ADOT

ADOT STATEWIDE Bicycle and Pedestrian Plan UPDATE

FINAL REPORT

JUNE 2013

ADOT Statewide Bicycle and Pedestrian Plan Update

Final Report

June 2013

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1. INTRODUCTION

What is the purpose of the ADOT Bicycle and Pedestrian Plan?

In 2003, ADOT completed the Arizona Statewide Bicycle and Pedestrian Plan. This plan offered a long-term vision for a statewide system of interconnected and shared roadways and bicycle and pedestrian facilities to guide ADOT transportation decisions relating to bicycle and pedestrian travel, planning, and facility development. Since 2003, many of the recommendations of the 2003 plan have been implemented.

The purpose of the 2012 ADOT Bicycle and Pedestrian Plan Update (Plan) is to update the 2003 plan and address the most critical bicycle and pedestrian transportation planning needs on the State Highway System (SHS), responding to the significant growth in Arizona that has occurred over the last decade.

How was the Plan developed?

The Plan was developed through a collaborative effort by the ADOT Bicycle and Pedestrian Plan Steering Committee, the public, and the study consultant.

Steering Committee members met several times throughout the course of the study. Their review of working documents was important to the success of the Plan. Public input was obtained through a survey that was conducted in May 2012. Over 1,800 people throughout Arizona responded to the survey. Plan recommendations reflect the public input.

What is in the Plan?

The Plan establishes a vision for bicycling and walking in Arizona, goals and objectives to measure progress toward the vision, and strategies and actions needed to achieve the vision, goals, and objectives.

The Plan establishes a goal to double the percentage of walking and bicycling trips statewide over the next 10 years, reduce motor vehicle crashes involving pedestrians by 20 percent and those involving bicyclists by 12 percent, and improve bicycle and pedestrian infrastructure on state highways. Finally, the Plan establishes strategies that upon implementation will promote the increased use and safety of bicycling and walking as transportation modes. Strategies proposed include:

- Safety
- Infrastructure
- Education of motorists, bicyclists, and pedestrians
- Policies, Plans, and Programs
- Design Guidelines

What roadways are included in the Plan?

The Plan focuses on the SHS; however, the study team fully recognizes the interdependence of the SHS and local and regional transportation networks, and that the needs and concerns of bicyclists and pedestrians extend beyond the SHS. Users of local and regional roadways in cities, towns, counties and tribal communities will benefit from programmatic recommendations (e.g., education, encouragement, and enforcement) made in the Plan.

It should be noted that references to regional jurisdictions/agencies in the Plan are inclusive of tribal communities. This is in consideration that some tribal communities have tribal, county, state and federal transportation networks within their jurisdictional boundaries. The SHS is illustrated in **Figure 1.**

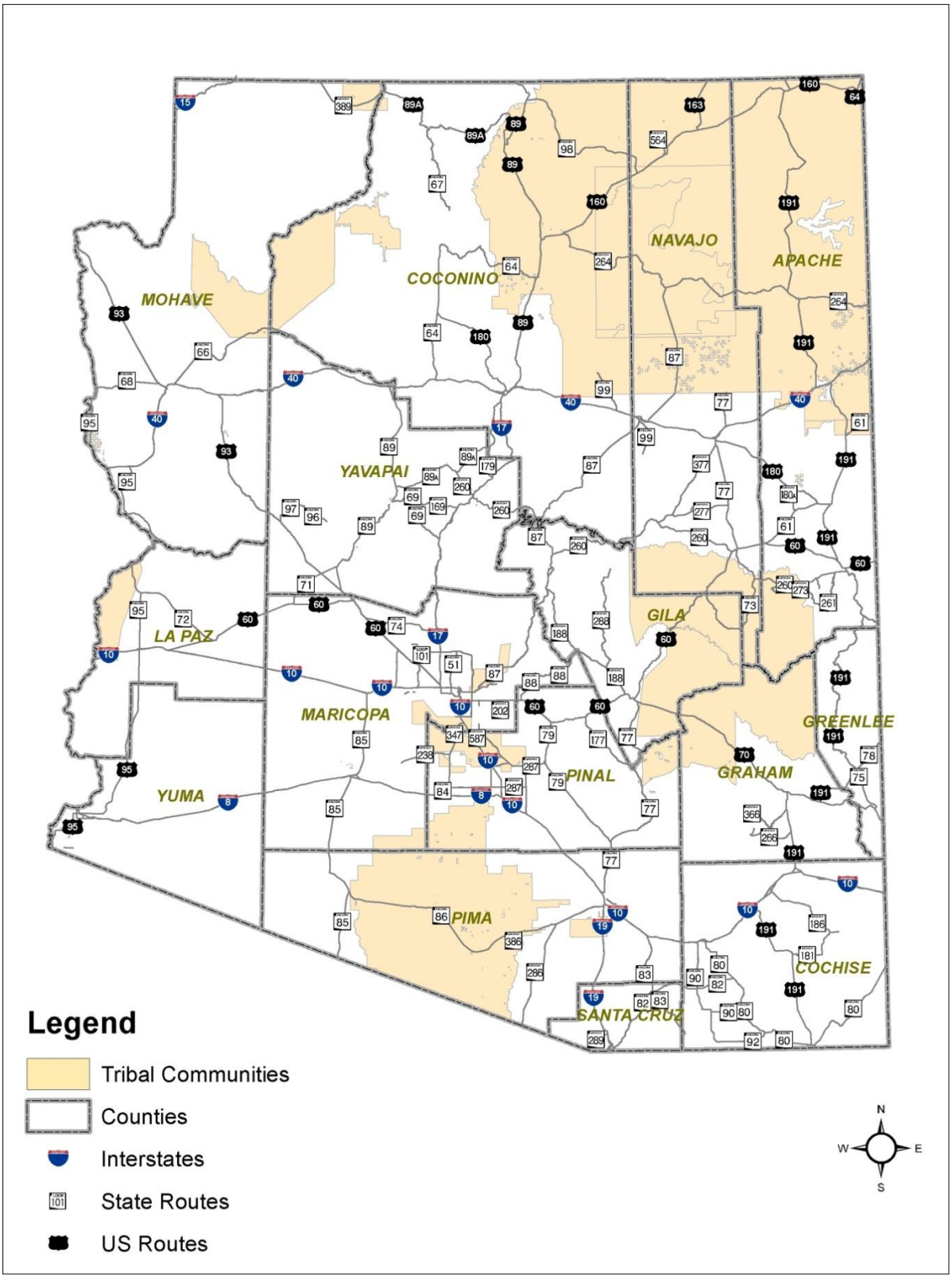


Figure 1 – State Highway System

What are existing state and federal policies as they pertain to bicycling and walking?

United States Code (USC), Title 23 – Highways, Chapter 2, Section 217, (g)

Title 23 USC Section 217, includes the following:

(g) Planning and Design.

(1) In general. Bicyclists and pedestrians shall be given due consideration in the comprehensive transportation plans developed by each metropolitan planning organization and State in accordance with sections 134 and 135, respectively. Bicycle transportation facilities and pedestrian walkways shall be considered, where appropriate, in conjunction with all new construction and reconstruction of transportation facilities, except where bicycle and pedestrian use are not permitted.

(2) Safety considerations. Transportation plans and projects shall provide due consideration for safety and contiguous routes for bicyclists and pedestrians. Safety considerations shall include the installation, where appropriate, and maintenance of audible traffic signals and audible signs at street crossings.

Policy Statement on Bicycle and Pedestrian Accommodation

In 2010, the United States Department of Transportation (USDOT) issued a Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations[1] (Policy Statement). The purpose of the Policy Statement is to support interconnected bicycling and walking networks to increase bicycle and pedestrian safety. The Policy Statement recommends the following actions:

- Consider walking and bicycling as equals with other transportation modes.
- Ensure people of all ages and abilities are considered when planning and designing facilities.
- Go beyond minimum standards.
- Integrate bicycle and pedestrian accommodation on new, rehabilitated, and limited-access bridges.
- Collect data on bicycling and walking trips.
- Set mode-share targets for bicycling and walking and track them over time.
- Remove snow from sidewalks, bike lanes, and shared-use paths.
- Improve non-motorized facilities during maintenance projects.

[1] http://www.fhwa.dot.gov/environment/bicycle_pedestrian/

Arizona Department of Transportation State Transportation Board

A stated policy of the ADOT State Transportation Board[2] is to encourage bicycling and walking as viable transportation modes, and actively work toward improving the transportation network so that these modes are accommodated, by:

- Promoting increased use of bicycling and walking, and accommodating bicycle and pedestrian needs in the planning, design, and construction of transportation facilities alongside state highways.
- Developing design guidelines and measures that give the roadway designer flexibility in accommodating the needs of all users of the transportation facility.
- Developing design guideline implementation policies that balance the needs of motorists, bicyclists, and pedestrians.
- Pursuing the use of federal funds that are available for alternative modes.

Arizona Department of Transportation, MGT 02-1 Bicycle Policy

The ADOT Bicycle Policy, MGT 02-01[3], establishes uniform guidelines for accommodating bicycle travel on the SHS. The policy was updated in 2007 and specified a review date of 2010, but the review has not been completed. The ADOT Bicycle Policy has provided significant benefits to bicyclists on the SHS; however, improvements can be made.

This Plan recommends modifying the ADOT Bicycle Policy to go beyond minimum requirements by including provisions for bicycle travel in all new major construction and reconstruction projects on the SHS and as part of pavement preservation, utility, and minor and spot improvement projects if the costs of accommodation are reasonable and feasible.

[2] http://www.azdot.gov/Board/PDF/Board_Policies_010411.pdf
[3] http://tinyurl.com/ayrhf7g

Arizona Department of Transportation, Roadway Design Guidelines, 107.2 - Pedestrian Facilities

The ADOT Roadway Design Guidelines[4] state that ADOT does not normally construct sidewalks as a part of an ADOT highway project. However, in urban areas, the highway cross section should be designed to provide space for sidewalks to be constructed in the future by local agencies. The guidelines state that ADOT may construct additional sidewalks along local streets or urban arterial highways at the request of the local government, provided there is an agreement with the local government to pay ADOT's additional costs for design, construction, and right-of-way. Agreements with the local government for sidewalk maintenance must be executed before advertising the project for bids.

What is the vision for bicycling and walking in Arizona?

The Steering Committee developed the following vision for bicycling and walking in Arizona:

> Arizona will become a state where people of all ages and abilities can conveniently, comfortably, and safely walk or bicycle to destinations as part of their everyday life. The quality of life and health of Arizona residents will be improved as more people choose to walk or bike. A "Complete System" of bicycle and pedestrian facilities on and off of the State Highway System will make the trip safer, more pleasant, more convenient, more accessible, and with minimal barriers, enhancing the livability and economic vitality of cities and towns in rural and urban areas. A "Complete System" recognizes that transit users often begin or end their trip as pedestrians or bicyclists. Access to transit along state highways will be made safer and more comfortable. Bicycling and walking will be incorporated into State Highway design to meet the needs of bicyclists, pedestrians, and transit users of all abilities and ages at traffic interchanges, intersections, signals, and along the State Highway. Bicycle and pedestrian facilities such as underpasses/overpasses, bicycle lanes, sidewalks and paths, and transit stops will clearly indicate the right-of-way or their accommodation on shared roadways.

[4] http://tinyurl.com/59pmrr, page 100-13

2. PLAN GOALS AND OBJECTIVES

Achieving the vision for bicycling and walking in Arizona requires a multi-faceted approach that increases the number of bicyclists and pedestrians statewide, provides them with facilities where they feel safe and comfortable, and promotes their safety.

Table 1 outlines the goals and objectives that will guide ADOT's activities to achieve the ADOT Bicycle and Pedestrian Program Vision. Performance indicators and baseline values for the indicators will measure progress toward the goals and are shown in **Table 1.** The goals are:

- Goal No. 1: Increase Bicycle and Pedestrian Trips
- Goal No. 2: Improve Bicyclist and Pedestrian Safety
- Goal No. 3: Improve Pedestrian and Bicycle Infrastructure

A selection of the indicators will be compiled and reported on an annual basis. The simple one-page summary of key bicycle and pedestrian indicators may be posted online at azbikeped.org and easily distributed via email to bicycle and pedestrian stakeholders, advocates, and professionals statewide. The summary will provide a mechanism to raise awareness for bicycle and pedestrian issues. The following indicators are proposed to be included in the annual summary:

- Percentage of trips to work by walking or bicycling statewide.
- Number of miles of SHS with a paved shoulder width of four feet or greater.
- Number of bicyclist injuries and fatalities statewide.
- Number of pedestrian injuries and fatalities statewide.
- Percentage of transportation funding allocated to bicycle and pedestrian projects (based on available reported data).

Table 1 – Plan Goals, Objectives, and Performance Indicators

Goal and Supporting Objectives	Performance Indicator	Existing Status/Baseline	Target
Goal No. 1: Increase Bicycle and Pedestrian Trips			
i. Double the percentage of trips to work by walking and bicycling statewide within the next 10 years.	Percentage of trips to work by walking and bicycling statewide.	Trips to Work by Bicycle: 1.0% Trips to Work by Walking: 2.2% (American Community Survey [ACS] 2009-2011)	Double the percentage of total trips made primarily by bicycling and walking in Arizona within the next 10 years.
Notes: In 2010, ACS data shows that out of 2.6 million workers in Arizona, 58,000 workers commute by walking and 25,000 workers commute by bicycling.			
Goal No. 2: Improve Bicyclist and Pedestrian Safety			
i. Zero Fatalities: Reduce the number of bicycle-motor vehicle crashes statewide.	Number of bicyclist injuries and fatalities statewide.	*2008 to 2010 Average* Bicyclists Injured: 1,636/year Bicyclists Killed: 21/year	*The overall goal is to eliminate all crashes involving bicyclists – "Zero Fatalities."* A progress goal is to reduce the number of bicycle-motor vehicle crashes (injuries and fatalities) by 12 percent by the year 2018, to fewer than 1,440 bicycle-motor vehicle crashes and 18 fatalities.
ii. Zero Fatalities: Reduce the number of bicycle-motor vehicle crashes on the SHS.	Number of bicyclist injuries and fatalities on the SHS.	217 crashes per year (average 2004-2008) on the SHS Analysis of 2007-2010 data shows average: Bicycle-motor vehicle crashes/year on the SHS: 177/year Bicyclists Injured: 19/year Bicyclists Killed: 4/year	*The overall goal is to eliminate all crashes involving bicyclists – "Zero Fatalities."* A progress goal is to reduce the number of bicycle-motor vehicle crashes (injuries and fatalities) by 12 percent by the year 2018. This goal represents a reduction of 21 crashes-per-year by the year 2018 (as compared to 2007-2010 data) to fewer than 156 crashes-per-year, 16 bicyclists injured, and three bicyclists killed per year.
Notes: *The ultimate goal is eliminate all crashes involving bicyclists and pedestrians – "Zero Fatalities."* To chart progress toward this goal, the ADOT Bicycle Safety Action Plan established a goal to reduce bicycle-motor vehicle crashes by 12 percent by 2018, as compared to 2004-2008 baseline data. Analysis of 2010 data establishes a baseline of 177 crashes-per-year.			

Table 1 – Plan Goals, Objectives, and Performance Indicators (continued)

Goal and Supporting Objectives	Performance Indicator	Existing Status/Baseline	Target
Goal No. 2: Improve Bicyclist and Pedestrian Safety (continued)			
iii. Zero Fatalities: Reduce the number of pedestrian-motor vehicle crashes statewide.	Number of pedestrian injuries and fatalities statewide.	*2008 to 2010 Average* Pedestrians Injured: 1,321 Pedestrians Killed: 134	*The overall goal is to eliminate all crashes involving pedestrians – "Zero Fatalities."* A progress goal is to reduce the number of pedestrian-motor vehicle crashes (injuries and fatalities) by 20 percent by the year 2018, to fewer than 1,057 crashes and 107 fatalities.
iv. Zero Fatalities: Reduce the number of pedestrian-motor vehicle crashes on the SHS.	Number of pedestrian injuries and fatalities on the SHS.	*2008 to 2010 Average* Pedestrians Injured: 38/year Pedestrians Killed: 42/year	*The overall goal is to eliminate all crashes involving pedestrians – "Zero Fatalities."* A progress goal is to reduce the number of pedestrian-motor vehicle crashes (injuries and fatalities) by 20 percent by the year 2018, to fewer than 30 pedestrians injured per year and fewer than 34 pedestrians killed per year.
The ultimate goal is eliminate all crashes involving bicyclists and pedestrians – "Zero Fatalities." To chart progress toward this goal, the ADOT Pedestrian Safety Action Plan established a goal to reduce pedestrian crashes (fatal and non-fatal) by 20 percent by the year 2016, as measured by a five-year average.			
Goal No. 3: Improve Pedestrian and Bicycle Infrastructure			
i. Provide pedestrian infrastructure in urbanized areas along non-access controlled state highways.	Number of miles of SHS with adjacent/parallel sidewalks or shared-use paths in urban areas/small urban areas.	Total sidewalk length on SHS: 319.2 miles Total shared-use path length on SHS: 19.6 miles Total length (centerline miles) where pedestrian infrastructure is needed: 169 miles	Provide pedestrian infrastructure including sidewalks, shared-use paths, and crossings in urbanized areas where there is a demonstrated need for the infrastructure.
Notes: Pedestrian Demand Index for State Highway Facilities (May 2007) used GIS mapping of population and roadway network data to identify areas of potential pedestrian demand. State Highway segments with Pedestrian Demand Index (PDI) of "Moderate" or above represent segments where pedestrian infrastructure may be most beneficial. Segments with "Highest," "High," and "Moderate" were combined with the ADOT sidewalk and shared-use path inventory to identify lengths of state highway (represented as centerline miles) where pedestrian infrastructure may be most beneficial.			

Table 1 – Plan Goals, Objectives, and Performance Indicators (continued)

Goal and Supporting Objectives	Performance Indicator	Existing Status/Baseline	Target
Goal No. 3: Improve Pedestrian and Bicycle Infrastructure (continued)			
ii. Accommodate bicyclists on all non-access controlled state highways.	Number of miles of SHS with a paved shoulder that meets AASHTO guidelines (four feet or greater).	Number of miles with effective shoulder width (four feet or greater): 2,852.65 miles (approximately 48.9% of the SHS) Effective shoulder width considers rumble strips, providing four feet of rideable shoulder exclusive of the rumble strip.	Provide minimum effective shoulder width of four feet or greater on all State Highways.

3. BICYCLING AND WALKING IN ARIZONA TODAY

What do Arizonans' think about walking and bicycling?

In May 2012, an online survey was distributed to the public. The purpose of the survey was to hear from people across Arizona about what is important to them in regards to traveling by bicycle or by foot along or crossing the SHS. The survey was posted on ADOT's website, was active for 30 days, and received over 1,800 responses. The following is a summary of the questions and responses from the survey.

Question No. 1

Question No. 1 asked survey respondents to rank the proposed Plan goals. Bicyclist and pedestrian safety was ranked as the highest priority. Note that a weighted average ranking of "1" represents the highest priority.

Table 2 – Ranking of ADOT Bicycle and Pedestrian Plan Goals

Answer Options	Ranking and Percent of Respondents				
	1 Most Important	2	3	4 Least Important	Weighted Average Ranking[1]
Decrease bicyclist and pedestrian injuries and fatalities	58.3%	20.4%	11.9%	9.4%	1.72
Increase the number of miles with paved shoulders of 4+ feet	22.2%	35.0%	25.8%	17.0%	2.38
Increase the number of miles of sidewalks and shared-use paths	12.7%	28.3%	36.9%	22.2%	2.69
Double the percentage of walking or bicycling trips	13.4%	19.3%	21.4%	45.9%	3.00

1. A lower rating average represents a higher criteria ranking. Decrease bicyclist and pedestrian injuries and fatalities received the highest ranking.

Question No. 2

Question No. 2 asked participants to rank the importance of various pedestrian considerations. Note that a weighted average ranking of "1" represents the highest priority. Increasing education and awareness of all roadway users, including pedestrians, ranked as the highest priority as illustrated in **Table 3.**

Table 3 – Ranking of Pedestrian Considerations

Answer Options	Ranking and Percent of Respondents					
	1 Most Important	2	3	4	5 Least Important	Weighted Average Ranking[1]
Improve education and awareness of all roadway user laws	40.0%	14.2%	11.4%	12.0%	22.5%	2.63
Install sidewalks or shared-use paths	27.4%	24.4%	18.0%	17.3%	13.0%	2.64

Table 3 – Ranking of Pedestrian Considerations (continued)

Answer Options	Ranking and Percent of Respondents					
	1 Most Important	2	3	4	5 Least Important	Weighted Average Ranking[1]
Improve maintenance of existing sidewalks and shared-use paths	10.6%	24.9%	34.5%	21.2%	8.8%	2.93
Provide adequate crossings on state highways	17.8%	22.4%	20.1%	21.0%	18.7%	3.01
Provide lighting on sidewalks and shared-use paths	9.6%	17.4%	17.6%	24.3%	31.1%	3.50

1. A lower rating average represents a higher criteria ranking. Decrease bicyclist and pedestrian injuries and fatalities received the highest ranking.

Question No. 3

Question No. 3 asked participants to rank the importance of various bicycle considerations. Note that a weighted average ranking of "1" represents the highest priority. The results show that the most important concern regarding bicyclists is providing wide shoulders on state highways (35.3% of respondents indicated this). Respondents also felt that improved maintenance of shoulders is an important improvement (29.5% of responses).

Table 4 – Ranking of Bicycle Considerations

Answer Options	Ranking and Percent of Respondents							
	1 Most Important	2	3	4	5	6	7 Least Important	Weighted Average Ranking[1]
Provide wide shoulders on state highways for use by bicyclists	35.3%	20.6%	13.3%	8.5%	8.5%	7.4%	6.3%	2.82
Improve maintenance of shoulders on state highways	7.8%	29.5%	20.9%	14.8%	11.8%	10.6%	4.6%	3.06
Provide shared-use paths on state highways	16.2%	12.2%	18.1%	17.6%	13.6%	12.5%	9.7%	3.38
Improve connectivity of bikeways	8.8%	13.3%	19.9%	24.1%	17.7%	11.0%	5.2%	3.41
Provide pavement markings and bicycle detection technology at intersections	4.7%	10.9%	13.4%	17.6%	26.1%	18.1%	9.1%	3.98
Provide more bicycle facilities at destinations	4.1%	7.7%	7.9%	7.5%	11.4%	23.0%	38.3%	4.99
Improve education and awareness of all roadway users	29.4%	9.4%	8.4%	9.0%	8.5%	13.8%	21.4%	3.69

1. A lower rating average represents a higher criteria ranking. Provide wide shoulders on state highways for use by bicyclists received the highest ranking.

Question No. 4

Question No. 4 asked survey respondents to suggest activities that can be completed by ADOT to improve the comfort and safety of bicyclists and pedestrians on the SHS. The following are a sample of ideas that were submitted:

A. What can ADOT do to improve the education of motorists, bicyclists, and pedestrians about current and safe practices?

Ideas included the following:

- Provide "Share the Road" roadway signs and pavement markings.
- Provide "Be a Roll Model" educational materials at big-box retail stores, sporting goods stores, awareness events, automobile dealers, insurance companies, repair shops, and more.
- Distribute Public Service Announcements (PSAs) throughout the state. Utilize media, social networks (e.g., local and national bike clubs, stores, etc.), billboards, and social media (e.g., Facebook, Twitter, YouTube, etc.) to spread educational messages.
- Require driver's license refresher courses, provide bicycle and pedestrian education materials at ADOT, Motor Vehicle Division (MVD) offices, require more frequent renewal of driver's licenses, improve information in driver's license manual, provide bicycle and pedestrian education information in license plate renewal envelopes, include defensive cyclist education in driver's education classes, include bicycle safety in drivers education in schools (including traffic schools).
- Encourage bicycle shops to conduct a brief test to those purchasing a bicycle, similar to a driver's license test, to show they know the rules of the road. Encourage stores to offer a small discount to those who participate in the test.
- Provide bicycle and pedestrian safety and educational materials to elementary schools (e.g., coloring books, stickers, etc.) and support implementation of bicycle and pedestrian safety training in elementary schools.
- Host awareness events/bicycle rodeos throughout the state.
- Promote no texting while driving.

B. What can ADOT do to improve bicycle and pedestrian facilities on state highways?

Ideas included the following:

- Widen shoulders where they are narrow – provide four-foot minimum paved shoulders s (without the rumble strip).
- Provide bicycle and pedestrian facilities that are separated away from motor vehicle lanes (e.g., provide a barrier between the bicycle lane and the travel lane, provide a separated shared-use path, etc.).

- Integrate trails and shared-use paths into construction or major reconstruction of new freeways and highways.
- Maintain shoulders free of debris and cracks; ensure that resurfacing efforts include the entire shoulder.
- Improve connectivity of bicycle routes in communities, improve coordination between communities to provide consistent facilities across jurisdictional boundaries, and collaborate with communities to provide bicycle and pedestrian facilities and shared use paths as alternates to state highways.
- Provide more grade-separated crossings for bicycles and pedestrians across state highways.
- Provide bike maintenance stations with air, water, shade, benches, lighting, etc.
- Install bicycle detection at signalized intersections.
- Encourage installation of bicycle facilities outside of buildings, at transit stops, etc.
- Adopt a Complete Streets policy and provide training.

C. What can ADOT do to identify more funding for bicycling and walking facilities on state highways?

Ideas included the following:

- Specify that a certain percentage of the cost of each state highway project must go toward bicycle and pedestrian improvements.
- Lobby for funding from the federal government and private companies (sponsorships) and promote the health and environmental benefits.
- Apply for grants at all levels of government.
- Increase penalty fines for law violations by motorists and bicyclists.
- Promote donations to the State Bicycle Safety Fund, as established by Arizona Revised Statutes (A.R.S 28-818)[5] (e.g., an option can be provided to donate on the state tax form).

D. What can ADOT do to encourage more people to walk or bicycle in Arizona?

Ideas included the following:

- Provide safe and comfortable facilities; provide separated bicycle and pedestrian facilities (shared-use paths), bike lanes, lighting, water fountains, and sidewalks; connect these facilities to make them more accessible; improve crossings at major intersections with state highways. Make improvements attractive and convenient.

[5] http://www.azleg.state.az.us/ars/28/00818.htm

- Educational campaigns that emphasize economic, environmental, and physical health benefits. Include how to be active but safe in the heat.
- Collaborate with Arizona Department of Administration to provide incentives to bike or walk to work (e.g., tax or insurance incentives, credit at stores, etc.). Implement trip reduction programs. Provide facilities at destinations (e.g., secure bike parking, showers, etc.). Provide tax credits for decongestion and/or cleaner air.
- Partner with local businesses and organizations to host awareness events such as races and Cyclovia (Sunday morning rides where streets are closed to motor vehicles).
- Maintain the facilities and keep them clear of debris and cracks.
- Increase and improve signage and pavement markings.
- Promote bicycle touring in Arizona to other states and countries and promote the US Bicycle Route System in partnership with Adventure Cycling to generate tourism revenue.
- Develop a smart phone application to identify and rate bicycle and walking routes throughout the state.

E. What can ADOT do to evaluate the effectiveness of bicycle and pedestrian safety and education materials and facilities?

Ideas included the following:

- Conduct ridership and pedestrian counts on state highways.
- Install bicycle counters on state highways.
- Establish a permanent statewide bicycle and pedestrian committee comprised of representatives of regional, county, and local agencies from around the state.
- Collaborate with universities and colleges to perform evaluations of projects and programs.
- Distribute quizzes at events or post online to see how well people know the rules of the road. Follow up with educational components.
- Advertise the ability for people to contact ADOT to report maintenance issues, or successes (via phone, smart phone application, various websites, Facebook, Twitter, etc). Currently, people may contact ADOT at http://www.azdot.gov/index_docs/Contact_ADOT.asp.

Question No. 5

Question No. 5 asked participants if they agree or disagree with the proposed Plan's Vision. The Vision was previously presented on page 8 and 9.

Table 5 – ADOT Bicycle and Pedestrian Plan Vision

Answer Options	Response Percent
Agree	89.9%
Disagree	6.1%
No opinion	4.1%

Question No. 6

In Question No. 6, respondents were provided the opportunity to comment on issues associated with specific state highways. Space was allocated for comments on up to six state highways for each survey respondent. Shoulder widening and maintenance were frequently identified on almost every state highway. A summary of responses is included in **Appendix A**.

Who is walking and bicycling?

Question No. 7, 8, and 9

The online survey provided respondents the opportunity to provide demographic information.

A majority of survey respondents were male, age 35 to 54. The majority of these individuals (66 percent) rides or walks at least weekly. A majority of survey respondents (58.4 percent) live in Maricopa County, Pima County (12.1 percent) and Coconino County (10.9 percent).

How many are bicycling and walking?

Data from the United States Decennial Census and American Community Survey

Detailed information about those who bicycle and walk is limited. Two sources of data collected at the national level include the American Community Survey (ACS) and the United States Decennial Census (US Census). The ACS provides information annually about the social and economic data of communities and contained information about education, housing, jobs, and transportation. The US Census contains Journey to Work data for workers 16 years and older, and includes information about the transportation mode utilized to arrive at work.

Table 6 and **Table 7** show the proportion of workers who bicycled or walked to work in 2000 and 2009-2011. Nationwide, among the approximate 140 million workers in 2009-2011, 0.5 percent reported that they bicycle to work and 2.8 percent reported that they walked. Data from the 2000 US Census shows similar statistics. In Arizona, the ACS data shows that the number of work trips by bicycling or walking statewide is also generally constant between 2000 and 2009-2011. However, between 2000 and 2009-2011, the levels of bicycling increased in the Flagstaff area, rising from 2.2 percent in 2000 to 3.1 percent in 2009-2011. Although this data is important to note, the ACS data is limited due to small

sample sizes. Journey to Work trips represent a small proportion of all bicycle and walking trips. According to the 2009 National Household Travel Survey (NHTS), walking trips accounted for 10.9 percent of all trips reported, while one percent of all trips reported were taken by bicycle. Together, the two modes account for 11.9 percent of all reported trips.[6] Also, only 15 percent of daily trips are taken for commuting.[7]

Other non-scientific surveys that have been conducted indicate a very high percentage of bicycling and walking trips on the SHS is non-commute, which is not captured by Journey to Work data.

Table 6 – Means of Transportation

Year	Total Population	Population of Workers 16 Years or Over	Number Biked to Work^	Number Walked to Work^	Percent of Workers Biked^	Percent of Workers Walked^
United States						
2000	281,421,906	128,279,228	488,497	3,758,982	0.4%	2.9%
2009-2011	309,231,244	138,076,928	754,952	3,887,229	0.5%	2.8%
State of Arizona						
2000	5,130,632	2,210,395	22,209	58,015	1.0%	2.6%
2009-2011	6,412,940	2,644,889	25,186	58,426	1.0%	2.2%
Flagstaff MSA						
2000	122,366	56,904	1,268	4,246	2.2%	7.5%
2009-2011	134,198	63,215	1,962	5,517	3.1%	8.7%
Phoenix MSA						
2000	3,251,876	1,466,434	13,855	30,577	0.9%	2.1%
2009-2011	4,208,639	1,799,764	14,750	30,354	0.8%	1.7%
Prescott MSA						
2000*	34,411	13,321	164	790	1.2%	5.9%
2009-2011	211,401	79,121	830	2,195	1.0%	2.8%
Lake Havasu-Kingman MSA						
2000*	61,614	24,273	128	460	0.5%	1.9%
2009-2011	201,205	69,365	125	1,402	0.2%	2.0%
Tucson MSA						
2000	843,746	369,261	5,268	9,547	1.4%	2.6%
2009-2011	982,419	407,137	6,233	10,325	1.5%	2.5%

[6] http://www.walkinginfo.org/15_year_report/, p. 6.
[7] http://www.bts.gov/programs/national_household_travel_survey/daily_travel.html

Table 6 – Means of Transportation (continued)

Year	Total Population	Population of Workers 16 Years or Over	Number Biked to Work^	Number Walked to Work^	Percent of Workers Biked^	Percent of Workers Walked^
Yuma MSA						
2000	160,026	51,675	460	2,234	0.9%	4.3%
2009-2011	197,138	69,587	336	1,694	0.5%	2.4%
*In 2000, Prescott MSA and Lake Havasu-Kingman MSA did not exist. Therefore, year 2000 data was obtained from the cities of Prescott, Kingman, and Lake Havasu. For the Lake Havasu-Kingman MSA, the values for each of these cities were combined.						
^ Data includes college students living in a house or apartment.						
Sources: US Census Bureau, 2000 Decennial Census (Summary File 3, Detailed Tables); US Census Bureau, 2009-2011 ACS 3-Year Estimates, Table B08301 and Table B01003 (http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t#none)						

Table 7 – 5-year Data for Prescott and Lake Havasu-Kingman MSA

Year	Total Population	Total Population of Workers 16 Years or Over	Number Biked to Work^	Number Walked to Work^	Percent of Workers Biked^	Percent of Workers Walked^
Prescott MSA						
2000*	34,411	13,321	164	790	1.2%	5.9%
2005-2009	209,365	86,285	413	3,025	0.5%	3.5%
2006-2010	209,260	84,516	497	2,651	0.6%	3.1%
Lake Havasu-Kingman MSA						
2000*	61,614	24,273	128	460	0.5%	1.9%
2005-2009	192,988	70,901	60	1,210	0.08%	1.7%
2006-2010	199,177	73,133	94	1,302	0.1%	1.8%
*In 2000, Prescott MSA and Lake Havasu-Kingman MSA did not exist. Therefore, year 2000 data was obtained from the cities of Prescott, Kingman, and Lake Havasu. For the Lake Havasu-Kingman MSA, the values for each of these cities were combined.						
^Data includes college students living in a house or apartment.						
Sources: US Census Bureau, 2000 Decennial Census (Summary File 3, Detailed Tables); US Census Bureau, 2006-2008 ACS, Table B08301 and Table B01003; US Census Bureau, 2008-2010 ACS, Table B08301 and Table B01003, 2011 ACS 1-Year Estimates (http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t#none)						

ADOT Bicycle Count Station

In April 2011, ADOT completed installation of a permanent bicycle count station on SR 179 near Sedona, Arizona. The inductive loop bicycle counter is located in the northbound and

southbound bicycle lanes (as depicted in photos below in **Figure 2**) at the north end of the Village of Oak Creek at milepost 307.

Figure 3 presents the total monthly count data for May 2011 to March 2011. The data shows a higher ridership in spring and fall. **Figure 4** shows that the number of bicyclists is generally higher on weekends than during the week.

Southbound SR 179

Northbound SR 179

Figure 2 – Bicycle Count Stations on SR 179

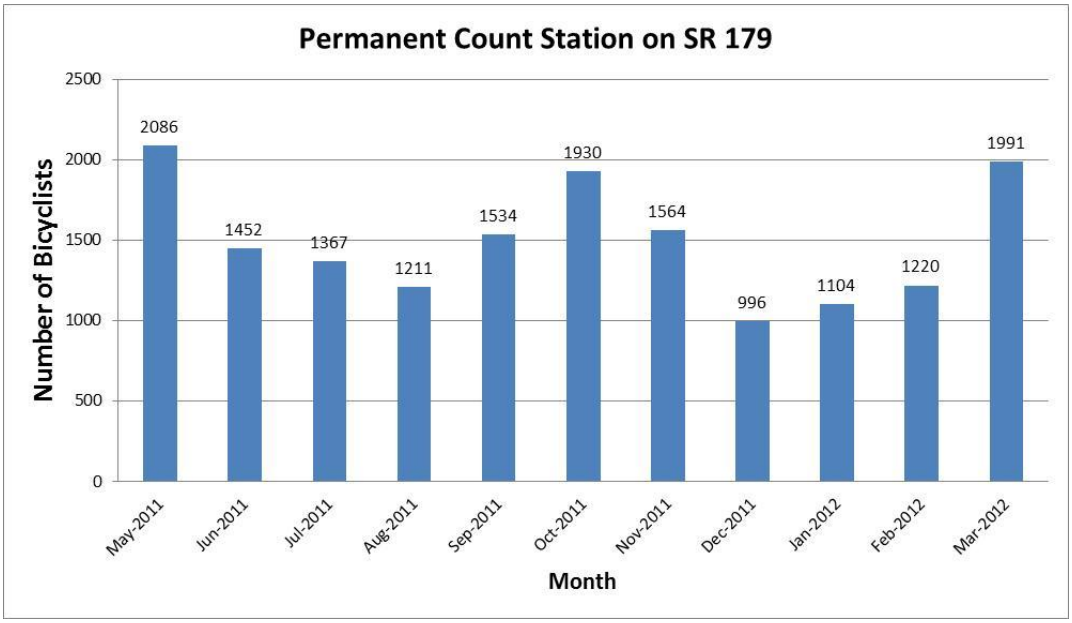


Figure 3 – Bicycle Count Data on SR 179 by Month
May 2011 to March 2012, Northbound and Southbound Count Stations

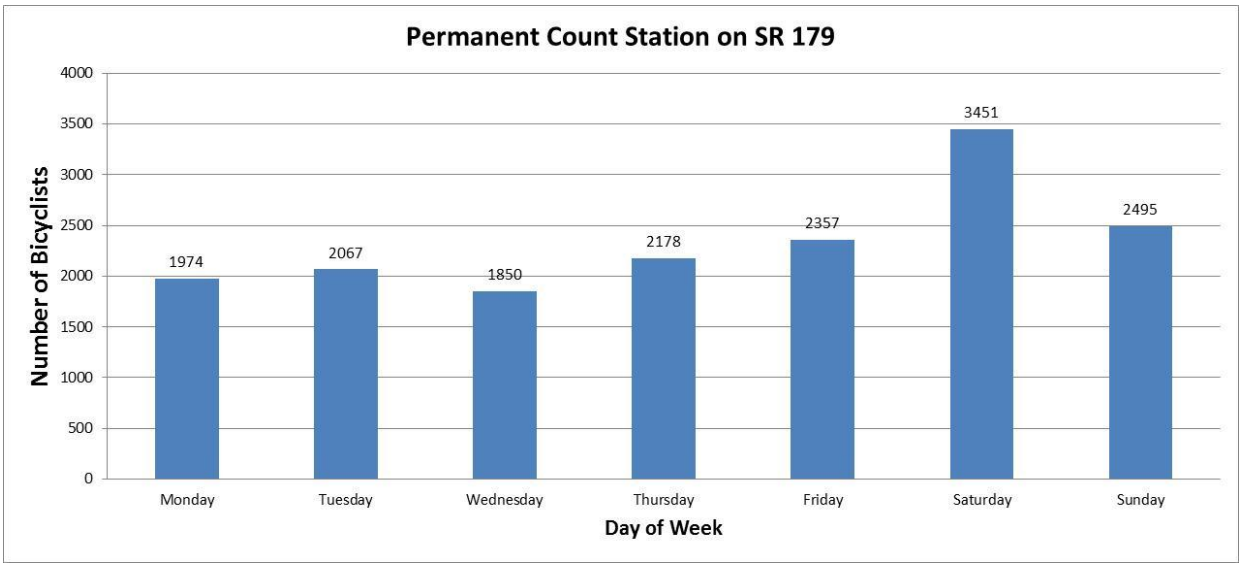


Figure 4 – Bicycle Count Data on SR 179 by Day of Week

May 2011 to March 2012, Northbound and Southbound Count Stations

What infrastructure do we currently have?

ADOT accommodates bicyclists and pedestrians on state highways with shared roadways (including paved shoulders and wide curb lanes), shared-use paths, and sidewalks. ADOT has also installed pedestrian hybrid beacons to help pedestrians cross state highways. These are summarized below.

Paved Shoulders

Paved shoulders are often the best way to accommodate bicyclists in rural areas. Paved shoulders also provide a benefit to roadway maintenance and motorists as they provide more recovery area as well as a breakdown area.

Paved Shoulder on SR 77 (Tucson)

The American Association of State Highway and Transportation Officials (AASHTO) recommend that paved shoulders be at least four feet wide to accommodate bicycle travel. The measurement of shoulder width should not include rumble strips. ADOT annually maintains and updates the Highway Performance Monitoring System (HPMS) database and the Highway Photo Log. Right shoulder width information was obtained from the 2008 HPMS data submittal. The 2008 submittal was reviewed with the 2010 photo log to identify state highway segments with rumble strips. Summary statistics

are listed in **Table 8** and right shoulder width information is displayed in **Figure 5.** The analysis demonstrates that 48.9% of state highways have an effective shoulder width of four feet or greater.

Table 8 – Effective SHS Shoulder Width

	SHS With and Without Rumble Strips	Miles	% of SHS with effective shoulder width of four feet or greater [1, 2]
SHS without Rumble Strips	Shoulder width of four feet or greater	848.98	14.5%
	Shoulder width less than four feet	2,267.81	-
	Total SHS without rumble strips	3,116.79	-
SHS with Rumble Strips	Shoulder width of four feet or greater	2,003.67	34.4%
	Shoulder width less than four feet	704.73	-
	Total SHS with rumble strips	2,708.40	-
Total		**5,825.38**	**48.9%**

1. Excludes SHS segments where bicyclists are prohibited.
2. Includes paved shoulders in both curbed (urban sections) and uncurbed (rural sections)

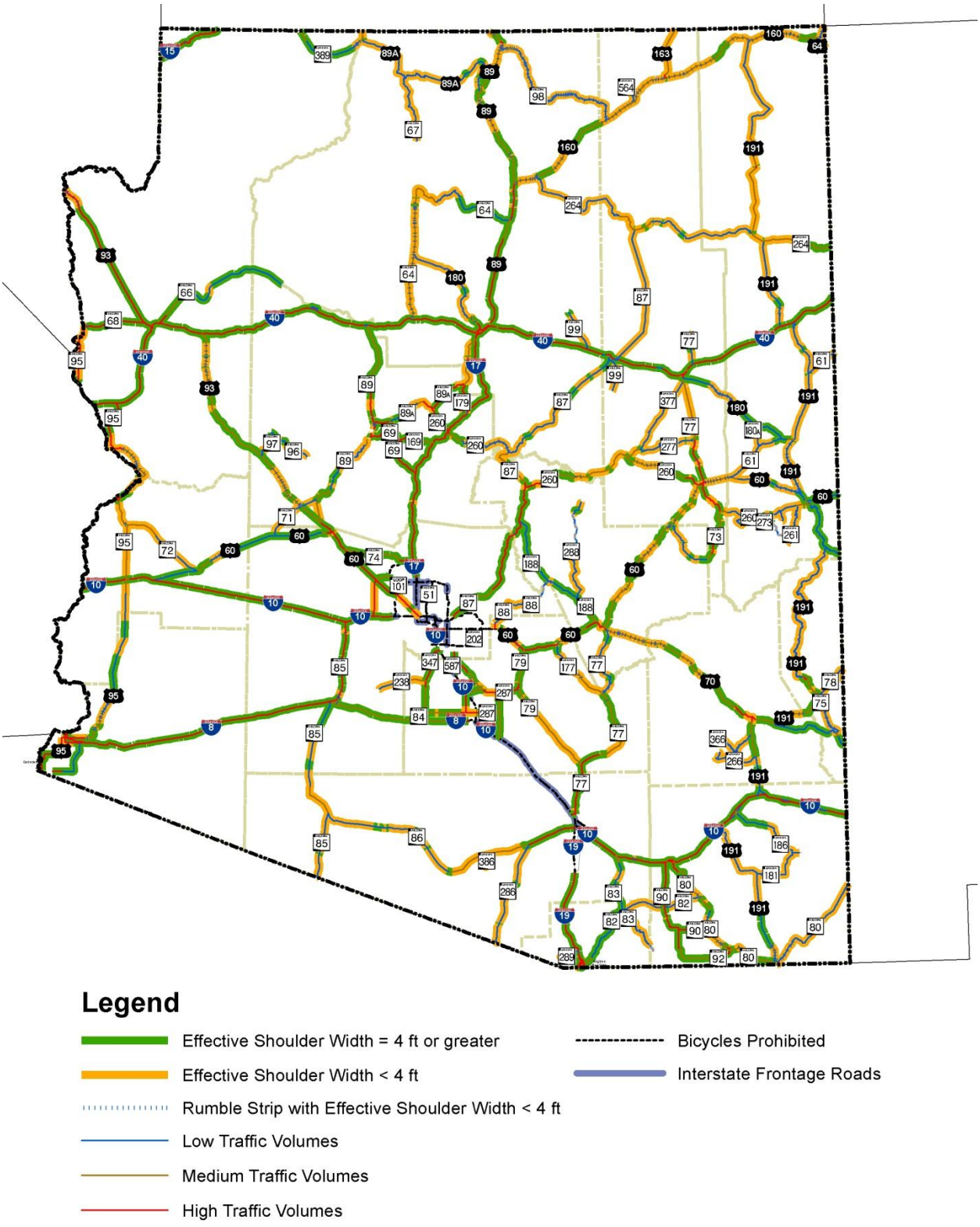


Figure 5 – Map of Effective Right Shoulder Width on the SHS

Bicycle Lanes

Bicycle lanes, as defined in the 2012 AASHTO Guide for the Development of Bicycle Facilities, are "a portion of a roadway which has been designated by pavement markings and, if used, signs, for the preferential or exclusive use of bicyclists." The 2009 Manual of Uniform Traffic Control Devices (MUTCD) describes bicycle lanes as "a portion of a roadway that has been designated for preferential or exclusive use by bicyclists by pavement markings and, if used, signs." The ADOT Bicycle Policy is to "consider bicycle lanes for inclusion with major new construction or major reconstruction when: 1) incremental costs for construction and maintenance are funded by a local agency AND 2) the bicycle lane is included as a part of a bicycle facilities plan adopted by a local agency."

Marked Bicycle Lane on US 60, MP 107.5 (near Wickenburg)

Bicycle Buffer on SR 77 at MP 79.1 (Oro Valley)

There are two segments of state highway with designated bicycle lanes and pavement markings and signing that are maintained by ADOT. One segment is located on US 60 near Wickenburg from MP 107.3 to MP 108.6. The other segment is on SR 77 in Tucson in the northbound direction, north of Roger Road.

SR 179 between Village of Oak Creek and Sedona has pavement markings and signage, although it is not maintained by ADOT. This segment is maintained by a non-profit cyclist organization.

Bicycle Buffer Treatment at Intersections

ADOT Roadway Design Guide allows for the installation of channelized intersection treatments to improve the safety and comfort of bicyclists. The Bicycle Buffer Treatment (ADOT Roadway Design Guide, Figure 408.11A) provides a buffer area between the through lane and the right-turn lane. The buffer area is formed by an extension of the through lane and the face of the curb line. The Bicycle Buffer is consistent with the MUTCD 2009, Figure 9C-4, but without the pavement markings and signage. The bicycle buffer has been implemented at a number of state highway intersections.

Sidewalks

ADOT Geographic Information Systems (GIS) and the ADOT photo log were reviewed to inventory sidewalk locations on the state highway system.

Existing Sidewalk along US 89 (Flagstaff)

Existing Shared Use Path on SR 92 at MP 321.2 (Sierra Vista)

The inventory data indicates that there are 319.2 miles total of sidewalk along the SHS, accounting for each side of the road separately.

Sidewalks and Shared-Use Paths

ADOT provides shared-use paths and sidewalks, consistent with the following policies:

Shared-use Paths

ADOT defines shared-use paths consistent with the AASHTO definition: a bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way. Shared-use paths may be used by pedestrians, skaters, wheelchair users, joggers, and other non-motorized users.

ADOT will accommodate shared-use paths within the ADOT right-of-way when the facilities are: 1) designed and located in accordance with accepted criteria for a proper and safe facility AND 2) funded and properly maintained by the local agency.

An inventory of shared-use paths indicates that there are 19.6 miles of shared use paths on state highways.

Pedestrian Grade Separations

ADOT will provide pedestrian grade separations consistent with the ADOT Roadway Design Guide, 107.2 – Pedestrian Facilities. An inventory of pedestrian crossings (overpasses and underpasses) identifies 48 pedestrian grade separations over state highways including interstates 10, 19, and 40; SR 51, US 60, US 70, SR 86, SR 87, SR 101L, SR 163, US 191, SR 202L, SR 260, and SR 264.

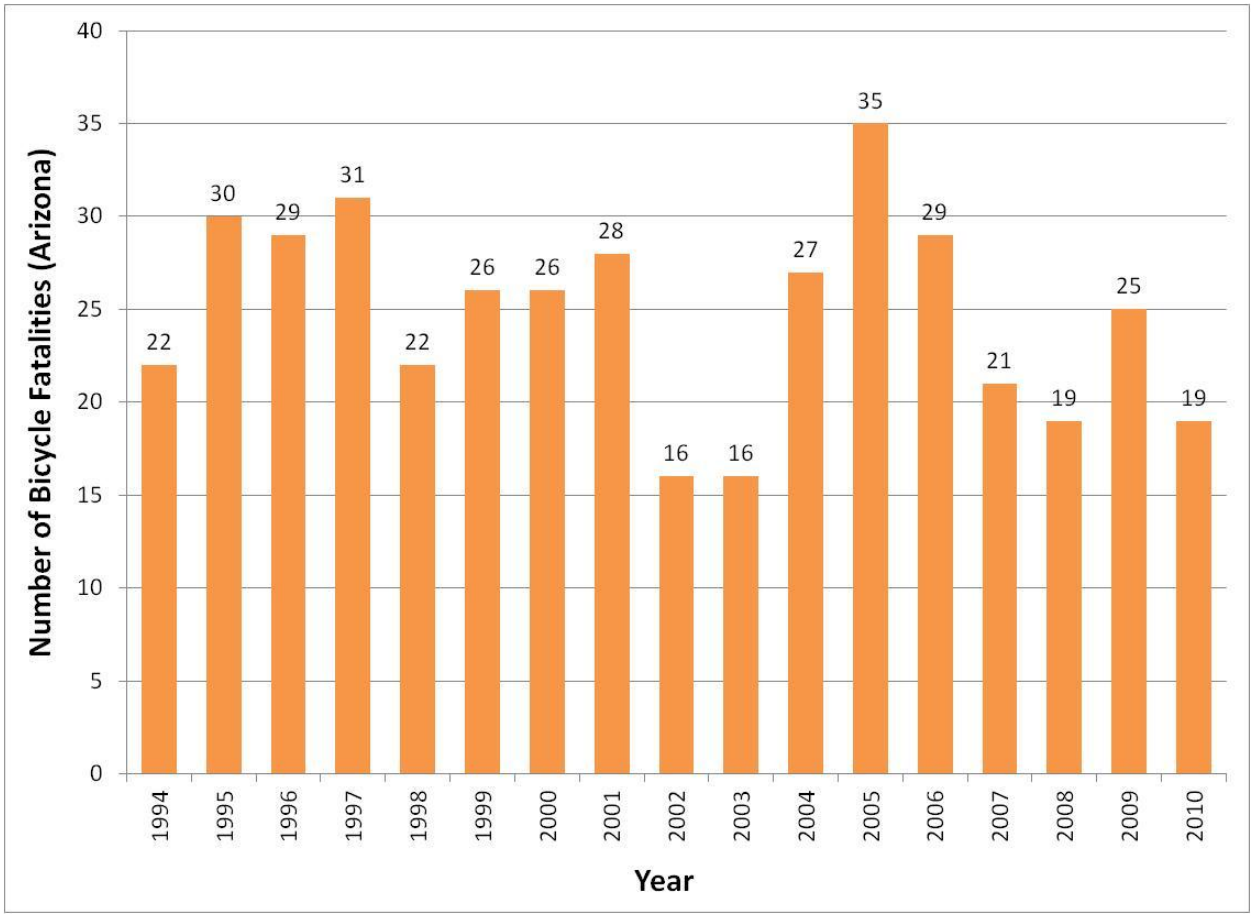
How safe is it to bicycle and walk in Arizona?

National and Statewide Bicycle and Pedestrian Safety Trends

The National Highway Traffic Safety Administration (NHTSA) reported (2010 data) that Arizona ranked 3rd highest in the nation for pedestrian fatalities with 146 pedestrians killed and a pedestrian fatality rate of 2.28 fatalities per 100,000 population.[8] For bicyclists, the NHTSA reported (2010 data) that Arizona was the 6th highest state in the nation for bicycle fatalities with 19 and a bicycle fatality rate of 2.96 bicycle fatalities per million residents.[9]

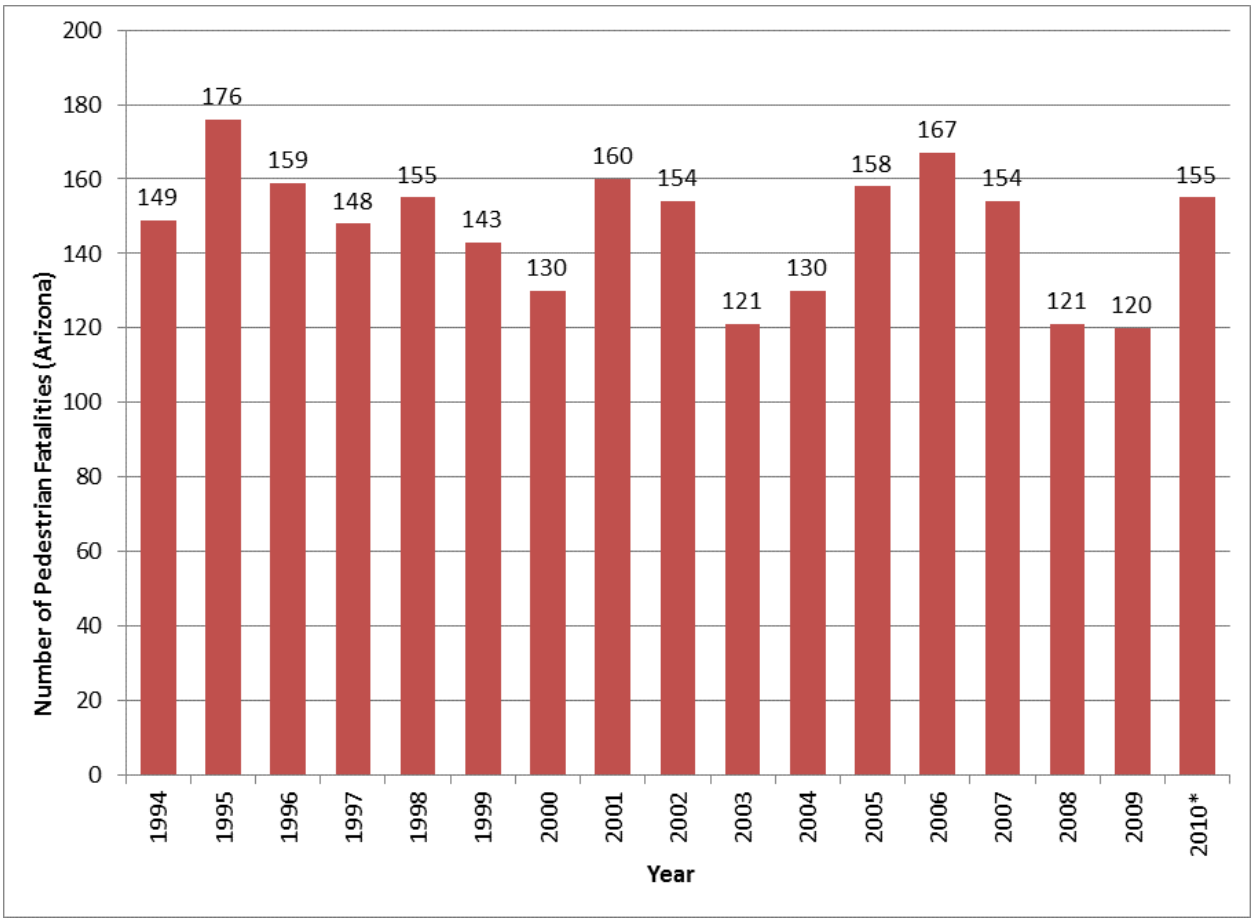
Supplemental data providing miles traveled by bicyclists and time to travel those miles does not exist, which indicates the degree of exposure for bicyclists to motor vehicles. As a result, it is unclear how bicyclist risk compares to risk associated with motor vehicular transportation. **Figure 6** and **Figure 7** illustrate the total number of bicycle (1994-2010) and pedestrian fatalities (1994-2010) in Arizona, respectively. As indicated, the number of bicyclist fatalities in 2010 decreased from those reported in 2009; pedestrian fatalities increased in 2010 from the 2009 levels. **Figure 8** shows a slight increase in the bicyclist and pedestrian fatalities as a percentage of all motor-vehicle related fatalities in the State. In 2010, pedestrian fatalities were 20% of all reported fatalities in Arizona. This is partly due to a decrease in motorist and passenger fatalities.

[8] http://www.nhtsa.gov/Pedestrians
[9] http://www.nhtsa.gov/Bicycles



Source: National Highway Traffic Safety Administration

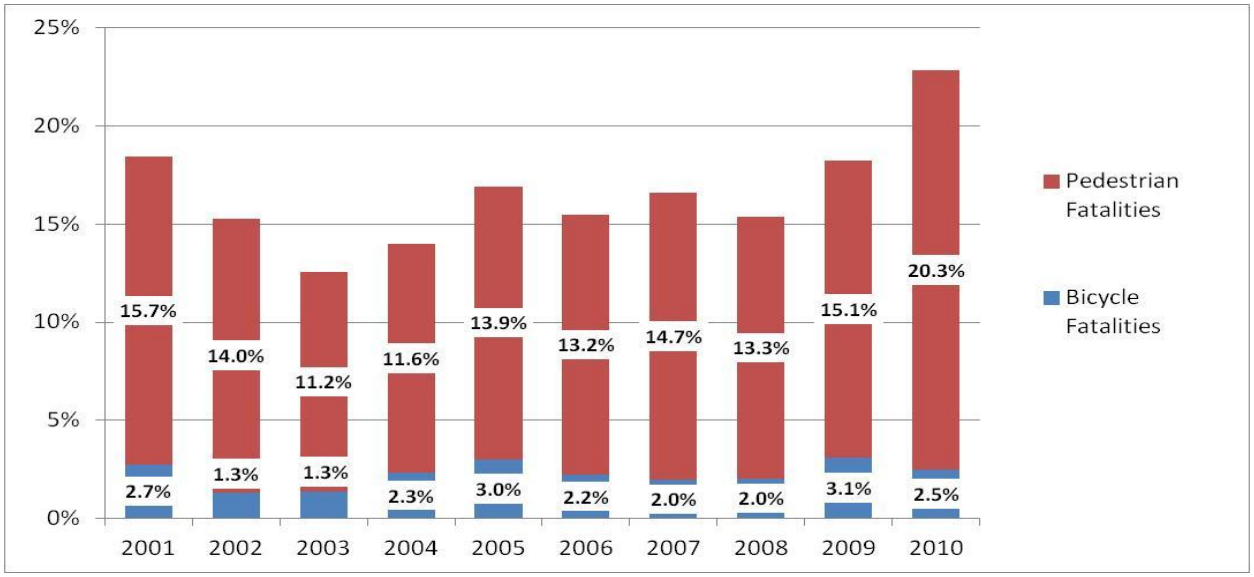
Figure 6 – Number of Arizona Bicycle Fatalities



Source: National Highway Traffic Safety Administration, Arizona Motor Vehicle Crash Facts, 2010[10]

Figure 7 – Number of Arizona Pedestrian Fatalities

[10] Pedestrian fatality data for 2010 was obtained from the "Arizona Motor Vehicle Crash Facts, 2010", which listed 155 pedestrians killed as opposed to NHSTA data which listed 146 pedestrians killed in 2010.



Source: ADOT Motor Vehicle Division, Arizona Motor Vehicle Crash Facts, 2001 - 2010

Figure 8 – Bicycle and Pedestrian Fatalities as a Percentage of All Motor-Vehicle Fatalities

Bicycle Safety Emphasis Areas

A detailed review of bicycle-motor vehicle crashes identified the following emphasis areas to improve bicyclist safety in Arizona.

- Reduce the number of bicycle crashes in urbanized and developed areas (e.g., large urbanized, small urbanized, and small urban).
- Reduce crashes in which a bicyclist or motor vehicle failed to yield at signalized intersections.
- Reduce crashes in which a bicyclist or motor vehicle failed to yield at unsignalized intersections.
- Reduce bicycle crashes involving vehicles making a right turn.
- Reduce crashes in which the bicyclist was riding facing traffic.
- Reduce crashes where the bicyclist was riding on the sidewalk.
- Reduce bicycle crashes that occurred at dawn, dusk, or in dark conditions.

Pedestrian Safety Emphasis Areas

A detailed review of pedestrian-motor vehicle crashes identified the following emphasis areas to improve pedestrian safety in Arizona.

- Reduce pedestrian crashes in urban areas at locations with high pedestrian activity.

- Reduce pedestrian crashes at intersections involving turning vehicles (right and left).
- Reduce pedestrian crashes on undivided (no median barrier) roadways.
- Reduce pedestrian crashes involving pedestrians who had been drinking.
- Reduce dart/dash/mid-block pedestrian crashes.
- Reduce pedestrian crashes involving turning vehicles at interchanges.
- Improve lighting conditions at high pedestrian activity locations.

High Priority Bicycle and Pedestrian Crash Locations

The ADOT Bicycle Safety Action Plan (BSAP) and Pedestrian Safety Action Plan (PSAP) each identified high priority bicycle and pedestrian crash locations on the state highway system. **Table 9** and **Table 10** list the high priority bicycle crash locations at SHS interchanges/intersections and along roadway segments, respectively. **Table 11** and **Table 12** list the high priority pedestrian crash locations at intersections/interchanges and along roadway segments, respectively as analyzed in the PSAP.

Table 9 – High Priority Intersection/Interchange Bicycle Crash Locations

BSAP Location ID	City/Town	On Street	Intersecting Street	Number of Crashes
39b	Tempe	Scottsdale Road	SR 202L Ramp	8
18c	Mesa	SR 87	SR 202L Ramp	6
26b	Phoenix	Indian School Road	SR 51 Ramp	6
28c	Phoenix	Northern Avenue	I-17 Frontage Road/Ramp	6
28e	Phoenix	Bethany Home Road	I-17 Frontage Road/Ramp	6
30a	Phoenix	Indian School Road	I-17 Frontage Road/Ramp	6
39a	Tempe	Priest Drive	SR 202L Ramp	6
39e	Tempe	Baseline Road	I-10 Ramp	6
6a	Chandler	Elliot Road	SR 101L Ramp/Frontage Road	5
6d	Chandler	SR 87	SR 202L Ramp	5
18e	Mesa	SR 87	McKellips Road	5
26f	Phoenix	7th Street	I-10 Ramp	5
26h	Phoenix	24th Street	SR 202L Ramp	5
27b	Phoenix	27th Avenue	SR-101L Frontage Road (Beardsley Road)	5
39f	Tempe	Priest Drive	US 60	5

Source: ADOT Bicycle Safety Action Plan, Final Report, 2012

Table 10 – High Priority Segment Bicycle Crash Locations (2004-2008)

BSAP Location ID	City/Town	Street Name	Limits	Number Through Lanes	Length (Miles)	Number of Crashes	Crashes/ Mile / Year
11c	Flagstaff	SR 40B	SR 89A to Elden Street	4	1	56	11.2
11a	Flagstaff	SR 89A (Milton Road)	I-17 to SR 40B	4	1.3	33	5.1
18a	Mesa	SR 101L Frontage Rd	University Dr to Broadway Rd	2	1.01	15	3.0
11d	Flagstaff	SR 40B	Switzer Canyon Dr to Lockett Rd	4	3.1	45	2.9
22c	Oro Valley	SR 77	Mountain Vista Drive to Ina Road	6	1.33	19	2.9
40a	Tucson	SR 77 (Oracle Road)	River Road to Miracle Mile	6	2.5	32	2.6
8	Cottonwood	SR 89A	Cottonwood St to Grosetta Rd	4	0.63	8	2.5
24a	Payson	SR 87	Forest Drive to Ridge Lane	4	1.95	22	2.3
5	Casa Grande	SR 287/SR 387	Cottonwood Lane to Arizona Rd	4	3.5	37	2.1
14b	Kingman	US 66	I-40 to Armour Avenue	4	0.5	5	2.0
25e	Peoria and Glendale	US 60	Northern Ave to Bethany Home Rd	6	0.5	5	2.0
40b	Tucson	SR 77 (Miracle Mile)	Fairview Avenue to Romero Rd	4	0.67	6	1.8
35	Sedona	SR 89A	Dry Creek Road to Soldier Pass Rd	4	1.88	15	1.6
11e	Flagstaff	US 180	SR 40B to Meade Lane	2	1.4	11	1.6
17b	Mesa	US 60X	Sossaman Road to Meridian Drive	6	5.02	34	1.4
37a	Sierra Vista	SR 92/SR 90	MLK Parkway/Tree Top Avenue to Calle Mercancia	4	2.49	15	1.2
19a	Mesa/ Gilbert	SR 87	Guadalupe Road to Baseline Road	6	1.02	6	1.2

Source: ADOT Bicycle Safety Action Plan, Final Report, 2012

Table 11 – Pedestrian Segment Prioritization Matrix (2002-2006)

PSAP Segment Number	City	Street Name	Limits		
			From	To	Segment Priority
1A	Bullhead City	SR 95	North Oatman Rd (MP 243.5)	SR-68 (MP 249.7)	Highest
1B	Bullhead City	SR 68	SR 95 (MP 249.7)	Davis Dam Rd (MP 251.3)	Moderate
2	Bullhead City	SR 95	Joy Ln (MP 236.4)	Camp Mohave Rd (MP 238.4)	Highest
3	Casa Grande	SR 287 (Florence Blvd)	SR 387 (MP 111.8)	Arizola Rd (MP 114.3)	Highest
4A	Flagstaff	SR40B	Riordan Rd (MP 195.3)	Elden St (MP 196.6)	Highest
4B	Flagstaff	SR 89A	University Av (MP 402.5)	SR-40B (MP 216.1)	Highest
4C	Flagstaff	US 180	SR-40B (MP 215.4)	Birch Ave (MP 216.1)	Moderate
5	Flagstaff	SR 40B	Arrowhead Ave (MP 198.3)	Postal Blvd (MP 199)	Moderate
6	Flagstaff	US 89	Snowflake Dr/Trailsend Dr (MP 420.1)	Townsend Winona Rd (MP 420.7)	Highest
7	Holbrook	SR 40B	5th Ave (MP 286.3)	I-40 Exit 286 G-Ramp (MP 287.4)	Moderate
8A	Tucson	SR 77	I-10 Frontage Rd (MP 68.1)	Limberlost Dr (MP 71)	Moderate
8B	Tucson	SR 77	River Rd (MP 72)	Sahuaro Vista (MP 75.1)	Highest
8C	Tucson	SR 77	Magee Rd (MP 75.9)	Mountain Vista Dr (MP 76.2)	Moderate
11	Sierra Vista	SR 90	SR-92 (MP 321.5)	Giulio Cesare Ave (MP 322.5)	Lowest
14	Sedona	SR 89A	Dry Creek Rd (MP 371)	Soldier Pass Rd (MP 372.9)	Highest
15	Casa Grande	SR 387 (Pinal Ave)	SR 287 (MP 0)	Cottonwood Ln (MP 1)	Lowest
20	Mesa	US 60X/ Apache Trail	Signal Butte Rd (MP 193)	Meridian Rd (MP 194)	Lowest
21	Mesa	US 60X Apache Trail	Ellsworth Rd (MP 191)	Crismon Rd (MP 192)	Moderate

Table 12 – Pedestrian Interchange Prioritization Matrix (2002-2006)

PSAP Interchange Number	Interchange Location		Overall Priority
1	I 17	Greenway Rd	Lowest
3	I 10	7th Ave	Lowest
4	SR 101 / SB Price Rd	Apache Blvd	Moderate
5	I 17	Cactus Rd	Moderate
9	SR 202	32nd St	Moderate
10	I 17	Bethany Home Rd	Highest
11	I 17	Camelback Rd	Highest
12	I 17	Dunlap Ave	Highest
13	SR 101 / SB Price Rd	University Dr	Highest
14	I 10	Baseline Rd	Lowest
18	I 17	Indian School Rd	Highest

Source: ADOT Pedestrian Safety Action Plan, Final Report, 2009

4. PLAN RECOMMENDATIONS

Strategies are proposed that, if implemented, will help ADOT achieve the ADOT Bicycle and Pedestrian Plan goals, objectives, and vision.

Recommended strategies take into account that bicycle and pedestrian accommodation is not a one-size-fits-all approach and that bicycling accommodation should be responsive to the preferences of different bicycling user groups and trip types. Bicyclists and pedestrians in Arizona represent a diverse and wide range of user skill and comfort level, as well as trip purpose.

Strategies are comprised of new or modified policies, new or continued education, encouragement or enforcement programs, and infrastructure recommendations.

Policies and Plans

Policies and plans are recommended to improve bicycling and walking in Arizona. These include modifications to existing ADOT policies and design guidelines.

Table 13 – Policies and Plans Recommendations

Strategy 1	Develop a Smart Transportation Guidebook to provide guidance on planning and designing non-limited access roadways, including multi-lane state highways in urban and rural communities.
Strategy 2	Develop an ADOT Pedestrian Policy that requires construction of sidewalks in urban areas as part of major construction or reconstruction highway projects.
Strategy 3	Update ADOT Bicycle Policy to reflect USDOT Policy on Bicycle and Pedestrian Accommodation and 2012 AASHTO Guide for the Development of Bicycle Facilities.
Strategy 4	Modify ADOT Roadway Design Guidelines to identify improvements for bicyclists and pedestrians.
Strategy 5	Amend State Statute to clarify bicyclist operation on sidewalks, crosswalks, and shared use paths.
Strategy 6	Recommend Modifications to Arizona Crash Report Form to enhance data collection regarding bicycle and pedestrian crashes

Strategy 1

Develop a Smart Transportation Guidebook to provide guidance on planning and designing non-limited access roadways, including multi-lane state highways in urban and rural communities

State highways often serve as a "Main Street" in many of Arizona's urbanized rural communities. These state highways serve multiple users including motorists, pedestrians, and bicyclists; however, many state highways through rural urbanized areas are designed

primarily for motor vehicles. Improving state highways to accommodate all users is essential in improving bicyclist and pedestrian safety. ADOT planning procedures, project development process, policies, and design guidance are needed to better address state highways through urbanized rural communities and the crossing of relatively wide state highways including interchanges and large intersections.

The ADOT Smart Transportation Guidebook will establish a framework for ADOT to provide facilities that meet the needs of all roadway users

Roadways that serve all users are often referred to as "Complete Streets."[11] Many communities and states have adopted "Complete Streets" policies. "Complete Streets" policies direct roadways to be designed for users of all ages and abilities including bicyclists, pedestrians, transit users, and motorists while recognizing that the design elements of "Complete Streets" (e.g., sidewalks, bike lanes, transit amenities) should be appropriate to the function and context of the facility, and should be sensitive to the surrounding land use and community character (e.g., rural, suburban, or urban context).

ADOT intends to develop a Smart Transportation Guidebook proposing an approach to roadway planning and design for ADOT facilities that recognizes the financial constraints, community desires, and existing and proposed land uses. The Smart Transportation Handbook should reflect all of the themes and intents of a "Complete Streets" policy and lead to the adoption of an ADOT "Complete Streets" policy. The ADOT Smart Transportation Guidebook could emphasize the following themes:

- Provide efficient infrastructure: Make highway and public transportation investments use context sensitive design to improve existing developed areas and attract residents and visitors to these places. Provide transportation choices and intermodal connections for air travel, driving, public transit, bicycling, and walking.

[11] http://www.smartgrowthamerica.org/complete-streets

- Concentrate development: Foster creation of well-designed developments and walkable/bikeable neighborhoods that offer healthy life style opportunities.
- Integrate multimodal planning across all ADOT divisions, removing "planning silos." In addition, establish mechanisms to coordinate across other state departments outside of ADOT.
- Discuss effective roadway guidelines for traffic lanes, shoulders, bicycle facilities, medians and intersections, pedestrian facilities, public transportation facilities, landscape design, shading, lighting, and street furniture.
- Demonstrate new project approaches that are responsive to the needs of all users including bicyclists and pedestrians.
- Emphasize Arizona-specific success stories.

Development of the Guidebook should involve staff from local and regional agencies and jurisdictions, particularly those through which state highways pass. Upon completion, an extensive outreach and information effort will be required to train both ADOT staff and their consultants.

The guidebook could contain elements that are applicable not only to ADOT facilities, but could be applied to local town, city, tribal and county facilities as well.

Strategy 2

Develop an ADOT Pedestrian Policy that requires construction of sidewalks in urban areas as part of major construction or reconstruction highway projects

It is recommended that ADOT prepare a Pedestrian Policy for sidewalk construction, repair, and maintenance on and along state highway facilities that is more comprehensive than the guidelines currently provided in the ADOT Roadway Design Guidelines.

The ADOT Pedestrian Policy will help to ensure that pedestrian facilities are provided where they are most needed

The ADOT Pedestrian Policy should consider allowances and conditions under which ADOT may assume responsibility or establish cost-sharing guidelines with local and regional jurisdictions for construction, repair, and maintenance of sidewalks on and along state highways.

The Pedestrian Policy should include provisions that require construction, maintenance, or repair of sidewalks associated with new development, redevelopment, or pavement preservation projects along state highways.

The Pedestrian Policy should include provisions for constructing pedestrian facilities in new construction, reconstruction, or pavement preservation projects, resurfacing, or utility projects on the state highway system by utilizing the 2004 AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities as the design guide for roadway features to accommodate pedestrians and the MUTCD as the design guide of traffic controls for pedestrian facilities. The Pedestrian Policy should be developed in tandem with an updated ADOT Bicycle Policy to ensure consistency in concepts, priorities, and application of the policies.

The ADOT Statewide Bicycle and Pedestrian Plan, Phase II (2004) initiated the development of an ADOT Pedestrian Policy. The draft Pedestrian Policy was developed with the purpose of addressing pedestrian access, safety, and facility needs. The draft Pedestrian Policy is included below. Additional considerations are included in brackets [ ].

PROPOSED ADOT PEDESTRIAN POLICY

It is the policy of the State of Arizona to provide accessible and convenient walking facilities and to support and encourage increased levels of walking.

It is the policy of the State of Arizona to promote safe, comfortable travel for pedestrians along roadways where there is a potential demand for pedestrian travel. [FUTURE PEDESTRIAN DEMAND AS A RESULT OF DEVELOPMENT AND LAND USE CHANGES SHOULD ALSO BE CONSIDERED]

Sidewalks should be provided along State Highways where there are origins and destinations in close proximity. Within close proximity is defined as an origin and a destination within 1.5 miles walking distance from one another and the subject facility is between the origin and destination. A transit stop is considered a destination. Continuous sidewalks should be provided when the above requirement is met regardless of an agreement with another governmental agency to maintain the sidewalk. It is the responsibility of ADOT to ensure that an Intergovernmental Agreement is in place for a city or county to maintain the sidewalk.

The minimum clear width for comfortable walking is 5 feet. [ADDRESS SETBACK AND BUFFER/PARKWAY ZONES BETWEEN TRAVEL LANES AND SIDEWALK, WIDER SIDEWALKS (6 FEET) MAY BE NEEDED ON STREETS WITH HIGH TRAFFIC VOLUMES WHERE A BUFFER/PARKWAY STRIP CANNONT BE PROVIDED AND WHERE VERTICAL OBSTRUCTIONS SUCH AS WALLS, FENCES, ETC. ARE ADJACENT TO THE SIDEWALK). Sidewalks should usually be placed on both sides of a highway. Safe pedestrian crossings should connect to sidewalks. Exceptions could include commercial strips entirely on one side with absolutely no destinations [OR POTENTIAL FUTURE DESTINATIONS] on the other side (e.g. railroad tracks). In most instances, placing a sidewalk on one side only leads to pedestrians walking on the roadway without a sidewalk, or crossing the highway twice to access the sidewalks.

It is the policy of the State of Arizona to comply with pedestrian and accessibility requirements set forth within the 1990 Americans with Disabilities Act (ADA). [CONSIDER ADOPTING PUBLIC RIGHTS-OF-WAY ACCESSIBILITY GUIDELINES (PROWAG) AS ADOT'S ACCESSIBILITY STANDARD]. These scoping and technical requirements are to be applied during the design, construction, and alteration of transportation facilities covered by titles II and III of the ADA to the extent required by regulations issued by Federal agencies, including the Department of Justice and the Department of Transportation, under the ADA.

It is ADOT's policy to require written approval from the State Traffic Engineer, the Assistant State Engineer, Roadway Engineering Group and the State Bicycle and Pedestrian Coordinator for any deviations or exceptions to this policy.

ACTION:

Make walkways an integral part of the circulation pattern within communities to promote safe interactions between motor vehicles and pedestrians and bicyclists, using techniques such as:

A. Integrate pedestrian facility accommodation into all planning, design and major construction activities of the Arizona Department of Transportation where there are origins and destinations within close proximity of the subject facility. In urban areas, sidewalks should be provided on both sides of a street.

B. Retrofit existing roadways with sidewalks and retrofit intersections and crossings to accommodate pedestrians as a component of major reconstruction where there are origins and destinations within close proximity. Pedestrian accommodation will also be considered in pavement preservation, utility, and minor and spot improvement projects if the cost of accommodations is reasonable and feasible.

C. Provide financial and technical assistance to local governments for construction of walkway projects.

Strategy 3

Update ADOT Bicycle Policy to reflect USDOT Policy on Bicycle and Pedestrian Accommodation and 2012 AASHTO Guide for the Development of Bicycle Facilities

The ADOT Bicycle Policy, MGT 02-01[12] establishes uniform guidelines for accommodating bicycle travel on the state highway system. The policy was updated in 2007 and specified a review date of 2010. The review has not been completed. The ADOT Bicycle Policy provided significant benefits to bicyclists on the SHS; however, crash analysis conducted in the BSAP demonstrates that improvements to bicycling safety on the SHS are needed. Strengthening the ADOT Bicycle Policy can contribute to improved bicyclist safety on state highways.

Wide curb lane on SR 89A

The ADOT Bicycle Policy should be updated to reflect USDOT Policy on Bicycle and Pedestrian Accommodation[13] and updated guidance in the 2012 AASHTO Guide for the Development of Bicycle Facilities. The 2012 AASHTO Guide includes multiple warnings against using wide curb lanes as a standard solution for major roadways and instead states that

[12] http://tinyurl.com/ayrhf7g

[13] *Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations, March 15, 2010,* http://www.fhwa.dot.gov/environment/bicycle_pedestrian/

"when sufficient width is available to provide bike lanes or paved shoulders, they are the preferred facilities on major roadways."[14]

It is suggested that an internal ADOT Work Group be established to review the ADOT Bicycle Policy, and to propose changes that reflect both ADOT State Transportation Board policies and recent USDOT policy statements as described above. Input should also be solicited from representatives of local and regional agencies and jurisdictions, particularly those through which state highways pass. The work group should solicit input from other state agencies and interested parties.

Potential revisions to the ADOT Bicycle Policy, for consideration by the internal ADOT Work Group, are included in **Appendix B**.

Strategy 4

Modify ADOT Roadway Design Guidelines to identify improvements for bicyclists and pedestrians

It is recommended that a review of Roadway Engineering Group, Roadway Design Guidelines be completed to identify areas of improvement for bicyclist and pedestrian accommodation on state highways. Sections where modifications should be considered include:

- 209.1 – Climbing Lanes, paragraph 7.
- 209.2 – Passing Lanes, paragraph 8.
- 306.4 – Urban Cross Sections, paragraph 3.
- 302.4 – Shoulder Width.
- 408.11 – Right Turn Channelization, paragraph 13.
- 107.2 – Pedestrian Facilities, Pedestrian Grade Separated Crossings.
- 404 – Driveway and Turnout Access.
- 408.11 – Right-Turn Channelization.

Specific recommendations are included in **Appendix C**.

Additional consideration for changes to Traffic Engineering Policies, Guidelines, and Procedures include:

- ADOT Traffic Engineering Policies, Guidelines and Procedures, December 2011, Section 200 – Traffic Studies, Subsection 240 – Traffic Impact Analysis.
- ADOT Traffic Engineering Policies, Guidelines and Procedures, December 2011, Section 600 – Traffic Signals, Subsection 621 – Signal Phase Change Intervals.

[14] Guide for the Development of Bicycle Facilities, 4th Edition, 2012. American Association of State Highway and Transportation Officials, Page 4-3.

- ADOT Traffic Engineering Policies, Guidelines and Procedures, January 2003, Section 700 – Illumination.
- ADOT Traffic Engineering Policies, Guidelines and Procedures, December 2011, Section 900 – Pedestrians, Subsection 910 – Pedestrian Crosswalks.

Specific recommendations are also included in **Appendix C**.

Strategy 5

Amend State Statute to clarify bicyclist operation on sidewalks, crosswalks, and shared use paths

The BSAP identified bicyclists riding on the sidewalk and riding while facing traffic as contributing factors to bicycle crashes. A typical crash scenario is when a bicyclist enters a roadway immediately after riding on the sidewalk while facing traffic. In such a scenario, the motorist may not see a bicyclist approaching from the right-hand side of the roadway.

Central to Arizona Revised Statues (A.R.S.) as they apply to bicyclists is A.R.S 28-812, which states that an individual riding a bicycle on a roadway or shoulder is granted all the rights of a driver of a vehicle, and is also subject to the responsibilities and duties applicable to a vehicle driver. However, there are opportunities to improve A.R.S. as they relate to bicycle riding on sidewalks or crosswalks.

When riding on a sidewalk, it is important for bicyclists to function as pedestrians – at a slow rate of speed; yielding to pedestrians; carefully scanning cross streets before proceeding across the intersection, cross

Amendments to U.V.C. proposed by the NCUTCD Bicycle Technical Committee. ***DRAFT***

Bicycle Technical Committee Approval date: 10/25/2012

§ 11-1209-Bicycles and human powered vehicles on sidewalks

(a) A person riding a bicycle upon and along a sidewalk, or across a roadway upon and along a crosswalk, shall yield the right of way to any pedestrian and shall give audible signal before overtaking and passing such pedestrian. This audible signal may be given by the voice or by a bell or other warning device capable of giving an audible signal and shall be given at such a distance and in such a manner as not to startle the person or persons being overtaken and passed.

(b) A person shall not ride a bicycle upon and along a sidewalk, or across a roadway upon and along a crosswalk, where such use of bicycles is prohibited by official traffic-control devices.

(c) A person shall not operate a bicycle from a sidewalk so as to suddenly leave a curb or other place of safety and move into the path of a vehicle that is so close as to constitute an immediate hazard.

(d) No person shall drive or operate a vehicle upon or along a sidewalk or shared pedestrian facility, or across a roadway upon or along a crosswalk, unless vehicles of that class are authorized by statute or by a posted traffic control device to be driven or operated upon or along a sidewalk or shared pedestrian facility or across a roadway upon or along a crosswalk.

(e) No person shall operate a bicycle on a sidewalk in excess of an ordinary walking speed when approaching or entering a crosswalk, approaching or crossing a driveway or crossing a curb cut or pedestrian ramp if a vehicle is approaching the crosswalk, driveway, curb cut or pedestrian ramp. This paragraph does not require reduced speeds for bicycles when other vehicles are not present.

(f) A person riding a bicycle upon and along a sidewalk, or across a roadway upon and along a crosswalk, shall have all the rights and duties applicable to a pedestrian under the same circumstances.

street, or driveway; and be willing to walk the bicycle when conditions dictate. The Manual of Uniform Traffic Control Devices, 2009, defines walking speed as 3.5 feet per second.

The National Committee for Uniform Traffic Control Devices (NCUTCD) recently proposed revisions to the U.V.C. § 11-1209 to clarify the operation of bicyclists on sidewalks. The proposed changes are listed in the text box on the previous page. Notably, paragraph (e) requires bicyclists to travel only at the speed of a pedestrian when a motor vehicle is approaching the crosswalk or driveway.

While the NCUTCD § 11-1209 proposal addresses bicycles on sidewalks as they approach intersections and crosswalks, the proposal does not address shared use paths. It is suggested that a proposal be submitted to the NCUTCD to add shared use paths to § 11-1209-Bicycles and human powered vehicles on sidewalks.

It should be noted that NCUTCD has also proposed revision to the U.V.C. to address rules for travel on shared use paths (text box on the right).

Amendments to U.V.C. proposed by the NCUTCD Bicycle Technical Committee. DRAFT

Bicycle Technical Committee Approval date: 10/25/2012

§ 1-(new)-Shared-use path

§1-(new)- Shared-Use Path—a bikeway outside the traveled way and physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent alignment. Shared-use paths are also used by pedestrians (including skaters, users of manual and motorized wheelchairs, and joggers) and other authorized motorized and non-motorized users.

§ 11-505--Pedestrians to use right half of crosswalks and shared-use paths.

Whenever practicable, pedestrians shall move upon the right half of crosswalks and shared-use paths, unless indicated otherwise by traffic-control devices.

Once a final determination has been made by the NCUTCD with respect to these proposed changes, the recommended language will be posted[15] for the use of all jurisdictions that wish to adopt uniform traffic laws which are consistent with and support the Manual on Uniform Traffic Control Devices. These changes may then also be considered in revisions to A.R.S.

Strategy 6

Recommend Modifications to Arizona Crash Report Form to enhance data collection regarding bicycle and pedestrian crashes

The BSAP recommended that the Arizona Crash Report form be reviewed to identify modifications and enhancements to improve data collection regarding bicycles crashes. As initial recommendations, the BSAP identified those as listed in **Appendix D**.

Perhaps as important as adding new data items to the form is emphasizing the importance of comprehensively completing the existing data fields in the Arizona Crash Report form.

[15] http://www.ncutcd.org/rulesroad042013.shtml.

The BSAP crash analysis demonstrated that many of the data fields were left incomplete, particularly as they related to the bicyclist and the pedestrian.

It is also suggested that ADOT establish an on-line incident report form that individuals can fill out without the assistance of a police officer. This will help to provide a more comprehensive data set regarding bicycle and pedestrian crashes. Currently, only crashes that involve a motor vehicle are reported to ADOT. An example of an online reporting form is: http://abptaskforce.org/lpincidentforms/incidentst.htm.

Education, Encouragement, and Evaluation

The online public survey, completed in May 2012, identified that "improve education and awareness of all roadway user laws" is one of the most important considerations for both pedestrians and bicyclists. This will require a balanced effort to educate the public, encourage them, enforce laws and safe practices, and evaluate progress.

Education programs should focus on educating all roadway users – bicyclists, pedestrians, and motorists – of the "rules of the road," and safe cycling and walking practices. Motorists, bicyclists, and pedestrians should understand and obey all applicable laws. Educating the public through training, published materials, workshops, and "how to" guides can provide the bicyclist, pedestrian, and motorist the knowledge and skills necessary to safely share the road.

The following education, encouragement, enforcement, and evaluation strategies are proposed.

Table 14 – Proposed Education and Encouragement Programs

Education Programs	
Strategy 7	Continue to provide guidance and technical support to regional and local jurisdictions for developing and implementing bicycle and pedestrian plans that are adopted by local agencies and jurisdictions.
Strategy 8	Provide greater detail of bicycle and pedestrian safety in the driver's manual and license test.
Strategy 9	Collaborate with public safety to include bicycle and pedestrian safety in POST (Arizona Peace Officer Standards and Training Board) training for police enforcement officers.
Strategy 10	Develop and implement a statewide bicycle and pedestrian safety campaign.
Strategy 11	Continue to print and distribute safety and education booklets; develop online tools and applications.
Strategy 12	Encourage design, engineering, planning, and other appropriate staff to complete bicycle, pedestrian, and transit facility design training once every four years.

Table 14 – Proposed Education and Encouragement Programs (continued)

Encouragement Programs	
Strategy 13	Establish State of Arizona as a model employer by providing incentives and facilities to its employees to encourage bicycling and walking to work. Encourage local and regional government agencies and employers to provide incentives and facilities for bicycling and walking to work.
Strategy 14	Continue to collaborate with local and regional agencies, companies, schools, and organizations (including Department of Health, non-profit health organizations) to conduct programs and events that promote bicycling and walking as part of a healthy lifestyle for children and adults including the elderly.
Evaluation Program	
Strategy 15	Develop and implement a statewide program for collecting and analyzing bicycle and pedestrian count data.

Education Programs

Strategy 7

Continue to provide guidance and technical support to regional and local jurisdictions for developing and implementing bicycle and pedestrian plans that are adopted by local agencies and jurisdictions

ADOT can encourage and support local jurisdictions and regional planning organizations to develop their own bicycle and pedestrian plans. Local and regional plans should be developed with extensive input from local pedestrian and bicycle advocates/riding clubs, organizers/sponsors of special events (e.g. running races, century ride; mountain bike competition), and schools. There should be significant coordination with ADOT regarding state facilities.

A.R.S. requires local jurisdictions (50,000 or more population) to include a bicycle element within their general plan. The bicycle element should consist of proposed bicycle facilities such as bicycle routes, bicycle parking areas and designated bicycle street crossing areas. Land use and circulation elements are also opportunities to plan for appropriate street connectivity that are conducive to walking and bicycling.

The ADOT Planning Assistance for Rural Areas (PARA) program can provide funding support for local rural agencies and jurisdictions to develop a bicycle or pedestrian plan. More information about the ADOT PARA program is available from the Arizona Department of Transportation, Multimodal Planning Division.[16]

[16]http://www.azdot.gov/mpd/systems_planning/pdf/para/PARAs.asp

Strategy 8

Provide greater detail of bicycle and pedestrian safety in the driver manual and test for a license.

In the web-based survey, multiple respondents cited a need for increased public knowledge regarding bicyclist and pedestrian laws in Arizona and bicyclists' rights on state highways.

The current MVD *Arizona Driver License Manual (Manual) and Customer Service Guide* touches on the basic rules of the road regarding motor vehicles, bicyclists, and pedestrians. The information in the *Manual* covers how to safely pass bicyclists, the importance of giving bicyclists not less than three feet of space when passing and bicyclist's right to use the travel lane. However, a greater degree of detail could be included in the *Manual* and additional questions in the test.

The following actions are recommended:

- Collaborate with MVD to include additional mandatory questions on the Arizona Driver License test regarding bicyclist laws and bicyclist rights. The driver's license test should include a question on the minimum safe distance when passing a bicyclist in the same direction. A limitation in using the driver's license test as an educational mechanism is that Arizona driver's licenses expire on the 65th birthday; as such, drivers seldom see the material. Other mechanisms, such as defensive driver training or traffic safety diversion programs should be utilized.
- Collaborate with MVD to revise the *Arizona Driver License Manual and Customer Service Guide* to emphasize bicyclist and pedestrian safety.
- Collaborate with MVD to require a driver's license refresher course and short examination on bicycle and pedestrian safety. The refresher course and examination would be required at regular determined interval (e.g. every 5 years). The refresher course could also be required when driver's licenses are replaced (due to loss, address correction, photo update, etc.). The refresher course could take the form of a 15 to 20-minute online webinar and could be incorporated into the vehicle registration renewal. The refresher course and examination would expose many more drivers to pedestrian and bicyclists rights and duties, and it would provide an opportunity to educate drivers about new bike/pedestrian laws and changes to existing laws.
- Collaborate with MVD to distribute bicycle and pedestrian safety-related information and education materials at MVD offices. Ensure that sufficient display space is provided.
- Incorporate bicycle and pedestrian safety content into vehicle infraction diversion program and aggressive driving classes.

Specific proposed edits to the *Manual* are included in the **Appendix E**.

Strategy 9

Collaborate with public safety to include bicycle and pedestrian safety in POST (Peace Officer Standards and Training) for police enforcement officers

Bicycle education of public safety and law enforcement officers was identified as a need in the BSAP. Bicycle and pedestrian training is limited within POST. While some local police departments throughout the state offer additional training on bicycle and pedestrian safety, statewide training of bicycle and pedestrian safety would raise awareness of public safety officers to enforce laws for motorists, bicyclists, and pedestrians. Training could be offered at public safety conferences, as webinars, or as part of continuing education programs at individual police departments and public safety departments.

Officer training leads to better enforcement of traffic laws which can have a trickle-down effect of educating the general public. Examples of training resources are provided at the website www.Bicyclinginfo.org.[17]

- Bicycle Traffic Enforcement Video - This is an internal training video for the Portland Police Bureau available through the PBIC Video Library.[18]
- Traffic Enforcement for Bicyclist Safety - A training video for Chicago Police Officers created in partnership between the Chicago Police Department and The Chicago Department of Transportation available through the PBIC Video Library.
- Law Enforcement's Roll Call Video: "Enforcing Law for Bicyclists" - This short video was developed by NHTSA.
- Enhancing Bicycle Safety: Law Enforcement's Role - This two-hour self-paced training for law enforcement officers was developed by the USDOT, NHTSA.
- NHTSA Community Oriented Bicycle Safety for Law Enforcement (2002).
- Wisconsin Pedestrian and Bicycle Law Enforcement Training Course (2007).
- Law Officers Guide to Bicycle Safety (2002).
- NHTSA Resource Guide on Laws Related to Pedestrian and Bicycle Safety.
- Florida Bicycle Law Enforcement Guide (2003).

Collaboration with law enforcement can continue beyond training. Continued enforcement of motor vehicle laws relating to bicyclists and motorists is important to improving their safety. ADOT and local governments should collaborate with public safety to improve enforcement of existing laws.

For example, agencies can work with public safety officers to conduct bicycle and pedestrian “decoy” operations (enforcement and public education action in which plain clothes police officers cross at mark or unmarked crosswalks, etc.) where drivers are

[17] http://www.walkinginfo.org/enforcement/training.cfm
[18] http://www.walkinginfo.org/videos

warned or cited for failure to yield to a pedestrian in a crosswalk, or for driving close than 3-feet to a bicyclist. Similarly, bicyclists and pedestrians can be stopped to educate them about the safe riding practices, the safest ways to cross a street, or to wear light-colored clothing at night.

Bicyclists who are riding against traffic on the roadway can be warned that riding with traffic is the law, and educated of the dangers of riding while facing traffic.

Motorists who are cited for driving too closely to a bicyclist (closer than 3 feet), not yielding to pedestrians in a crosswalk, or other unsafe practices can be required to attend traffic school in lieu of receiving points on their license. ADOT should work with local jurisdictions to ensure that bicycle and pedestrian safety is incorporated into traffic school curriculum.

As an example, in the City of Tucson, the City Prosecutor's Office will dismiss a bicyclist's civil traffic citation if he or she submits proof of completion of the Bicycle Safety Class offered by the Pima County Bicycle and Pedestrian Program.[19]

Strategy 10

Develop and implement a statewide bicycle and pedestrian safety campaign.

A majority of survey respondents identified education and awareness as the most important activity that ADOT could do to improve safety for bicyclists and pedestrians on state highways.

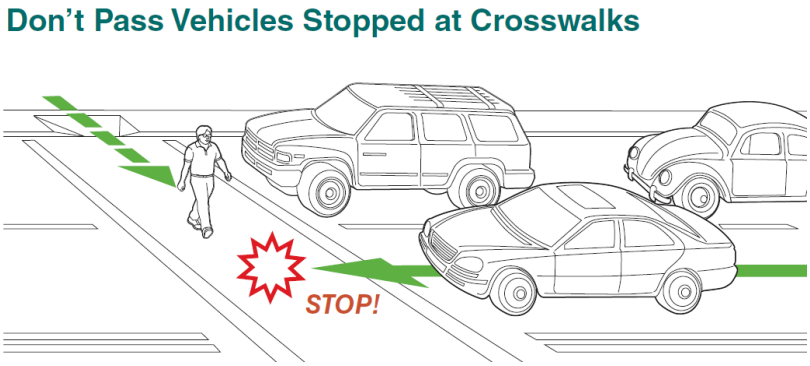


Illustration from ADOT 's Sharing the Road with Pedestrians

Previous studies, such as the BSAP, identified a number of behaviors, of both motorists and bicyclists that lead to crashes. These include wrong way riding (bicyclist), riding on sidewalks (bicyclist), or improper turning at intersections (motorist).

Improving education and awareness of all roadway users and proper behavior can lead to fewer bicycle or pedestrian crashes with motor vehicles.

ADOT conducted a Bicycle and Pedestrian Safety Campaign in the Verde Valley in 2009.

The campaign[20] featured the creation and distribution of fliers, hangtags, rack cards (in

[19] http://cms3.tucsonaz.gov/prosecutor/diversion

English and Spanish), stickers, and utility bill inserts. In addition to these materials, public service announcements were created for the radio and television. The announcements were aired on multiple radio stations and local television networks. The materials focused on proper rules of the road for drivers, bicyclists, and pedestrians.

It is recommended that this campaign be continued and expanded in other parts of Arizona. The Campaign could focus on the following messages:

- Explain the danger of wrong-way bicycling riding.
- Show potential issues and hazards of bicyclists riding on the sidewalk.
- Emphasize use of lights while riding at night and low-light conditions.
- Encourage helmet use, particularly among children.
- Emphasize motorist awareness of bicyclists and pedestrians, particularly for turning vehicles at intersections.
- Educate motorists on the 3-foot law (safe passing distance).
- Health, environmental, and social benefits of bicycling and walking.
- Safe practices for walking on and along a roadway when sidewalks are present and when there is no sidewalk available.
- Program should be bilingual (English and Spanish), and make particular efforts to reach disadvantaged populations.

The outreach campaign could include public service announcements (PSAs) on TV, radio and social media. The campaign should include outreach efforts to engage children, teenagers, and young adults. These could include poster contests, coloring books, and messages on elementary, middle school, and high school marquees. Online campaigns and smartphone applications should be developed. Materials and messages should be distributed to and target both high and low-socioeconomic populations.

True stories about crashes involving motorists and bicycles or pedestrians could be included. A consistent campaign over an extended period will allow an evaluation of the effectiveness of the campaign to be conducted.

Bicycle and pedestrian laws and safety messages could be added to the MVD online vehicle registration website (servicearizona.com). Associated fines for violating the laws could

also be displayed to draw attention to them.

ADOT can continue to educate bicyclists utilizing resources developed nationally. The LAB "Smart Cycling" program is a set of curricula for adults and children taught by certified instructors. ADOT can continue to collaborate with local agencies and bicycle advocacy organizations to offer the LAB courses to as many bicyclists as possible, including children in elementary and middle schools. In fact, the MAG Strategic Transportation Safety Plan includes a goal to reduce the number of crashes that involve bicyclists or pedestrians through utilizing LAB materials. Stated goals of the Plan include the following:[21]

- Promote bicyclist training programs for youth and adults. Utilize programs such as those provided by the LAB and PBIC.
- Co-sponsor safety and training programs with the Coalition of Arizona Bicyclists and/or other agencies.

Also, Pima County offers a variety of bicycle safety courses for both children and adults.[22]

Strategy 11

Continue to print and distribute safety and education booklets, develop online tools and applications

Safety and education booklets were developed as recommended in the 2003 ADOT Bicycle and Pedestrian Plan. The booklets are available at www.azbikeped.org and include:

- Sharing the Road with Pedestrians: This guide presents motorists with considerations to give pedestrians as well as how pedestrians must be aware of their surrounding environment. It illustrates potential conflict situations between pedestrians and vehicles in motion or stationary, and presents what pedestrians and motorists should be aware of to avoid crashes.
- Share the Road: A guide for bicyclists and motorists: This guide provides information about how bicyclists and motorists can share a roadway, and discusses what both bicyclists and motorists can do to avoid crashes and conflicts. This guide is recommended for beginner bicyclists and motorists.

[21] http://www.azmag.gov/Documents/pdf/cms.resource/strategic_safety_plan226438.pdf
[22] http://bikeped.pima.gov

- Arizona Bicycling Street Smarts: This booklet teaches bicyclists of all experience levels how to ride confidently, legally, and safer on roadways.
- Cycle Arizona Bicycle User Map.

The Share the Road Guides are targeted to the public, both motorists and users. Arizona Bicycling Street Smarts is intended to be used by intermediate to advanced bicyclists interested in learning the details behind becoming a better and safer rider. The education booklets show images of examples of common bicycle-motor vehicle crash types, and ways for bicyclists and pedestrians to avoid them.

It is recommended that ADOT continue to fund printing and distribution of these educational guides. Materials should be distributed to schools (particularly middle schools) and bike shops statewide. It is also recommended that ADOT convert the education booklets (e.g. Cycle Arizona Map, Share the Road booklets) to smartphone applications.

Strategy 12

Encourage design, engineering, planning, and other appropriate staff to complete bicycle, pedestrian, and transit facility design training once every four years

Providing the appropriate facilities for bicyclists, pedestrians, and transit users within design projects requires knowledge of current best practices. Planners and design engineers (from both the public and private sectors) must recognize that bicyclists, pedestrians, and transit users have different characteristics and needs. Bicycle, pedestrian, and transit facility design is typically not taught in detail to design engineers and it is something that is continually evolving based on application and evaluation of alternate approaches.

It is recommended that ADOT host bicycle and pedestrian facility design courses at different locations throughout the state on an annual or biannual basis. Design courses should be a minimum of one day on up to three days, and focused on design only. The design courses will help engineers and planners to stay abreast of bicycle and pedestrian facility best practices (e.g. AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities, the new AASHTO Bicycle Guide, MUTCD) and flexibility of design within current standards and guidelines. The course should address "complete streets" and context sensitive design. Overview sessions should also be conducted for others such as developers, elected officials and high-level decision-makers.

Organizations such as the National Complete Streets Coalition, Association of Pedestrian and Bicycle Professionals, and NHTSA offer established curriculum that could be utilized for the facility design training courses.

Encouragement Programs

Strategy 13

Establish State of Arizona as a model employer by providing incentives and facilities to its employees to encourage bicycling and walking to work. Encourage local and regional government agencies and employers to provide incentives and facilities for bicycling and walking to work

Specific action items that may be implemented by the ADOT Bicycle and Pedestrian Program include:

- Continue to encourage employees to participate in Bike to Work Day and Month sponsored by Valley Metro and other regional agencies.
- Continue collaboration with local agencies and regional MPOs, coordinating with major employers to provide bicycle route maps to employees. Continue to host booths or display tables at major employers to discuss the best routes for employees to use to ride to work from their homes, and answer questions about bicycle commuting.
- Provide facilities at the worksite such as lockers, showers, and secure bicycle parking.
- Collaborate with Arizona Department of Administration, Office of Travel Reduction Programs[23], to establish a Bike Share program for employees to use to commute within the capitol area and downtown Phoenix. Capitol Ride Share is responsible for developing and implementing travel reduction programs for state employees in Maricopa County.
- Collaborate with Arizona Department of Administration, Office of Travel Reduction Programs, to establish policies to reimburse employees for bicycle travel. The State of California reimburses employees 4 cents per mile when a bicycle is used in the conduct of official state business.[24] IRS regulations also allow for up to $20/month for qualified bicycle commuting.
- Encourage development of employer-based programs such as "parking cash out" where employers pay employees the equivalent of what it costs to park a car at a worksite, or residential apartment or condominium. Cash-out programs are an effective means of allocating scarce parking or managing a growing demand for more parking. In addition, there are tax benefits for employers and employees.[25] Employers may provide workers with up to $125 per month in tax-free transit and vanpool benefits, per limitations under IRS Section 132(f)(2)(A) *Qualified Transportation Fringe Benefits for Vanpools (Commuter Highway Vehicles) and*

[23] http://www.capitolrideshare.com/files/whywedo.htm
[24] http://tinyurl.com/b7clc9l
[25] National Center for Transit Research, http://www.nctr.usf.edu/programs/clearinghouse/commutebenefits/

Transit Passes. The monthly limitation under Section 132(f)(2)(B) regarding the fringe benefit exclusion amount for qualified parking is $240. Commuters can receive both the transit and parking benefits (up to $365 per month). Private employers can allow employees to use pretax dollars to pay for transit passes, vanpool fares, and parking.

- Provide reimbursement for bicycle commuting. Employees may exclude reimbursements paid by employers for qualified bicycle commuting expenses. Per IRS Section 132(f)(1)(D), the maximum exclusion is $20 times the number of months the employee uses a bicycle for commuting to work. Allowable expenses include the purchase, maintenance, repair and storage expenses related to bicycle commuting. The bicycle commuting expense exclusion cannot be claimed for any period in which the exclusion for public transit passes or qualified parking is claimed.
- Identify "Bicycle and Transit-Friendly Employers" in bicycle and pedestrian education materials as a way to persuade other employers to become bicycle and transit-friendly employers.

Strategy 14

Continue to collaborate with local and regional agencies, companies, schools, and organizations (including Department of Health, non-profit health organizations) to conduct programs and events that promote bicycling and walking as part of a healthy lifestyle for children and adults including the elderly

ADOT should continue to support local and regional agencies, companies, schools, and organizations to promote bicycling and walking as a healthy lifestyle. Walking and bicycling regularly to school, work, social events, church and stores should be promoted as key to physical and psychological health, and as a healthy way to exercise and socialize. Community

Golder Ranch Fire Department, in Catalina, Arizona, teaches bicycle safety classes to elementary school students

events should involve local elected officials to help them buy-in to bicycle and pedestrian programs and facilities, and to encourage residents to follow their lead.

The following programs can be implemented to encourage walkable and bikeable communities:

- Health Impact Assessments (HIAs): HIA is a data-driven tool used to assess the potential health impacts a policy, procedure or program may have. HIAs often assess built environment projects or policies and their impacts on the accessibility, safety and number of community members who walk, bike and use transit. HIAs can make recommendations to mitigate negative consequences to walkers, bikers and transit users. In Arizona, the Tempe Streetcar Project and the Sycamore Light Rail Station HIAs both assessed biking and pedestrian facilities.[26]
- Safe Routes to School: ADOT currently has a Safe Routes to School program that provides support to communities throughout Arizona. This program is no longer a federal requirement; however, this program is important to Arizona and should be maintained under MAP-21, Moving Ahead for Progress in the 21st Century Act (P.L. 112-141) which funds surface transportation programs for fiscal years 2013 and 2014.

Walking School Buses can be a part of Safe Routes to School programs

[26] http://azdhs.gov/phs/bnp/nupao/az-healthy-communities/index.php?pg=examples, http://www.healthimpactproject.org/

The following events can be conducted to encourage walking and bicycling:

- Walk to School Day[27]: International Walk to School Day is held in October of each year. The event is promoted by the National Center for Safe Routes to School.
- National Bike Month: Bike month is often held in May throughout the United States and typically include a number of events, including a Bike to Work Day. In Arizona, events are held in April in the lower desert and in May for the High Country and nationally. Additional guidance is available from the League of American Bicyclists (LAB).[28]
- Bike to School Day[29]: The first Bike to School Day was held in May 2012 in coordination with the LAB National Bike Month.
- Walk to Work Day: "National Walk to Work Day is held the first Friday of April in the United States. It began in 2004. The day is promoted by Prevention magazine and endorsed by the US Department of Health and Human Services and the American Podiatric Medical Association."[30]
- Open Streets Event: Open streets events temporarily close streets to automobile traffic so that people may use them for walking, bicycling, dancing, playing, and socializing. Additional information is available from the Alliance for Bicycling and Walking and The Streets Plans Collaborative.[31]
- Bike Ride Event: Bicycle ride events can generate funds for a local cause, create recognition that bicyclists are present, and promote pride in local bicycling. These events often increase local bicycle riding throughout the year and can be justification for bicycle facility improvements.
- Walk Friendly Communities Program: ADOT can encourage participation in the Walk Friendly Communities[32] (WFC), a national recognition program developed to encourage towns and cities across the United States to establish or recommit to a high priority for supporting safer walking environments. The WFC program recognizes communities that are working to improve a wide range of conditions related to walking, including safety, mobility, access, and comfort. The City of Flagstaff is designated as a Bronze-level community.[33]
- Bicycle Friendly America Program: Similarly, ADOT can continue and encourage others to participate in the LAB Bicycle Friendly America program, which provides award recognition for communities that actively support bicycling.[34]

[27] http://www.walkbiketoschool.org/
[28] http://www.biketoworkinfo.org/resources/pdf/2010_National_Bike_Month_Organizer_Kit.pdf
[29] http://www.walkbiketoschool.org/
[30] http://tinyurl.com/ars29a7
[31] http://openstreetsproject.org/
[32] http://www.walkfriendly.org/
[33] http://www.walkfriendly.org/communities/community.cfm?ID=34
[34] http://www.bikeleague.org/programs/bicyclefriendlyamerica/

- Cyclovia: Cyclovia are scheduled closings of city streets to automobiles for the exclusive use, benefit, and enjoyment of bicyclists and pedestrians. Cyclovia events originated in Bogota, Columbia where certain main streets are closed each Sunday. An annual Cyclovia event is held in Tucson, Arizona each April in the downtown and surrounding area. A variety of activities is held along the route.[35] The City of Mesa also holds an annual Cyclovia event as part of the Great Arizona Bicycle Festival.[36]

Evaluation Program

Strategy 15

Develop and implement a statewide program for collecting and analyzing bicycle and pedestrian count data

A bicycle and pedestrian counting program can provide meaningful data to ADOT and used to track trends and prioritize investments on state highways. A counting program may utilize automatic counters to provide counts of bicyclists in high crash segment locations, supporting expenditures on new bicycle facilities, and bicycle policies. A count program could include a data collection schedule, prioritization of locations, evaluation of information, and how the information can be used.

The Washington State Department of Transportation (WSDOT) bicycle and pedestrian count program may serve as a model to ADOT. WSDOT conducts an annual Bicycle and Pedestrian Documentation Project. WSDOT's Documentation Project is part of the National Bicycle and Pedestrian Documentation Project.[37] Each year WSDOT solicits bicycle and pedestrian advocacy groups across the state to enlist volunteers for the count. Over three days in September 2010, there were over 300 volunteers that conducted counts in 30 cities across the state.[38]

Similarly, in Arizona, local communities and advocacy organizations can contribute labor resources to a data collection effort. Many local bicycle and pedestrian advocacy organizations work every day to further bicycle and pedestrian activities within their community.

New technologies also provide opportunities to collect bicycle and pedestrian travel data. The San Francisco County Transportation Authority developed a Smartphone application, CycleTracks[39], that collects bicycle routes used by users. A study conducted in Austin, Texas, demonstrated that bicyclists smartphone data can help communities to understand where people bike, and for what reasons, offering an inexpensive alternative to traditional bicycle data collection. The data can be used to aid decision-making about future bicycle

[35] http://www.cycloviatucson.org/
[36] http://www.azbikefest.org/attractions.aspx
[37] http://bikepeddocumentation.org/
[38] http://www.wsdot.wa.gov/bike/Count.htm
[39] http://www.sfcta.org/modeling-and-travel-forecasting/cycletracks-iphone-and-android

and pedestrian facilities. The amount of information provided by the use of a smartphone application can far exceed what would be available using other data collection methods.[40] ADOT should develop a smartphone application that can then also be utilized by local agencies throughout the state to document trends in bicycle ridership.

Many bicyclists and pedestrians currently utilize smartphone applications to track and record their usage. ADOT may consider developing a mechanism for users to submit this data to ADOT as input to a count program. Such data would help ADOT to identify popular corridors, and corridors where improvements are needed.

Another potential data source to identify key bicycling and walking corridors throughout the state are ADOT event permits. A formal review of permits for events sponsored by local organizations would also serve to identify key corridors throughout the state.

Before and after studies of ADOT projects that include new or improved bicycle and pedestrian facilities should be conducted to demonstrate the effectiveness and outcome of new facilities.

It is proposed that ADOT develop a bicycle and pedestrian count data collection program and participate in the National Bicycle and Pedestrian Documentation Project.

Bicycle and Pedestrian Infrastructure

Responses from the May 2012 public survey indicate that providing bicycle and pedestrian infrastructure is a key component to encouraging more people to bike and walk. Survey respondents indicated that installing sidewalks and shared-use paths on state highways and providing wide shoulders on state highways are important.

Improved maintenance of shoulders was also noted as a significant concern. Many respondents mentioned that the shoulders along state highways are often filled with debris, uneven, or have cracks.

Table 15 lists strategies to improve bicyclist and pedestrian infrastructure on the state highway system.

Table 15 – Strategies to Improve Bicyclist and Pedestrian Infrastructure

Strategy 16	Install pavement markings or signage to discourage wrong-way bicycle riding.
Strategy 17	Identify opportunities to implement USDOT, Federal Highway Administration (FHWA) proven countermeasures to improve pedestrian safety: medians and pedestrian crossing islands, pedestrian hybrid beacon, and road diets.
Strategy 18	Support local and regional agencies and jurisdictions to establish connectivity and alternative routes to state highways through local jurisdictions.

[40] http://tinyurl.com/avuvmbm

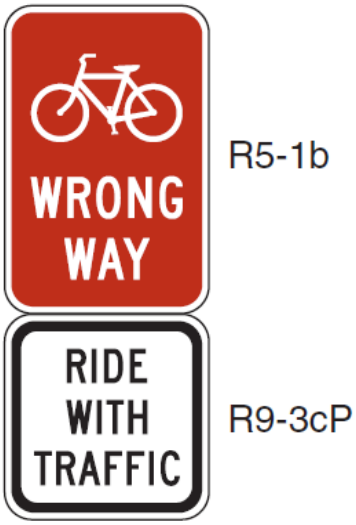
Table 15 – Strategies to Improve Bicyclist and Pedestrian Infrastructure (continued)

Strategy 19	Collaborate with local and regional jurisdictions to implement infrastructure along and crossing state highways consistent with local bicycle and pedestrian plans.
Strategy 20	Coordinate with US Forest Service, National Park Service, and Arizona State Parks to ensure that bicycle and pedestrian facilities connect state highways to forests and national parks.
Strategy 21	Configure traffic signals to detect bicycles at intersections.
Strategy 22	Review and propose essential resting spot/accommodation facilities (water) for bicyclists and pedestrians.
Strategy 23	Construct sidewalks in urban areas and small urbanized areas where origins and destinations present a need.
Strategy 24	Construct and maintain paved and striped shoulders in urban areas and on rural routes; where rumble strips are used, ensure that they are installed to provide a minimum effective clear shoulder width of 4 feet; in urban areas, provide as a minimum condition, a 4-ft paved shoulder (as measured from edge of gutter pan), with white stripe at the edge of the motor vehicle lane.
Strategy 25	Implement the proposed US Bicycle Route System in Arizona.

Strategy 16

Install pavement markings or signage to discourage wrong-way bicycle riding

Wrong-way bicycle riding has been identified as a common contributing factor to bicycle-motor vehicle crashes. When riding on the roadway or shoulder, Arizona law requires bicyclists to ride with traffic. A.R.S. 28-721 states that vehicles (and bicyclists) operating on the roadway should drive on the right half of the roadway. A.R.S. 28-812 states that a person riding a bicycle on a roadway or shoulder adjoining a roadway is granted all of the rights and is subject to all of the duties applicable to the driver of a vehicle.



It is suggested that ADOT install pavement markings and/or signage, at locations where wrong-way riding is identified as a contributing factor to crashes, to indicate the appropriate direction of travel for the bicyclist. Potential pavement marking and signing alternatives include:

- Installing a bicycle lane symbol with a directional arrow at the beginning and end of each block. This option would require modification of ADOT Bicycle Policy; ADOT Roadway Design Guidelines; and ADOT Traffic Engineering Policies, Guidelines and

Procedures, to allow pavement markings to be placed in wide shoulders.

- Install "Bicycle Wrong Way" (Section 9B.07) and "Ride with Traffic" (R5-1b, R9-3cP) signs, consistent with MUTCD. These signs could be installed on the back of other signage such as speed limit signs.

Strategy 17

Identify opportunities to implement USDOT, Federal Highway Administration (FHWA) proven countermeasures to improve pedestrian safety: medians and pedestrian crossing islands, pedestrian hybrid beacon, and road diets

State highways often create barriers in communities because traffic speeds and volumes can make them difficult to cross, and there are few places (signalized intersections) where pedestrians and bicyclists can cross comfortably. The PSAP identified that 74 percent of pedestrian fatalities were attributable to pedestrians crossing the state highway. Improving crossings on state highways is critical to improving pedestrian safety. A list of prioritized locations with a high number of pedestrian-motor vehicle crashes, where crossing improvements may be considered was provided previously in **Table 11**, and a prioritized list of intersections and interchanges was previously included in **Table 12.**

ADOT should conduct a detailed evaluation of each high pedestrian crash location, and identify appropriate countermeasures, including those identified in FHWA's "Guidance Memorandum on Promoting the Implementation of Proven Safety Countermeasures."[41] The memorandum encourages agencies to consider countermeasures that are research-proven, but not widely applied on a national basis. Three of the countermeasures have been proven to reduce pedestrian-related crashes:

- Medians and Pedestrian Crossing Islands in Urban and Suburban Areas: Raised medians (or refuge areas) should be considered in curbed sections of multi-lane roadways in urban and suburban areas, particularly in areas where there are mixtures of significant pedestrian and vehicle traffic and intermediate or high travel speeds. Medians may be particularly beneficial where pedestrian traffic is dispersed and there are not obvious, well-used crossing points. A challenge to converting an existing two-way left turn lane (TWLTL) to a raised median is the number of driveways and side streets and the potential impact to existing driveways. An access management plan and access mitigation strategies will be required in such cases.
- Pedestrian Hybrid Beacon: Pedestrian hybrid beacons should only be used in conjunction with a marked crosswalk. In general, they should be used if gaps in traffic are not adequate to permit pedestrians to cross, if vehicle speeds on the major street are too high to permit pedestrians to cross, or if pedestrian delay is

[41] http://safety.fhwa.dot.gov/ped_bike/

excessive.[42] Transit and school locations may be good places to consider using the pedestrian hybrid beacon.

- "Road Diet" / "Right-sizing" (Roadway Reconfiguration): A "road diet" involves converting an undivided four lane roadway into three lanes made up of two through lanes and a center two-way left-turn lane. The reduction of lanes allows the roadway to be reallocated for other uses such as bike lanes, pedestrian crossing islands, and/or parking. Road diets have multiple safety and operational benefits for vehicles as well as pedestrians.

Strategy 18

Support local and regional agencies and jurisdictions to establish connectivity and alternative routes to state highways through local jurisdictions

Bicyclists do not stop riding and pedestrians do not stop walking at jurisdictional boundaries, nor when ownership of a road changes from a local or regional government to ADOT. Well-connected grid street networks increase the number of people walking, bicycling, and taking transit, which help reduce vehicle miles traveled. Connectivity enables people to take shorter routes. It also enables them to travel on quieter streets. These shorter routes on quiet streets are more conducive to bicycling and walking. However, in many cases on Arizona's highways, discontinuities exist in the network because of roadway ownership boundaries, including discontinuous sidewalks and bicycle lanes or narrowing of wide shoulders upon entering ADOT right-of-way. Furthermore, many Arizona state highways, are designed for high-speed motor

GUIDELINES FOR PROVIDING BIKEWAYS AND WALKWAYS ON ROUTES PARALLEL TO STATE HIGHWAYS

There are occasions when it is infeasible or impractical to provide bikeways and walkways on a state highway, or the state highway does not serve the mobility and access needs of bicyclists and pedestrians, such as on limited access expressways. The following guidelines should be used to determine if it is more appropriate to provide facilities on a parallel local street:

1. a. Conditions exist such that it is not economically or environmentally feasible to provide adequate bikeways and walkways on the state highway; or

   b. State highway does not provide adequate access to destination points within reasonable walking or bicycling distances; or

   c. Bikeways and walkways on the state highway would not be considered safe;

2. Parallel route must provide continuity and convenient access to facilities served by the state highway;

3. Costs to improve parallel route should be no greater than costs to improve the state highway; and

4. Proposed facilities on parallel route must meet state standards for bikeways and walkways.

The above criteria should be satisfied and considered along with other factors when considering parallel routes for the provision of bicycle and pedestrian facilities. ODOT and the appropriate local government agency or agencies should negotiate cooperative cost sharing based on usage and benefits to the local and state system.

[42] http://www.azdot.gov/Highways/Traffic/standards/PGP/draftPHBguide.pdf

vehicle traffic and are therefore uncomfortable facilities for bicyclists and pedestrians, even when the state highway passes through the center of town and serves as more of a "main street" role than a state highway role.

It is suggested that local cities, towns, and regional jurisdictions also develop alternatives to the state highway.

- A lower-speed (25 mph or less) local street that runs parallel to a state highway could be marked and improved as a bicycle or walking route. Signs directing users to the local parallel route would lessen the dependency of users on the state highway. The State of Oregon[43] developed guidelines for providing bikeways and walkways on routes parallel to state highways (see text box previous page).
- Additional mid-mile crossings of interstates and freeways would provide an alternative route from traffic interchange area. In the Phoenix area, mid-mile collector and arterial streets could be constructed to cross I-17 providing an alternative to the traffic interchanges located at the mile arterials.

The above recommendation does not minimize or diminish the need for ADOT to continue to improve accommodation of bicyclists and pedestrians on state highways.

Strategy 19

Collaborate with local and regional agencies and jurisdictions to implement infrastructure along and crossing state highways consistent with local bicycle and pedestrian plans

ADOT encourages efforts to increase bicycle and pedestrian connections. Many communities are developing or have planned bicycle or pedestrian facilities within ADOT right-of-way.

Local and regional agencies and jurisdictions should include needed crossings of state highways within their bicycle and pedestrian plans. This will better facilitate ADOT's ability to collaborate with local and regional agencies and jurisdictions to plan, design, and implement these projects.

As an example, the City of Tempe is planning for bicycle and pedestrian crossings of I-10. They have coordinated with ADOT to review the feasibility of a bicycle and pedestrian bridge over I-10 at Alameda Drive. ADOT collaborated with Tempe to conduct a feasibility study for the bridge.

Strategy 20

Coordinate with US Forest Service, National Park Service, and Arizona State Parks to ensure that bicycle and pedestrian facilities connect state highways to forests, national parks, state, city, and county parks

[43] Oregon Bicycle and Pedestrian Plan, 1995

Arizona has many state and national forests and parks. Coupled with great weather, this presents an opportunity for bicyclists and pedestrians to experience Arizona's wildlife. In locations where ADOT maintained state highways are near state or national forests and parks, ADOT should coordinate with the forest and park services to create access points and paths for bicyclists and pedestrians. In addition, and perhaps more importantly, trails crossing a state highway should be adequately and appropriately addressed with traffic control devices.

Adventure Cycling had entered into a national agreement with the National Park Service to support a number of projects to benefit both the national park and bicyclists, such as:

- Educational campaign, or promotion of "cyclists only" days.
- Providing planning expertise for infrastructure and facilities for cyclists in parks, where appropriate.
- Helping to identify funding
- Promotion and documentation of bicycle tourism
- Designation of U.S. Bicycle Routes (refer to Strategy 25) that will bring cyclists to National Parks or, in some cases, designation of routes through them.

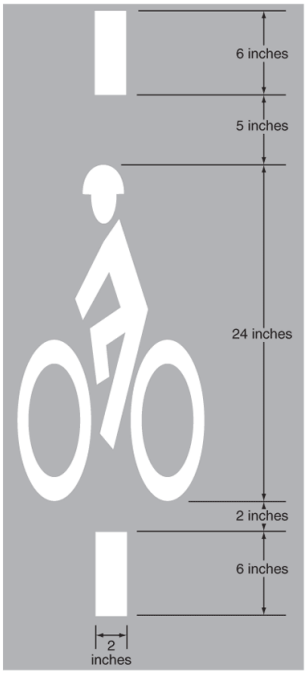
Strategy 21

Provide push buttons, crosswalks, and bicycle detection on all legs of an intersection

On many intersections with state highways, pedestrian push buttons and crosswalks are only provided on 2 or 3 legs of an intersection, creating an impediment for pedestrians. Traffic control devices and crosswalks should be provided on all legs of an intersection to improve the ability to cross the state highway.

Many traffic signals on state highways utilize loop detectors to detect vehicles on side streets, triggering a 'green' for the waiting vehicle. However, many of these traffic signals do not detect bicyclists. As such, a bicyclist may wait several minutes for a vehicle to arrive to trigger the 'green.' Where loop detectors are utilized, they should be configured to detect bicyclists. Pavement markings, consistent with the MUTCD, should be provided that indicates the optimum position for a bicyclist to actuate the signal.

Figure 9C-7. Bicycle Detector Pavement Marking



Newer signals often utilize video detection that more easily detects a bicyclist. At signals that do not use video detection, pedestrian push buttons should be accessible. Any new signal or signal modification should ensure that push buttons (or video detection) is accessible and convenient to pedestrians and bicyclists on all legs of the intersection.

Traffic signals should also be configured to provide

adequate time for a pedestrian or bicyclist to cross the intersection safely. Sometimes, the "green" time allocated for a vehicle to enter from a side street to the state highway is too short for a bicyclist to cross the intersection completely. Additional requirements for accessible pedestrian signals are described in the MUTCD[44].

Strategy 22

Review and propose essential resting spot/accommodation facilities (water) for bicyclists and pedestrians

Roadways between rural towns in Arizona can often extend for 100 miles or more without any water available. It is proposed that a review be completed of existing water locations and potential water locations. Potential water locations include both public and private sources. Existing public sources include parks and recreation facilities in towns that currently may not be clearly designated to approaching bicyclist nor called out in bicycling maps. Potential public sources include ADOT maintenance facilities and other facilities that have water, but have access to that water closed off at certain times. Existing and potential private water sources include bicycle friendly businesses such as bike shops, gas stations, or even private residences.

Once existing locations are mapped, potential additional locations should be identified and an analysis conducted to determine the feasibility of locating an accessible water source. Once identified, water locations and the distances between locations should be noted both on printed materials and on signage along designated routes. For bicyclists, a maximum distance of 25 miles between water stops should be provided whenever practicable. Water locations should also provide much-needed shade.

An inventory of publicly-accessible water sources could be incorporated into a smartphone application.

"Threeway Bicyclists Stop" in Greenlee County is an example of a potential designated bicyclist resting spot. The project, constructed with Transportation Enhancement Funds, included ramadas, picnic tables, restroom facilities, bicycle parking, a public drinking water facility, and an interpretive kiosk on 2 acres of land at the Clifton Ranger District administrative site.

Strategy 23

Construct sidewalks in urban areas and small urbanized areas where origins and destinations present a need

An analysis of areas of where sidewalks may be needed was conducted. **Appendix F**, **Table 20** lists areas of missing sidewalk segments where pedestrian demand may exist.

[44] http://mutcd.fhwa.dot.gov/htm/2009r1r2/part4/part4e.htm

These segments should be reviewed for project opportunities to construct sidewalks. These segments are depicted in **Figure 13** through **Figure 17.**

These locations should also be evaluated to ensure proper crossings of the state highways are provided. ADOT should consider conducting pedestrian crossing warrant studies at locations where origins and destinations are on the opposite side of the road. Infrastructure, as warranted, such as pedestrian hybrid beacons may be considered.

Significant coordination will be required with local and regional agencies and jurisdictions to verify locations of, plan for, and implement the needed sidewalk segments.

In addition to the sidewalk opportunities identified in this plan, ADOT should identify opportunities for shared use paths when designed and located in accordance with accepted criteria for a proper and safe facility. These shared-use paths within ADOT right-of-way are typically going to be of three types:

1. A crossing of an ADOT State Highway by a shared use path traveling perpendicular to the State Highway

2. Shared-use path that provides access through a separated grade interchange. Separated grade interchanges typically create a major barrier for bicycle and pedestrian travel. Locations where there are residential and or commercial destinations adjacent to the interchange or adjacent roadways are open to bicycle traffic, a shared-use path connection through the interchange may be necessitated even if it connects with an on-street bicycle facility and sidewalk adjacent to the interchange.

Example of a shared use path along a state highway in Sierra Vista, Arizona

3. Shared-use path that is parallel to the highway.

Strategy 24

Construct and maintain paved and striped shoulders in urban areas and on rural routes, where rumble strips are used, ensure that they are installed to provide a minimum effective clear shoulder width of four feet[45], and in urban areas, provide as a minimum condition, a four-foot paved shoulder (as measured from edge of gutter pan), with white stripe at the edge of the motor vehicle lane

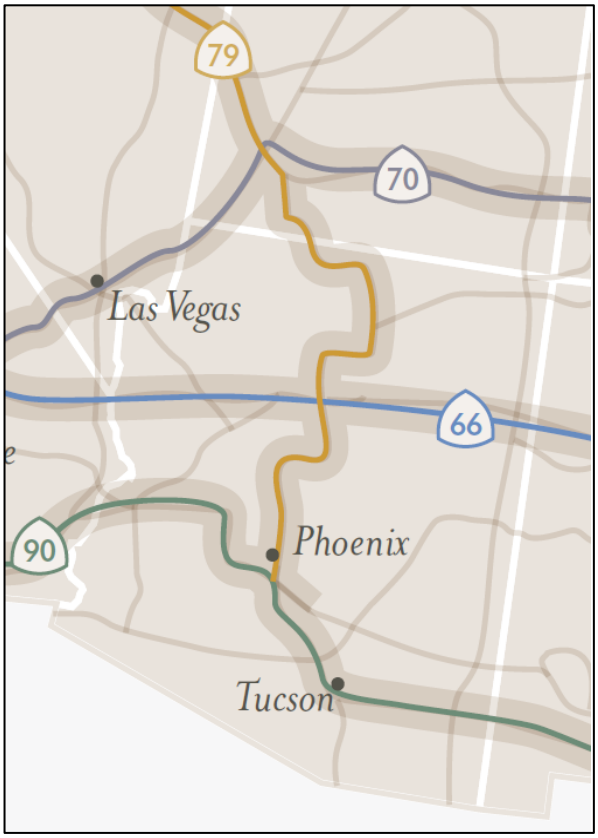
[45] ADOT Traffic Engineering Signing and Marking Standard Drawings M-22: Continuous Longitudinal Rumble Strip Groove, Pattern & Location Details and Exception Details, September 2008

An inventory of state highway segments with less than four feet of paved shoulder, supplemented by public input through the May 2012 survey, helped identify priority state highway segments where improved shoulders are needed. These are listed in **Appendix G**, **Table 21** and depicted in **Figure 21** through **Figure 24.**

Opportunities should be identified to implement the needed shoulder improvements as part of construction, reconstruction, or pavement rehabilitation projects. Pavement rehabilitation projects should include edge-to-edge widening and include rehabilitation and maintenance of shoulders.

Strategy 25

Implement the proposed US Bicycle Route System in Arizona



US Bicycle Route network in Arizona

Source: Adventure Cycling Association. http://www.adventurecycling.org/routes-and-maps/us-bicycle-route-system/national-corridor-plan/index.cfm#az

The US Bicycle Route System (USBRS) is a developing national network of bicycle routes, which will link urban, suburban, and rural areas using a variety of appropriate cycling facilities. To date, 10 US Bike Routes have been established in 9 states: Alaska, Kentucky, Illinois, Maine, Michigan, Minnesota, New Hampshire, North Carolina, and Virginia. Presently, more than 40 states are working to create US Bicycle Routes.[46]

US Bike Routes are nominated for numbered designation through AASHTO's Special Committee on US Route Numbering, which is the same committee that assigns numbers to US highways and interstates. For a route to receive official designation as a US Bicycle Route, it must connect two or more states, a state and an international border, or other US Bicycle Routes.

The National Corridor Plan (Arizona shown left) shows officially designated US Bike Routes as dark, solid lines. The lighter lines indicate corridors where routes may be developed. Corridors can be added or changed based on opportunities or local support.

ADOT supports the development and implementation of the USBRS. ADOT worked with New Mexico DOT (east connection), CALTRANS (west connection), state bicycling organizations, volunteers, and Adventure

[46] http://www.adventurecycling.org/routes-and-maps/us-bicycle-route-system/usbrs-101/

Cycling to coordinate the historic Route 66 as a US Bicycle Route. Also, ADOT will coordinate with local governments, National Forest Service, National Park Service[47], and Historic US 66 Association of Arizona.

[47] http://www.adventurecycling.org/resources/blog/adventure-cycling-and-national-park-service-agreement/

5. IMPLEMENTATION SUMMARY

Implementation will build upon the momentum established during implementation of the 2003 Arizona Statewide Bicycle and Pedestrian Plan and during development of this Plan Update.

ADOT is committed to the continued effort to improve bicycling and walking statewide.

This Plan proposes strategies that upon their implementation will help ADOT to achieve each of the Plan goals. **Table 16** reviews each strategy, provides key implementation tasks, priority, and anticipated time period in which the implementation task will be conducted.

Near-term represents activities that may be initiated immediately. Mid-term activities represent those that should be initiated within 1 to 5 years.

Table 16 – Summary of Proposed Strategies and Implementation Tasks

Strategy	Description	Implementation Tasks	Priority	Time Period
Plans and Policies				
Strategy 1	Develop a Smart Transportation Guidebook to provide guidance on planning and designing non-limited access roadways, including multi-lane state highways in urban and rural communities.	Participate in ADOT Smart Transportation Guidebook development and implementation	High	Near-term
Strategy 2	Develop an ADOT Pedestrian Policy that requires construction of sidewalks in urban areas as part of major construction or reconstruction highway projects.	Convene ADOT Working Group to refine and propose ADOT Pedestrian Policy	High	Near-term
Strategy 3	Update ADOT Bicycle Policy to reflect USDOT Policy on Bicycle and Pedestrian Accommodation and 2012 AASHTO Guide for the Development of Bicycle Facilities.	Convene ADOT Working Group to refine and propose ADOT Bicycle Policy	High	Near-term
Strategy 4	Modify ADOT Roadway Design Guidelines.	Convene ADOT Working Group to refine and propose specific modifications to ADOT Roadway Design Guidelines. RDG updates should reflect outcome and intent of ADOT Smart Transportation Guidebook. See Strategy No. 1.	High	Mid-term
Strategy 5	Amend State Statute to clarify bicyclist operation on sidewalks, crosswalks, and shared use paths.	Pending adoption of changes to the U.V.C proposed by the NCUTCD, collaborate with ADOT Government Relations to propose changes to A.R.S consistent with U.V.C. changes.	High	Mid-term

Table 16 – Summary of Proposed Strategies and Implementation Tasks (continued)

Strategy	Description	Implementation Tasks	Priority	Time Period
Plans and Policies (continued)				
Strategy 6	Recommend Modification's to Arizona Crash Report Form to provide more detail regarding bicycle and pedestrian crashes.	Convene Working Group to refine and propose modifications to Arizona crash report form. The form was last updated in 2010. Identify anticipated timeframe of the next detailed review.	High	Mid-term
Education Programs				
Strategy 7	Continue to provide guidance and technical support to regional and local jurisdictions for developing and implementing bicycle and pedestrian plans that are adopted by local agencies and jurisdictions.	Coordinate with PARA program to continue to advertise that the PARA program that bicycle and pedestrian planning are eligible activities. General Plans are updated on a 10-year cycle. Many local jurisdiction General Plans are currently being updated by local agencies. ARS 9-461.05 (General plans; authority; scope) states, "E. The general plan shall include for cities of fifty thousand persons or more and may include for cities of less than fifty thousand persons the following elements or any part or phase of the following elements . . . 9. A bicycling element consisting of proposed bicycle facilities such as bicycle routes, bicycle parking areas and designated bicycle street crossing areas.	High	On-going; Many general plans are currently being updated to meet 10-year deadline. ADOT PARA Program accepts applications on an annual basis.
Strategy 8	Provide greater detail of bicycle and pedestrian safety in the driver's manual and test for a license.	Establish a Working Group with MVD to update the driver's license manual, test, and on-line training course. Collaborate with MVD to distribute bicycle and pedestrian safety-related information and education materials at MVD offices. Ensure that sufficient display space is provided.	High	Mid-term Near-term

Table 16 – Summary of Proposed Strategies and Implementation Tasks (continued)

Strategy	Description	Implementation Tasks	Priority	Time Period
Education Programs (continued)				
Strategy 9	Collaborate with public safety to include bicycle and pedestrian safety in POST (Arizona Peace Officer Standards and Training Board) training for police enforcement officers.	Develop a public safety officer training program and curriculum. Training could be offered at public safety conferences, as webinars, or as part of continuing education programs at individual police departments and public safety departments. Develop enforcement strategies and programs aimed at bicyclist and pedestrian law violations that are most likely to result in serious crashes. Develop enforcement strategies aimed at motorist errors and aggressive behaviors.	High	Mid-term
Strategy 10	Develop and implement a statewide bicycle and pedestrian safety campaign.	Develop basic pedestrian and bicycle education programs for communities and schools. Identify funding opportunities for a bicycle and pedestrian safety awareness campaign; identify high priority market areas.	Medium	Mid-term
Strategy 11	Continue to print and distribute safety and education booklets; develop online tools and applications.	Develop on-line and smart-phone applications for Cycle Arizona map, Share the Road booklets; tools should be coordinated with data collection strategies (Strategy 15). Update Cycle Arizona map to reflect completed projects (shoulder improvements, new roads).	Medium	Mid-term
Strategy 12	Encourage design, engineering, planning, and other appropriate staff to complete bicycle, pedestrian, and transit facility design training once every four years.	Identify funding for training courses; conduct training courses at locations statewide.	High	Near-term

Table 16 – Summary of Proposed Strategies and Implementation Tasks (continued)

Strategy	Description	Implementation Tasks	Priority	Time Period
Encouragement Programs				
Strategy 13	Establish State of Arizona as a model employer by providing incentives and facilities to its employees to encourage bicycling and walking to work. Encourage local and regional government agencies and employers to provide incentives and facilities for bicycling and walking to work.	Educate agency executive leadership and management of available opportunities; solicit support of Arizona Department of Administration.	Medium	Mid-term
Strategy 14	Continue to collaborate with local and regional agencies, companies, schools, and organizations (including Department of Health, non-profit health organizations) to conduct programs and events that promote bicycling and walking as part of a healthy lifestyle for children and adults including the elderly.	Participate in planning and execution of events, provide education materials, encourage local agencies to host events; serve as conduit for connecting stakeholder resources to support local events. Conduct regular (bi-annual) Statewide Bicycle and Pedestrian Steering Committee Meetings to monitor and discuss implementation of this plan, encourage inter-disciplinary coordination, and facilitate information sharing. Work to encourage all local agencies or counties to establish Bicycle and Pedestrian Committees.	High	On-going
Evaluation Program				
Strategy 15	Develop and implement a statewide program for collecting and analyzing bicycle and pedestrian count data.	Develop annual bicycle count program in collaboration with bicycle and pedestrian advocacy organizations; implement permanent count stations on high-use corridors. Develop smart phone applications to provide continuous submission of data by smart phone users.	High	Mid-term

Table 16 – Summary of Proposed Strategies and Implementation Tasks (continued)

Strategy	Description	Implementation Tasks	Priority	Time Period
Infrastructure				
Strategy 16	Install pavement markings or signage to discourage wrong-way bicycle riding.	As specific corridors/segments are identified through Road Safety Assessments, Bicycle Safety Action Plan, and other means, determine if treatment is appropriate; collaborate with ADOT Regional Traffic Engineers.	High	On-going
Strategy 17	Identify opportunities to implement USDOT, Federal Highway Administration (FHWA) proven countermeasures to improve pedestrian safety: medians and pedestrian crossing islands, pedestrian hybrid beacon, and road diets.	Conduct RSAs for locations identified in Pedestrian Safety Action Plan and Bicycle Safety Action Plan. As specific corridors/segments are identified, propose strategies on a project-specific basis as appropriate.	High	On-going
Strategy 18	Support local and regional agencies and jurisdictions to establish connectivity and alternative routes to state highways through local jurisdictions.	Identify and prioritize state highways in urban areas where alternative routes should be considered. In collaboration with local jurisdiction, develop alternative route plan; identify projects needed to establish connectivity. Assist in the development of local and regional bicycle maps; particularly for towns and counties outside of MPOs.	Medium	Mid-term
Strategy 19	Collaborate with local and regional jurisdictions to implement infrastructure along and crossing state highways consistent with local bicycle and pedestrian plans.	Participate in local agency bicycle and pedestrian plan development; identify state highway crossing needs within the plans	High	On-going

Table 16 – Summary of Proposed Strategies and Implementation Tasks (continued)

Strategy	Description	Implementation Tasks	Priority	Time Period
Infrastructure (continued)				
Strategy 20	Coordinate with US Forest Service, National Park Service, and Arizona State Parks to ensure that bicycle and pedestrian facilities connect state highways to forests and national parks.	Establish working group with state and federal land management agency representatives, inventory needed connections, and develop a plan that identifies needed connections, proposed improvements, and cost estimates.	Medium	Mid-term
Strategy 21	Configure traffic signals to detect bicycles at intersections.	Establish a working group with Regional Traffic Engineers to discuss bicycle detection current practices, and recommended technology for new projects (e.g. in-pavement loops, video).	High	Near-term
Strategy 22	Review and propose essential resting spot/accommodation facilities (water) for bicyclists and pedestrians.	Inventory locations, identify needed locations, develop partnerships with local businesses as appropriate to serve as 'bicycle rest areas'; reflect locations in update of Cycle Arizona map or on-line tool	Medium	Mid-term
Strategy 23	Construct sidewalks in urban areas and small urbanized areas where origins and destinations present a need.	Identify funding and projects of opportunity for new sidewalks within ADOT right of way or shared use paths	High	On-going

Table 16 – Summary of Proposed Strategies and Implementation Tasks (continued)

Strategy	Description	Implementation Tasks	Priority	Time Period
Infrastructure (continued)				
Strategy 24	Construct and maintain paved and striped shoulders in urban areas and on rural routes; where rumble strips are used, ensure that they are installed to provide a minimum effective clear shoulder width of 4 feet; in urban areas, provide as a minimum condition, a 4-ft paved shoulder (as measured from edge of gutter pan), with white stripe at the edge of the motor vehicle lane.	Identify funding and projects of opportunity for new or improved shoulders. It significantly more cost effective for bicycle and pedestrian improvements to be provided as a component of roadway projects in comparison to a stand-alone bicycle or pedestrian project. Develop a tracking system of segments identified in Strategy 24; review planned projects that my include segments. Tracking system will provide the State Bicycle and Pedestrian Coordinator, and bicycle and pedestrian advocates throughout the state, with a listing of all major roadway projects within the State is recommended. This listing could include a project description and timeline, ADOT staff and Consultant staff contacts, a summary of the bicycle and pedestrian issues and how these issues are being addressed.	High	On-going
Strategy 25	Implement the proposed US Bicycle Route System in Arizona.	Develop implementation plans for USBR 90, USBR 79, and USBR 66.	High	Near-term

APPENDICES

Appendix A – Statewide Survey Responses

Table 17 – Survey Question No. 6 Responses

State Highways that received comment	Response Count	Concerns
809 (45%) respondents answered this question		
Interstate 8	5	Maintenance concerns; improve shoulders; respite facility every 25 miles
Interstate 10	56	• Improve crossings over I-10 (specifically identified need for bike lanes on arterials crossing I-10 at Southern, Broadway, Elliot Road, Ray Road, Warner Road, Chandler Blvd, Sunshine Road, Sunland Gin Road, Ina Road, Cortaro Farms, downtown Tucson); provide new bike/ped crossings at locations such as Sarival Ave (Goodyear), Bullard Wash (near Bullard Ave.; provide new bike/ped only overpasses every ½ mile. • Improve shoulders on Frontage Roads; extend frontage roads to fill missing segments between Phoenix and Tucson (specifically between Phoenix and Eloy).
Interstate 17	45	• Provide bicycle/pedestrian crossings, for example near Camelback Road. Provide bike lanes on arterials crossing I-17 (Camelback, Bethany Home, Indian School); complete crossings near Carefree Highway, Norterra and Anthem areas. • Provide a paved pathway connecting Kachina Village to Flagstaff; alternatively, provide a paved pathway along Munds Highway • Ensure that rumble strips between Phoenix and Flagstaff do not reduce the available shoulder for bicycles to render them unusable by bicyclists. • Improve pedestrian accommodation on McConnell Drive as it crosses under I-17. This underpass is used by a lot of NAU students. • Improve pedestrian accommodation on overpass at Flagstaff Airport
Interstate 19	9	• Improve west and east frontage road south of Continental to Tubac, construct bicycle lanes; section between Exit 63 and Rio Rico needs priority to add paved shoulders. • Keep shoulders clear of debris; place signs (e.g. Border Patrol check point, construction signs) so that they are still passable by a bicyclist • From Tubac to the Palo Parado Exit on the I-19 East Frontage Road there are many paved shoulders that need refurbishment to make them rideable. Also, there are some missing paved shoulders here that should be included. • I-19 West Frontage Road between Continental and Canoa needs shoulders
Business Route 40	1	• Need pedestrian crossings on Milton Road • Mid-block crossings on Milton Rd • Provide continuous wide shoulder, particularly west of Milton Road • Improve bicycle accommodation under railroad tracks on Route 66 / Milton Road • Need continuous sidewalks on one side of the road near Woody Mountain Road

Table 17 – Survey Question No. 6 Responses (continued)

State Highways that received comment	Response Count	Concerns
Interstate 40	11	• Shoulder between Bellemont and Flagstaff needs improvement to be suitable for bicyclists • Shoulder sweeping is needed between Flagstaff and Winslow • Additional bicycle and pedestrian crossings of I-40 in Flagstaff are needed • Between Kingman and Flagstaff, the creative use of Historic Route 66 alignments with the addition of some paved multi-use paths could create a world class touring route that could be used locally as a commuter route from outlying communities.
State Route 51	10	• Improve safety of bicyclists at Indian School / SR 51 Interchange • Construct a continuous pathway along SR 51. Currently extends from Loop 101 to Sweetwater, and again from 32nd Street to Northern. There are several sections of disconnected shared use paths on SR 51. Complete the connections
US 60	50	• Need bicycle lanes (striped shoulders) from 83rd Avenue through Surprise, and Sun City to Loop 303. • Provide shared use path along US 60 from Sun City through Glendale • Improve shoulder from Sun City to Wickenburg; connect widened shoulder to SR 74; shoulders needed on SR 74 • Need sidewalks and paved shoulder between Olive Ave. and McDowell • Improve/widen shoulder between Superior and Globe • Improve/widen shoulder between Mountain View Road and Superstition Mountain Drive (roadway was recently resurfaced); General shoulder widening needed between SR 88 and SR 79, Gold Canyon area; new rumble strips makes shoulder insufficient for bicyclists • Need pedestrian/bicycle crossing over Grand Ave/US 60 at 39th Ave. • Rumble strips force bicyclists to ride on white line, from Show Low east to near Springerville; need to widen shoulder
State Route 64	7	Need to widen shoulders to serve bicyclists accessing the Grand Canyon
State Route 66	21	Note: Most survey respondents confused SR 66 with Route 66 in Flagstaff. As such, survey comments are reflected in Business Route 40. • Capitalize on Historic Route 66 to make this an attractive bicycling route
State Route 68	1	New paving is hard to pedal on
State Route 69	12	• Provide bike lanes through SR 89A/SR 69 Interchange, needs wide shoulder on SR 89A between I-17 and Prescott • Need pedestrian and bicycle facilities between Prescott and Prescott Valley and Prescott Valley to Cordes Junction; equestrian use is also common in this area • Need a signalized pedestrian crossing in Mayer at the Circle K.
State Route 72	1	Widen shoulders
State Route 73	2	Widen shoulders; maintenance of shoulders
State Route 74	19	• Improve crossing over I 17 • Carefree Highway between I-17 and Lake Pleasant has some spots with very narrow shoulders due to rumble strips. • Shoulder improvements are needed from US 60 to I-17

Table 17 – Survey Question No. 6 Responses (continued)

State Highways that received comment	Response Count	Concerns
State Route 77	34	• Wide shoulders needed through Catalina (Golder Ranch Road to Eagle Crest Ranch Road) • Need pedestrian crossing opportunities in Catalina (east side to west side of highway) • Left turn phases on traffic signals is very short – insufficient for bicyclists (Catalina State Park, Rancho Vistoso Blvd). Need detection for bicyclists so that left turn phasing is extended when bicyclist is present • Need continuous sidewalks from Miracle Mile to Magee (missing segments) • Need pedestrian crossing opportunities north of River Road • Need to close gap in bicycle route between River Road and Roger Road – no paved shoulder in this segment; bicyclists must ride in travel lane • Shoulders need maintenance/improvement between Mammoth and Winkelman; this is primary route for bicycle tours to the White Mountains • Need widened shoulders north of Oracle to Globe; rumble strip reduces effective shoulder width for bicyclists • Need to complete shared use path in Oro Valley between First Ave and Oracle Road (note: currently, the missing segment requires bicyclists to ride on the shoulder of SR 77 to connect to the pathway).
State Route 79	13	Provide wide shoulders from Florence Junction /Florence to Oracle Junction; this section would be an ideal route between Phoenix and Tucson, but no shoulders are provided
State Route 80	6	• Widen / maintain shoulders (Whetstone to Sonoita, Tombstone to Bisbee, SR 90 to Bisbee • Need crossing at Huachuca St. and San Pedro St. (Benson)
State Route 82	10	• Widen shoulder (Sonoita to Tombstone, SR 90 to Tombstone) • Need edge to edge repaving (not travel lane to travel lane) • Shoulder maintenance west of Patagonia • Vegetation control (4 feet clear of shoulder)
State Route 83	21	• Better lighting (in Sonoita) • Edge to edge paving when resurfacing • Wide shoulders needed between Tucson and Sonoita; particular MP 44 to I-10; this is a popular bicycle tourism route; Sonoita to Parker Canyon Lake
State Route 84	2	Needs to be repaved; better maintenance of the shoulders
State Route 86	10	• Need a pedestrian crossing in Sells • Maintenance of shoulders, in particular Ajo to Mission Road
State Route 87	87	• Shoulders needed in SB direction south of Payson, north of Payson (between Pine and Strawberry), MP 290 to MP 305, Signal Peak Road to Sacaton, SR 179 to Coolidge, SR 387 to SR 287 • Need pedestrian facilities between Pine and Strawberry • Debris in shoulder, Shea to McDowell, Shea to Bush Highway • Convert closed rest area at SR 188 to bicycle rest area with water
State Route 88	15	Needs shoulder widening, Apache Junction to Tortilla Flat

Table 17 – Survey Question No. 6 Responses (continued)

State Highways that received comment	Response Count	Concerns
State Route 89	29	• Need shoulder on entire route: Prescott to Wickenburg, Prescott to Ash Fork • Rumble strips reduce effective shoulder width, Prescott Airport to Watson Lake.
US 89	8	• Widen/improve shoulders: Flagstaff City limit to Townsend-Winona Road and Sunset Crater; • Shoulder is non-existent approximately 20 miles north of Flagstaff (southbound only MP 442.3 to approximately 434.3)
State Route 89A	69	• Improve Milton Road for bicyclists; access management, bicycle lanes • Need paved shoulder between Kachina Village/Mountainaire and Flagstaff; need connection between Old Munds Highway and Ft. Tuthill • Wide shoulders needed, Flagstaff to Sedona/Clarkdale, striped shoulders needed from SR 179 to MP 369, provide paved shoulder in Sedona • Wide shoulder needed between Clarkdale, Jerome, and Mingus Mountain • Need pedestrian crossings, Dry Creek Road to uptown Sedona • Signage needed near Red Rock Loop Road reminding of 3-foot passing law
State Route 90	14	• Need continuous shared use path along SR 90 bypass to SR 92/ • Wide shoulders needed, Sierra Vista to Bisbee • Need pedestrian improvements through I-10/SR 90 interchange • Need to connect existing shared use path on SR 90 to Ft. Huachuca East Gate • Debris in shoulders, SR 90, Sierra Vista to Huachuca City
State Route 92	15	• Improve shoulders between Palominas and Coronado Monument, Sierra Vista Mall to Ramsey Road, Three Canyons Road to Bisbee • Widen shoulders from Sierra Vista to Hereford • Need traffic signal detection that senses bicyclists at SR 92/Ramsey Canyon Road • Provide shared use paths on both sides of the highway; paths on only one side or the other lead to vehicular conflict and/or non-use.
US 93	13	• Need widened shoulders from approximately 16 miles south of the NV border till about mile post 60, southbound; west of Wickenburg has rumble strips that reduce effective shoulder width; need continuous paved shoulder from Wickenburg to I-40; SR 71 to Santa Maria River shoulder is very narrow or non-existent
State Route 95	9	• Need wide shoulder from Parker to Lake Havasu City • Need improved shoulders from MP 177 to MP 201
US 95	3	• Regular shoulder sweeping needed • Improve shoulder from Yuma Proving Ground to Pacific Avenue

Table 17 – Survey Question No. 6 Responses (continued)

State Highways that received comment	Response Count	Concerns
Loop 101	29	• Need better crossing facilities for both bikes and pedestrians; share the road signage needed; improve pavement markings; more bike lanes; shared use path to separate bikes from vehicles; widen shoulders; maintenance • Need bike lanes on Chandler Blvd under Loop 101 • Loop 101/Pima/Princess, motorists existing off ramp to turn right disregard bicyclist in bike lane • Need a bike lane on University Drive at Loop 101 Overpass • Establish bicycle and pedestrian connections to 59th Avenue bridge • Provide sidewalks on frontage roads to connect to neighborhood sidewalks (e.g. at 33rd Avenue) • Improve bicycle/pedestrian accommodation through Rio Salado underpass, Cave Creek Road underpass • Provide additional pedestrian / bicycle bridges over the Loop 101 in the West Valley • Provide shared use path along SR 101 from SR 51 to Hayden Road to connect to SR 51 shared use path
State Route 143	4	Need better bicycle and pedestrian facilities to access the airport; transition from Phoenix maintained roads, across ADOT road, into Tempe isn't seamless; better crossing by the airport
US 160	1	Widen shoulders
State Route 169	2	Widen shoulders; better signage to share the road; shared use path on both sides of highway
State Route 177	2	Bike lanes are needed between Winkelman and Superior
State Route 179	25	• Rumble strips from Village of Oak Creek to I-17 reduce effective shoulder width • Shoulders south of MP 304.5 needed widening; rumble strips make shoulder unusable; Beaver Head Flats Road to I-17 • Improve SR 179 between Red Rock Ranger Station and I-17; narrow shoulder with rumble strips; MP 298 to MP 302
US 180	37	• Improve/widen shoulder from Flagstaff to Grand Canyon • Between Shultz Pass Road and FS 164B; and between Snowbowl Road and Valle, there is not sufficient shoulder for cyclists or pedestrians. • Continue FUTS path beyond Shultz Pass Road • Pedestrian crossings needed, continuous sidewalks needed on Fort Valley Road
State Route 180A	2	Widen shoulders; maintenance of roads and shoulders
State Route 187	3	Needs a shoulder, from SR 87 to SR 387
State Route 188	2	Maintenance of shoulders
Loop 202	16	• Incorporate shared use path into design of South Mountain Freeway • Provide shared use path parallel to freeway from Loop 101 to US 60 • Improve crossings at interchanges – bike lanes disappear on arterials • Improve bicycle accommodation at Priest Drive/SR 202 interchange, Scottsdale/Rural/SR 202 interchange, Dobson Road/SR 202 interchange

Table 17 – Survey Question No. 6 Responses (continued)

State Highways that received comment	Response Count	Concerns
State Route 210	2	Few places to cross and those that are there aren't very safe
State Route 238	2	Needs shoulders
State Route 260	35	• Need a safe crossing; bike lanes needed; maintenance; better signage and pavement markings at intersections to designate space for bikes; shared use path to separate bikes and vehicles; needs shoulders • Improve SR 260/US 89A intersection for bicyclists and pedestrians • Provide shoulders on 260 from the bottom of the rim to Show Low; Payson to Starr Valley, between Pine and Strawberry • Wide shoulders needed from Show Low to Pinetop to Eager • Improve discontinuous shoulders between Cottonwood and I-17; also Payson to Camp Verde; Heber to Show Low and Forest Lake
State Route 273	1	Needs to be repaved with a shoulder
State Route 287	4	Widen shoulders; improved bike crossing from Hacienda Rd. to Thornton Rd.
State Route 288	1	Continue pavement to Highway 260
Loop 303	11	• Widen shoulders; shared use paths to separate bikes from vehicles; difficult to cross at Bell Rd.; maintenance; needs rest areas with shade and water; disconnected shoulders and bike lanes • Provide wide shoulders between I-10 and US 60 • Traffic signal timing inadequate for bicyclists and Loop 303/Bell Road, Grand Avenue
State Route 347	7	Bike lanes without rumble strips; improve crossing near Riggs Rd. for bikes; sidewalks needed to access businesses
State Route 387	1	Shared use path or sidewalk needed near Villago Subdivision

Appendix B – Potential Modifications to Arizona Bicycle Policy MGT 02-1

Potential modifications and additions to the ADOT Bicycle Policy are in *italics;* deletions are in ~~strikethrough.~~

POLICY

1. It is ADOT's goal to develop a transportation infrastructure that provides safe and convenient bicycle access *that fosters increased usage by bicyclists.* ADOT further advocates that bicyclists have the right to operate in a legal manner on all roadways open to public travel, with the exception of fully controlled-access highways. Bicyclists may use fully controlled-access highways in Arizona except where specifically excluded by regulation and where posted signs give notice of a prohibition. In support of, and in accord with the foregoing, it is ADOT's policy to:

    a. *Go beyond minimum requirements to* include provisions for bicycle travel in all new major construction and major reconstruction projects on the state highway system. New bridge and roadway widening projects are normally considered as being within the scope of major construction or major reconstruction. *Bicycle accommodation will be considered in* pavement preservation, utility, and minor and spot improvement projects ~~are not included~~ *if the cost of accommodations is reasonable and feasible; at a minimum,* existing widths for bicycles will be maintained. The scoping documents for new construction and reconstruction will define the parameters for inclusion of bicycle travel.

    b. Utilize the AASHTO Guide for the Development of Bicycle Facilities as the design guide for roadway features to accommodate bicycles.

    c. Utilize the Manual on Uniform Traffic Control Devices, Part 9 as adopted in accordance with A.R.S 28-641 for design of traffic controls for bicycle facilities.

    ~~d. Provide shared roadway cross-section templates as a minimum condition with new major construction and major reconstruction projects, regardless of the presence of a shared use path.~~ [*Note: this paragraph is deleted because it is now addressed by bullet point 'e'*].

    e. ~~Consider,~~ *Provide* as a part of major new construction and major reconstruction in urban areas, *a minimum 4-ft paved shoulder* ~~wide curb lanes up to 15' in width~~ (exclusive of gutter pan) and placement of a stripe at the vehicle lane edge where appropriate, *regardless of the presence of a shared use path*. ~~This decision will be made on a project basis weighing such factors as location, vehicular traffic, grades, anticipated bicycle usage, and right of way availability.~~

    f. ~~Consider,~~ *Provide* bicycle lanes for inclusion with major new construction or major reconstruction when~~:1) incremental costs for construction and maintenance are funded by a local agency AND 2)~~ the bicycle lane is included as a part of a bicycle facilities plan adopted by a local agency, *regardless of the presence of a shared use path*.

g. As a part of major new construction and major reconstruction, ADOT will fund and construct at-grade or grade separated (including bridges) street or roadway crossings of state highway system roadways to meet cross section templates accommodating bicyclists that have been adopted as standard by the local agency. The limits of construction are determined on a project-by-project basis, are normally within the ADOT right of way, and may include appropriate transitions to existing roadways outside of ADOT right of way.

h. Accommodate shared use paths within the ADOT right of way when the facilities are: 1) designed and located in accordance with accepted criteria for a proper and safe facility AND 2) funded and properly maintained by the local agency.

i. Utilize the ADOT Traffic Engineering PGP # 1030 to designate route sections where bicycle traffic is prohibited on fully access-controlled State Highways.

j. Utilize the ADOT Traffic Engineering PGP # 480 for placement of longitudinal rumble strips on State Highways.

k. Use pavement surfacing materials that provide reasonably smooth surfaces on travel lanes and shoulders in conjunction with paving projects.

l. ~~Evaluate and consider the impacts of~~ *Accommodate* bicyclists when restriping roadways in conjunction with new construction, reconstruction, pavement preservation and minor spot improvement projects [*Note: Consider moving bullet point 'l' to immediately follow bullet point 'a' to emphasize bicycle improvements as part of minor project*].

m. Utilize Intergovernmental Agreements to define funding and maintenance responsibilities with local governments for bicycle facilities within State highway right-of-way.

2. It is ADOT's Policy not to: [*Note: as policy content is approved, consider rephrasing so that it contains positive statements, followed by a list of exceptions*]

a. Reduce existing travel lane widths *on higher speed, free flowing, principal arterials* to accommodate bicycle traffic unless the *need is justified to allow provision for bicyclists, and* supported by a traffic study. *Travel lane widths may be considered for reduction to accommodate bicycles under interrupted-flow operating conditions at lower posted speeds (45 mph or less). Narrower lane widths on lower speed (45 mph or less) facilities are normally adequate and have some advantages.*[48] Concurrence by the State Traffic Engineer and the Assistant Engineer, Roadway Engineering Group are required.

[48] The Florida Department of Transportation allows travel lanes to be narrowed to 11 feet on the state highway system regardless of speed if the purpose is to accommodate a bicycle facility. Travel lanes can be narrowed to 10 feet if the design speed is 35 miles per hour. Refer to FDOT Plans Preparation Manual, Volume I, Chapter 25.4.5; accessible at: http://www.dot.state.fl.us/rddesign/PPMManual/2012/Volume1/Chap25.pdf.

b. Sign or designate bikeways on any roadways on the State Highway System or roads on State owned right of way without concurrence of the District Engineer and State Bicycle Coordinator.

c. Sign or designate sidewalks as bicycle routes or bikeways.

d. Use ~~t~~*T*ransportation ~~enhancement~~ *Alternative* funds for maintenance of bicycle facilities.

e. Mark or sign sidewalks or shared-use paths on State right of way parallel and adjacent to roadways for the preferential or exclusive use of bicyclists per ADOT Traffic Engineering PGP # 1031.

3. It is ADOT's policy to require written approval from the State Traffic Engineer and the Assistant State Engineer, Roadway Engineering Group in consultation with the State Bicycle Coordinator for any variations or exceptions to this policy.

Appendix C – Potential Modifications to ADOT RDG and Traffic Engineering PGP's

Modifications to ADOT, Roadway Engineering Group, Roadway Design Guidelines (RDG)[49] may be considered to improve the routine accommodation of bicyclists on the State Highway System. Potential modifications are listed below. Additions are indicated in *italics*; deletions are shown in ~~strikethrough~~.

209.1 – Climbing Lanes, paragraph 7

Also see the design memorandum entitled "A Policy on the Design of Passing Lanes and Climbing Lanes" on the Roadway Design website~~. If bicyclists are utilizing the facility, a~~ *A* minimum shoulder width of 4 ft *or more, exclusive of a rumble strip,* should be provided *to accommodate bicyclists*.

209.2 – Passing Lanes, paragraph 8

For adding passing lanes to existing roadways, see the design memorandum entitled "A Policy on the Design of Passing Lanes and Climbing Lanes" on the Roadway Design website. ~~If bicyclists are utilizing the facility, a~~ *A* minimum shoulder width of 4 ft *or more, exclusive of a rumble strip,* should be provided *to accommodate bicyclists.*

302.4 – Shoulder Width

The shoulder width given in Table 302.4 shall be the minimum continuous usable width of paved shoulder, *exclusive of a rumble strip.*

Within Table 302.4, Paved Shoulder Width, Paved Shoulder Width (ft) (In Direction of Travel), Right, change widths specified for Urban multi-lane divided, Urban multi-lane undivided, Acceleration lanes, and Frontage roads (2-lane) from 4-ft to 6-ft.

306.4 – Urban Cross Sections, paragraph 3:

A) Urban Section UA*:* This section should be used on highways for the initial construction to four lanes. This section is normally used as the urban extension of a divided rural or fringe-urban highway. Use of this section should be based, in part, on a consideration of the access requirements of adjacent properties. The section may not be appropriate for areas of heavy strip development. ~~On a project-by-project basis,~~ *Provide a minimum 4-ft paved shoulder,* exclusive of curb and gutter *and rumble strip* ~~may be considered~~ *and place a stripe at the vehicle edge line* to accommodate bicycle usage. ~~Factors to be considered include location, vehicular traffic, grades, anticipated bicycle usage, and right of way availability.~~

B) Urban Section UB: This section should be used where an existing four-lane undivided highway is being widened or where existing strip development requires the continuous two-way left-turn lane. ~~On a project-by-project basis~~, *Provide a minimum 4-ft paved*

[49] http://www.azdot.gov/highways/Roadway_Engineering/Roadway_Design/Guidelines/Manuals/PDF/RoadwayDesignGuidelines.pdf

shoulder ~~a 15 ft outside lane~~, exclusive of curb and gutter, *and rumble strip*, ~~may be considered~~ to accommodate bicycle usage ~~when weighing the factors listed in Section UA~~.

E) Non-Standard Sections: The following sections can be utilized on a very limited and restricted basis, subject to specific prior approval of the Assistant State Engineer, Roadway Engineering Group. The approval is required prior to development of the Final Project Assessment or Final Design Concept Report.

Included are:

- Three lanes. Use of a three-lane section is restricted to local traffic or non-through routes; i.e., routes with little or no external through traffic, which have very restrictive existing right-of-way. Further, the section is limited to application in small urban areas, and where implementation will constitute final, ultimate construction. The roadway will be 44 ft wide with two 12-ft through lanes, a 12-ft turn lane, and 4-ft non-curbed shoulders on each side. With curb and gutter, a 4-ft paved shoulder ~~14 ft wide outside lane~~ exclusive of curb and gutter is acceptable to accommodate bicycle traffic.

408.11 – Right Turn Channelization, paragraph 13

E) Bicycle Buffer: ~~Where bicycles are expected to be prevalent, a~~ *A* buffer area between the through lane and the right-turn lane should be provided. Figure 408.11A (**Figure 9** and **Figure 10**) shows the bicycle buffer with a wide curb lane. The buffer area is formed by the extension of the through lane and the face of curb line. Figure 408.11B shows the bicycle buffer for non-curb and gutter sections. ~~The buffer may be omitted where bicycle traffic or right-turn traffic is expected to be infrequent.~~

Figure 9 – Bicycle Buffer, ADOT Roadway Design Guidelines, Figure 408.11A

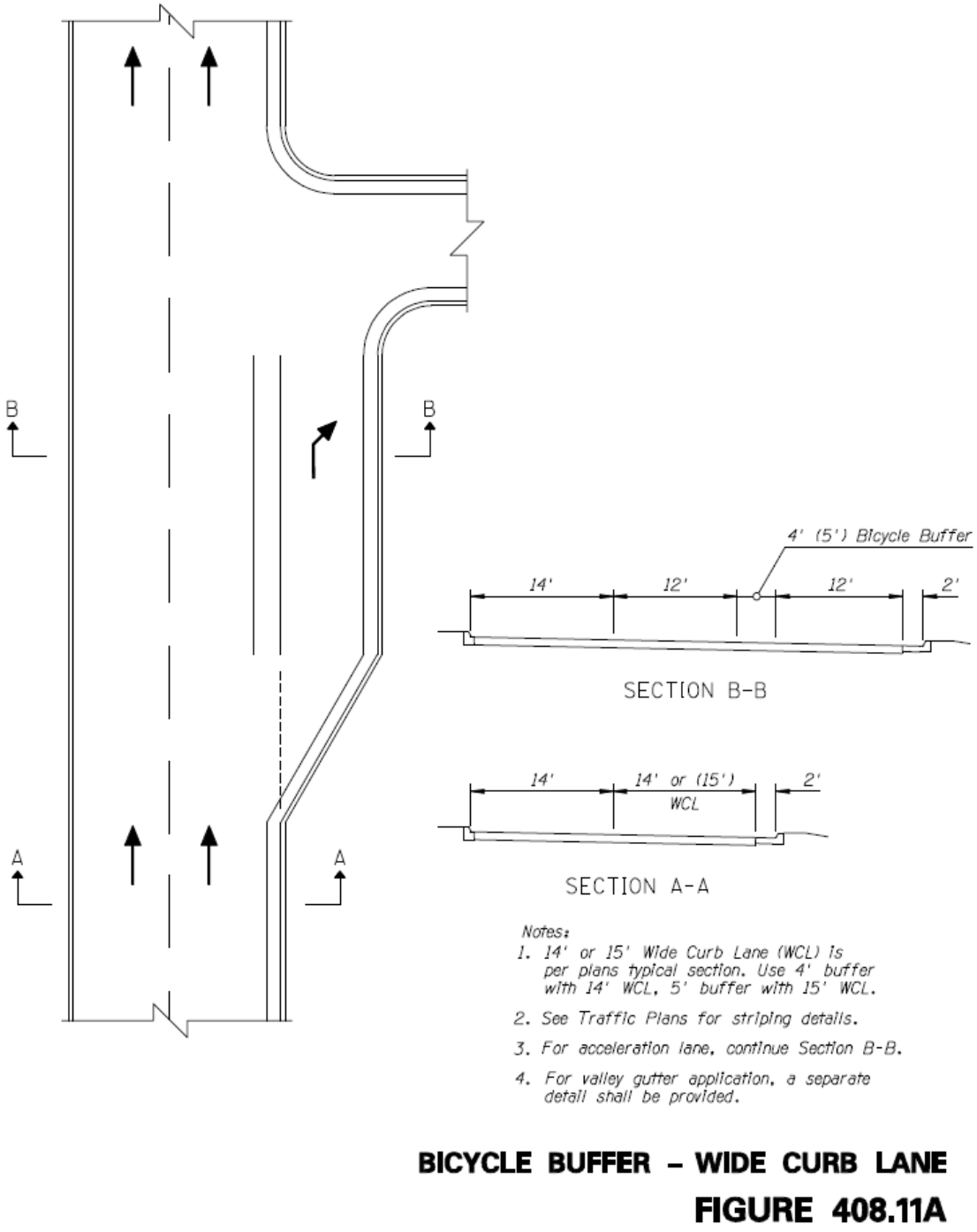
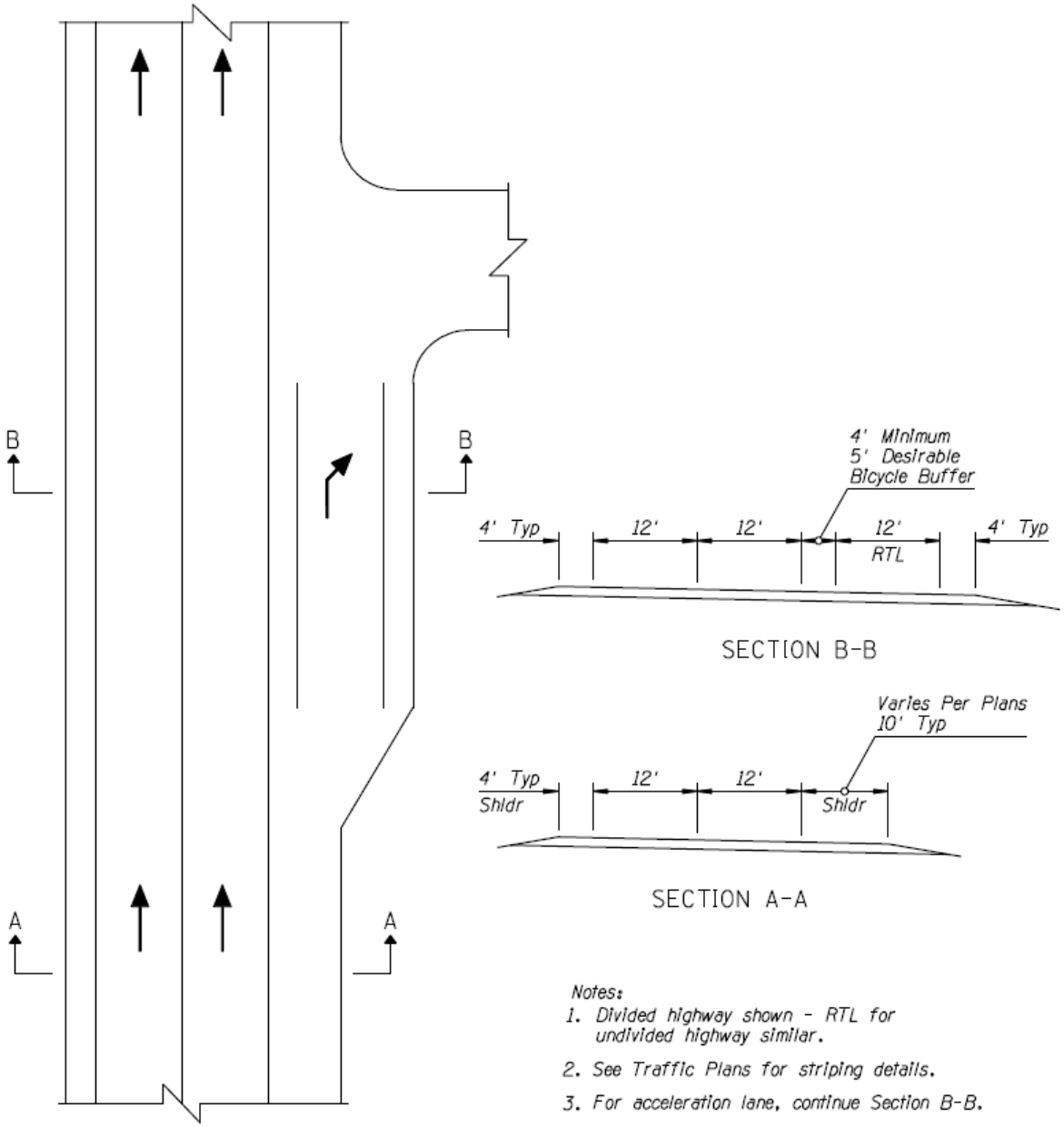


Figure 10 – Bicycle Buffer, ADOT Roadway Design Guidelines, Figure 408.11B



BICYCLE BUFFER – NON-CURB & GUTTER

FIGURE 408.11B

107.2 – Pedestrian Facilities
Pedestrian Grade Separated Crossings

ADOT Roadway Design Guidelines Section 107.2 states that to warrant construction of a pedestrian grade structure, six of the following criteria must be satisfied:

- High vehicular volumes conflict with high pedestrian volumes, constituting an extreme hazard;
- Modification of school routes, busing policies, campus procedures, or attendance boundaries to eliminate the need for a crossing is not feasible;
- Physical conditions make a grade separation structure feasible from an engineering standpoint, including pedestrian channelization to insure usage of the structure;
- Pedestrian movements can be restricted for at least 600 ft on each side of the proposed overpass;
- A demonstrated problem exists that simpler, more economic solutions have failed to remedy; and
- The anticipated benefits to be derived from the overpass clearly outweigh the costs.

It is recommended that Section 107.2 be modified to state that before grade separation is considered, other lower-cost yet proven strategies should be considered such as median refuge islands, traffic signals, and pedestrian hybrid beacons.

It is recommended that consideration be given to amending Section 107.2 to state that the grade structure must be located where it is intuitive and convenient for pedestrians to access both ends of the structure. As an example, the City of Madison, Wisconsin uses the following criteria when evaluating a grade separated crossing:

- Pedestrian attractors
- Perceived ease of accessibility
- Pedestrian demand
- Pedestrian origin and destination
- Pedestrian volumes
- Motor vehicle volumes
- Nearest alternative “safe” crossing
- Barriers, lighting, topography, etc.

404 – Driveway and Turnout Access
ADOT Roadway Design Guidelines, Section 404 – Driveway and Turnout Access, governs driveway access to state highways. Section 404.1 states that “depressed curb openings are provided for driveways”.

It is recommended that consideration be given to modifying Section 404 to emphasize use of depressed curb openings on state highways with a sidewalk, ensuring that they are designed as a sidewalk with an apron and not as a street intersection.

408.11 – Right-Turn Channelization

The analysis and design of right-turn lanes should consider pedestrian movements as per the ADOT Roadway Design Guidelines, Section 408.11 – Right Turn Channelization. ADOT Section 408.11 – Right Turn Channelization states the following:

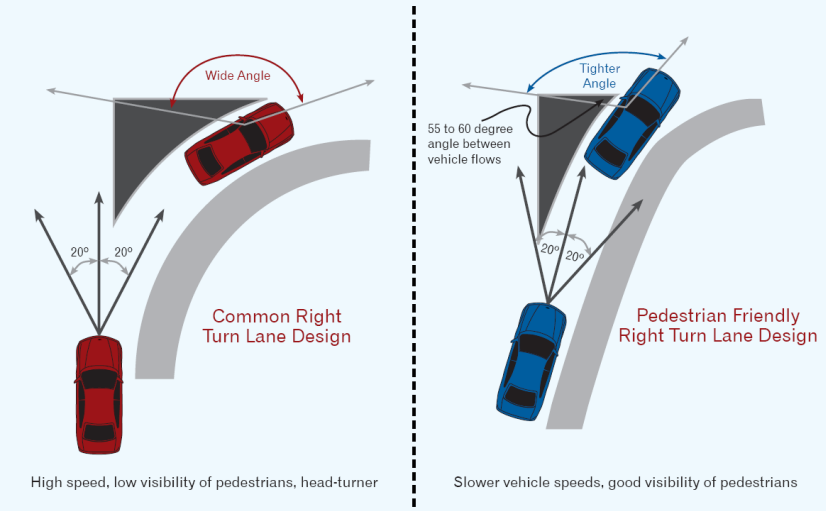
C) Free Right Turns: Free right turns (without signal or sign control) are often used to improve the capacity of an intersection with a heavy right turn demand. The right turn is made "free" by channelizing the turning movement outside of the intersection controls. For free right turns to function properly, vehicles should not turn into a through traffic lane. Rear-end accidents can occur as turning cars slow down or stop while waiting for gaps in the through cross-traffic stream.

If turning traffic must stop, it is better to take the turning movement through a controlled intersection where it is expected to stop, and then turn as cross traffic permits.

Free right turns shall only be provided where the turning movement can be made into an auxiliary or acceleration lane.

It is recommended that ADOT Roadway Design Guidelines be amended to include reference to a free right turn design as illustrated in **Figure 11** in areas where pedestrians are present. A free right turn lane with a tighter approach angle, as illustrated in **Figure 11**, results in slower vehicle approach speeds and improves pedestrian visibility. The design vehicle should not necessarily be the largest vehicle that can be expected to traverse the intersection. Large vehicles should be allowed to encroach into adjacent travel lanes in areas with a high number of pedestrians.

Figure 11 – Improved Free Right Turn Lane Design[50]



[50] Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities, An ITE Proposed Recommended Practice, Institute of Transportation Engineers, 2006; Figure 10.10

Traffic Engineering Policies, Guidelines and Procedures

Modifications to ADOT Traffic Engineering, Policies, Guidelines, and Procedures may be considered to improve the routine accommodation of pedestrians on the State Highway System. Potential modifications are described below.

ADOT Traffic Engineering Policies, Guidelines and Procedures, December 2011, Section 200 – Traffic Studies, Subsection 240 – Traffic Impact Analysis

Access to the State highway system is managed through the encroachment permit process. The permit process requires those desiring access to the State highway system to apply for an encroachment permit. Since access to a State highway for a development may impact traffic on the highway, ADOT requires preparation of a Traffic Impact Analysis "for developments which desire an encroachment permit."

ADOT defines two categories of traffic impact analyses. The category, and level of analysis required, is dependent upon the amount of traffic anticipated to be generated by the development.

It is recommended that ADOT consider modifying traffic impact analysis guidelines to require assessment of bicycle and pedestrian facilities within the analysis. The bicycle and pedestrian assessment would identify accessible, direct, convenient and safe access to the development and buildings, crossing needs of the state highway, and ways that the development can be made pedestrian friendly to encourage more bicycle and pedestrian trips. At a minimum, sidewalks should be required on the abutting highway and at the local cross-street if at an intersection.

ADOT Traffic Engineering Policies, Guidelines and Procedures, December 2011, Section 600 – Traffic Signals, Subsection 621 – Signal Phase Change Intervals

ADOT PGP Subsection 621 includes guidance for yellow and all-red clearance intervals.

It is recommended that ADOT consider modifying ADOT PGP Subsection 621 to allow for a lead pedestrian interval (LPI), as part of the all-red interval, where conflicts exist between turning vehicles and pedestrians.

ADOT Traffic Engineering Policies, Guidelines and Procedures, January 2003, Section 700 – Illumination

ADOT PGP Section 700 states that lighting will be installed by the State only where engineering judgment indicates there are sufficient traffic volumes and/or collisions to satisfy one or more of the conditions set forth where illumination would enhance highway safety.

It is recommended that illumination be provided routinely, like sidewalks, where pedestrian demand is present.

ADOT Traffic Engineering Policies, Guidelines and Procedures, December 2011, Section 900 – Pedestrians, Subsection 910 – Pedestrian Crosswalks

Subsection 910 states that by legal definition, there are three or more crosswalks at every intersection whether marked or unmarked. The policy states that a marked crosswalk

should be installed at an intersection where an unmarked crosswalk would not be clearly discernible due to peculiar geometrics or other physical characteristics.

It is recommended that ADOT consider modifying Section 910 to state explicitly that marked crosswalks should be provided at all signalized intersections.

Subsection 910 states that a marked, mid-block crosswalk may only be provided if the following conditions are met:

A. The length of the block between intersections shall be at least 1000 feet;

B. There shall be a high pedestrian volume generator nearby; and

C. There shall be a reasonable demand by the pedestrians to cross within a concentrated area at least 400 feet from the nearest intersection.

The dimensions listed in subsection 910 are oriented towards suburban locations; block lengths are usually much shorter in urban locations and often shorter in downtown areas in small-town rural locations.

It is recommended that ADOT consider allowing a context-sensitive review of crosswalk warrants. This is particularly applicable in communities where the state highway serves as "Main Street." As communities desire to make their downtown areas more pedestrian-friendly, shorter spacing between crosswalks may be desirable.

The FHWA report entitled Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations[51] includes guidelines that may be considered for incorporation into ADOT PGP 910.

It is recommended that ADOT consider updating publications to reflect the findings for FHWA-RD-01-142, including the ADOT publication "Pedestrian Crosswalks – How Safe Are They?"

The report emphasizes that when considering marked crosswalks at uncontrolled locations, the question should not simply be "should I provide a marked crosswalk or not?" The report continues, "Regardless of whether marked crosswalks are used, **there remains the fundamental obligation to get pedestrians safely across the street** (emphasis added). In most cases, marked crosswalks are best used in combination with other treatments (e.g., curb extensions, raised crossing islands, traffic signals, roadway narrowing, enhanced overhead lighting, traffic calming measures). In all cases, the final design must accomplish the goal of getting pedestrians across the road safely. The design question is, "How can this task best be accomplished?"

[51] Zegeer, C., J. Stewart, and H. Huang, Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations, Report No. FHWA-RD-01-142, FHWA, Washington, DC, May 2001

Recommended Guidelines from Report No. FHWA-RD-01-142

Marked pedestrian crosswalks may be used to delineate preferred pedestrian paths across roadways under the following conditions:

1. At locations with stop signs or traffic signals. Vehicular traffic might block pedestrian traffic when stopping for a stop sign or red light; marking crosswalks may help to reduce this occurrence.
2. At non-signalized street crossing locations in designated school zones. Use of adult crossing guards, school signs and markings, and/or traffic signals with pedestrian signals (when warranted) should be used in conjunction with the marked crosswalk, as needed (ADOT PGP 920 identifies warrant criteria for crosswalks in school areas).
3. At non-signalized locations where engineering judgment dictates that the number of motor vehicle lanes, pedestrian exposure, average daily traffic (ADT), posted speed limit, and geometry of the location would make the use of specially designated crosswalks desirable for traffic/pedestrian safety and mobility. This must consider the conditions listed below.

Marked crosswalks alone are insufficient (i.e., without traffic-calming treatments, traffic signals and pedestrian signals when warranted, or other substantial crossing improvement) and should not be used under the following conditions, and as described in **Figure 12**.

- Where the speed limit exceeds 40 mph.
- On a roadway with four or more lanes without a raised median or crossing island that has (or will soon have) an ADT of 12,000 or greater.
- On a roadway with four or more lanes with a raised median or crossing island that has (or will soon have) an ADT of 15,000 or greater.

Street crossing locations should be routinely reviewed to consider the following available options:

- Option 1 – No special provisions needed.
- Option 2 – Provide a marked crosswalk alone.
- Option 3 – Install other crossing improvements (with or without a marked crosswalk) to reduce vehicle speeds, shorten crossing distances, and increase the likelihood of motorists stopping and yielding.

Other Factors

Distance of Marked Crosswalks from Signalized Intersections: Marked midblock crosswalks should not be installed in close proximity to traffic signals, since pedestrians should be encouraged to cross at the signal in most situations. The minimum distance from a signal for installing a marked midblock crosswalk should be determined by local traffic engineers based on pedestrian crossing demand, type of roadway, traffic volume, and other factors. The objective of adding a marked crosswalk is to channel pedestrians to safer crossing

points. It should be understood, however, that pedestrian crossing behavior may be difficult to control merely by the addition of marked crosswalks. The new marked crosswalk should not unduly restrict platooned traffic, and should be consistent with marked crosswalks at other unsignalized locations in the area.

Other Treatments: In addition to installing marked crosswalks (or, in some cases, instead of installing marked crosswalks), there are other treatments that should be considered to provide safer and easier crossings for pedestrians at problem locations. Examples of these pedestrian improvements include:

- Providing raised medians (or raised crossing islands) on multi-lane roads.
- Installing traffic signals and pedestrian signals where warranted, and where serious pedestrian crossing problems exist (Note that ADOT is in the process of developing warrant criteria for Pedestrian Hybrid Beacons).[52]
- Reducing the exposure distance for pedestrians by:
- Providing curb extensions.
- Providing pedestrian islands.
- Reducing four-lane undivided road sections to two through lanes with a left-turn bay (or a two-way left-turn lane), sidewalks, and bicycle lanes.
- When marked crosswalks are used on uncontrolled multi-lane roads, consideration should be given to installing advance stop lines as much as 30 ft prior to the crosswalk (with a STOP HERE FOR CROSSWALK sign) in each direction to reduce the likelihood of a multiple-threat pedestrian collision.
- Bus stops should be located on the far side of uncontrolled marked crosswalks.

[52] ADOT Pedestrian Hybrid Beacon (PHB) Evaluation Guidelines, http://www.azdot.gov/Highways/Traffic/standards/PGP/draftPHBguide.pdf

Figure 12 – Marked Crosswalks at Uncontrolled Locations[53]

Roadway Type (Number of Travel Lanes and Median Type)	Vehicle ADT ≤ 9,000			Vehicle ADT > 9,000 to 12.000			Vehicle ADT > 12,000 to 15,000			Vehicle ADT > 15,000		
	Speed Limit**											
	≤ 30 mi/h	35 mi/h	40 mi/h	≤ 30 mi/h	35 mi/h	40 mi/h	≤ 30 mi/h	35 mi/h	40 mi/h	≤ 30 mi/h	35 mi/h	40 mi/h
2 Lanes	C	C	P	C	C	P	C	C	N	C	P	N
3 Lanes	C	C	O	C	P	P	P	P	N	P	N	N
Multi-Lane (4 or More Lanes With Raised Median ***	C	C	P	C	P	N	P	P	N	N	N	N
Multi-Lane (4 or More Lanes) Without Raised Median	C	P	N	P	P	N	N	N	N	N	N	N

* These guidelines include intersection and midblock locations with no traffic signals or stop signs on the approach to the crossing. They do not apply to school crossings. A two-way center turn lane is not considered a median. Crosswalks should not be installed at locations that could present an increased safety risk to pedestrians, such as where there is poor sight distance, complex or confusing designs a substantial volume of heavy trucks, or other dangers, without first providing adequate design features and/or traffic control devices. Adding crosswalks alone will not make crossings safer, nor will they necessarily result in more vehicles stopping for pedestrians. Whether or not marked crosswalks are installed, it is important to consider other pedestrian facility enhancements (e.g. raised median, traffic signal, roadway narrowing, enhanced overhead lighting, traffic-calming measures, curb-extensions), as needed, to improve safety of the crossing. There are general recommendations; good engineering judgment should be used in individual cases for deciding where to install crosswalks.

** Where the speed limit exceeds 40 mi/h, marked crosswalks alone should not be used at unsignalized intersections.

C = Candidate for marked crosswalks. Marked crosswalks must be installed carefully and selectively. Before installing new marked crosswalks, an engineering study is needed to determine whether the location is suitable for a marked crosswalk. For an engineering study, a site review may be sufficient at some locations, while a more in-depth study of pedestrian volume, vehicle speed, sight distance, vehicle mix, etc. may be needed at other sites. It is recommended that a minimum of 20 pedestrian crossings per peak hour (or 15 or more elderly and/or child pedestrians) exist at a location before placing a high priority on the installation of a marked crosswalk alone.

P = Possible increase in pedestrian crash risk may occur if crosswalks are added without other pedestrian facility enhancements. These locations should be closely monitored and enhanced with other pedestrian crossing improvements, if necessary, before adding a marked crosswalk.

N = Marked crosswalks alone are insufficient, since pedestrian crash risk may be increased due to providing marked crosswalks alone. Consider using other treatments, such as traffic-calming treatments, traffic signals with pedestrian signals where warranted, or other substantial crossing improvement to improve crossing safety for pedestrians.

***** The raised median or crossing island must be at least 4 ft wide and 6 ft long to serve adequately as a refuge for pedestrians in accordance with the MUTCD and AASHTO guidelines.**

[53] Zegeer, C., J. Stewart, and H. Huang, Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations, Report No. FHWA-RD-01-142, FHWA, Washington, DC, May 2001

Appendix D – Potential Modifications to Arizona Crash Report Form

Table 18 – Potential Modifications to Arizona Crash Report Form

Arizona Crash Report Data Item	Data Description	Discussion	Recommendation for Arizona Crash Report
4dd	Safety Devices	The current definition in the Crash Report form states that "helmet used…is not used for non-motorists such as bicycle and other pedal cycle riders and vehicle occupants other than motorized cycles." The Model Minimum Uniform Crash Criteria, Third Edition (2008) (MMUCC) recommends including a non-motorist Safety Equipment (e.g., helmets, lighting, etc.) data field to evaluate the effectiveness of non-motorist safety equipment, and to calculate usage statistics to inform development and evaluation of educational countermeasures.	• Include a new data item representing non-motorized safety equipment (helmet, lighting, reflective clothing, etc.) • Alternatively, a pedal cycle / bicycle supplement could be developed similar to supplements for fatal crash, truck/bus, and occupants (10 or more)
-	Presence/Type of Bicycle Facility	This data is currently not collected in the Arizona Crash Report Form. This data item is recommended in the MMUCC, which states that this data is needed to: • Determine usage and safety of bicycle facilities.	Add data field for presence/type of bicycle facility. MMUCC defines this data item as: Any road, path, or way which is specifically designated as being open to bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.
-	Presence/Type of Bicycle Facility (continued)	• Determine the location of bicycle crashes in relation to a bicycle facility. This data is important for ascertaining the relative safety performance of various types/classes of bike paths to guide future design/operation decisions (MMUCC)	Subfields include: 1) Facility: None, Wide Curb Lane, Marked Bicycle Lane, Unmarked Paved Shoulder, Separate Bicycle Path/Trail, Unknown 2) Signed Bicycle Route: Yes, No, Unknown, Not Applicable

Table 18 – Potential Modifications to Arizona Crash Report Form (continued)

Arizona Crash Report Data Item	Data Description	Discussion	Recommendation for Arizona Crash Report
-	Widths of Lane(s) and Shoulder(s)	This data is currently not collected in the Arizona Crash Report Form. This data item is recommended in the MMUCC, which states that it is important to monitor the association of lane/shoulder widths and the frequency of crashes.	Add data field for widths of the lane(s) and shoulder(s). MMUCC defines this data item as: Widths (in feet) of the lane(s) and of the shoulder(s) where crash occurred. Data attributes would include the width of the lane(s) and of the shoulder(s) at the location of the crash. Suggested data fields are: • Lane Width • Right Shoulder Width • Left Shoulder Width
-	Adjacent development type	Functional class of the roadway is recommended in the MMUCC, to be added through linking of the crash data with the roadway inventory data. The MMUCC states that "knowledge of land use is needed in analyzing crashes as part of a network analysis."	Add data field to describe adjacent land uses. Suggested data fields are: residential, commercial, industrial, retail, recreational, mixed use, other, unknown.
-	Mainline number of lanes at intersection	This data item is recommended in the MMUCC to provide an accurate description of the intersection, and to identify associations of crashes with roadway/intersection width.	The MMUCC defines this data field as: Number of through lanes on the mainline approaches of an intersection, including all lanes with through movement (through and left-turn, or through and right-turn) but not exclusive turn lanes.

Appendix E – Potential Modifications to Arizona Driver's License Manual

Table 19 – Potential Modifications to Arizona Driver's License Manual

MVD License Manual (March 2012)	Current Text	Suggested Revision or Enhancement
Page 25 – Positioning Vehicle-Cushion of Space Around Your Vehicle	When sharing a lane with a bicycle, allow at least 3 feet for clearance between you and the bicycle. Moderate your speed. At high speeds, your vehicle may cause a gust of wind that could knock the bicyclist to the ground. Be alert for the bicycle swerving.	Add illustration of 3-foot clearance to emphasize.
Page 28 – Roundabouts	Always yield to pedestrians and bicyclists that are crossing the road. Bicyclists – Be aware of traffic rules or walk your bike and use the crosswalks.	Add depictions of cars yielding for bicyclists and pedestrians in the roundabout.
Page 44 – Right Turns-Right on red	Always yield the right-of-way to pedestrians, bicyclists and of course, oncoming traffic. Unless signs direct you otherwise, turn into the right lane of the road you enter.	Provide an illustration showing potential conflicts regarding bicyclists.
Page 46 – Sharing the Road with a Bike	Bicyclists must obey the same traffic laws as drivers of vehicles, and they have the right-of-way under the same conditions as motorists. Motorists should be alert for bicyclists along the roadway because cyclists are often difficult to see. Extra caution is necessary. Motorists are required to allow a minimum safe distance of 3 feet when passing a bicycle traveling in the same direction. At night, you should dim your headlights for bicyclists. Drivers should be prepared for a bicyclist swerving. Although bicyclists must ride with the flow of traffic and stay near the right side of the road, they can legally move left for several reasons, such as: • Turning left. • Avoiding hazards. • Passing pedestrians or vehicles. • If the lane in which the person is operating a bicycle is too narrow for a bicycle and motor vehicle to travel safely side-by-side.	Add a graphic depicting the 3-foot rule to emphasize it. Highlight the 3-foot rule in text, and place it in a separate paragraph. Add text to fourth bullet to read: • If the lane in which the person is operating a bicycle is too narrow for a bicycle and motor vehicle to travel safely side-by-side. In this case, the bicyclist may use as much of the lane as needed to discourage unsafe passing.

Table 19 – Potential Modifications to Arizona Driver's License Manual (continued)

MVD License Manual (March 2012)	Current Text	Suggested Revision or Enhancement
Page 46 – Sharing the Road with a Bike (continued)	Important rules for bicyclists: • Do not carry more persons than the design of the bicycle permits. • Do not ride more than two side-by side. • Ride as near to the right side of the road as possible. • Use proper hand signals. • Do not bicycle under the influence of drugs or alcohol — it is illegal. • When riding at night, have a white head lamp visible from 500 feet, and a rear reflector.	• ~~Ride as near to the right side of the road as possible~~ Ride on the right side of the roadway in the same direction as other traffic. (Note: This is a much more important safety message and directly addresses the #1 safety risk - wrong-way bicycling. This also avoids having to list the exceptions noted above, which would be needed if the text refers to "as far to the right as practical" [NEVER "as far as possible"]) For more information and tips on bicycling on Arizona roads and streets, see "Arizona Bicycling Street Smarts", at http://www.azbikeped.org/azbss.htm
Page 65 –Test Questions	11. What are the rights of a person riding a bicycle in the street?	Add questions – Question: When passing a bicycle traveling in the same direction, what is the minimum legal passing distance between the motorist and the bicyclist? Answer: not less than 3 feet Question: Although bicyclists must ride with the flow of traffic and as close as practicable to the right-hand curb or edge of the roadway, in which situations can they legally move left? Answers: a. When turning left b. To avoid a hazard c. If the lane in which the person is operating a bicycle is too narrow for a bicycle and a vehicle to travel safety side by side within the lane. d. All of the above. Question: Is it legal for a pedestrian to cross the street at an intersection that doesn't have a marked crosswalk?" Answer: Yes Question: Is it legal for a bicyclist to make a left turn from a left turn lane?" Answer: Yes. Question: Is it legal for a bicyclist to ride in the center of a regular traffic lane? a. always b. sometimes c. never Answer: b.

Appendix F – State Highway Segments where Sidewalks may be Needed

Table 20 – State Highway Segments Sidewalks Opportunities

Number	Area	State Highway	Street Face	From	To	Sidewalk Need	Comments
1	Tucson	Irvington Rd.	North	I 19 NB exit/entrance ramp intersection	I 19 SB exit/entrance ramp intersection	Moderate	
2	Phoenix	US 60 X	Dis-continuous on both sides	Southside: 77th Street to SR 202L, SR 202L to 104th Street, Signal Butte to Meridian Road North Side: West of Meridian Road to Signal Butte Road, west of Signal Butte to Ellsworth Road, west of SR 202L to east of Sossaman Road		High	Contains some short segments of sidewalk.
3	Tucson	SR 86	Both Sides	Camino Verde	Kinney Rd.	Moderate	
4	Tucson	SR 77	Both Sides	River Rd.	Ternero St.	Highest	
5	Tucson	SR 77	Both Sides	Ternero St.	Magee Rd.	High	
6	Tucson	SR 77	Both Sides	Magee Rd.	Tangerine Road	High	Town of Oro Valley input is that sidewalks are particularly needed from Pusch View Lane north to Tangerine Road. Sidewalks currently existing from Pusch View Lane to 400 feet south of La Reserve Drive.
7	Tucson	SR 77	Both Sides	Golder Ranch Dr.	Edwin Rd.	Moderate	
8	Tucson	Ina Rd.	Both Sides	SB Frontage Rd.	NB Frontage Rd.	Moderate	
9	Casa Grande	SR 84	Both Sides	Garden Ave.	Thornton Rd.	Moderate	Sidewalks are present in areas along this stretch, but they are disconnected or only on one side of the street.

Table 20 – State Highway Segments Sidewalks Opportunities (continued)

Number	Area	State Highway	Street Face	From	To	Sidewalk Need	Comments
10	Casa Grande	SR 387	Both Sides	Ghost Ranch Rd.	O'Neil Dr.	Moderate	Two commercial developments at the NE and SW corners of McCartney Rd. provide sidewalks within this segment.
11	Florence	SR 287	Both Sides	916 ft. west of Campbell Ave.	Intersection with SR 79 Business	Moderate	
12	Florence	SR 79	Both Sides	Florence Heights Dr.	Ranch View Rd.	Moderate	
13	Morenci	US 191	Both Sides	Eagle Creek Rd.	0.55 miles north of Mountain Ave.	Moderate	Serves Morenci and the Tailings Water Reclamation Reservoir.
14	Globe	US 60	Both Sides	0.2 miles SW of Vukanovich Dr.	0.8 miles south of Fairgrounds Rd.	Moderate	
15	Gold Canyon	US 60	Both Sides	Kings Ranch Rd.	Mountain View Rd.	Moderate	
16	Apache Junction	SR 88	Both Sides	Idaho Rd.	0.3 mi. S of 1st Water Rd.	Moderate and High	The section with a High PDI score is between Cortez Rd. and Hackamore Rd.
17	Phoenix Area	SR 87	Both Sides	Hunt Highway	685 ft north of Lake Dr.	Moderate	Sidewalks on the west side are consistently present north of Chandler Heights Rd.
18	Phoenix Area	SR 87	West Side	202 Underpass	McDowell Rd.	High and Highest	
19	Phoenix Area	Broadway Rd.	North Side	Crossing over I 10	_	Moderate	
20	Phoenix Area	SR 143	Both Sides	I 10 EB off-ramp	E. University Dr.	Moderate	
21	Phoenix Area	N. 19th Ave.	West Side	NB I 10 on-ramp	McDowell Rd.	Highest and High	

Table 20 – State Highway Segments Sidewalks Opportunities (continued)

Number	Area	State Highway	Street Face	From	To	Sidewalk Need	Comments
22	Phoenix Area	US 60	Southwest Side	I 17 Overpass	Thomas Rd.	High	
23	Phoenix Area	US 60	Both	640 ft south of 37th Ave.	Cotton Crossing	Highest and High	Portions are controlled access, so a path parallel to the highway may be appropriate.
24	Phoenix Area	US 60	Both; N. side after Bell Rd.	Loop 101 intersection	Meeker Blvd.	Highest, High and Moderate	Coordinate with BNSF to provide pedestrian and bicycle crossings of the railroad
25	Phoenix Area	Loop 303	Both	I 10 Underpass	Thomas Rd.	Moderate	Portions of adjacent lands are unimproved but look as if being cleared for development.
26	Phoenix Area	195th Ave.	Both	I 10 Underpass	McDowell Rd.	Moderate	
27	Prescott	SR 89	Both	Hidden Valley Rd.	Copper Basin Rd.	High	Transportation Enhancements (TE) projects are in design
28	Prescott to Dewey-Humboldt	SR 69	Both	0.5 mi. west of SR 89 intersection	0.4 mi. south of Bradshaw Mtn. Rd.	High and Moderate	There is a shared use path along north side of SR 69 through much of Prescott Valley; sidewalk needed on south side
29	Prescott	SR 89	Both	0.8 mi. north of SR 89/SR 60 intersection	E. Gate Rd.	Moderate	
30	Flagstaff	Flagstaff Ranch Rd.	West Side	I 40 intersection	_	Moderate	
31	Flagstaff	US 66	Both	Woody Mtn. Rd.	Woodlands Village Blvd.	Moderate	South side only between Northwestern St. and Railroad Spring Blvd.

Table 20 – State Highway Segments Sidewalks Opportunities (continued)

Number	Area	State Highway	Street Face	From	To	Sidewalk Need	Comments
32	Flagstaff	US 180	Both	Navajo Rd.	Kelly McCoy Rd.	Moderate	
33	Flagstaff	US 180	Both	Country Club Dr.	Test Dr.	High	
34	Sierra Vista	SR 92	Both	Carr Canyon Rd.	Buffalo Soldier Trail	High and Moderate	
35	Sierra Vista	SR 90	Both	Coronado Dr.	Campus Dr.	Highest and Moderate	
36	Sierra Vista	SR 90	Both	Colonia de Salud	Kino Rd.	Moderate	
37	Bisbee	SR 80	Both	Compton Ave.	Tombstone Canyon Rd.	Moderate	
38	Douglas	SR 80	Both	22nd St.	Drive Way	Highest and Moderate	
39	Page	US 89	Both	Industrial Rd.	Dam Access Rd.	Moderate	
40	Page	SR 98	Both	US 89 intersection	Copperhead Rd.	Moderate	
41	Parker	SR 95	Both	21st St.	18th St.	Highest	
42	Parker	SR 95	Northeast Side	18th St.	Arizona Ave.	Highest	

Table 20 – State Highway Segments Sidewalks Opportunities (continued)

Number	Area	State Highway	Street Face	From	To	Sidewalk Need	Comments
43	Parker	SR 95	Both	7th St.	Riverfront Dr.	Highest	A TE project for the west side of SR 95 Spur (California Ave.) from 7th St. (MP 144.16) to Kofa Ave. (MP 144.62), will construct 1,600 linear ft of sidewalk. The sidewalk in the vicinity of Port of Entry (POE) will be constructed along the west side of the POE between 3rd St .and 4th St.
44	Lake Havasu	SR 95	South Side	Acoma Blvd.	Fremont Ln.	Moderate	
45	Lake Havasu	SR 95	Both	Fremont Ln.	Mulberry Ave.	Moderate	
46	Lake Havasu	SR 95	Southwest Side	Mulberry Ave.	Smokertree Ave.	Moderate	
47	Lake Havasu	SR 95	Northeast Side	Smokertree Ave.	Mesquite Ave.	Low	This segment was included, even though it has a Low PDI score because it will connect other segments on SR 95 in the City that have Moderate PDI scores.
48	Lake Havasu	SR 95	West Side	Mesquite Ave.	Industrial Blvd.	Moderate	
49	Bullhead City	SR 95	Both	Valencia Rd.	Central Ave.	Moderate	
50	Bullhead City	SR 95	Southwest Side	Meadows Dr.	Mohave Dr.	Moderate	
51	Kingman	SR 66	Both	Castle Rock	Gordon Dr.	Moderate	
52	Maricopa	SR 347	Both	0.40 mile north of Cobblestone Farms Dr.	Alterra Pkwy	Low	Some commercial developments have sidewalks in front of their stores, but for the majority of this road, there are no sidewalks on either side of the street.

Table 20 – State Highway Segments Sidewalks Opportunities (continued)

Number	Area	State Highway	Street Face	From	To	Sidewalk Need	Comments
53	Nogales	I-19B	South Side	Potrero Ave.	Morley Ave.	Highest	There is not a sidewalk on the north side of the road; a canal and RR tracks adjacent to the roadway may preclude a sidewalk
54	Nogales	SR 189	Both	Target Range Rd.	0.10 miles west of Frank Reed Rd.	Moderate	
55	Patagonia	SR 82	Southside	-	-	Low	Sidewalks exist on the north side of the road. There are gaps on the south side of the highway. Although this segment was not identified as having a high PDI score, sidewalks should be considered. Trucks often use this route as a shortcut to I-10.
56	Rio Rico	I-19 Crossings	-	-	-	Low	Although this segment was not identified as having a high PDI score, additional pedestrian crossings were identified as a need by public input.

Figure 13 – State Highway Sidewalk Opportunities – Statewide

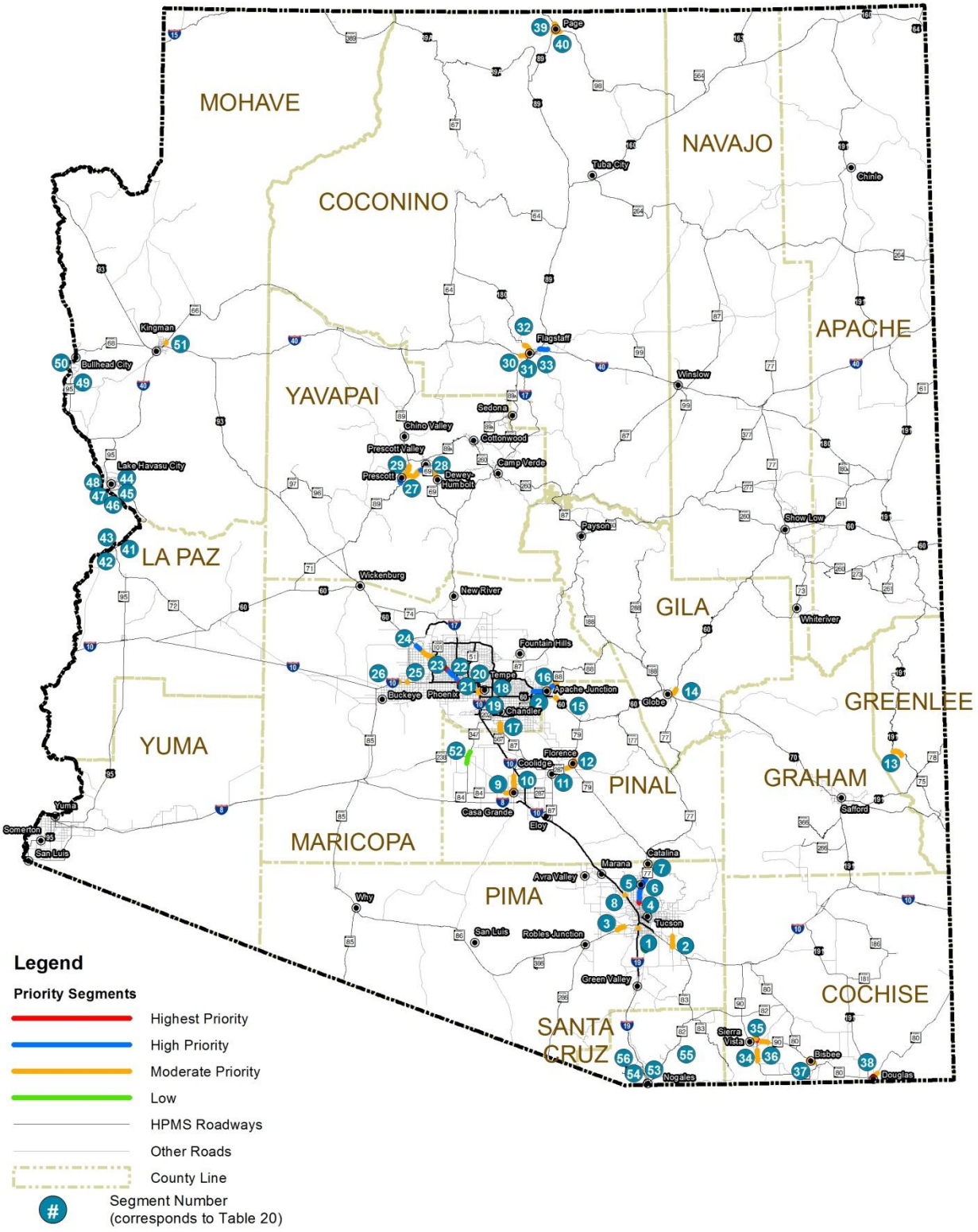


Figure 14 – State Highway Sidewalk Opportunities – Flagstaff, Verde Valley, and Prescott

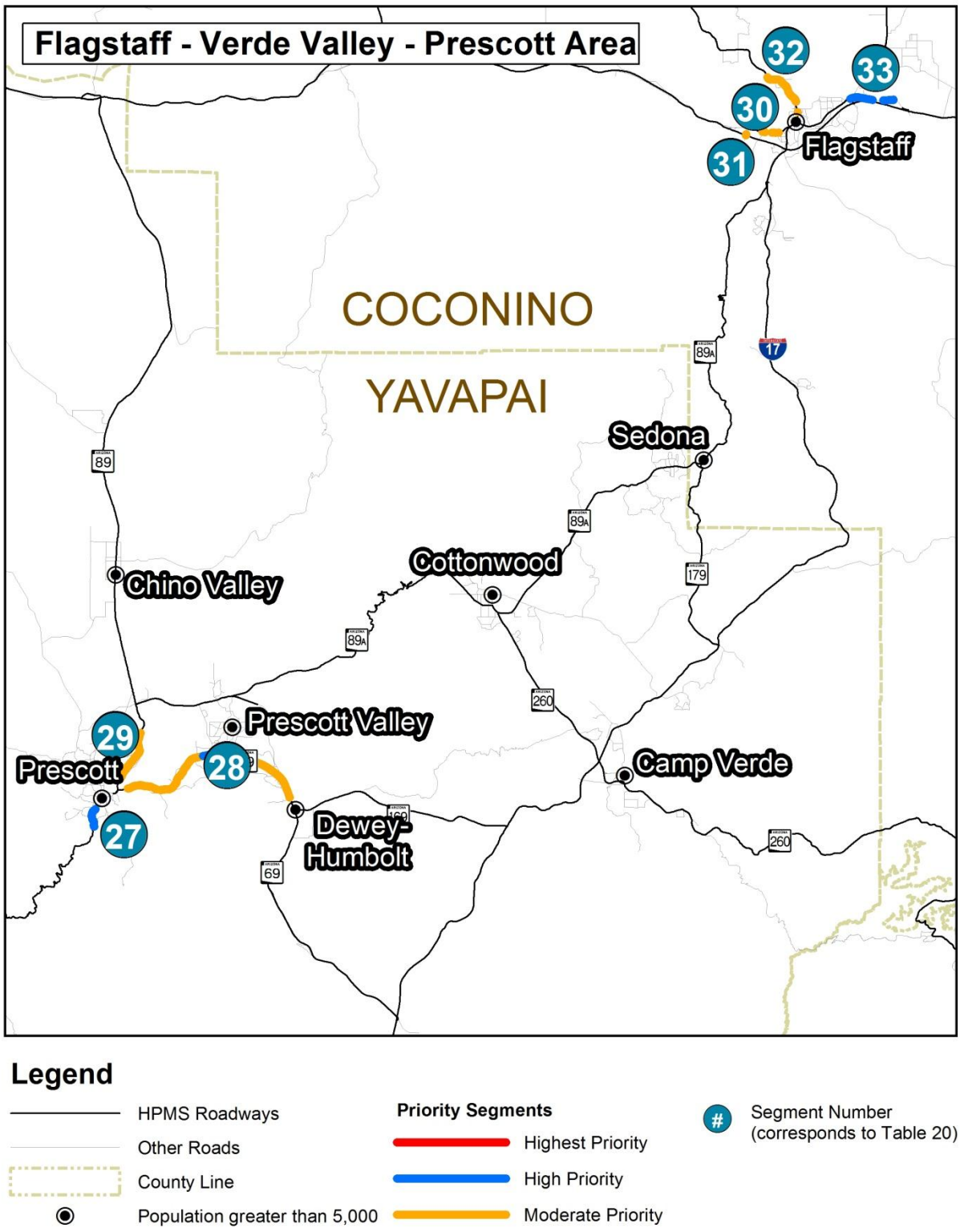


Figure 15 – State Highway Sidewalk Opportunities – Tucson

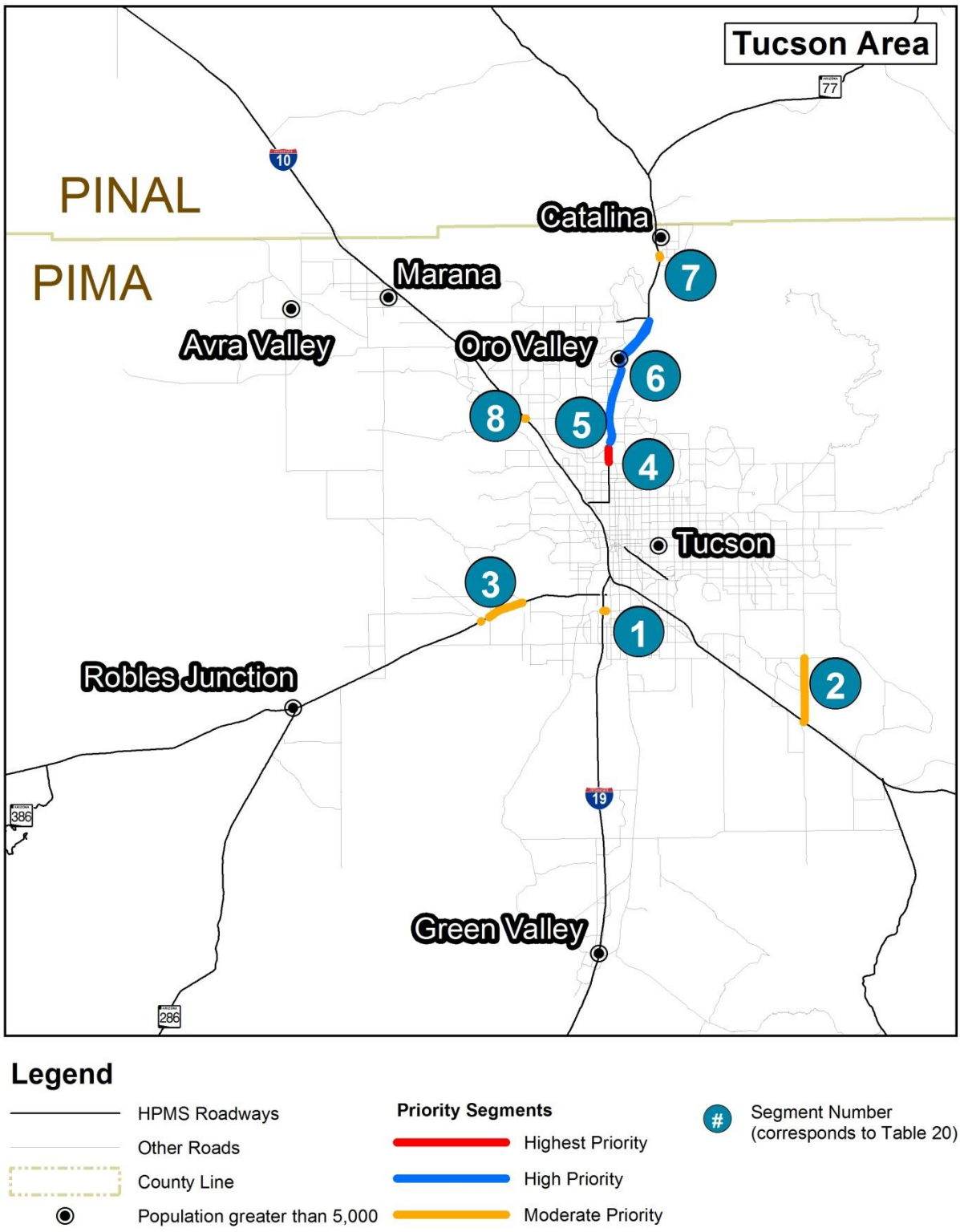


Figure 16 – State Highway Sidewalk Opportunities – Phoenix-Casa Grande

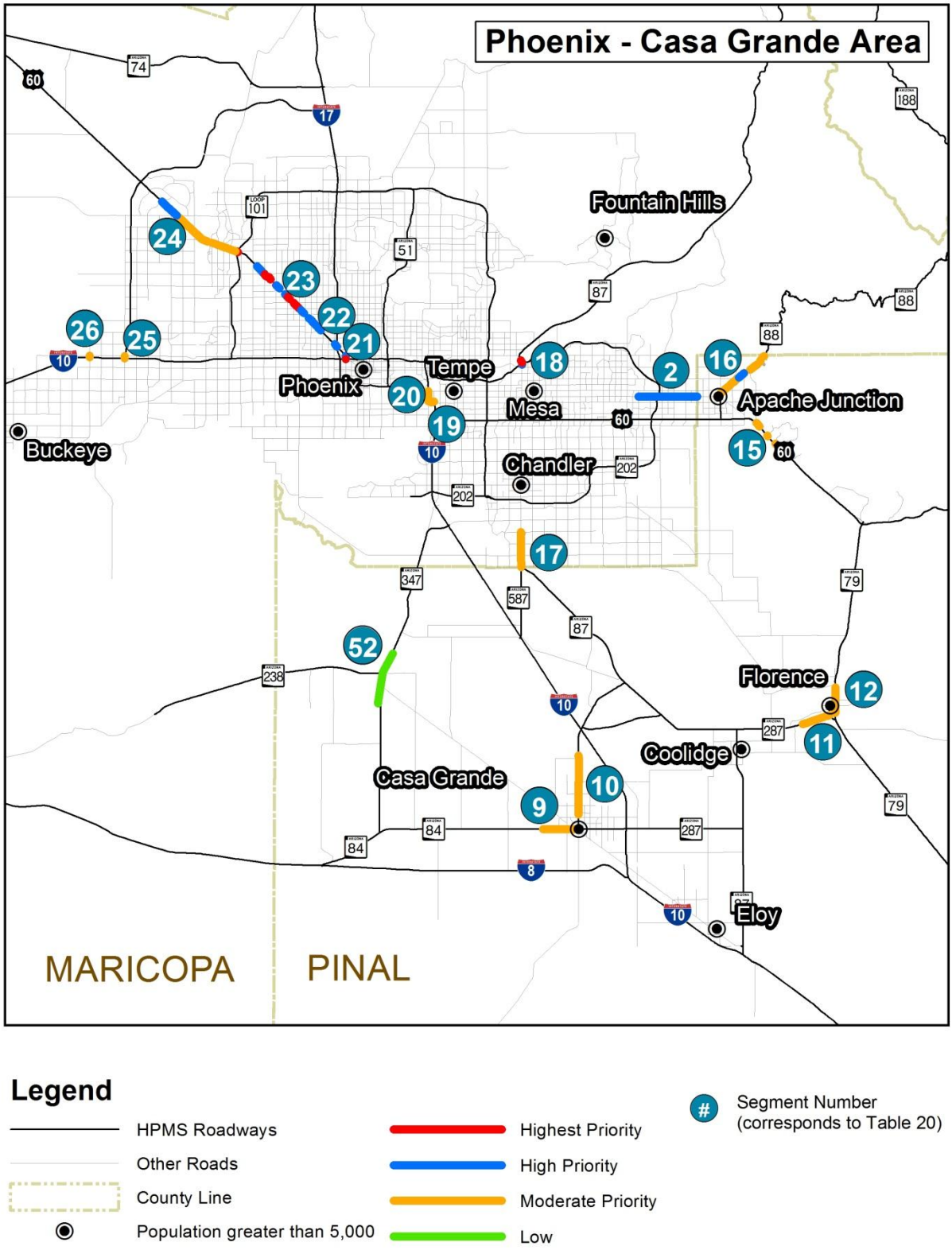


Figure 17 – State Highway Sidewalk Opportunities – Sierra Vista – Douglas

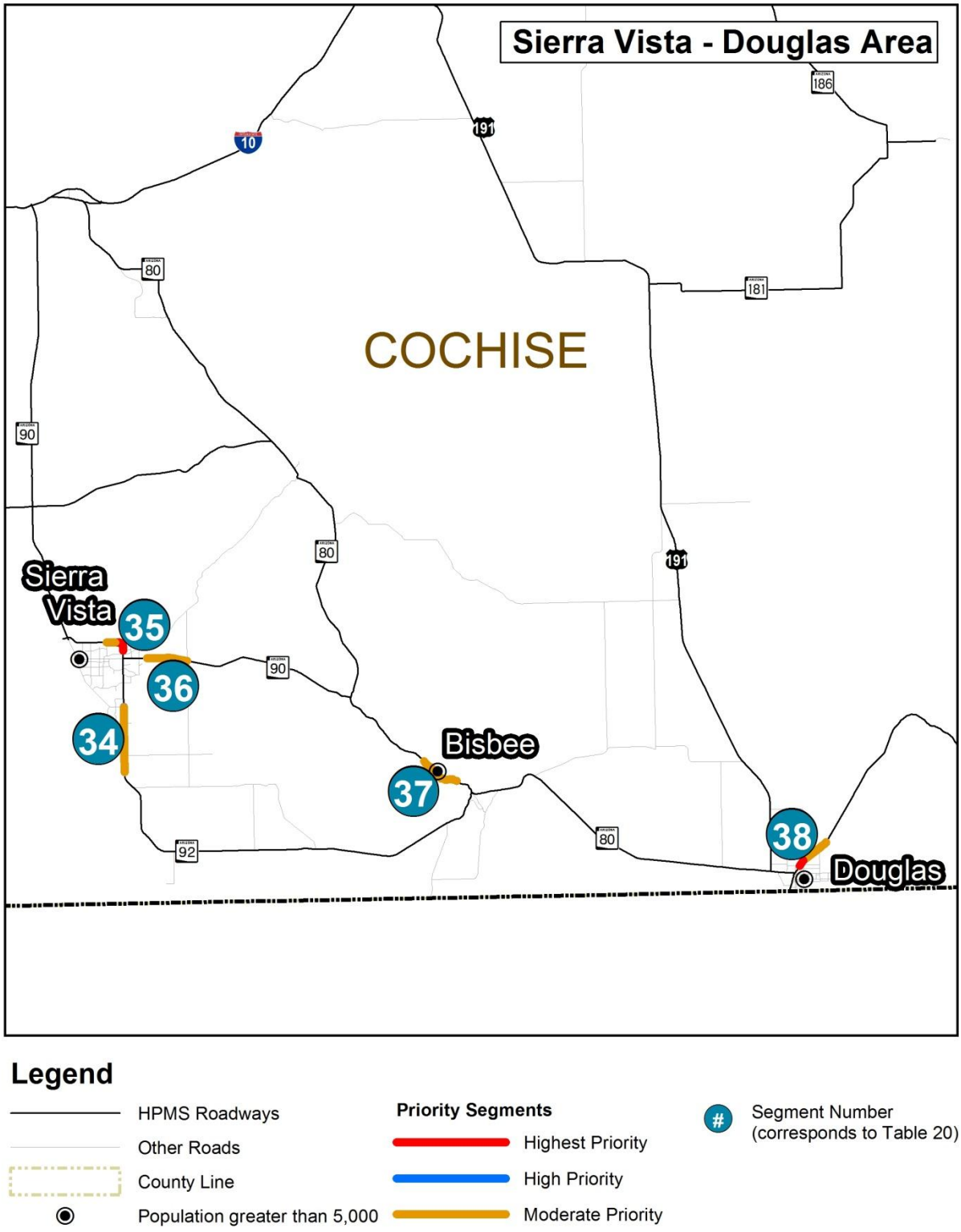


Figure 18 – State Highway Sidewalk Opportunities – Nogales

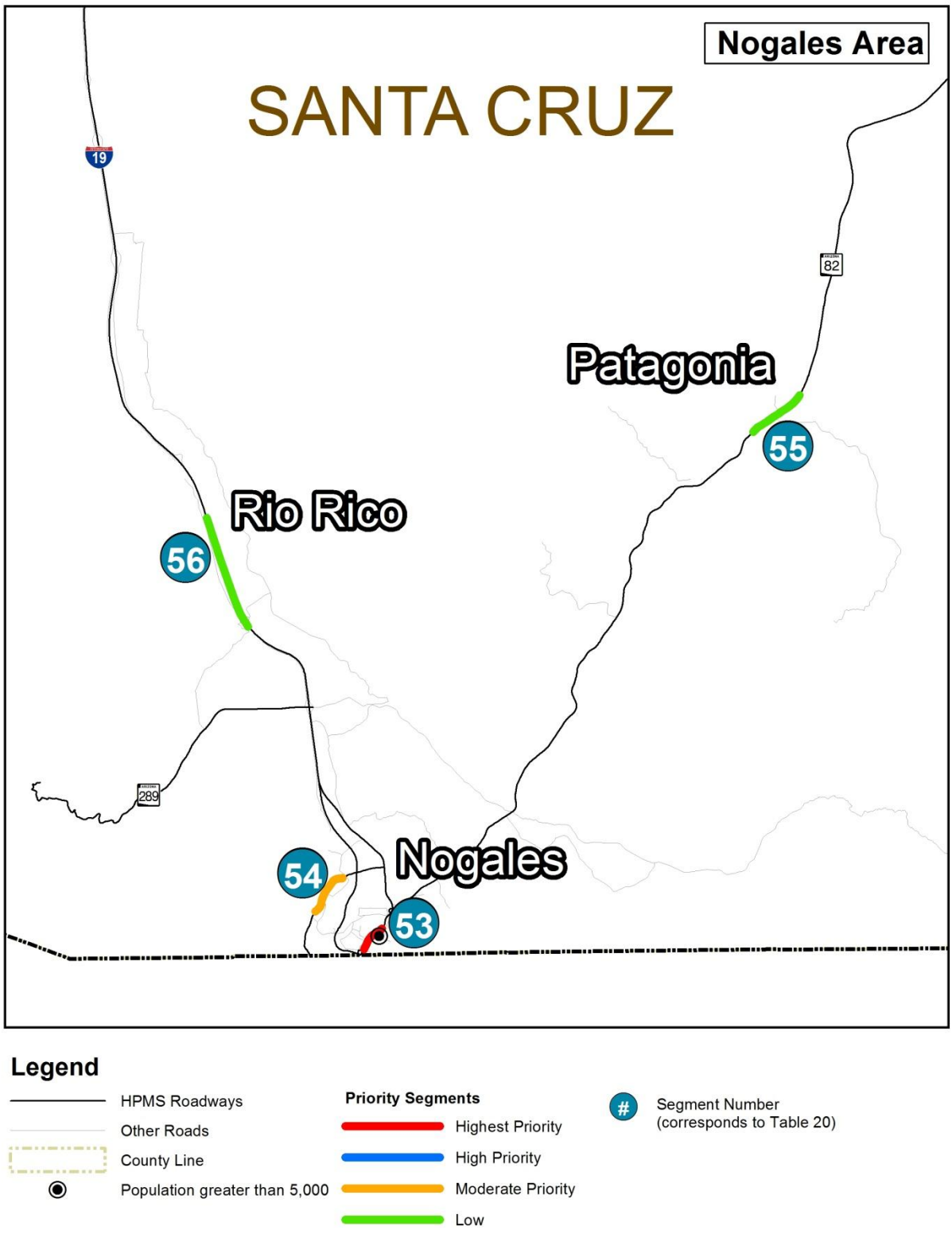


Figure 19 – State Highway Sidewalk Opportunities – Lake Havasu City and Bullhead City

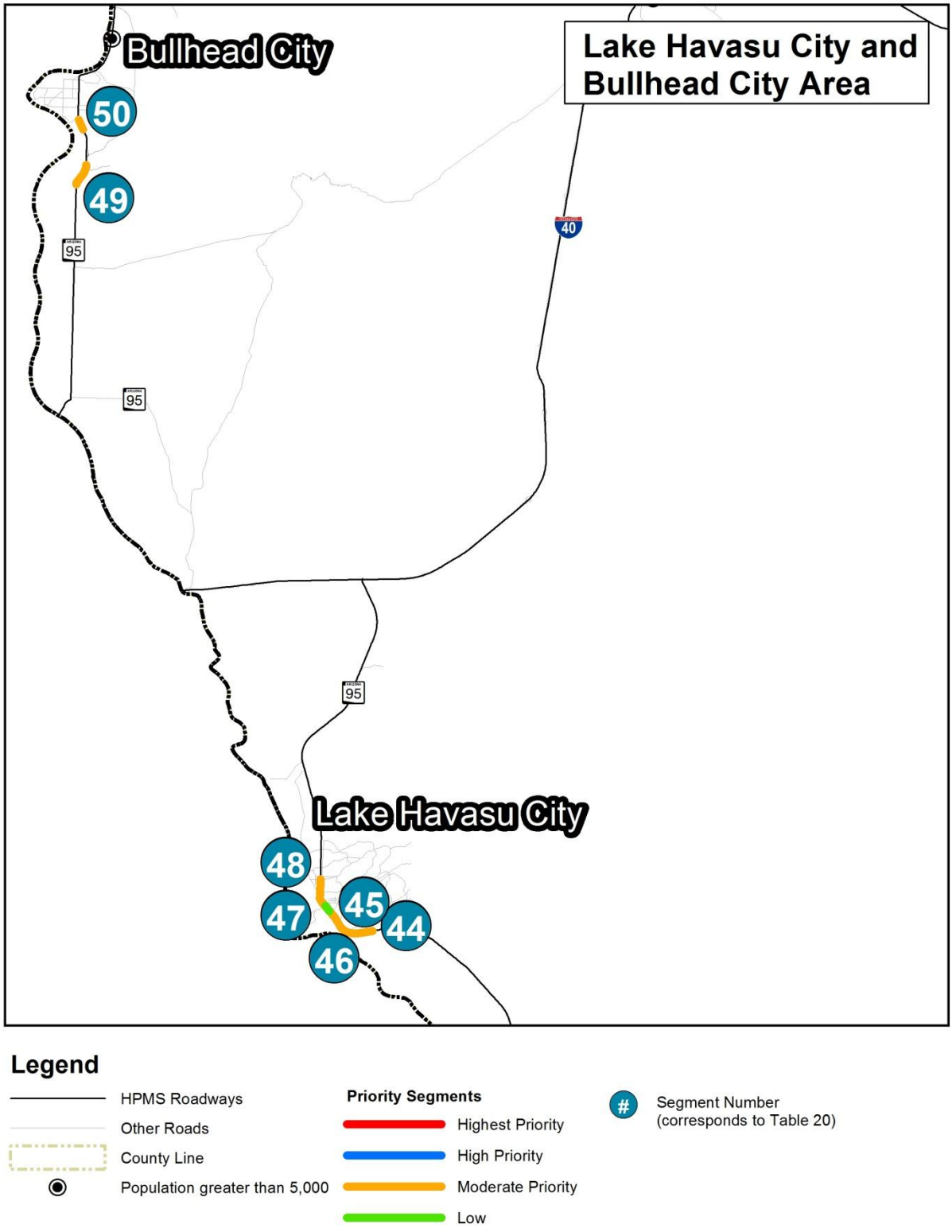
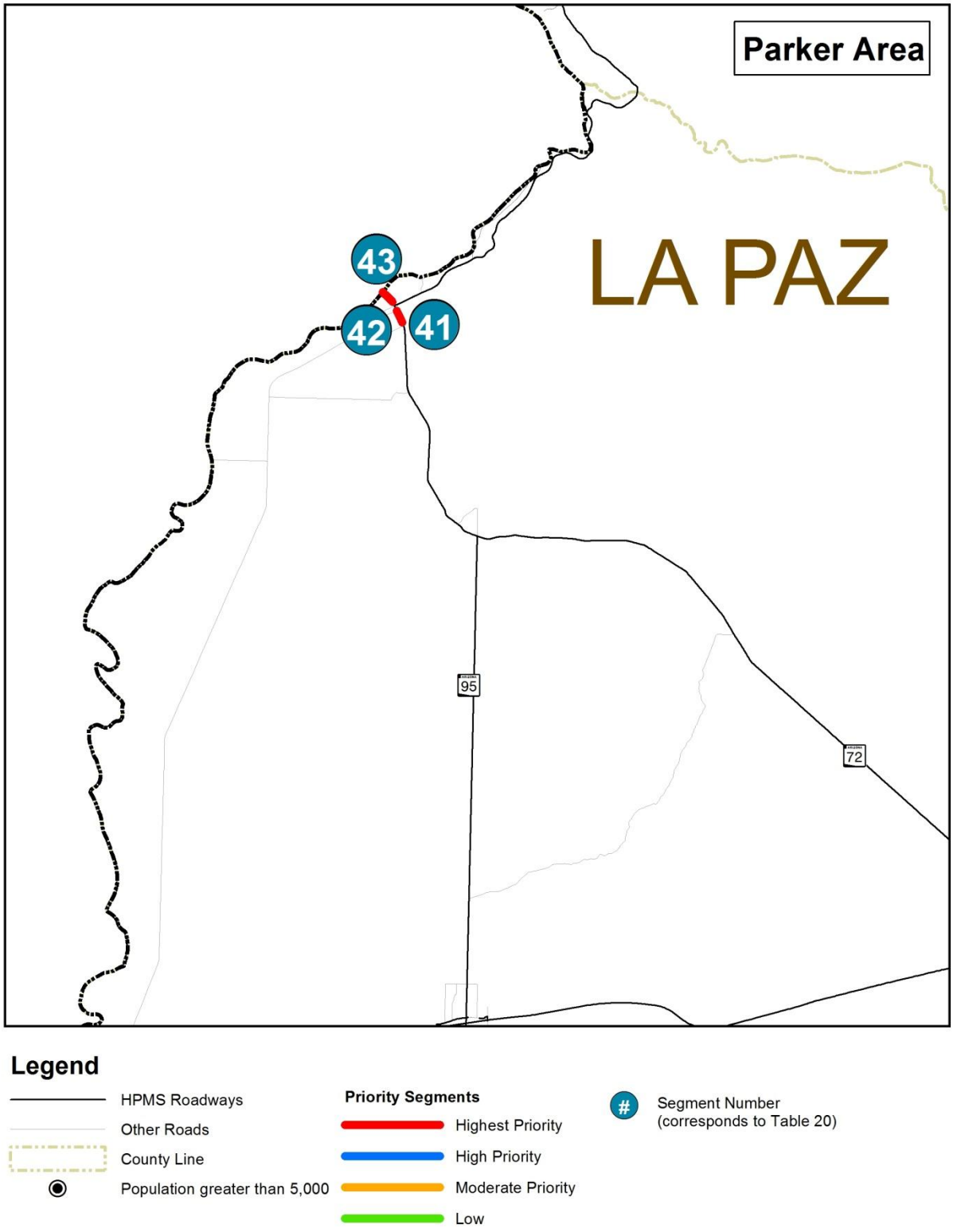


Figure 20 – State Highway Sidewalk Opportunities – Parker



Appendix G – Priority Wide Paved Shoulder Opportunities

Table 21 – Priority Paved Shoulder Opportunities

ID #	Area	State Highway	From	To	Comments
1	Black Canyon City	I 17	Bumble Bee TI	MP 250+0.40	Effective shoulder width is less than 4 feet. Rumble strips present.
2	Wickenburg	US 60	MP 110+0.76	MP 112+0.90	Effective shoulder width is less than 4 feet.
3	Superior to Globe	US 60	MP 227+0.97	MP 240.34	Effective shoulder width is less than 4 feet. Rumble strips present in some areas.
4	Globe	US 60	Main Street	Broad Street	Effective shoulder width is less than 4 feet.
5	Queen Valley to Apache Junction	US 60	Mountain View Rd.	PM 210+0.31	Effective shoulder width is less than 4 feet. Rumble strips present.
6	Show Low to Springerville	US 60	SR 77 TI	MP 374+0.60	Effective shoulder width is less than 4 feet. Rumble strips present in some areas.
7	Show Low to Springerville	US 60	MP 369+0.30	MP 382+0.60	Effective shoulder width is less than 4 feet. Rumble strips present.
8	Williams to Grand Canyon National Park	SR 64	MP 185+0.84	MP 269+0.05	Effective shoulder width is less than 4 feet. Rumble strips present in some areas.
9	Prescott to Prescott Valley	SR 69	MP 296+0.04	MP 294+0.61	Effective shoulder width is less than 4 feet.
10	Prescott to Prescott Valley	SR 69	Glassford Hill Rd.	Fain Rd.	Effective shoulder width is less than 4 feet.
11	Salome to SR 95 TI	SR 72	SR 95	US 60	Effective shoulder width is less than 4 feet.
12	US 60 TI to Canyon Day	SR 73	Gila/Navajo CB	MP 331+0.45	Effective shoulder width is less than 4 feet.
13	Catalina	SR 77	Golder Ranch Rd.	MP 087+0.46	Effective shoulder width is less than 4 feet.

Table 21 – Priority Paved Shoulder Opportunities (continued)

ID #	Area	State Highway	From	To	Comments
14	Tucson	SR 77	Roger Rd.	River Rd.	Effective shoulder width is less than 4 feet.
15	Oracle to Mammoth	SR 77	Old Hwy 77	Mammoth TB	Effective shoulder width is less than 4 feet.
16	Winkelman	SR 77	Winkelman TB	MP 145+0.29	Effective shoulder width is less than 4 feet. Rumble strips present.
17	Winkelman to Globe	SR 77	MP 145+0.76	MP 166+0.11	Effective shoulder width is less than 4 feet.
18	SR 77 TI to Florence	SR 79	MP 092+0.24	MP 130+0.8	Effective shoulder width is less than 4 feet.
19	Tombstone	SR 80	MP 305	MP 313+0.76	Effective shoulder width is less than 4 feet. Rumble strips present.
20	Sonoita to Tombstone	SR 82	MP 033	MP 066+0.47	Effective shoulder width is less than 4 feet.
21	Sonoita to Tucson	SR 83	MP 46+0.58	MP 052+0.20	Effective shoulder width is less than 4 feet.
22	Pine and Strawberry	SR 87	Pine Creek Canyon Rd.	MP 290+0.05	Effective shoulder width is less than 4 feet.
23	Pine and Strawberry	SR 87	MP 292+0.28	MP 316+0.77	Effective shoulder width is less than 4 feet.
24	Coolidge	SR 87	SR 287	SR 187	Effective shoulder width is less than 4 feet.
25	Apache Junction to Tortilla Flats	SR 88	Superstition Blvd.	MP 213+0.32	Effective shoulder width is less than 4 feet.
26	Prescott to Wickenburg	SR 89	MP 309+0.95	MP 285+0.81	Effective shoulder width is less than 4 feet. There is a TE in design for White Spar Road (SR 89)
27	Prescott to Wickenburg	SR 89	MP 270+0.63	MP 271+0.94	Effective shoulder width is less than 4 feet.

Table 21 – Priority Paved Shoulder Opportunities (continued)

ID #	Area	State Highway	From	To	Comments
28	Prescott to Wickenburg	SR 89	MP 278+0.20	Congress	Effective shoulder width is less than 4 feet.
29	Prescott to Chino Valley	SR 89	Hillsdale Rd.	Perkinsville Rd.	Effective shoulder width is less than 4 feet. Rumble strips present in some areas.
30	Flagstaff to Sedona	SR 89A	MP 397+0.88	Upper Red Rock Loop Rd.-0.26	Effective shoulder width is less than 4 feet.
31	Cottonwood to Jerome	SR 89A	SR 260	Old Fain Rd.	Effective shoulder width is less than 4 feet.
32	Sierra Vista to Bisbee	SR 90	Moson Rd.	MP 339+0.04	Effective shoulder width is less than 4 feet. Rumble strips present.
33	SR 71 to Joshua Forest Parkway	US 93	MP 165+0.87	MP 181+0.84	Effective shoulder width is less than 4 feet. Rumble strips present.
34	Wikieup to I 40	US 93	MP 095+0.80	Chicken Springs Rd.	Effective shoulder width is less than 4 feet. Rumble strips present in some areas.
35	Parker to Lake Havasu	SR 95	MP 150+0.38	Chenoweth	Effective shoulder width is less than 4 feet. Rumble strips present in some areas.
36	Tonalea to Tuba City	US 160	MP 329+0.76	BIA 021	Effective shoulder width is less than 4 feet. Rumble strips present in some areas.
37	Tuba City to US 89	US 160	US 89	MP 321+0.68	Effective shoulder width is less than 4 feet. Rumble strips present.
38	Winkelman to Superior	SR 177	MP 137+0.50	MP 164+0.60	Effective shoulder width is less than 4 feet. Rumble strips present in some areas.
39	Sedona	SR 179	I 17	MP 303+0.14	Effective shoulder width is less than 4 feet. Rumble strips present.

Table 21 – Priority Paved Shoulder Opportunities (continued)

ID #	Area	State Highway	From	To	Comments
40	Flagstaff	US 180	MP 218+0.94	SR 64	Effective shoulder width is less than 4 feet. Rumble strips present in some areas.
41	Casa Grande	SR 187	SR 387	SR 87	Effective shoulder width is less than 4 feet.
42	Maricopa	SR 238	MP 024	SR 347	Effective shoulder width is less than 4 feet.
43	Cottonwood to Eagar	SR 260	SR 89A	US 180	Effective shoulder width is less than 4 feet. Rumble strips present in some areas.
44	Casa Grande	SR 287	Kortsen Rd.	I 10	Effective shoulder width is less than 4 feet.
45	Phoenix	Loop 303	Indian School Rd.	SR 303 Front -0.35	Effective shoulder width is less than 4 feet. Note that as sections of SR 303 are improved to a full freeway, ADOT Traffic Engineering PGP 1030 will be modified to restrict bicyclists on SR 303. Refer to http://www.azdot.gov/Highways/traffic/standards/PGP/TM1030.pdf)
46	Tucson	I-19 East Frontage Road	Canoa Ranch Exit	½ mile north of Canoa Ranch Exit	From ½ mile north of Canoa Ranch north to Continental Rd adequate paved shoulder already exists. The gap in paved shoulder is a safety concern for bicyclists and motorists, and Green Valley Coordinating Council, Pima County Department of Transportation, and the Santa Cruz Bicycle Advocate Committee have recommended paving these shoulders.
47	Flagstaff	US 89A / Milton Road / SR 40B	Forest Meadows	US 180 / Humphries	This will require coordination with City of Flagstaff, ADOT, FMPO, and NAIPTA to develop a Milton Road that meets the needs of all roadway users.
48	Globe to Show Low	US 60	US 70	SR 260	Shoulder width is variable; sections have effective shoulder width greater than 4 feet; rumble strip reduces effective shoulder width to less than 4 feet in other sections

Table 21 – Priority Paved Shoulder Opportunities (continued)

ID #	Area	State Highway	From	To	Comments
49	Payson	SR 87	MP 251	MP 246	Southbound only. Very narrow to no paved shoulders through this section
50	Payson	SR 87	MP 224	MP 228	Effective shoulder width is less than 4 feet.
51	Kingman	SR 66	MP 80	MP 81	Majority of SR 66 has wide shoulders; passing lanes between these segments have narrowed the shoulders to just 1 to 2 feet.
	Kingman	SR 66	MP 86	MP 90	
	Kingman	SR 66	MP 105	MP 106	
52	Tuba City	US 89	MP 469.5	480 (US 160)	While some sections of this segment have been improved, there are still sections without shoulders; US 89 is part of US Bicycle Route System 79.
	Tuba City	US 89	MP 491.7	494.4	
	Tuba City	US 89	MP 505.4	512.5	
	Tuba City	US 89	MP 518	MP 521.2	
53	Kingman to Hoover Dam	US 93 (southbound)	MP 17.3	MP 58.5	Southbound shoulder
54	Phoenix	US 60	(Grand Avenue (MP 148)	SR 101 (Downtown Phoenix) (MP 160)	

Figure 21 – State Highway Paved Shoulder Opportunities – Statewide

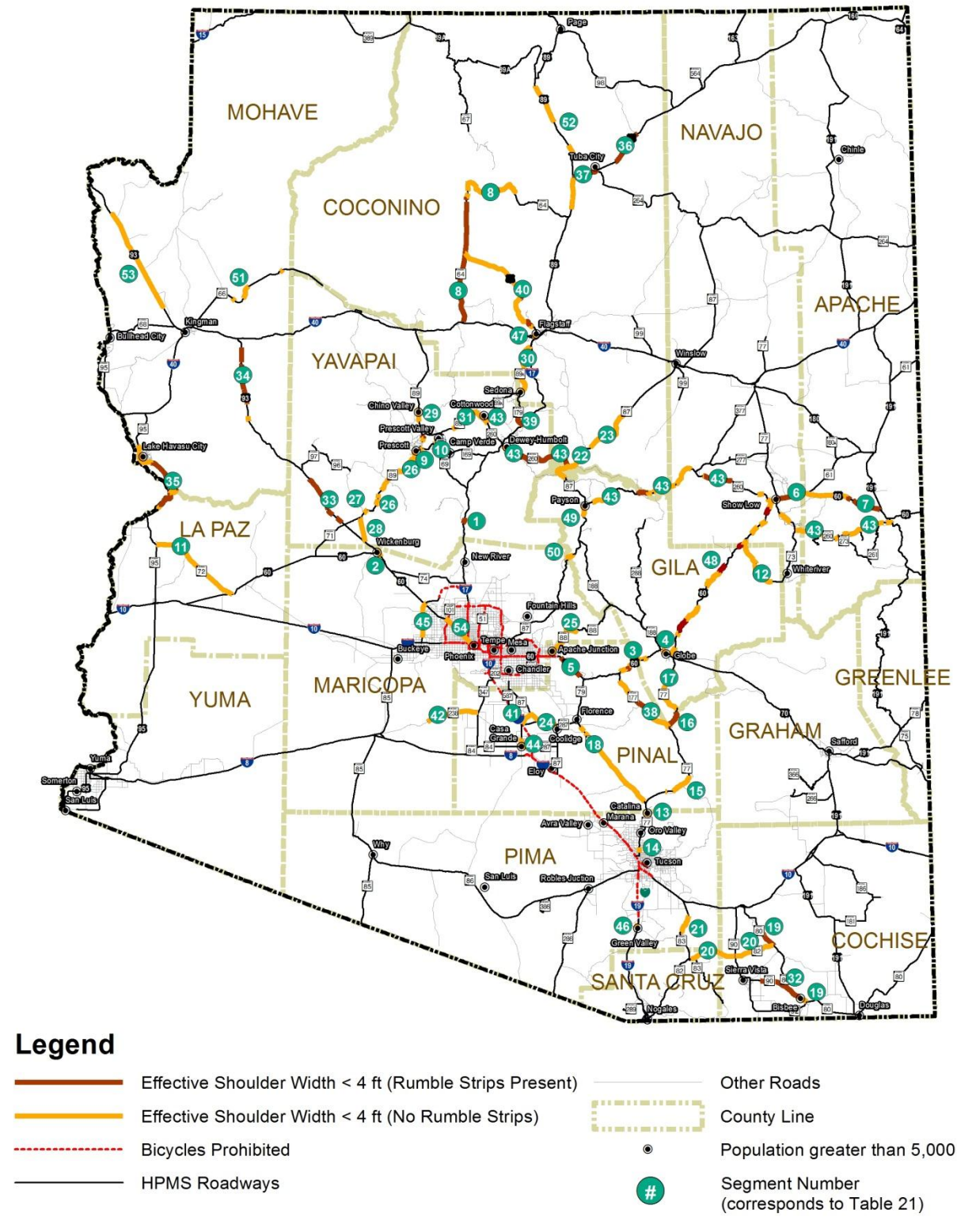


Figure 22 – State Highway Paved Shoulder Opportunities – Phoenix – Casa Grande

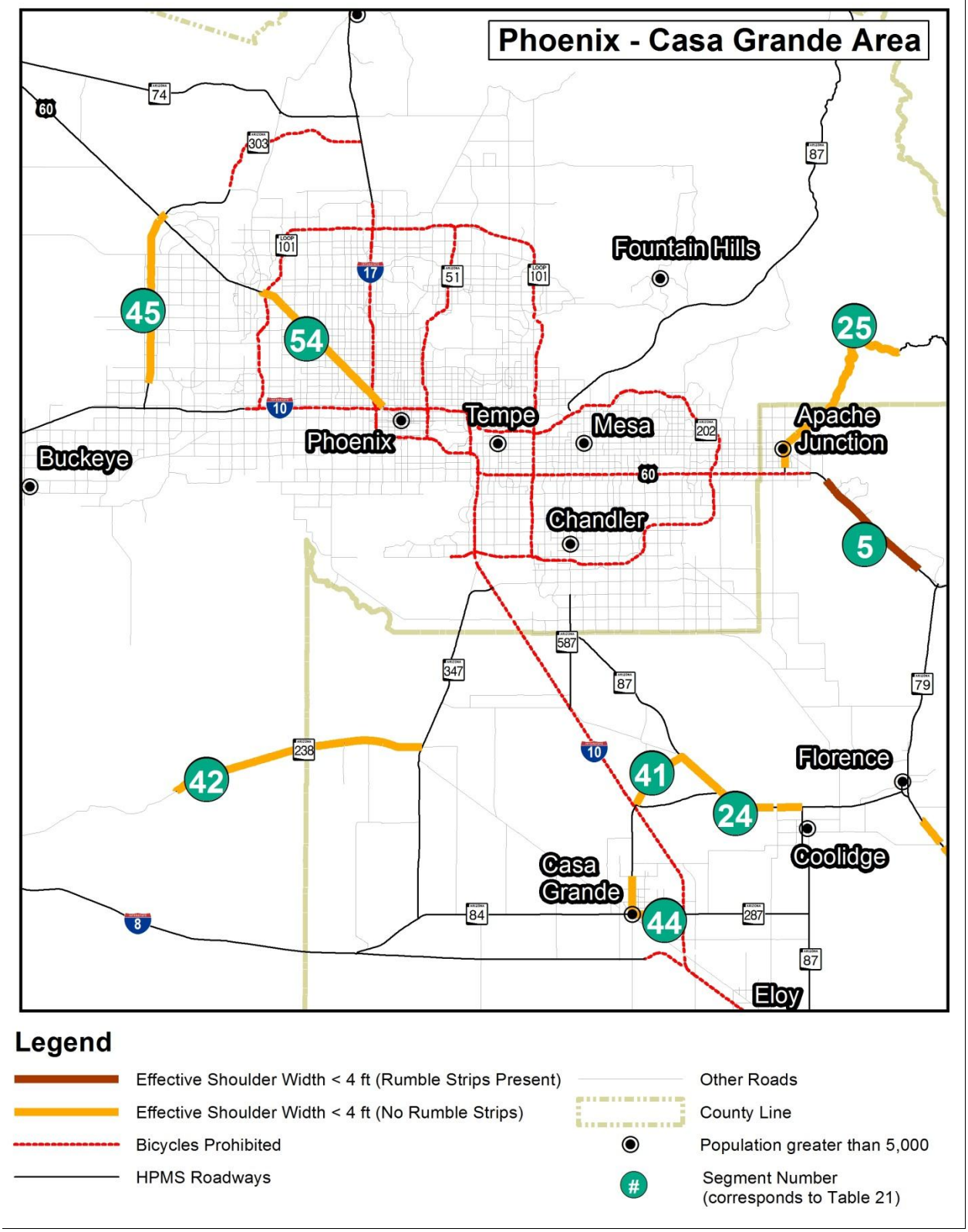


Figure 23 – State Highway Paved Shoulder Opportunities – Flagstaff, Verde Valley, Prescott

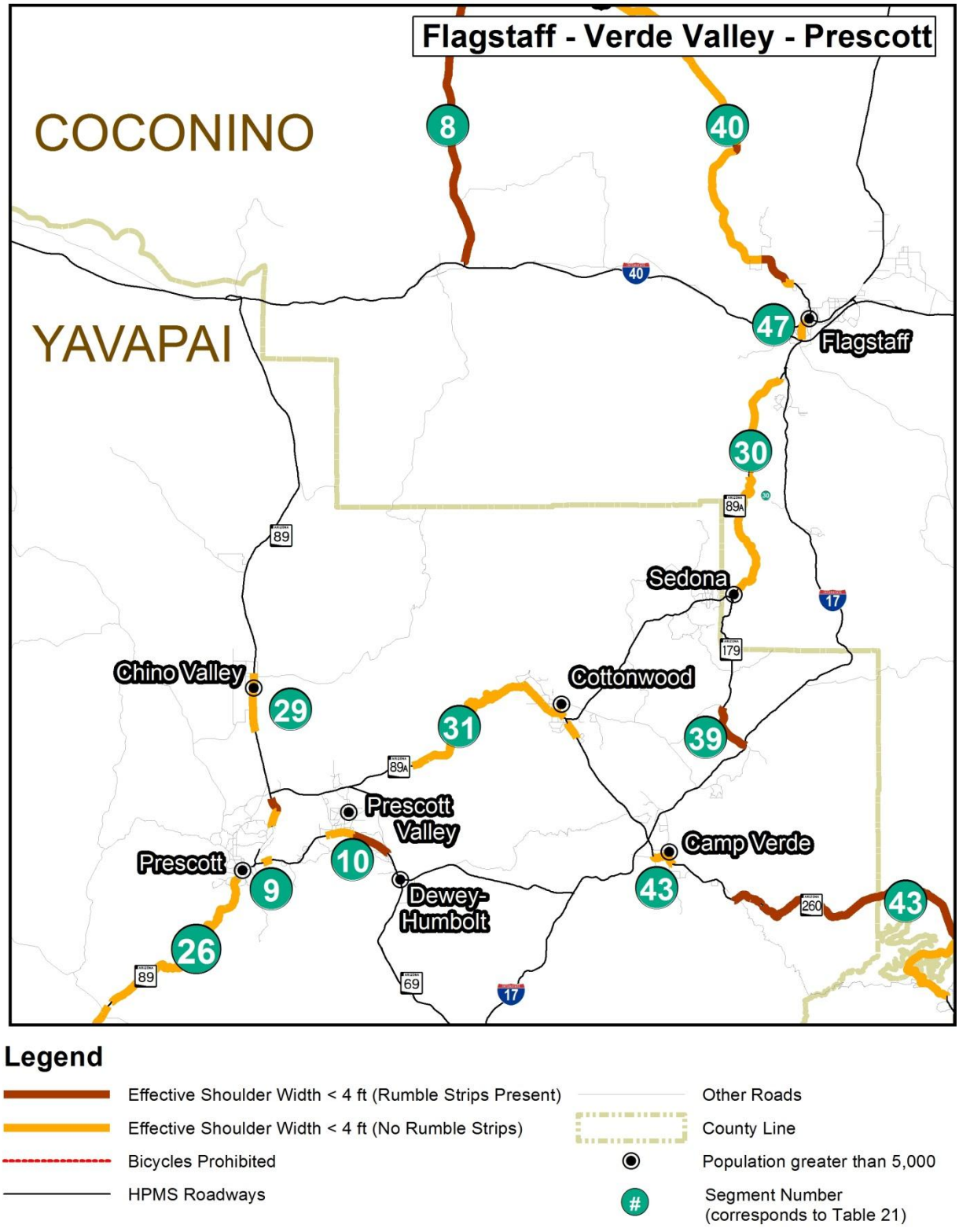


Figure 24 – State Highway Paved Shoulder Opportunities – Tucson