
		Potential for Near-Term Implementation Synergy	1	Ability for projects to share resources or leverage other near-term planned construction projects (road resurfacing, utility work from TIP, FRI-C, FRI2, etc.)
		Quick Wins	1	Project requires a modest investment, has few barriers to implementation (paint only, no roadway redesign), and could be constructed within six months

Typical Capital & Maintenance Costs

Capital Costs

Active transportation facilities can vary considerably in cost. ROW acquisition, environmental permitting, or relocation of curbs and drainage infrastructure can drastically increase the cost of a project. Tables 7.3 and 7.4 represent conservative cost ranges for facilities recommended in the RBPP. These cost estimates are intended for general reference only, do not include site specific considerations, and should be verified by local jurisdictions.

For example, providing a bike lane on a street could be as simple as adding a single white line and periodic stenciling if the bike lane is replacing a shoulder or a parking lane. Streets that need complete restriping only to accommodate a bike lane would have additional paint removal and installation costs, while streets that are already being resurfaced would reduce the cost of the bike lane to a negligible percentage of the project.

Table 7.3

Estimated Facility Type Cost Estimates Per Mile (Center Line), Miles Per \$100,000 (Center Line), New Miles Proposed

	Cost Per Mile (Center Line)	Miles per \$100,000	New Miles Proposed
Shared-use Paths	\$250,000-\$1,000,000	0.1-0.4 miles	580 miles
Sidewalks	\$400,000	0.25 miles	n/a
Separated Bike Lanes	\$500,000-\$1,000,000	0.1-0.2 miles	262 miles
Buffered Bike Lanes	\$10,000-\$18,000	5-10 miles	215 miles
Bike Lanes	\$4,000-\$7,000	15-25 miles	267 miles
Bicycle Boulevards	\$15,000-\$75,000	0.75-6 miles	10.6 miles

Table 7.4

Estimated Spot Improvement Type Cost Estimates Each, Installations Per \$100,000

	Cost Each or Per Mile (Center Line)	Installations per \$100,000
Grade-Separated Crossings	\$200,000-\$6,000,000	0.16-0.5
Full Signals or Toucans	\$150,000-\$200,000	0.5-0.66
Hybrid Beacons	\$75,000-\$100,000	0.75-1
RRFBs	\$20,000-\$25,000	4-5
Bicycle Parking	\$200-\$5,000	20-500

Maintenance Best Practices & Costs

As the existing system is refined and proposed recommendations are implemented, the cities, Clark County, and NDOT should establish a multi-departmental maintenance program that involves, at a minimum, Public Works and Parks and Recreation Departments in order to provide a region-wide standard for sweeping, pavement management, and weed abatement and eradication.

The coordination and implementation of bicycling and walking facilities should include vegetation that is compatible with the facility and the climate, reduces the burden on the maintenance program, and reduces water demand.

BIKEWAY MAINTENANCE

On-street bikeways (i.e. separated bike lanes, buffered bike lanes, bike lanes, and bicycle boulevards) are typically as useful as they are maintained. Bicycles are much more susceptible to flat tires and uncomfortable ride quality when road surfaces and road debris are not adequately maintained. Regular sweeping and resurfacing should ensure that pavement is as smooth and clean as possible.

Due to the high oil content of asphalt overlays, slurry and chip seals, and seal coats, pavement markings in bike lanes (striping and symbols) can fade prematurely. The bikeway maintenance program should address this need by restriping and repainting symbols every 1-2 years, or as necessary.

Separated Bike Lane Maintenance

Due to their inherent design characteristics, separated bike lanes often require more frequent and different maintenance practices (depending on the degree and type of physical separation) than conventional paint-only bike lanes.

Like all bikeway facilities, maintenance of separated bike lanes should be considered during the planning and design phases to ensure that once implemented, the facility can remain clear of debris and functional for bicyclists. Just as proper-functioning signage, lighting, and pavement markings are essential to the safety and operations of motor vehicles, so are bikeway elements for the safe operation of bicycle facilities. Pavement markings and striping need to remain visible. Missing flexible delineators, concrete buttons, or other vertical barriers should be regularly replaced, and separated bike lanes require regular sweeping. Routine maintenance best practices for separated bike lanes include:

- Maintaining pavement quality through spot repairs, regular overlays, and longer-term repaving
- Sweeping and removal of garbage and debris on a weekly basis
- Vegetation trimming to provide clear access on a monthly basis
- Restriping facilities as needed, usually annually
- Repair of damage due to storms, floods, collisions and other unforeseen events
- Repair and replacement of wayfinding or other signage

Typical Capital & Maintenance Costs

On-Street Maintenance Best Practices

- Replacement of damaged flexible delineators, concrete buttons, or other vertical barriers

Costs associated with maintenance can be reduced if existing maintenance vehicles, such as street sweepers, can be used. Two-way separated bike lanes (typically 10' or wider) can be maintained using conventional maintenance vehicles. One-way facilities, which can be narrower, may require specialized vehicles depending on the facility's width. Creating a connected high comfort network reduces maintenance costs by allowing maintenance crews to maintain without extended travel from one unconnected facility to another. When future facilities are planned, the department responsible for maintaining the new facility should be identified, and budget should be allocated to ensure its continued maintenance.

Drainage is another factor that should be considered during the planning and design phase for a new separated bike lane facility. Combining recommendations from the *Massachusetts State*

DOT Separated Bikeway Planning and Design Guide, the following best practices are recommended to ensure proper drainage:

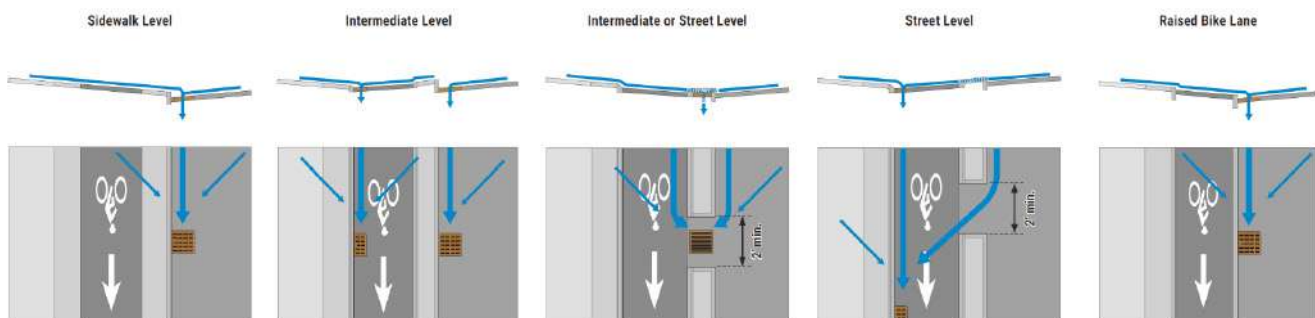
- Street-level separated bike lanes that include flexible posts, concrete buttons, or other discontinuous barriers for physical separation do not require alterations to existing drainage infrastructure
- For street-level separated bike lanes that use a raised median separator, the provision of breaks in the median allows use of the existing drainage system
- For sidewalk and intermediate level facilities, drainage strategies illustrated in Figure 7.22 are recommended depending on the type of facility

SHARED-USE PATH MAINTENANCE

The cities, County, and other agencies have invested considerable resources in the construction of shared-use paths along washes, through neighborhoods, and along riparian corridors. The physical condition of shared-use

Figure 7.22:

Separated Bike Lane Drainage Considerations (Source: *MassDOT Separated Bikeway Planning and Design*)



Off-Street Maintenance Best Practices & Costs

paths is an important consideration when residents and visitors consider choosing walking or bicycling for transportation, recreation, or other uses.

Typical off-street bicycle and pedestrian facility maintenance activities include sweeping and after-flood cleanup, pavement management, weed abatement, landscaping, and mowing. The following maintenance recommendations seek to establish a uniform approach to maintenance activities for existing and proposed paved, off-street facilities for all jurisdictions. Maintenance activities can generally be categorized into one of two types: routine maintenance, which is done annually or more frequently, and major or

capital maintenance, which involves more intensive activity at a less than annual frequency.

Routine Maintenance

Not every shared-use path will have the same needs and levels of expenditure. It is estimated that for routine maintenance approximately \$3,000 to \$4,000 be budgeted per mile of shared-use path per year.

Capital Maintenance

Major or capital maintenance activities typically involve more intensive maintenance repairs such as pavement seal coating, pavement overlays, pavement reconstruction, or other structural rehabilitations. Needs can vary widely

Table 7.4
Recommended Routine Shared-Use Path Maintenance Frequency and Estimated Costs

Maintenance Activity	Function	Frequency	Est. Annual Cost (per mi.)
Path sweeping	Keep paved surfaces debris free	At least twice annually (once in spring and once in fall); more often if necessary due to flooding	\$180 (x2)
Litter and trash removal	Keep path clean and maintain consistent quality of experience for users	Annually, or as needed	\$70
Tree and brush trimming	Eliminate encroachments into path corridor and open up sight lines	Annually, or less frequently as needed	\$100
Weed abatement	Manage existence and/or spread of noxious weeds, if present	Twice annually, in late spring and mid to late summer	\$350 (x2)
Safety Inspections	Inspect path tread, slope stability, and bridges or other structures	Annually	\$20
Sign and other amenity inspection/replacement	Identify and replace damaged infrastructure	Annually (assume 2 sign replacements)	\$100
Crack sealing and repair	Seal cracks in asphalt to reduce long term damage	Annually	\$2,500
Total			\$3,850

Typical Capital & Maintenance Costs

Off-Street Maintenance Best Practices & Costs

based upon environmental factors, such as soil conditions, flood potential, drainage, and the quality of initial construction.

Any asphalt-paved shared-use path surface will deteriorate over time with asphalt surfaces dropping in quality rapidly after 10 years. Preservation efforts within 5-10 years, such as seal coating, extend the life of asphalt efficiently and at a lower cost than waiting for the surface to fail requiring expensive reconstruction.

Overlays may be needed after multiple seal coats or at approximately 30 years after initial construction. A full reconstruction could be required when needed, typically at 50 years if the seal coat and overlay have been provided.

Concrete paths, which are a more significant capital investment, but require significantly less capital maintenance than asphalt, are currently used in Southern Nevada where paths and washes intersect, and, due to a lighter color, may reduce surface temperatures in summer months. This paving method may be considered given the flooding potential of rivers and washes near existing and proposed shared-use paths in the project area. Concrete paths may require isolated jacking or replacement, but generally limited maintenance expenditures should be expected for a life of upwards of 50 years.

Financial planning for major or capital maintenance can be a budgetary challenge. Some jurisdictions stay focused on eventual reconstruction and treat capital maintenance in their

maintenance budgets, whereas others treat this as separate capital projects to be considered at a later date. Depending on the existing age and the level of effort, major or capital maintenance can require an average budget of between \$2,000 and \$7,000 per mile per year. Some years may require more expensive maintenance with others requiring little to none.

Figure 7.23:
Concrete Section of the Las Vegas Wash Trail



Figure 7.24:
Bridge Structure Deck in Concrete to Reduce Maintenance



Funding Analysis

Federal, State & Local Funding Sources

Implementation of the proposed bicycle and pedestrian system will often require funding from diverse local, regional, state, and federal sources as well as coordination with multiple agencies. The majority of non-local public funds for bicycle and pedestrian projects are derived through a core group of federal and state programs. To facilitate funding efforts, this section presents a brief overview of different funding sources and strategies.

FEDERAL & STATE FUNDING

Federal funds from the Surface Transportation Block Grant Program (STBGP) are allocated to the state and distributed proportional to population, allowing funding to get to as many different types of communities as possible. Program funding for transportation alternatives (TA) is included within the STBGP. The Southern Nevada Public Land Management Act (SNPLMA) funds trail projects using the proceeds from the sale of public lands.

LOCAL & REGIONAL FUNDING

County and/or municipal funds may also be used to construct bicycle and pedestrian facilities. The cities in the project area should take advantage of local and private contributions, if appropriate, in developing the proposed system.

This could include a variety of resources, such as volunteer or in-kind labor during construction, right-of-way donations, outreach, planning and design, or monetary donations towards specific improvements.

Additionally, each city should develop a dedicated local funding source for active transportation improvements through a general fund allocation, which will be sustainable funding that can be used to leverage other sources as well as develop projects. In addition to these funds, active transportation projects can be funded through a variety of measures at a local level: bonds financing, special improvement districts, or specified local sales taxes.

Tables 7.5 through 7.8 provide a list of funding sources that may be applicable to projects identified in this Plan. Most of these sources are competitive and require the preparation of applications. For multi-agency projects, applications may be more successful if prepared jointly with other local and regional agencies.

Funding Analysis

Local Funding

Table 7.5
Local Bicycle and Pedestrian Funding Options

Funding Opportunity	Eligible Project Types	Qualifications	Lead Agency	Submittal Specifics
Bond Financing	Varies	Varies	Varies	Though not a funding source, bonds are a financing technique. Money is borrowed against some source of revenue or collateral (i.e. parcel tax revenue). They do not increase total funding, but rather shift investment from future to present.
Special Assessment or Taxing Districts	Varies	Varies	Local Gov't	Local municipalities can establish special assessment districts for infrastructure improvements. Urbandale, Iowa established a special assessment program in 1996 for building sidewalks in existing developments where they were missing. Exception clauses allowed residents to apply for hardship status, or to allow residents to petition for sidewalks on only one side of the street rather than both.
Development Impact Fees	Varies	Varies	Local Gov't	Development impact fees are one-time charges collected from developers for financing new infrastructure construction and operations and can help fund bicycle and pedestrian improvements, if approved. Impact fees are assessed through an impact fee program.
New Construction	Varies	Varies	Local Gov't	Future road widening and construction projects are methods of providing bicycle and pedestrian projects. To ensure that roadway construction projects provide infrastructure where needed, it is important that the review process includes a designated bicycle and pedestrian coordinator or similarly assigned liaison at the City, County, or NDOT. Planned roadway improvements in the project area should include bikeways and walkways, per the Complete Streets recommendation in Chapter 5.

Funding Analysis

State & Federal Funding

Table 7.6
State and Federal Bicycle and Pedestrian Funding Options (Part 1/3)

Funding Opportunity	Eligible Project Types	Qualifications	Lead Agency	Submittal Specifics
Highway Safety Improvement Program (HSIP)	Infrastructure and program safety improvements	Public road with a correctable crash history, expected to reduce crashes, positive cost-benefit ratio, or, a systemic safety project	NDOT	Program purpose is to reduce fatalities and serious injuries on public roads through infrastructure and programs. Like SSIP, HSIP can fund low cost, systemic improvements if benefit-cost is met. (https://www.nevadadot.com/uploadedFiles/NDOT/About_NDOT/NDOT_Divisions/Planning/MultiModal/2016%20STIP%20Process%208-27-2015.pdf)
Transportation Infrastructure Finance and Innovation Act (TIFIA) Loans	Large projects	Varies	USDOT	Like bonds, these loans are not funding but do provide financing options, including credit assistance in the form of direct loans, loan guarantees, and standby lines of credit for large, surface transportation projects of national and regional significance, as well as public-private partnerships.
State-Administered Community Development Block Grants (CDBG)	Street improvements	Best if project benefits low or moderate-income populations and part of a consolidated plan	HUD, State, and Local Gov't	Only Boulder City and small communities are eligible for this type of CDBG. The grantee cannot be a principal city of a metropolitan statistical area, a city with more than 50,000 population, or a county with a population with more than 200,000. Applications are submitted to the State. (https://www.hudexchange.info/cdbq-state/)
Entitlement Jurisdiction Community Development Block Grants (CDBG)	Street improvements	Best if project benefits low or moderate-income populations in an "entitlement" community, defined at right	HUD, Local Gov't	The second pool of funds is distributed by formula to "entitlement" jurisdictions, which are generally cities with populations of 50,000 or more and counties with populations of 200,000 or more (https://portal.hud.gov/hudportal/documents/huddoc?id=19565_CDBG.pdf)
FAST Act Safety Program	Safety improvements	States where >15% of fatal crashes involve bicyclists or pedestrians	NDOT	The FAST Act created a safety program to fund projects that improve safety for bicyclists and pedestrians, administered through the state DOT.

Funding Analysis

State & Federal Funding

Table 7.6 Continued
State and Federal Bicycle and Pedestrian Funding Options (Part 2/3)

Funding Opportunity	Eligible Project Types	Qualifications	Lead Agency	Submittal Specifics
Surface Transportation Block Grant Program (STBGP)	Bicycle and pedestrian improvements, among others	Varies	RTC and NDOT	In the new 2016 federal transportation act (FAST), the former STP is now known as the Surface Transportation Block Grant Program (STBGP) and includes the former Transportation Alternatives (TAP), Recreational Trails (RTP), and Safe Routes to Schools (SRTS) programs. This program has a state and an MPO component. An increase in the funding share for MPOs means that larger MPOs will receive more funding.
Congestion Mitigation and Air Quality (CMAQ)	Bicycle and pedestrian improvements, among others	Reduce congestion, improve air quality in non-attainment/maintenance areas by shifting travel demand away from cars	RTC	Projects must be included in the Transportation Improvement Program (TIP) selection, administered by RTC.
Land and Water Conservation Fund (LWCF)	Bicycle and pedestrian paths and trails, or acquisition of land for paths and trails	Projects that create outdoor recreation facilities, or land acquisition for public outdoor recreation	DNR	Provides matching grants to states and local governments for the acquisition and development of public outdoor recreation areas and facilities. The program is intended to create and maintain a nationwide legacy of high quality recreation areas and facilities and to stimulate non-federal investments in the protection and maintenance of recreation resources. 50/50 match is required, and the grant recipient must be able to fund the project completely while seeking reimbursements for eligible expenses. (http://parks.nv.gov/about/grant-programs/land-and-water-conservation-fund)
Nevada Recreational Trails Grant Program (RTP)	Recreational trail projects open to the public	On-the-ground trail development, maintenance, and/or rehabilitation	Nevada Division of Parks	RTP is an FHWA trails assistance program administered by Nevada Division of State Parks. Private individuals, non-profits, city, county, state and federal governments are eligible to apply. 80/20 match. (http://parks.nv.gov/about/grant-programs/recreational-trails-program)

State & Federal Funding

Table 7.6 Continued
State and Federal Bicycle and Pedestrian Funding Options (Part 3/3)

Funding Opportunity	Eligible Project Types	Qualifications	Lead Agency	Submittal Specifics
Rivers, Trails, and Conservation Assistance Program	Planning assistance for bicycle and pedestrian projects	Staff support for facilitation and planning	National Park Service	Projects need to be related to conservation and recreation, with broad community support, and supporting the National Park Service's mission. Applicants must submit National Park Service applications by August 1 annually, including basic information as well as letters of support. The local contact is Deborah Reardon at deborah_reardon@nps.gov or (702) 277-5614.
Transportation Investments Generating Economic Recovery (TIGER)	Shovel-ready, surface transportation projects	Positive estimated cost-benefit ratio meeting federal transportation goals, benefiting country as a whole	USDOT, State, and Local Gov'ts	Approvals for the ninth round of TIGER, totaling nearly \$500 million, were signed into law in 2016. Pre-application and final application required. Projects involving highways, bridges, bicycle and pedestrian facilities, public transportation, rail, and inter-modal are eligible.
State Legislation	Legislation dependent	Legislation dependent	State of Nevada	State legislation can create laws that have dedicated bicycle funding components. Two examples of this are the Oregon "bike bill" which requires including bicycle and pedestrian facilities when any road, street or highway is built or rebuilt and the California Active Transportation Program grants, which provide state funds to cities and counties wishing to improve safety and convenience for bicyclists and pedestrians. (http://oregon.gov/ODOT/HWY/BIKEPED/Pages/bike_bill.aspx) (http://www.dot.ca.gov/hq/LocalPrograms/atp/)
Federal Lands Access Program (FLAP)	Planning, engineering, construction, and other activities	Projects must be on, adjacent to, or provide access to federal lands	NDOT	Fund is administered through NDOT in coordination with the Central Federal Lands Highway Division, which develops a Programming Decisions Committee. The Committee prioritizes projects, establishes selection criteria, and calls for projects. Local contact is Morgan Malley at morgan.malley@dot.gov or (720) 963-3605. (https://flh.fhwa.dot.gov/programs/flap/nv/)

Funding Analysis

Regional Funding

Table 7.7
Regional Bicycle and Pedestrian Funding Options

Funding Opportunity	Eligible Project Types	Qualifications	Lead Agency	Submittal Specifics
Passenger Enhancements	Sidewalk projects and bicycle infrastructure	Sidewalk must be within half mile and bike infrastructure must be within three miles of a transit stop	RTC	Funding can be completed in two ways. The lead agency will share in the cost of the construction, if the submitting agency has already done design and is planning to construct. If the project is on RTC's priority sidewalk list, RTC will design and construct.
Residential Construction Tax (RCT)	Acquisition, expansion of public parks, playgrounds, recreational and cultural facilities	Projects in new development	Clark County	Developers must pay a RCT when construction, or remodeling residential dwelling units, and apartment houses. (https://www.municode.com/library/NV/clark_county/codes/code_of_ordinances?nodeId=TIT19PARE_CH19.05LOPACO_19.05.030RECOTMPAT)
Southern Nevada Public Land Management Act (SNPLMA)	Parks, trails, natural areas, capital improvements, conservation initiatives, and environmentally-sensitive land acquisition	Contribute to core values of sustainability, connectivity, and community; max. 3 project submissions per entity per category; commitment to future operations, maintenance and fiscal sustainability	BLM, RTC	SNPLMA allows BLM to sell public land around in Southern Nevada, the revenue from which is split between the State of Nevada General Education Fund (5%), the Southern Nevada Water Authority (10%), and a special account available to the Secretary of the Interior. Projects that provide opportunities for underserved communities are high priority. (https://www.blm.gov/nv/st/en/snplma.html)

Private, Non-Profit, & Corporate Funding

Table 7.8
Private, Non-Profit, or Corporate Bicycle and Pedestrian Funding Options

Funding Opportunity	Eligible Project Types	Qualifications	Lead Agency	Submittal Specifics
Cambia Health Foundation Children's Health Program	Programs and possibly infrastructure	Projects must improve access to healthy foods, recreation facilities, and encourage healthy behavior for families.	Cambia Health Foundation	Grants are typically in \$50,000 to \$100,000 range. Focus is on programs. Contact foundation staff at cambiahealthfoundation@cambiahealth.org for additional information. (http://www.cambiahealthfoundation.org/programs/childrens-health)
People for Bikes Green Lane Project Grants	Bicycle infrastructure	Projects must improve the bicycling environment	People for Bikes	People for Bikes have awarded 272 grants to non-profit organizations and local governments in 49 states and the District of Columbia, since 1999.
People for Bikes Community Grants	Paths, rail trails, mountain bike trails, bike parks, BMX facilities, large-scale advocacy	Project funding should leverage federal funding and build momentum for bicycling	People for Bikes	People for Bikes have awarded 341 grants, totalling more than \$2.9 million and leveraging nearly \$670 million in public and private funding. This grant program is funded by partners in the bicycle industry.
REI Grants	Preservation and restoration	Non-profit, partner with local store	REI	REI awarded \$4.2 million in grants to more than 300 non-profits for preservation and restoration projects in 650 locations. After a store/non-profit relationship is established, REI asks the non-profit to apply for grant funding. Unsolicited grant applications are usually not considered.
Community Fundraising	All	Small dollar amounts	Local Gov't, agency, or non-profit	Lead agency manages the details, marketing, and range of a community fundraising campaign. (http://www.pedbikeinfo.org/planning/funding_non-government.cfm)
Nat'l Ass'n of Realtors' Smart Growth Grants	Land-use and transportation-related activities/policies that support development that meets at least one of 10 Smart Growth Principles	Small dollar amounts	Local Gov't, agency, or non-profit	Funds to be used within one year. Requires proof of expenditures (invoices, receipts), self-evaluation form, and photos, study, or plan resulting from the grant.
National Trails Fund	Hikers as primary constituency, but shared-use paths also eligible; land acquisition for trails; improved access	Must be an Alliance Member and a 501(c)3 nonprofit (or government agencies as long as 5019(c)3 is fiscal agent	Local Gov't, agency, or non-profit	American Hiking Society's National Trails Fund is the only privately funded, national grants program dedicated solely to building and protecting hiking trails. (https://americanhiking.org/national-trails-fund/frequently-asked-questions/)

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CHAPTER 8

Conclusion



Conclusion

Realizing Southern Nevada's Bicycling & Walking Potential

Southern Nevada will develop a **safe, connected, and convenient walking and bicycling system** that serves as a viable transportation and recreation asset while advancing the region's economic, educational, health, and environmental goals.

Southern Nevada possesses incredible potential to become a national leader in bicycling and walking. The region already boasts an impressive shared use path system that could serve as a solid foundation for building a high comfort system which accommodates pedestrians and bicyclists of all ages and abilities. In addition, a mild climate and relatively flat geography makes bicycling and walking possible much of the year. According to the RTC, 25% of all trips taken in Southern Nevada are less than one mile, and nearly 50% are less than 3 miles. These relatively short trips could easily be taken on foot or by bike given adequate facilities, proper education, and effective encouragement.

OPPORTUNITIES FOR SYNERGY

Changing attitudes about Southern Nevada's growth and development have evolved since the 2008 plan to increasingly include a desire for walkable and bike-able communities. Southern Nevada Strong (SNS) captures this bold and collaborative vision and weaves it into a variety of other community initiatives. The resulting SNS vision illustrates how biking and walking are closely integrated with a number of community issues such as social equity, quality of life, community health, and economics. In addition to SNS, several recent or ongoing efforts offer opportunities to leverage and accelerate improvement to the bicycling and walking environment.

The RTC's ongoing High Capacity Transit Plan represents one key initiative that could offer synergy with the goals of the RBPP. Bicycling and walking offer critical first- and last-mile connections for transit users. Additionally, future transit-oriented developments (TOD) paired with transit improvements would offer further synergy for improving active transportation.

The recent roll out of the RTC bike share system in downtown Las Vegas represents yet another opportunity for synergy. Providing safe and comfortable routes for bike share patrons can improve fare box recovery, benefit local businesses, and normalize bicycling for Southern Nevada residents and visitors alike. In time, bike share may even expand to other parts of the region such as UNLV.

The continuation of fuel revenue indexing (FRI-C), passed in November of 2016, creates an indirect funding source for many bicycle and pedestrian projects throughout the region. Vehicular projects funded through FRI-C may include bicycle and pedestrian elements.

These efforts, combined with increasing interest in bicycling and walking from both jurisdictions and the general public, illustrate that development of a regional, high-quality active transportation network is both needed and widely beneficial (even to people who don't frequently walk or ride a bicycle). Improved community health, decreased congestion, and increased mobility are just some of the benefits possible with improved bicycling and walking conditions.

Figure 8.1:
A mother and child riding together in Southern Nevada



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