



# Statewide Bicycle and Pedestrian Plan

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August 4, 2003  
091374006

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## ACKNOWLEDGEMENTS

The Arizona Department of Transportation's Transportation Planning Division would like to express its appreciation to the dedicated individuals who provided valuable input in the development of Arizona's first ever Statewide Bicycle and Pedestrian Plan. In addition to the many citizens who attended the public open houses and provided important recommendations, the following Steering Committee Members were instrumental in the preparation of the plan:

*Bob Aberg, Citizen of the State of Arizona*

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*Dave Wessel, Flagstaff Metropolitan Planning Organization*



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## 1. Executive Summary

The United States Department of Transportation (USDOT) has established specific goals to improve the role and function of bicycling and walking as modes of transportation. As stated in the National Bicycling and Walking Study (Publication Number FHWA-PD-94-023), these goals are to double the number of person trips made by bicycling or walking and to simultaneously reduce by 10 percent the number of bicyclist and pedestrian deaths and injuries associated with vehicular and bicycle and pedestrian crashes. The U.S. Bureau of Transportation Statistics has found that approximately 20 percent of U.S. citizens, or nearly 41 million people, ride bicycles at least one or more times per month. Also, nearly all Americans and visitors to the U.S. walk or use wheelchairs for some utilitarian and recreational trips. Planning for and constructing accommodations for bicycling and walking and improving safety, education, and enforcement programs are critical in achieving the USDOT goals and to improving regional mobility.

Bicycling and walking are basic, fundamental modes of transportation that in today's motorized world of travel are commonly overlooked as an option to help manage our circulation issues and concerns. One of the underlying principles in planning for bicycling and walking is to provide a system that allows users significant mode choices and that creates a reasonable balance in accommodating those choices, without favoring one mode at the expense of all others. This means in order to achieve a balance within the current transportation network, bicycling and walking need to be made more attractive and truly be a viable option for transportation. This includes creating a non-motorized network comprised of on-street facilities, off-street facilities, and end of trip facilities. Education and enforcement programs enhance alternative forms of transportation.



Two pieces of legislation, one State and the other Federal, provide the impetus for developing a statewide, long-term plan for bicycles and pedestrians as a transportation mode. In 1986 the Arizona Legislature revised Arizona Revised Statute (ARS) 28-812 that grants any person riding a bicycle on a roadway or on a shoulder of a roadway "all the rights and ... all the duties" applicable to the driver of a motor vehicle. This law made bicycling a viable form of transportation with bicyclists having the right to use any roadway in the State, except where prohibited. The Federal Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, clearly stated that state departments of transportation must integrate bicycle and pedestrian planning into their long-term transportation planning. ISTEA stressed that urbanized areas are responsible for regional metropolitan transportation planning and that the Arizona Department of Transportation (ADOT) is responsible for including these Metropolitan Planning Organization (MPO) plans in its long-term plans as well as providing transportation planning for the rural areas of Arizona. In 1998, the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21) replaced ISTEA. TEA-21 builds on the bicycle and pedestrian initiatives established in ISTEA and reaffirms the need to accommodate bicyclists and pedestrians in the planning and design of roadway projects.

With the advent of multi-modal transportation planning, and given that most of the major metropolitan areas in Arizona have implemented bicycle and pedestrian plans, it is now desirable that ADOT develop



a bicycle and pedestrian plan that encompasses all of Arizona. The major intent of the Statewide Bicycle and Pedestrian Plan (Plan) is to provide a long-term plan for a system of shared roadways and bicycle and pedestrian facilities for the ADOT State Highway System. This includes the definition of the roles of the State and local government in the continual development of the bicycle and pedestrian transportation system in Arizona. It also includes the identification of all existing bicycle and pedestrian plans of the MPOs within Arizona to address the relationship between ADOT and the jurisdictions in the advancement of these plans. In addition, this plan includes design and maintenance guidelines for consideration by all implementing agencies in Arizona. Most importantly, this statewide bicycle and pedestrian plan guides ADOT in making transportation decisions impacting bicycling and pedestrian activity, and improves the accommodation of these non-motorized modes of transportation within Arizona's multi-modal transportation system. **Exhibit 1** on the following page displays roadways in the ADOT State Highways system, ADOT districts, and the counties within Arizona.

This Plan includes the following Sections:

1. Executive Summary
2. Bicycle and Pedestrian Terms, Definitions and State Statutes
3. Stakeholder Coordination
4. Study Goal and Objectives
5. 2002 Current Conditions
6. Bicycle/Pedestrian Committees, Coordinators, Documents, and Maps
7. Arizona Bicycle Network
8. Design Guidelines for Consideration
9. Maintenance Guidelines for Consideration
10. Policies, Ordinances, Codes, and Standards
11. Programs
12. Existing and Potential Funding Sources
13. Implementation

### **Stakeholder Coordination**

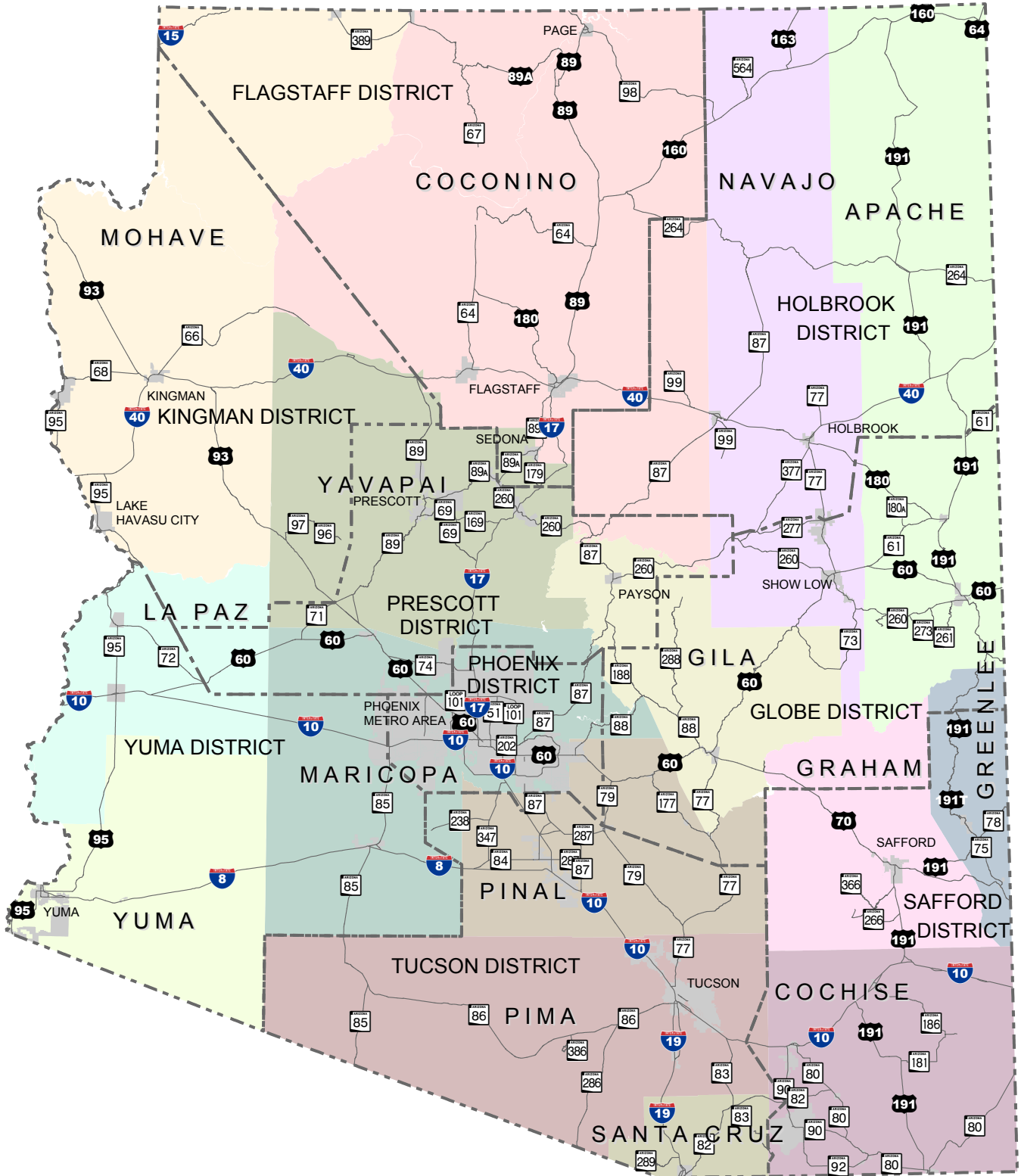
The Statewide Bicycle and Pedestrian Plan is the culmination of input from all interested parties. The extensive stakeholder coordination for the Plan was comprised of six components: the Steering Committee, the Review Committee, ADOT District/Regional Traffic Engineer input, public meetings, user surveys and the project website. The participation by representatives from both engineering and planning divisions from ADOT, MPOs, and local jurisdictions plus interested organizations provides valuable input that was critical to the creation of an implementable plan that meets the needs of the citizens and visitors to Arizona.

### **Study Goal**

To provide a long-term plan for a statewide system of interconnected bicycle facilities that will guide ADOT transportation decisions relating to bicycle and pedestrian travel, planning, and facility development.

# ARIZONA STATEWIDE BICYCLE AND PEDESTRIAN PLAN

## EXHIBIT 1: STATE OF ARIZONA





### Study Objectives

- A. Conduct an inventory of highways under ADOT jurisdiction to determine existing conditions for bicycle travel.
- B. Determine preferred bicyclist routes on the State Highway System.
- C. Evaluate financial considerations, including costs. Compile a listing of funding sources that are currently being used or can be used to fund shared lane roadway and bicycle and pedestrian facilities. Identify funding strategies and a system for tracking individual projects.
- D. Develop a pedestrian policy to guide ADOT in State Highway, U.S. Highway, and Interstate Highway development. Evaluate the effectiveness of the existing ADOT Bicycle Policy, at least nine months after its adoption, and recommend revisions, if needed.
- E. Evaluate facility design and maintenance issues. Develop design standards and cross-section detail design for shared roadways and bicycle facilities that can be integrated into existing design standards, if needed.
- F. Implementation – develop a statewide bicycle network plan that prioritizes corridors, integrates existing plans from other jurisdictions, and identifies funding for future development.
- G. Provide model bicycle and pedestrian ordinances for local governments in Arizona.
- H. Involve representatives from interested agencies and organizations throughout the State and citizens of Arizona in the development of the Plan.

### 2002 Current Conditions

The assessment of current conditions used ADOT's vast database of roadway characteristics within the State Highway Log and the Highway Performance Monitoring System as a backbone. The main criteria that were evaluated include:

- right shoulder width;
- volume to capacity ratio;
- speed limit; and
- percent truck traffic.

Although it was extremely beneficial to utilize this existing data, it is recognized that the data is not completely accurate and that by definition it is insufficient because it only records data for one direction of travel. With this in mind, there was a significant effort made to get existing conditions comments from ADOT engineers, Steering Committee members, and the public.

A score is assigned to all State Highway segments for the criteria listed above to quantitatively represent bicycling conditions. The points for a particular route are summed together to create a bicycling conditions score. **Exhibits 5** and **5B** (see pages 39 and 40) show this bicycling conditions score. The



bicycle conditions score is utilized in the Implementation Plan to prioritize recommended improvements.

A majority of the rural roadway segments within Arizona received a high bicycling conditions score primarily based on the shoulder being five feet or greater in width (53 percent of State Highways) or the roadway having a low volume to capacity ratio. On the other hand, virtually all of the non-interstate Highways have sections that received a low bicycling conditions score based on there being a narrow shoulder and also a reasonably high volume to capacity ratio. There also are a significant number of shoulders that have rumble strips that transform a shoulder with a reasonable width into an undesirable bicycle segment. A typical ride on one of Arizona's rural highways would include acceptable conditions for a majority of the ride with sections of the ride that are undesirable due to narrow shoulders or shoulders filled with rumble strips.



Urban State Highways within Arizona typically have below average bicycling conditions based on there being either a shoulder less than four feet wide or a shared lane that is less than 15 feet wide, high vehicular speeds and a reasonably high volume to capacity ratio. There also are a significant number of urban highways that have an excessive number of driveway access points and that lack the proper maintenance of bicycling and walking facilities. ADOT has worked with implementing agencies that plan to improve roadway conditions within urban areas; however, it is the primary responsibility of the local or regional jurisdiction to program roadway improvements within the urban area.



### **Bicycle and Pedestrian Committees, Coordinators, Documents, and Maps**

The information in the Plan builds upon information provided from Bicycle and Pedestrian Committees and Coordinators regarding existing guidelines, standards, and plans set forth by national organizations, and Arizona state, city, and county entities. This section includes the recommendations that

- All communities within Arizona consider having Bicycle and Pedestrian Advisory Committees.
- ADOT have the current Bicycle and Pedestrian Coordinator position solely dedicated to bicycle and pedestrian projects and a Bicycle and Pedestrian Coordinator's Assistant Position be developed at ADOT. In addition, it is recommended that ADOT designate one Bicycle and Pedestrian Contact for each district.
- Implementing agencies within Arizona consider having at least one full time Bicycle and/or Pedestrian Coordinator.
- Implementing agencies put a high priority on implementing proposed local routes that fill a gap between existing bicycle routes.
- That adjacent implementing agencies work together to provide bicycle route connectivity across jurisdictional boundaries.



### Arizona Bicycle Network

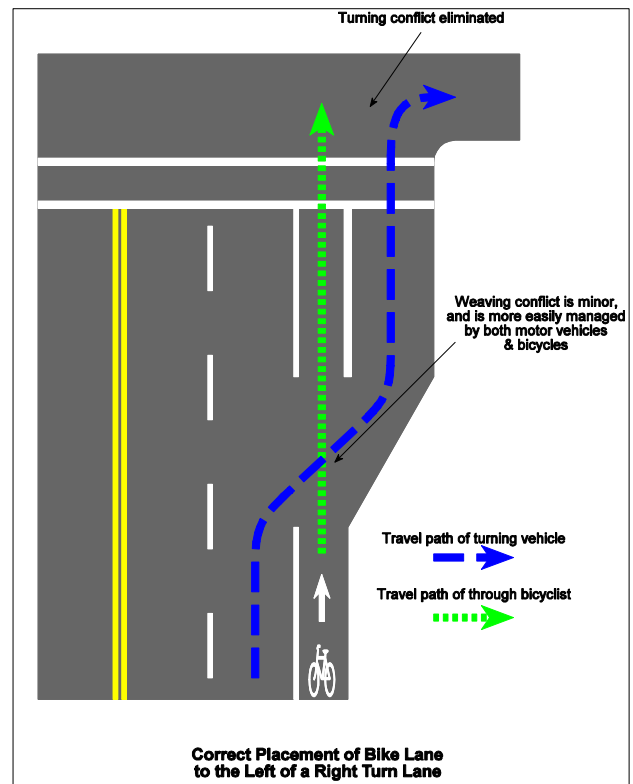
The Arizona Bicycle Network is comprised of roadways within the State Highway System, except where bicycles are specifically prohibited, and it includes regionally significant non-ADOT bicycle facilities. The purpose of this task is to create a statewide bicycle network map that provides users with valuable information regarding the major bicycle routes within the state and specifies where there are alternative routes to the State Highway System. **Exhibits 8** and **8B** (see pages 69 and 70) depict the Arizona Bicycle Network and include right shoulder width and traffic volume data.

It is recommended that Implementation of the Plan include the development, printing and distribution of a fold out user map that combines the data presented in **Exhibit 8** with educational information and other resources for bicyclists. This user map is anticipated to be similar to the Cycle Arizona Map of Suitable Bicycle Routes on the State Highway System that ADOT printed in 1998 for free distribution.

### Design and Maintenance Guidelines for Consideration

ADOT and other implementing agencies within Arizona should consider the appropriate accommodation of bicyclists and pedestrians in the design and maintenance of improvement projects. These sections includes design and maintenance guidelines that are important to the betterment of bicycling and walking within Arizona. At this time, it is not possible to address all impacts and fiscal implications these guidelines would have on any particular implementing agency within Arizona. Therefore the guidelines within this plan are provided for consideration by all agencies and are not a specific requirement on ADOT or any other agency within Arizona.

AASHTO developed national design guidelines for bikeways with input from state departments of transportation, including ADOT. Currently, ADOT recognizes design guidelines including the 1999 *AASHTO Guide for the Development of Bicycle Facilities* and the *Manual on Uniform Traffic Control Devices (MUTCD)*, Millennium Edition Revision 1 with an Arizona Supplement. In addition, the Arizona Department of Transportation acknowledges the Institute of Transportation Engineers Traffic Control Devices Handbook. AASHTO is currently developing pedestrian facility design guidelines that will be reviewed by ADOT and adopted accordingly. The design and maintenance guidelines included in this Plan are intended to supplement the above referenced guidelines.





### **Policies, Ordinances, Codes, and Standards**

Implementing agencies within Arizona should review the codes and standards included herein and use the vast amount of successful codes and standards that currently exist within Arizona and nationally.

Implementation of the Plan should include a task to further review the existing ADOT bicycle policies and the policy revisions included herein for consideration. Additional effort will be needed to come to agreement on the appropriate ADOT policy language such that bicyclists and pedestrians will be better accommodated on ADOT facilities.

### **Programs**

Programs with safety strategies incorporating education and enforcement elements are an integral part of this statewide plan, and it will require cooperation among numerous agencies and interest groups to achieve valuable results. ADOT should develop a program to provide data, data analysis, resources, tools, standards, and guidance on bicycle and pedestrian safety. Local governments, school districts, and civic groups need to continue and expand sessions on traffic safety, including adult courses such as the Bicycle Education Program of the League of American Bicyclists. ADOT also should develop a program to provide important instructional and informational brochures and safety literature, including guides that will expand knowledge of laws implementing pedestrians and the safe operation of bicycles and motor vehicles.

A number of recommendations are listed below that ADOT and agencies around the state could implement to improve bicycling and walking conditions.

- Provide planning and design training of bicycle and pedestrian accommodations to other ADOT staff, MPOs, and city staff;
- Assist in the development of state, regional, and local bicycle maps;
- Support advertising campaigns and public service announcements that educate the public on the virtues of non-motorized transportation;
- Develop basic pedestrian and bicycle education programs for communities and schools;
- 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;
- Continue to consider additions to driver's education products that emphasize safe motorist driving when encountering bicyclists and pedestrians on the road;
- Assist in promoting bike-to-work days and safe routes to school programs; and
- Promote the link between land use and transportation by encouraging smart growth initiatives.

### **Existing and Potential Funding Sources**

It is recommended that future phases of the Bicycle and Pedestrian Program include an emphasis on prioritizing, applying, and politicking for an increased percentage of the available funds to be applied to bicycle and pedestrian projects. The review of funding sources indicates that a large potential exists for funding bicycle and pedestrian facilities and associated programs. With strong public desire for bicycle and pedestrian facilities and programs, the current lack of adequate facilities and opportunities, the need to improve facilities to meet legal requirements such as the Americans with Disabilities Act, and the





need to provide parity in funding to help reduce the disproportionate bicycle and pedestrian fatalities and serious injuries, attaining significant amounts of funding is necessary to meet the objectives of this Plan.

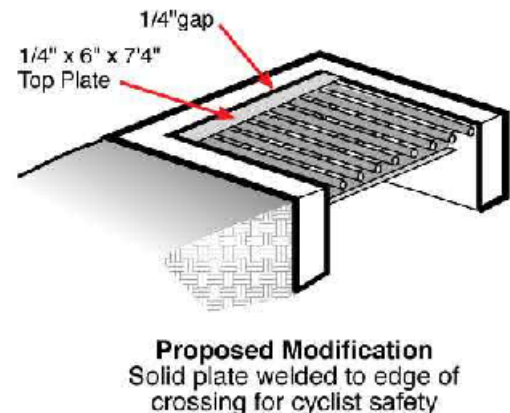
It is important to realize that the majority of the funding sources described in this section fund projects based on a highly competitive application/selection process. It is anticipated that it will take targeted effort over a significant period of time to increase the percentage of funds that are applied to bicycle and pedestrian improvements.

### **Implementation**

It is recommended that the first priority of implementation be to assure that adequate bicycle and pedestrian facilities are provided as an integral component of all future ADOT projects, with the exception of projects that have no relation to bicyclists or pedestrians. It is recognized that it is 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.

ADOT should work with other implementing agencies to obtain funding from any of the various funding sources to construct shared-use paths within ADOT right-of-way when it is consistent with the adopted plan of an implementing agency.

It is recommended that ADOT develop a program to systematically retrofit through roadway cattle guards as appropriate along State Highways open to bicycle travel that have gaps greater than one quarter-inch by four inch parallel to the direction of bicycle travel. Because cattle guards with gaps that can trap a bicycle tire can be a liability and it is estimated that cattle guards can be retrofitted for approximately \$1,000 per location, it is recommended that this program be given a high priority. An annual program should be initiated to retrofit cattle guards that meet the criteria above. It is recommended that \$200,000 be attained from Hazard Elimination funds for the first year.



Shoulder widening for segments that have an effective width of two feet or less includes narrow shoulders, shoulders with wide rumble strips reducing the effective width and narrow bridges. The desire is to widen shoulder to a width of six to ten feet, based on the width specified in the ADOT Roadway Design Guideline 302.4. Based on a desire to improve bicycling conditions along a long corridor for a limited cost, segments with the following criteria were selected as the highest priority (see **Section 5** for a description of the Bicycling Conditions Score and the relative cost):

- Relative cost of minor or moderate expense;
- A Bicycling Conditions score of 17 or less; and
- Right shoulder width less than or equal to two feet

The result of this Implementation ranking is shown in **Exhibits 9** and **9B** (see pages 165 and 166). Priority is being placed on those facilities that can be implemented at a minor or moderate expense and that are adjacent to an urban area. It is recognized that there is greater demand for bicycling in and



adjacent to the urban areas and there will be more benefit from the proposed improvements. It is recommended that funding be designated in locations where an improvement over a short distance can improve conditions along a corridor that typically has suitable conditions.

Implementation of the Arizona Statewide Bicycle and Pedestrian Plan will build upon the momentum established during the development of the Bicycle and Pedestrian Plan. ADOT is committed to the continued effort to improve bicycling and walking statewide.

The Phase II and III tasks will begin to implement the recommendations of the Plan and will include the continued coordination with a Statewide Bicycle and Pedestrian Committee. The following implementation recommendations are some of the tasks that may be included in Phases II and III:

- Develop and Distribute a Bicycle User Map;
- Develop a Statewide Bicycle and Pedestrian Education Program;
- Develop and Print a Statewide “Share the Road” Guide for Bicyclists, Pedestrians and Motorists;
- Develop Grant and Funding Plans;
- Develop Bicycle and Pedestrian Facility Action Plans;
- Create a Maintenance and Facility Request System;
- Facilitate an Update of ADOT Bicycle and Pedestrian Policy;
- Develop a Statewide Bicycle and Pedestrian Committee;
- Pursue Statewide Training Opportunities;
- Create a Rural Specific Design Guideline; and
- Create a Pedestrian Focused Action Plan.



## 2. Bicycle and Pedestrian Terms, Definitions, and State Statutes

The terms used throughout this document are defined below. The definitions are from the *Guide for the Development of Bicycle Facilities* by the American Association of State Highway and Transportation Officials (AASHTO), 1999 and the Arizona Revised Statutes.

### **Bicycle and Pedestrian Terms and Definitions from AASHTO**

**BICYCLE** – Every vehicle propelled solely by human power upon which any person may ride, having two tandem wheels, except scooters and similar devices. The term “bicycle” for this publication also includes three- and four-wheeled human-powered vehicles, but not tricycles for children.

**BICYCLE FACILITIES** – A general term denoting improvements and provisions made by public agencies to accommodate or encourage bicycling, including parking and storage facilities, and shared roadways not specifically designated for bicycle use.

**BICYCLE LANE OR BIKE LANE** – A portion of a roadway that has been designated by striping, signing, and pavement markings for the preferential or exclusive use of bicyclists.

**BICYCLE PATH or BIKE PATH** – See Shared-Use Path.

**BICYCLE ROUTE SYSTEM** – A system of bikeways designated by the jurisdiction having authority with appropriate directional and informational route markers, with or without specific bicycle route numbers. Bicycle routes should establish a continuous routing, but may be a combination of any and all types of bikeways.

**BICYCLIST TYPE** – AASHTO suggests three categories of bicyclists, A, B, and C, defined as follows:

**A**dvanced or experienced riders generally use their bicycles as they would a motor vehicle. They are riding for convenience and speed, and want direct access to destinations with a minimum of detour or delay. They are typically comfortable riding with motor vehicle traffic; however, they need sufficient operating space on the traveled way or the shoulder to eliminate the need for either themselves or a passing motor vehicle to shift position.

**B**asic or less confident adult riders who may also be using their bicycles for transportation purposes (e.g., going to the store or visiting friends) but prefer to avoid roads with fast and busy motor vehicle traffic, unless there is ample roadway width to allow easy overtaking by the faster motor vehicles. Thus, basic riders are comfortable riding on neighborhood streets and shared-use paths, and prefer designated facilities such as bicycle lanes or wide shoulder lanes on busier streets.

**C**hildren, riding on their own or with their parents, may not travel as fast as their adult counterparts but still may require access to destinations in their community, such as schools, convenience stores, and recreational facilities. Residential streets with low motor vehicle speeds, shared-use paths, and busier streets with well-defined pavement markings between bicycles and motor vehicles can accommodate children without their needing to ride in the travel lane of major arterials.



**BIKEWAY** – A generic term for any road, street, path or way which in some manner is specifically designated for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.

**BICYCLE ROUTE** – See Signed Shared Roadway.

**HIGHWAY** – A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.

**RAIL-TRAIL** – A shared-use path, paved or unpaved, built within the right-of-way of an existing or former railroad.

**RIGHT-OF-WAY** – A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to transportation purposes.

**RIGHT OF WAY** – The right of one vehicle or pedestrian to proceed in a lawful manner in preference to another vehicle or pedestrian.

**ROADWAY** – The portion of the highway, including shoulders, intended for vehicular use.

**RUMBLE STRIPS** – A textured or grooved pavement sometimes used on or along shoulders of highways to alert motorists who stray onto the shoulder.

**SHARED ROADWAY** – A roadway, which is open to both bicycle and motor vehicle travel. This may be an existing roadway, street with wide curb lanes, or road with paved shoulders.

**SHARED-USE PATH** – 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. Pedestrians, skaters, wheelchair users, joggers, and other non-motorized users may also use shared-use paths.

**SHOULDER** – The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of sub-base, base, and surface courses.

**SIDEWALK** – The portion of a street or highway right-of-way designed for preferential or exclusive use by pedestrians.

**SIGNED SHARED ROADWAY (SIGNED BIKE ROUTE)** – A shared roadway which has been designated by signing as a preferred route for bicycle use.

**TRAVELED WAY** – The portion of the roadway for the movement of vehicles, exclusive of shoulders.

**UNPAVED PATH** – Paths not surfaced with asphalt or Portland cement concrete.



## **Bicycle and Pedestrian Terms, Definitions and Statutes from the Arizona Revised Statutes**

### ARS 28-101. Pertinent Definitions

6. “Bicycle” means a device, including a racing wheelchair, that is propelled by human power and on which a person may ride and that has either:
  - (a) Two tandem wheels, either of which is more than sixteen inches in diameter.
  - (b) Three wheels in contact with the ground, any of which is more than sixteen inches in diameter.
20. “Electric personal assistive mobility device” means a self-balancing two non-tandem wheeled device with an electric propulsion system that limits the maximum speed of the device to fifteen miles per hour or less and that is designed to transport only one person.
30. “Motor vehicle”:
  - (a) Means either:
    - (i) A self-propelled vehicle.
    - (ii) For the purposes of the laws relating to the imposition of a tax on motor vehicle fuel, a vehicle that is operated on the highways of this state and that is propelled by the use of motor vehicle fuel.
  - (b) Does not include a motorized wheelchair or a motorized skateboard. For the purposes of this subdivision:
    - (i) “Motorized wheelchair” means a self-propelled wheelchair that is used by a person for mobility.
    - (ii) “Motorized skateboard” means a self-propelled device that has a motor, a deck on which a person may ride and at least two tandem wheels in contact with the ground.
38. “Pedestrian” means any person afoot. A person who uses an electric personal assistive mobility device or a manual or motorized wheelchair is considered a pedestrian unless the manual wheelchair qualifies as a bicycle. For the purposes of this paragraph, “motorized wheelchair” means a self-propelled wheelchair that is used by a person for mobility.
43. “Right-of-way” when used within the context of the regulation of the movement of traffic on a highway means the privilege of the immediate use of the highway. Right-of-way when used within the context of the real property on which transportation facilities and appurtenances to the facilities are constructed or maintained means the lands or interest in lands within the right-of-way boundaries.
47. “State Highway” means a state route or portion of a state route that is accepted and designated by the board as a State Highway and that is maintained by the state.
48. “State route” means a right-of-way whether actually used as a highway or not that is designated by the board as a location for the construction of a State Highway.
49. “Street” or “highway” means the entire width between the boundary lines of every way if a part of the way is open to the use of the public for purposes of vehicular travel.
53. “Vehicle” means a device in, on or by which a person or property is or may be transported or drawn on a public highway, excluding devices moved by human power or used exclusively on stationary rails or tracks.

### ARS 28-601. Definitions

3. “Crosswalk” means:
  - (a) That part of a roadway at an intersection included within the prolongations or connections of the lateral lines of the sidewalks on opposite sides of the highway measured from the curbs or, in absence of curbs, from the edges of the traversable roadway.
  - (b) Any portion of a roadway at an intersection or elsewhere that is distinctly indicated for pedestrian crossing by lines or other markings on the surface.



7. "Intersection" means the area embraced within the prolongation or connection of the lateral curb lines, or if none, the lateral boundary lines of the roadways of two highways that join one another at, or approximately at, right angles, or the area within which vehicles traveling on different highways joining at any other angle may come in conflict. If a highway includes two roadways thirty or more feet apart, each crossing of each roadway of the divided highway by an intersecting highway is a separate intersection. If the intersecting highway also includes two roadways thirty or more feet apart, each crossing of two roadways of the highways is a separate intersection.
9. "Motorized wheelchair" means any self-propelled wheelchair that is used by a person for mobility.
19. "Roadway" means that portion of a highway that is improved, designed or ordinarily used for vehicular travel, exclusive of the berm or shoulder. If a highway includes two or more separate roadways, roadway refers to any such roadway separately but not to all such roadways collectively.
20. "Safety zone" means the area or space that is both:
  - (a) Officially set apart within a roadway for the exclusive use of pedestrians.
  - (b) Protected or either marked or indicated by adequate signs as to be plainly visible at all times while set apart as a safety zone.
21. "Sidewalk" means that portion of a street that is between the curb lines or the lateral lines of a roadway and the adjacent property lines and that is intended for the use of pedestrians.
26. "Traffic" means pedestrians, ridden or herded animals, vehicles and other conveyances either singly or together while using a highway for purposes of travel.

ARS 28-641. Traffic control device manual and specifications

The director shall adopt a manual and specifications for a uniform system of traffic control devices for use on highways in this state. Except as provided in section 28-2416, the uniform system shall correlate with and as far as possible conform to the system set forth in the most recent edition of the manual on uniform traffic control devices for streets and highways prepared by the national joint committee on uniform traffic control devices.

ARS 28-645. Traffic control signal legend

A. If traffic is controlled by traffic control signals exhibiting different colored lights or colored lighted arrows successively one at a time or in combination, only the colors green, red and yellow shall be used, except for special pedestrian signals carrying a word legend. The lights shall indicate and apply to drivers of vehicles and pedestrians as follows:

1. Green indication:

- (a) Vehicular traffic facing a green signal may proceed straight through or turn right or left unless a sign at that place prohibits either turn. Vehicular traffic, including vehicles turning right or left, shall yield the right-of-way to other vehicles and to pedestrians lawfully within the intersection or an adjacent crosswalk at the time the signal is exhibited.
- (b) Vehicular traffic facing a green arrow signal, shown alone or in combination with another indication, may cautiously enter the intersection only to make the movement indicated by such arrow or such other movement as is permitted by other indications shown at the same time. Vehicular traffic shall yield the right-of-way to pedestrians lawfully within an adjacent crosswalk and to other traffic lawfully using the intersection.
- (c) Unless otherwise directed by a pedestrian control signal as provided in section 28-646, pedestrians facing any green signal, except if the sole green signal is a turn arrow, may proceed across the roadway within any marked or unmarked crosswalk.



2. Steady yellow indication:

(a) Vehicular traffic facing a steady yellow signal is warned by the signal that the related green movement is being terminated or that a red indication will be exhibited immediately thereafter when vehicular traffic shall not enter the intersection.

(b) Unless otherwise directed by a pedestrian control signal as provided in section 28-646, pedestrians facing a steady yellow signal are advised by the signal that there is insufficient time to cross the roadway before a red indication is shown and a pedestrian shall not then start to cross the roadway.

3. Red indication:

(a) Except as provided in subdivisions (b) and (c) of this paragraph, vehicular traffic facing a steady red signal alone shall stop before entering the intersection and shall remain standing until an indication to proceed is shown. On receipt of a record of judgment for a violation of this subdivision, the department shall order the person to attend and successfully complete traffic survival school training and educational sessions within sixty days after the department issues the order. Notwithstanding section 28-3315, if the person fails to attend or successfully complete traffic survival school training and educational sessions, the department shall suspend the person's driving privilege pursuant to section 28-3306 until the person attends and successfully completes traffic survival school training and educational sessions. A person whose driving privilege is suspended pursuant to this subdivision may request a hearing. If the person requests a hearing, the department shall conduct the hearing as prescribed in section 28-3306.

(b) The driver of a vehicle that is stopped in obedience to a red signal and as close as practicable at the entrance to the crosswalk on the near side of the intersection, or if there is no crosswalk, then at the entrance to the intersection, may make a right turn but shall yield the right-of-way to pedestrians and other traffic proceeding as directed by the signal. A right turn may be prohibited against a red signal at any intersection if a sign prohibiting the turn is erected at the intersection.

(c) The driver of a vehicle on a one-way street that intersects another one-way street on which traffic moves to the left shall stop in obedience to a red signal but may then make a left turn into the one-way street. The driver shall yield the right-of-way to pedestrians and other traffic proceeding as directed by the signal at the intersection, except that such left turn may be prohibited if a sign prohibiting the turn is erected at the intersection.

(d) Unless otherwise directed by a pedestrian control signal as provided in section 28-646, a pedestrian facing a steady red signal alone shall not enter the roadway.

B. If an official traffic control signal is erected and maintained at a place other than an intersection, this section applies except as to those provisions of this section that by their nature can have no application. Any stop required shall be made at a sign or marking on the pavement indicating where the stop shall be made, but in the absence of a sign or marking the stop shall be made at the signal.

C. The driver of a vehicle approaching an intersection that has an official traffic control signal that is inoperative shall bring the vehicle to a complete stop before entering the intersection and may proceed with caution only when it is safe to do so. If two or more vehicles approach an intersection from different streets or highways at approximately the same time and the official traffic control signal for the intersection is inoperative, the driver of each vehicle shall bring the vehicle to a complete stop before entering the intersection and the driver of the vehicle on the left shall yield the right-of-way to the driver of the vehicle on the right.



ARS 28-646. Pedestrian control signals; loitering prohibited

A. If special pedestrian control signals exhibiting the words “walk” or “don't walk” are in place, the signals shall indicate as follows:

1. Walk. Pedestrians facing the signal may proceed across the roadway in the direction of the signal and shall be given the right-of-way by the drivers of vehicles.
2. Don't walk. A pedestrian shall not start to cross the roadway in the direction of the signal, but a pedestrian who has partially completed crossing on the walk signal shall proceed to a sidewalk or safety island while the don't walk signal is showing.

B. A pedestrian shall not loiter or unduly delay crossing the roadway after traffic has stopped to give the right-of-way.

ARS 28-647. Flashing signals

If an illuminated flashing red or yellow signal is used in a traffic sign or signal it requires obedience by vehicular traffic as follows:

1. Flashing red stop signal. If a red lens is illuminated with rapid intermittent flashes, drivers of vehicles shall stop before entering the nearest crosswalk at an intersection or at a limit line if marked, or if none, then before entering the intersection, and the right to proceed is subject to the rules applicable after making a stop at a stop sign. On receipt of a record of judgment for a violation of this paragraph, the department shall order the person to attend and successfully complete traffic survival school training and educational sessions within sixty days after the department issues the order. Notwithstanding section 28-3315, if the person fails to attend or successfully complete traffic survival school training and educational sessions, the department shall suspend the person's driving privilege pursuant to section 28-3306 until the person attends and successfully completes traffic survival school training and educational sessions. A person whose driving privilege is suspended pursuant to this paragraph may request a hearing. If the person requests a hearing, the department shall conduct the hearing as prescribed in section 28-3306.
2. Flashing yellow caution signal. If a yellow lens is illuminated with rapid intermittent flashes, drivers of vehicles may proceed through the intersection or past the signal only with caution.

ARS 28-704. Minimum speed limits; requirement to turn off roadway (See HB 2503 at end of Section)

A. A person shall not drive a motor vehicle at such a slow speed as to impede or block the normal and reasonable movement of traffic except when reduced speed is necessary for safe operation or in compliance with law.

B. If the director or local authorities within their respective jurisdictions determine on the basis of an engineering and traffic investigation that slow speeds on any part of a highway consistently impede the normal and reasonable movement of traffic, the director or local authority may determine and declare a minimum speed limit below which a person shall not drive a vehicle except when necessary for safe operation or in compliance with law.

C. If a person is driving a vehicle at a speed less than the normal flow of traffic at the particular time and place on a two-lane highway where passing is unsafe, and if five or more vehicles are formed in a line behind the vehicle, the person shall turn the vehicle off the roadway at the nearest place designated as a turnout by signs erected by the director or a local authority, or wherever sufficient area for a safe turnout exists, in order to permit the vehicles following to proceed.





ARS 28-724. Overtaking on the right

A. The driver of a vehicle may overtake and pass on the right of another vehicle only under the following conditions:

1. When the vehicle overtaken is making or about to make a left turn.
2. On a street or highway with unobstructed pavement that is not occupied by parked vehicles and that is of sufficient width for two or more lines of moving vehicles in each direction.
3. On a one-way street or on a roadway on which traffic is restricted to one direction of movement and if the roadway is free from obstructions and of sufficient width for two or more lines of moving vehicles.

B. The driver of a vehicle may overtake and pass another vehicle on the right only under conditions permitting the movement in safety. The driver shall not make the movement by driving off the pavement or main traveled portion of the roadway.

ARS 28-735. Overtaking bicycles; civil penalties (See HB 2503 at end of Section)

A. When overtaking and passing a bicycle proceeding in the same direction, a person driving a motor vehicle shall exercise due care by leaving a safe distance between the motor vehicle and the bicycle of not less than three feet until the motor vehicle is safely past the overtaken bicycle.

B. If a person violates this section and the violation results in a collision causing:

1. Serious physical injury as defined in section 13-105 to another person, the violator is subject to a civil penalty of up to five hundred dollars.
2. Death to another person, the violator is subject to a civil penalty of up to one thousand dollars.
3. Subsection B of this section does not apply to a bicyclist who is injured in a vehicular traffic lane when a designated bicycle lane or path is present and passable

ARS 28-756. Method of giving hand and arm signals

A. Except as provided by subsection B, a person shall give all hand and arm signals required by this article from the left side of the vehicle in the following manner, and the signals shall indicate as follows:

1. Left turn. Hand and arm extended horizontally.
2. Right turn. Hand and arm extended upward.
3. Stop or decrease speed. Hand and arm extended downward.

B. A person operating a bicycle may give a right turn signal by extending the right hand and arm horizontally and to the right side of the bicycle.

ARS 28-791. Pedestrians subject to traffic rules

A. Pedestrians are subject to traffic control signals at intersections as provided in section 28-645 unless required by local ordinance to comply strictly with the signals. At all places other than intersections, pedestrians are accorded the privileges and are subject to the restrictions stated in this article.

B. A local authority may require by ordinance that pedestrians strictly comply with the directions of an official traffic control signal and may prohibit by ordinance pedestrians from crossing a roadway in a business district or crossing a designated highway except in a crosswalk.



ARS 28-792. Right-of-way at crosswalk

A. Except as provided in section 28-793, subsection B, if traffic control signals are not in place or are not in operation, the driver of a vehicle shall yield the right-of-way, slowing down or stopping if need be in order to yield, to a pedestrian crossing the roadway within a crosswalk when the pedestrian is on the half of the roadway on which the vehicle is traveling or when the pedestrian is approaching so closely from the opposite half of the roadway as to be in danger. A pedestrian shall not suddenly leave any curb or other place of safety and walk or run into the path of a vehicle that is so close that it is impossible for the driver to yield.

B. If a vehicle is stopped at a marked crosswalk or at an unmarked crosswalk at an intersection to permit a pedestrian to cross the roadway, the driver of another vehicle approaching from the rear shall not overtake and pass the stopped vehicle.

ARS 28-793. Crossing at other than crosswalk

A. A pedestrian crossing a roadway at any point other than within a marked crosswalk or within an unmarked crosswalk at an intersection shall yield the right-of-way to all vehicles on the roadway.

B. A pedestrian crossing a roadway at a point where a pedestrian tunnel or overhead pedestrian crossing has been provided shall yield the right-of-way to all vehicles on the roadway.

C. Between adjacent intersections at which traffic control signals are in operation, pedestrians shall not cross at any place except in a marked crosswalk.

ARS 28-794. Drivers to exercise due care

Notwithstanding the provisions of this chapter every driver of a vehicle shall:

1. Exercise due care to avoid colliding with any pedestrian on any roadway.
2. Give warning by sounding the horn when necessary.
3. Exercise proper precaution on observing a child or a confused or incapacitated person on a roadway.

ARS 28-795. Pedestrians to use right half of crosswalk

Pedestrians shall move expeditiously, when practicable, on the right half of crosswalks.

ARS 28-796. Pedestrian on roadways

A. If sidewalks are provided, a pedestrian shall not walk along and on an adjacent roadway.

B. If sidewalks are not provided, a pedestrian walking along and on a highway shall walk when practicable only on the left side of the roadway or its shoulder facing traffic that may approach from the opposite direction.

C. A person shall not stand in a roadway for the purpose of soliciting a ride from the driver of a vehicle.

ARS 28-797. School crossings; definition

A. The director, with respect to State Highways, or the officer, board or commission of the appropriate jurisdiction, with respect to county highways or city or town streets, by and with the advice of the school district implementing board or county school superintendent may mark or cause to be marked by the department or local authorities crosswalks in front of each school building or school grounds abutting the crosswalks where children are required to cross the highway or street.



B. The department or local authorities may approve additional crossings across highways not abutting on school grounds on application of school authorities and with written satisfactory assurance given the department or local authorities that guards will be maintained by the school district at the crossings to enforce the proper use of the crossing by school children.

C. The manual prescribed in section 28-641 shall provide for yellow marking of the school crossing, yellow marking of the center line of the roadway and the erection of portable signs indicating that vehicles must stop when persons are in the crossing. The manual shall also provide the type and wording of portable signs indicating that school is in session and permanent signs that warn of the approach to school crossings.

D. When the school crossings are established, school authorities shall place within the highway the portable signs indicating that school is in session. This placement shall be not more than three hundred feet from each side of the school crossing. In addition, portable “stop when children are in crosswalk” signs shall be placed at school crossings. School authorities shall maintain these signs when school is in session and shall cause them to be removed immediately when school is not in session.

E. A vehicle approaching the crosswalk shall not proceed at a speed of more than fifteen miles per hour between the portable signs placed on the highway indicating “school in session” and “stop when children are in crosswalk”.

F. Notwithstanding any other law:

1. An agency of appropriate jurisdiction may establish a school crossing on an unpaved highway or street adjacent to a school when the agency determines the need for the school crossing on the basis of a traffic study. School crossings on unpaved highways and streets shall be marked by the use of signs as prescribed in the manual prescribed in section 28-641.

2. A local authority may establish a school crossing at an intersection containing a traffic control signal if the local authority determines the need for a school crossing on the basis of a traffic study.

G. When a school authority places and maintains the required portable “school in session” signs and “stop when children are in crosswalk” signs, all vehicles shall come to a complete stop at the school crossing when the crosswalk is occupied by a person.

H. For the purposes of this section, “school in session”, when used either in reference to the period of time or to signs, means during school hours or while children are going to or leaving school during opening or closing hours.

#### ARS 28-811. Parent and guardian responsibility; applicability of article

A. The parent of a child and the guardian of a ward shall not authorize or knowingly permit the child or ward to violate this chapter.

B. Except as otherwise provided in this article, this chapter applies to a bicycle when it is operated on a highway or on a path set aside for the exclusive use of bicycles.

#### ARS 28-812. Applicability of traffic laws to bicycle riders

A person riding a bicycle on a roadway or on a 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 by this chapter and chapters 4 and 5 of this title, except special rules in this article and except provisions of this chapter and chapters 4 and 5 of this title that by their nature can have no application.



ARS 28-813. Riding on bicycles

- A. A person propelling a bicycle shall not ride other than upon or astride a permanent and regular seat attached to the bicycle.
- B. A person shall not use a bicycle to carry more persons at one time than the number for which it is designed and equipped.

ARS 28-814. Clinging to vehicle

A person riding on a bicycle, coaster, sled or toy vehicle or on roller skates shall not attach the bicycle, coaster, sled, toy vehicle or roller skates or that person to a vehicle on a roadway.

ARS 28-815. Riding on roadways and bicycle paths; prohibition of motor vehicle traffic on bike paths

- A. A person riding a bicycle on a roadway at less than the normal speed of traffic at the time and place and under the conditions then existing shall ride as close as practicable to the right-hand curb or edge of the roadway, except under any of the following situations:
  - 1. If overtaking and passing another bicycle or vehicle proceeding in the same direction.
  - 2. If preparing for a left turn at an intersection or into a private road or driveway.
  - 3. If reasonably necessary to avoid conditions, including fixed or moving objects, parked or moving vehicles, bicycles, pedestrians, animals or surface hazards.
  - 4. If the lane in which the person is operating the bicycle is too narrow for a bicycle and a vehicle to travel safely side by side within the lane.
- B. Persons riding bicycles upon a roadway shall not ride more than two abreast except on paths or parts of roadway set aside for the exclusive use of bicycles.
- C. A path or lane that is designated as a bicycle path or lane by state or local authorities is for the exclusive use of bicycles even though other uses are permitted pursuant to subsection D or are otherwise permitted by state or local authorities.
- D. A person shall not operate, stop, park or leave standing a vehicle in a path or lane designated as a bicycle path or lane by a state or local authority except in the case of emergency or for crossing the path or lane to gain access to a public or private road or driveway.
- E. Subsection D does not prohibit the use of the path or lane by the appropriate local authority.

ARS 28-816. Carrying article on bicycles

A person shall not carry a package, bundle or article while operating a bicycle if the package, bundle or article prevents the driver from keeping at least one hand on the handlebars.

ARS 28-817. Bicycle equipment

- A. A bicycle that is used at nighttime shall have a lamp on the front that emits a white light visible from a distance of at least five hundred feet to the front and a red reflector on the rear of a type that is approved by the department and that is visible from all distances from fifty feet to three hundred feet to the rear when the reflector is directly in front of lawful upper beams of head lamps on a motor vehicle. A bicycle may have a lamp that emits a red light visible from a distance of five hundred feet to the rear in addition to the red reflector.
- B. A person shall not operate a bicycle that is equipped with a siren or whistle.



C. A bicycle shall be equipped with a brake that enables the operator to make the braked wheels skid on dry, level, clean pavement.

ARS 28-818. Bicycle safety fund

A. A bicycle safety fund is established. The department shall administer the fund. The fund consists of monies received from:

1. The federal government or any agency of the federal government for any purpose authorized by this section.
2. Donations.
3. This state or any agency of this state for any purpose authorized by this section.

B. The department:

1. May designate monies deposited in the bicycle safety fund for use only for specified purposes consistent with this section and only for use in specified political subdivisions of this state.
2. Shall spend monies contributed by a political subdivision to the bicycle safety fund and any donation to the fund designated for use in a political subdivision and any matching monies deposited in the fund as a result of the contribution or donation only for use in the political subdivision.
3. Shall only spend monies from the bicycle safety fund as follows:
  - (a) For planning, engineering, constructing and maintaining bicycle paths and bicycle lanes.
  - (b) As matching monies to be used with federal or local monies spent for planning, engineering, constructing or maintaining bicycle paths and bicycle lanes.
  - (c) As matching monies to be used with federal or local monies spent for planning and implementing safety programs.

C. Monies in the bicycle safety fund are exempt from the provisions of section 35-190 relating to lapsing of appropriations. The department may spend monies in the fund for purposes authorized by this section subject to legislative appropriation.

ARS 28-855. Stop signs; yield signs

A. The director, with reference to State Highways, and local authorities, with reference to other highways under their jurisdiction, may designate through highways and erect stop or yield signs at specified entrances to the through highways or may designate an intersection as a stop or yield intersection and erect like signs at one or more entrances to the intersection.

B. A driver of a vehicle approaching a stop sign shall stop before entering the crosswalk on the near side of the intersection, or if there is no crosswalk, shall stop at a clearly marked stop line, or if there is no line, shall stop at the point nearest the intersecting roadway where the driver has a view of approaching traffic on the intersecting roadway before entering the intersection except when directed to proceed by a police officer.

C. The driver of a vehicle approaching a yield sign shall slow down in obedience to the sign to a speed reasonable for the existing conditions and shall yield the right-of-way to any vehicle in the intersection or approaching on another highway so closely as to constitute an immediate hazard during the time the driver is moving across or within the intersection. If after driving past a yield sign without stopping the driver is involved in a collision with a vehicle in the intersection, the collision is prima facie evidence of the driver's failure to yield the right-of-way.



ARS 28-856. Emerging from alley, driveway or building

The driver of a vehicle emerging from an alley, driveway or building within a business or residence district shall:

1. Stop the vehicle immediately before driving onto a sidewalk or onto the sidewalk area extending across any alleyway or private driveway.
2. Yield the right-of-way to any pedestrian as necessary to avoid collision.
3. On entering the roadway, yield the right-of-way to all closely approaching vehicles on the roadway.

ARS 28-873. Stopping, standing or parking prohibitions

Except if necessary to avoid conflict with other traffic or if in compliance with law or the directions of a police officer or traffic control device, a person shall not stop, stand or park a vehicle in any of the following places:

1. On a sidewalk.
2. In front of a public or private driveway, except that this paragraph does not apply to a vehicle or the driver of a vehicle engaged in the official delivery of the United States mail if both of the following apply:
  - (a) The driver does not leave the vehicle.
  - (b) The vehicle is stopped only momentarily.
3. Within an intersection.
4. Within fifteen feet of a fire hydrant.
5. On a crosswalk.
6. Within twenty feet of a crosswalk at an intersection.
7. Within thirty feet on the approach to any flashing beacon, stop sign, yield sign or traffic control signal located at the side of a roadway.

ARS 28-904. Driving on sidewalk

- A. A person shall not drive a vehicle on a sidewalk area except on a permanent or duly authorized temporary driveway.
- B. This section does not apply to a motorized wheelchair, electric personal assistive mobility device, authorized emergency vehicle, security vehicle owned by this state or small service vehicle owned by this state or a political subdivision of this state.

ARS 28-908. Persons in wheelchairs or on electric personal assistive mobility devices

A person operating a wheelchair or motorized wheelchair or an electric personal assistive mobility device has all of the rights and duties that are contained in this chapter and chapters 4 and 5 of this title and that are applicable to pedestrians except provisions that by their nature can have no application.

ARS 28-911. Electric personal assistive mobility devices

A person who is under sixteen years of age shall not operate an electric personal assistive mobility device.



ARS 28-3164. Original applicants; examination

A. The department may examine an applicant for an original driver license or the department may accept the examination conducted by an authorized third party pursuant to chapter 13 of this title or documentation of successful completion of a driver education course approved by the department. The examination shall include all of the following:

1. A test of the applicant's:
  - (a) Eyesight.
  - (b) Ability to read and understand official traffic control devices.
  - (c) Knowledge of safe driving practices and the traffic laws of this state, including those practices and laws relating to bicycles.
2. An actual demonstration of ability to exercise ordinary and reasonable control in the operation of a vehicle or vehicle combination of the type covered by the license classification or endorsement for which the applicant applies.
3. Other physical and mental examinations if the department finds them necessary to determine the applicant's fitness to safely operate a motor vehicle on the highways.

ARS 28-7201. Definitions

In this article, unless the context otherwise requires:

1. "Implementing body" means the city or town council or other authority of a city or town, the board of supervisors of a county or the transportation board.
2. "Owner" or "owners of record" includes a person, firm, partnership, association or corporation.
3. "Owners association" means a nonprofit corporation authorized to do business in this state.
4. "Roadway" includes all or part of a platted or designated public street, highway, alley, lane, parkway, avenue, road, sidewalk or other public way, whether or not it has been used as such.

ARS 28-7501. Definitions

In this article, unless the context otherwise requires:

1. "Any highway purpose" includes any one or more of the following purposes:
  - (a) Payment of highway obligations.
  - (b) The cost of and cost allocated to construction, reconstruction, maintenance and repair of public highways and bridges, county, city and town roads and streets.
  - (c) The acquisition of real property for future highway needs.
  - (d) The cost of constructing landscape buffers, noise barriers, pedestrian bypasses, multi-use paths and other environmental impact mitigation measures to mitigate the adverse impact of freeways on local neighborhoods.

ARS 28-8132. Funding; improving transit services

A. The department may make grants to governmental authorities provided in section 28-8131 for the purposes provided in this article and may cooperate with local authorities in improving existing transit services and in integrating these services to:

1. Better meet public transportation needs.
2. Promote a balanced regional transportation system.
3. Improve local or regional air quality.



4. Provide assistance in the planning, design and implementation of intermodal transportation projects, pedestrian related projects and bicycle related projects.

B. Planning, coordination and actual operation of these services may be funded with general state revenues appropriated by the legislature for these purposes.

ARS 28-8133. Demonstration or pilot projects

A. The department may conduct demonstration or pilot projects to evaluate the effectiveness of new, extended, improved or integrated public transportation services, bicycle activities, pedestrian activities, intermodal transportation activities, and car pooling or van pooling activities in meeting regional transportation needs or in improving air quality.

B. These projects may be funded with general state revenues appropriated by the legislature for this purpose.

Bicycling; Shared Roads – House Bill 2503

To date: Introduced in the Arizona House, voted down in the Senate.

Issue: This bill clarifies four points of law that will improve bicycle safety and sharing the roads with motor vehicles.

ARS 28-735 clarifies that an individual may be fined for driving a vehicle too closely to a cyclist. Unfortunately, a few drivers drive very closely to cyclists, thus exhibiting threatening and unsafe behavior. Even if a cyclist does not incur physical injury, the psychological and “windblast” effect of a driver passing at high speeds can be serious and can cause a crash.

This section also removes Section C since it is in conflict with many other sections of law relating to: bicyclists preparing to make left turns, vehicles crossing into the bike lanes and paths, and bicyclists having to move temporarily into the travel lane to avoid debris, pavement damage, and vehicles parked in a bike lane. In addition, section C addresses “Bike Paths” which do not technically exist in Arizona Statute or official highway or transportation standards documents.

ARS 28-704 further clarifies that the three-foot law prevails. Bicycles can travel below the normal and reasonable flow of traffic. Drivers of motor vehicles may also travel below the reasonable movement of traffic in order to pass safely around bicyclist.

ARS 28-751 clarifies that a vehicle may use the reversible left lane for a reasonable distance if there is no traffic present to allow for the minimum three feet safe passing distance as required in 28-735.





### 3. Stakeholder Coordination

The Statewide Bicycle and Pedestrian Plan is the culmination of input from all interested parties. The extensive stakeholder coordination for the Plan was comprised of six components: the Steering Committee, the Review Committee, ADOT District/Regional Traffic Engineer input, public meetings, user surveys, and the project website. The participation by representatives from both engineering and planning divisions from ADOT, MPOs, and local jurisdictions plus interested organizations provides valuable input that is critical to the creation of an implementable plan that meets the needs of the citizens and visitors to Arizona.

#### 3.1. *Steering Committee Input*

Members of the Steering Committee were actively involved in the review and development of the plan. Comments provided by the Steering Committee were discussed at the meetings and the documents were revised based on the consensus of the group. Steering Committee members also were able to stay involved with the project through e-mail communication and the project website. For more information on the project website, see **Section 3.5**. Representatives of the following organizations made up the Steering Committee:

- ADOT Northern Regional Traffic Engineer;
- ADOT Intermodal Transportation Division;
- ADOT Roadway Design;
- ADOT Regional Traffic;
- ADOT Traffic Engineering;
- ADOT Transportation Enhancements;
- ADOT Transportation Planning Division;
- Bicycle Advisory Committee – Flagstaff;
- Bicycle Advisory Committee – Glendale;
- Bicycle Advisory Committee – Prescott;
- Central Arizona Association of Governments;
- City of Flagstaff;
- City of Flagstaff City Council;
- City of Glendale;
- City of Goodyear;
- City of Mesa;
- City of Phoenix Trails;
- City of Tempe Transportation;
- City of Tucson;
- City of Yuma Community Development;
- Coalition of Arizona Bicyclists;
- Flagstaff Metropolitan Planning Organization;
- Greater Arizona Bicycling Association – Phoenix and Tucson;
- Maricopa Association of Governments;
- Maricopa County DOT;
- Northern Arizona University;
- Phoenix Children’s Hospital;
- Pima Association of Governments;
- Pedestrian Advisory Committee – Tucson;
- Prescott Alternative Transportation;
- Southeastern Arizona Governments;
- Southwest Gas;
- Tucson Department of Transportation;
- Town of Oro Valley;
- Valley Metro;
- Western Arizona Council of Governments;
- Yuma Unofficial Foothills Bicycle Club;
- Yuma Metropolitan Planning Organization; and
- Yuma Safety Representative.



### 3.2. *Review Committee Input*

The Review Committee was kept involved in the plan through e-mail notification and review of the website. Anyone interested in being more involved in the plan was invited to participate on the Steering Committee, which was discussed in **Section 3.1**. The following is a list of organizations/divisions that were on the Review Committee:

- Arizona Bicycle Club;
- Arizona Department of Education;
- ADOT District Engineers;
- ADOT Regional Traffic Engineers;
- ADOT Environmental Group;
- ADOT Geographic Information Systems;
- Arizona Office of Tourism;
- Arizona State Parks;
- Arizona State University;
- City of Flagstaff;
- City of Phoenix Traffic;
- City of Tucson Bicycle Advisory Committee;
- Commission on Disabilities Issues;
- Council on Physical Fitness;
- Department of Commerce;
- Department of Health Services;
- Department of Public Safety;
- Federal Highway Administration;
- Flagstaff Metropolitan Planning Organization;
- Governor's Office of Highway Safety; and
- Greater Arizona Bicycling Association, Phoenix and Tucson Chapters.

### 3.3. *ADOT District and Regional Traffic Engineer Input*

The ADOT District and Regional traffic engineers have a vast knowledge of the conditions of roadways under their jurisdiction and issues related to bicycle and pedestrian transportation. Background information on the project and requests for information regarding conditions and issues that impact bicycling and walking within their jurisdiction were sent to the following positions in the Fall 2002:

- Baja Regional Traffic Engineer;
- Flagstaff District Engineer;
- Globe District Engineer ADOT
- Holbrook District Engineer;
- Kingman Maintenance District Engineer;
- Kingman District Engineer;
- Northern Regional Traffic Engineer;
- Prescott Maintenance District Engineer;
- Phoenix Construction Assistant DE;
- Phoenix Construction District Engineer;
- Phoenix Regional Traffic Engineer;
- Phoenix Prescott District Engineer;
- Safford Development and Maintenance Engineer;
- Safford District Engineer;
- Tucson District Engineer;
- Western Regional Traffic Engineer; and
- Yuma District Engineer.

Information provided by the regional and district engineers is incorporated into the existing conditions summary in **Section 5.3**.



### **3.4. Public Open House Meetings**

Public meetings are an important component of all planning processes. If the Plan does not include input from the general public, it is unlikely to contain the desires of the community or the support for the implementation of the Plan. Public feedback was gathered through two sets of public open house meetings. The first was held to review the project scope and existing conditions status. The second meeting was held to review the draft Plan. Each of the public meetings was held in Northern, Central, and Southern Arizona.

Information provided from the public at the open house meetings is summarized in **Section 5.3**.

### **3.5. User Surveys**

Information regarding bicycling and walking was gathered from the general public through the use of surveys, one for bicycling, and one for walking. The survey solicits detailed feedback regarding the existing bicycling and walking conditions and issues, the Plan, and potential improvements to bicycling and walking facilities. A copy of the survey that was distributed is provided in **Appendix A**.

**Section 5.3** includes a summary of the comments received on the user surveys.

### **3.6. Project Website**

There is a website for the ADOT Bicycle and Pedestrian Program at [www.azbikeped.org](http://www.azbikeped.org). Content on the website contains statewide bicycle and pedestrian data, maps, information, contacts, and links. The website contains information for the general public on the Plan and a password protected section for Review and Steering Committee members. The website is expandable so additional information that becomes available can be placed on the site. Information regarding the Public Open House Meetings and the user surveys described in **Sections 3.4** and **3.5** were posted on the website.



## 4. Study Goals and Objectives

The study goal and objectives were prepared by the Arizona Department of Transportation and finalized based on direct Steering Committee input and a review of goals and objectives from other state plans.

### 4.1. Study Goal and Objectives

#### **Study Goal**

To provide a long-term plan for a statewide system of interconnected bicycle and pedestrian facilities that will guide ADOT transportation decisions relating to bicycle and pedestrian travel, planning, and facility development.

#### **Study Objectives**

- A. Conduct an inventory of highways under ADOT jurisdiction to determine existing conditions for bicycle travel.
- B. Determine preferred bicycle routes on the state highway system.
- C. Evaluate financial considerations, including costs. Compile a listing of funding sources that are currently being used or can be used to fund shared lane roadway and bicycle and pedestrian facilities. Identify funding strategies and a system for tracking individual projects.
- D. Develop a pedestrian policy to guide ADOT in State Highway, U.S. Highway, and Interstate Highway development. Evaluate the effectiveness of the existing ADOT Bicycle Policy, at least nine months after its adoption, and recommend revisions, if needed.
- E. Evaluate facility design and maintenance issues. Develop design standards and cross-section detail design for shared roadways and bicycle facilities that can be integrated into existing design standards, if needed.
- F. Implementation – develop a statewide bicycle network plan that prioritizes corridors, integrates existing plans from other jurisdictions, and identifies funding for future development.
- G. Provide model bicycle and pedestrian ordinances for local governments in Arizona.
- H. Involve representatives from interested agencies and organizations throughout the State and citizens of Arizona in the development of the Plan.



## 5. 2002 Current Conditions

An evaluation of current conditions on State Highways is being utilized to provide a baseline of typical conditions and issues regarding bicycling and walking in Arizona. The State Highway System includes approximately 6,200 miles of roadway. Due to the vast mileage of roadways included in this Plan, the majority of current conditions are being collected from existing data sources. The main data sources include existing ADOT data and input from Review Committee members. The following is a list of data that is desired:

- Shoulder width;
- Annual Average Daily Traffic (AADT);
- Percent truck traffic;
- Rumble strips type and condition by milepost designation;
- Mill and fog coat situations by milepost;
- Roadway Level of Service (LOS);
- Inventory of off-road facilities;
- Pedestrian facility type and location;
- Bicycle facility type and location;
- Bicycle and pedestrian related crashes and causes;
- Presence of major intersections or interchanges;
- Type and condition of signing;
- Traffic signals and bicycle and pedestrian features;
- Parking and general occupancy;
- Speed limit;
- General maintenance condition and presence of hazards;
- Number and width of travel lanes;
- Right-of-way width and unused right-of-way;
- Presence and condition of railroad tracks, grates, cattle guards, and other potential hazards;
- Observed bicycling or walking patterns;
- Presence of schools, parks, and other generators;
- Local access and bypass routing associated with controlled access highways (alternate signed routes); and
- Roadway relative cost.



### 5.1. Existing ADOT Data

The State Highway Log and the Highway Performance Monitoring System (HPMS) are the two main databases of roadway conditions that ADOT maintains. Both databases can be viewed using ArcView and Microsoft Excel programs. Data is entered into both systems by ADOT and jurisdiction staff throughout the state. There is a vast amount of data included in the HPMS database. The data includes 98 parameters for over 10,000 roadway segments covering over 57,000 miles of roadway within the state of Arizona. A listing of the 98 parameters included in the HPMS database is in **Appendix B**. The database is available for review on the following website, [www.azhighwaydata.com](http://www.azhighwaydata.com). Due to budget constraints, this website may not be updated in the future. The following is a list of desired data that is included in the 98 parameters of HPMS or the State Highway Log:

- Right shoulder width;
- Shoulder pavement type;
- Shoulder condition;
- Roadway relative cost;
- AADT;
- Percent truck traffic;
- Roadway LOS;
- Speed limit;
- Pavement condition;
- Number of travel lanes;
- Right-of-way width;
- Left shoulder width;
- Functional type;
- Width of travel lanes;
- Presence of railroad tracks;
- Designated truck route; and
- Terrain type.

An explanation of the data parameters is also included in **Appendix B**.

The Bicycle Suitability, shown in **Exhibits 2** and **2B**, is the previous baseline for bicycling conditions within Arizona and many comments regarding current conditions are referenced to the Bicycle Suitability inventory. This map has continued to be updated by ADOT; however, **Section 7** includes a map of the bicycling conditions based on the 2001 ADOT data and the content presented on the map is revised. The right shoulder width is one of the most critical parameters in determining bicycle suitability and is shown in **Exhibits 3** and **3B**. The ability to widen the roadway to provide an adequate shoulder for bicycling, or walking in some situations, is crucial information in the determination of priority corridors for implementation and is displayed in **Exhibits 4** and **4B**. The original determination of relative cost is based on an ADOT evaluation of roadway relative cost. The following is a list of the ADOT category and the associated relative cost for this study:

#### ADOT Roadway Widening Data

Poor shoulder condition  
Widen three or more lanes  
Widen two to three lanes  
Widen one lane  
No widening feasible

#### ADOT Bicycle and Pedestrian Category

Minor expense  
Moderate expense  
Moderate expense  
Major expense  
Not feasible

The information provided on these exhibits was reviewed by stakeholders and revisions were made based on stakeholder knowledge. **Tables 1** through **3** include the distances of the parameters displayed in the exhibits.



**Table 1 – 1996 Bicycle Suitability**

	<b>More Suitable</b>	<b>Less Suitable</b>	<b>Prohibited</b>	<b>No data</b>	<b>Total</b>
Distance (mi.)	3667	2094	251	175	6187

**Table 2 – Right Shoulder Width**

	<b>0 – 2'</b>	<b>3 – 4'</b>	<b>Minimum 5'</b>	<b>Prohibited</b>	<b>Total</b>
Distance (mi.)	2075	480	3345	365	6265

**Table 3 – Relative Cost**

	<b>Minor Expense</b>	<b>Moderate Expense</b>	<b>Major Expense</b>	<b>No</b>	<b>Prohibited</b>	<b>Total</b>
Distance (mi.)	1400	3925	480	60	370	6235

**Motor Vehicle and Bicycle/Pedestrian Crash Facts**

The Arizona Motor Vehicle Crash Facts 2000 is another ADOT data source that provides valuable information. General information on crashes involving bicyclists or pedestrians and a motor vehicle in motion is included in the report. The most current data available is provided on the ADOT website. The report uses the term pedalcyclist in place of the common term bicyclist. Information on locations of crashes is not included in this report. A summary of the data provided is as follows:

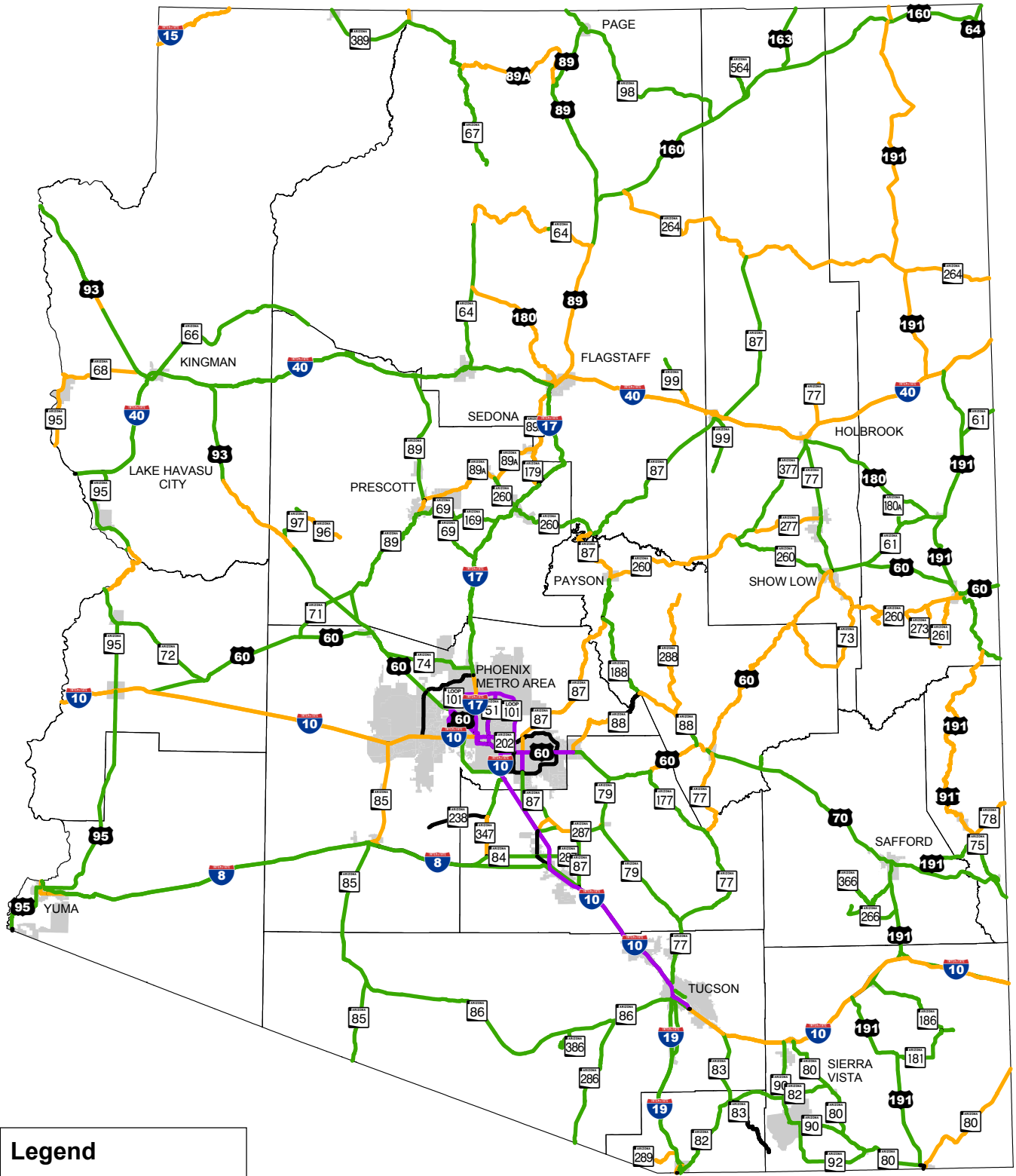
- Of 131,573 reported motor vehicle crashes in Arizona in 2001, approximately three percent included a pedestrian or bicyclist;
- Pedestrian crashes are 1.22 percent and bicyclist crashes are 1.52 percent of the total crashes in Arizona;
- 9.8 percent of pedestrian crashes were fatal (157) and 1.46 percent of bicyclist crashes were fatal (29). Arizona consistently is among the 5 highest in pedestrian and bicycle deaths per 100,000 population; however, the death per 100,000 population rate is typically highest in locations with more pedestrian and bicycle travel;
- 35 to 55 year old males are more likely than other males or females to be killed as a pedestrian or bicyclist in a crash with a motor vehicle;
- Over 57 percent of pedestrians killed in crashes with motor vehicles were crossing the roadway;
- Approximately 15 percent of pedestrians injured were impaired due to drinking or drugs;
- Approximately 56 percent of pedestrian crashes happened in the daylight and approximately 877 percent of bicyclist crashes happened in the daylight; and
- Approximately 87 percent of all pedestrian and bicyclist crashes were in clear weather conditions

It should be noted that these statistics only include reported crashes between a bicycle and a motor vehicle in motion. Other bicycle crashes not involving a moving motor vehicle, such as fixed object crashes and falls, are not included. Studies have indicated that over 80 percent of all bicycle crashes do not involve motor vehicles.



# ARIZONA STATEWIDE BICYCLE AND PEDESTRIAN PLAN

## EXHIBIT 2: 1996 BICYCLE SUITABILITY MAP



**Legend**

- More Suitable
- Less Suitable
- Bicycles Prohibited
- No Data Available

Note: This is the Bicycle Suitability Map developed in 1996. Updated bicycle conditions are shown in Exhibits 5, 5B, 8 & 8B.

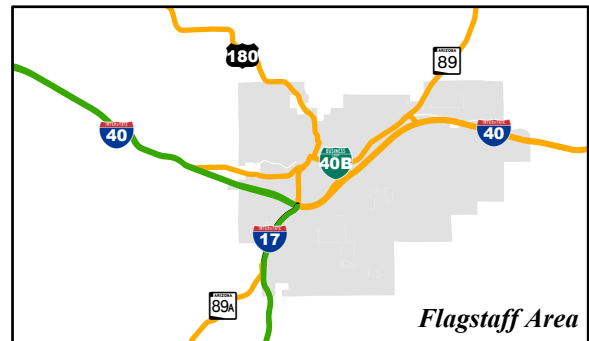
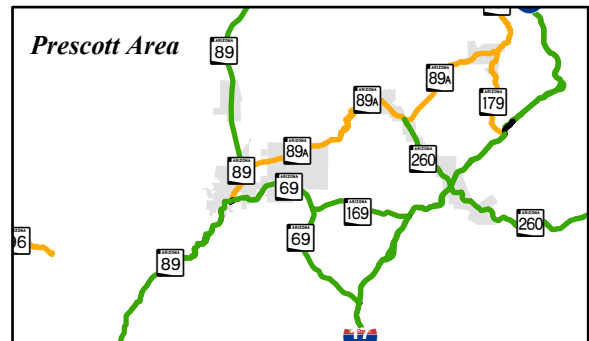
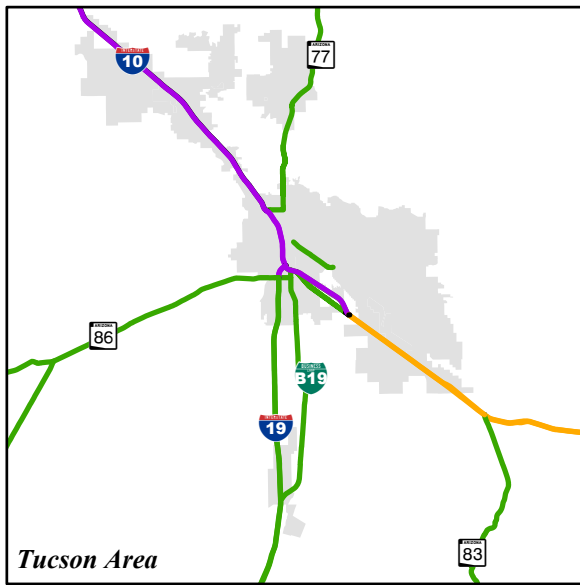
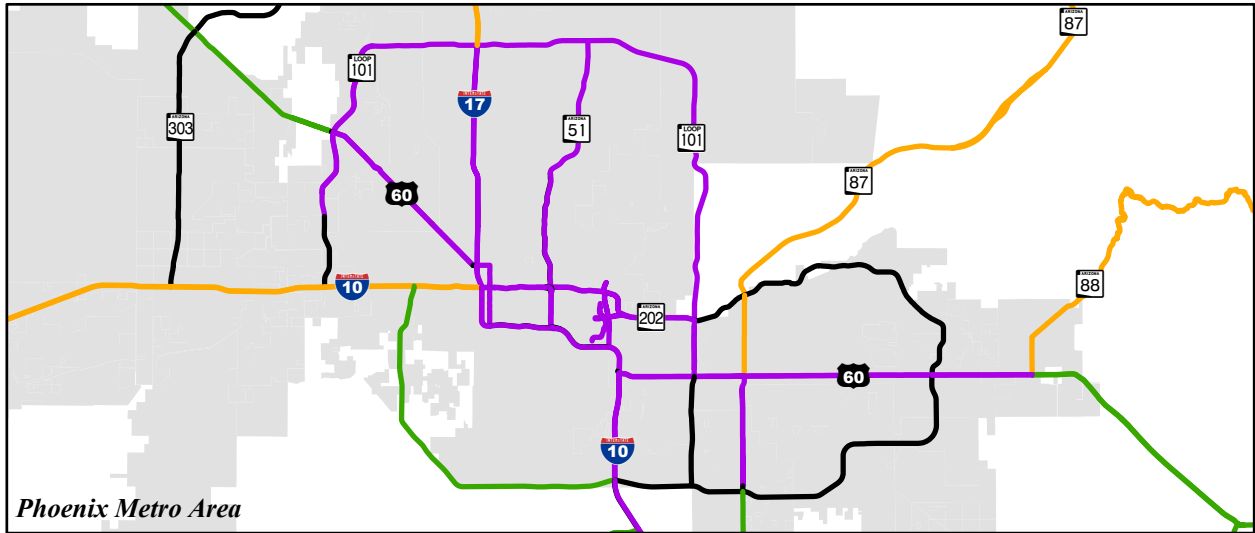






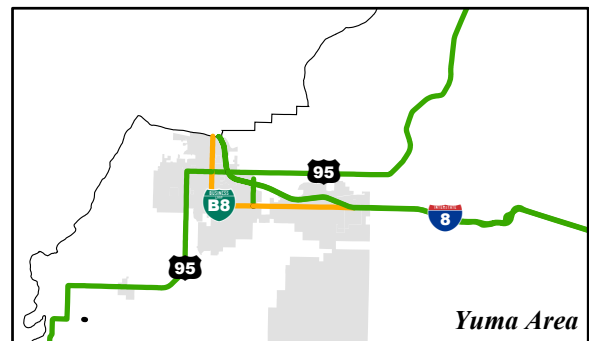
ARIZONA STATEWIDE BICYCLE AND PEDESTRIAN PLAN

EXHIBIT 2B: 1996 BICYCLE SUITABILITY MAP (LOCAL AREAS)



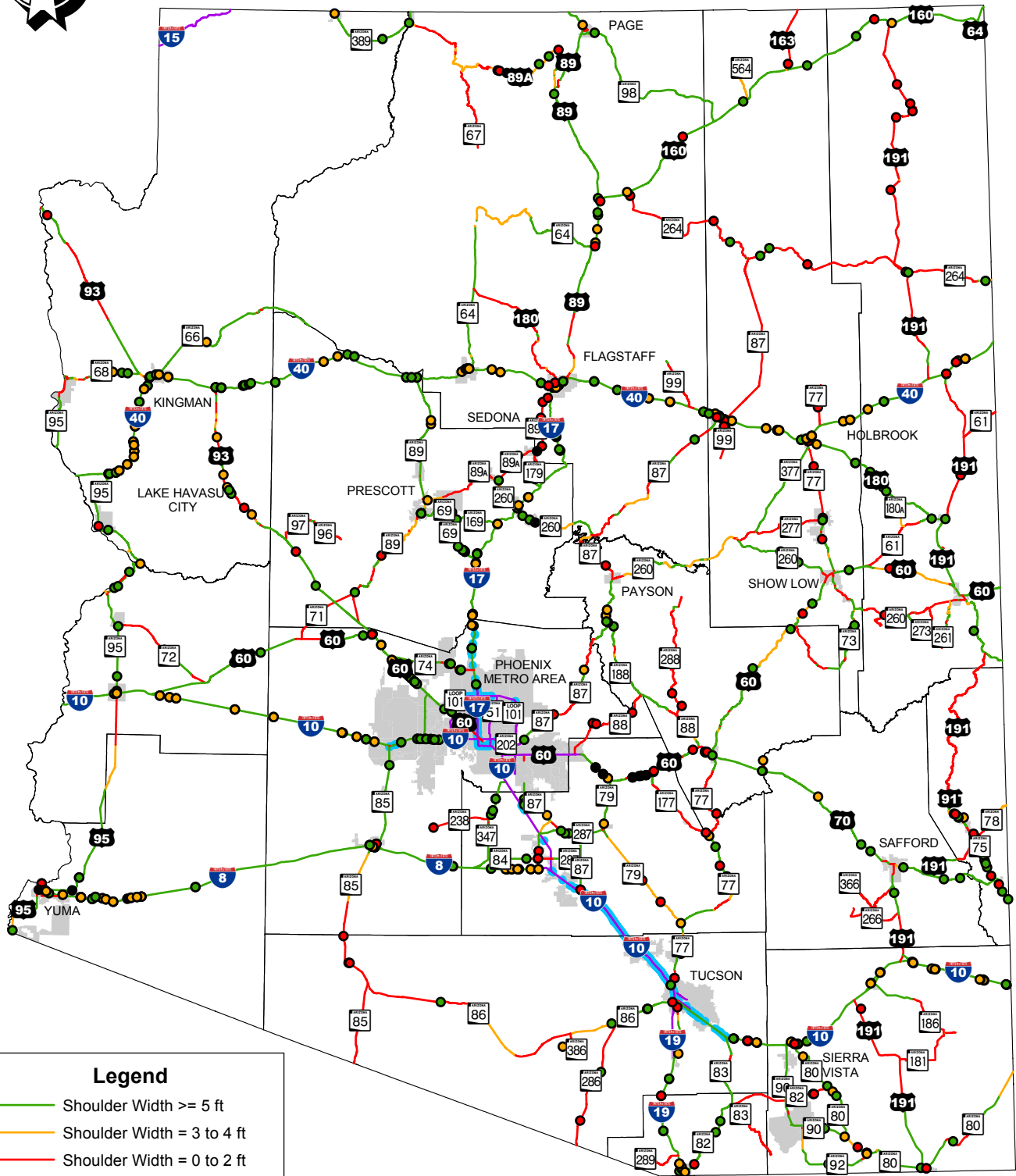
**Legend**

- More Suitable
- Less Suitable
- Bicycles Prohibited
- No Data Available



Note: This is the Bicycle Suitability Map that was developed in 1996. Updated bicycle conditions are shown in Exhibits 5, 5B, 8 & 8B.

EXHIBIT 3: RIGHT SHOULDER WIDTH



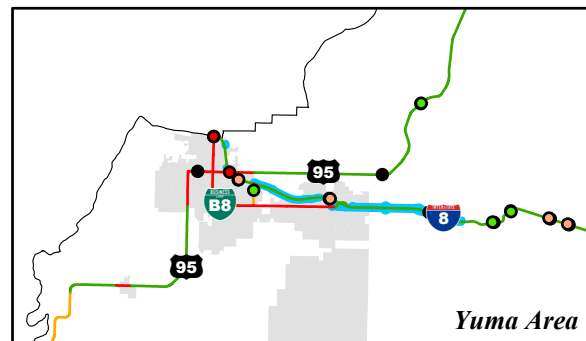
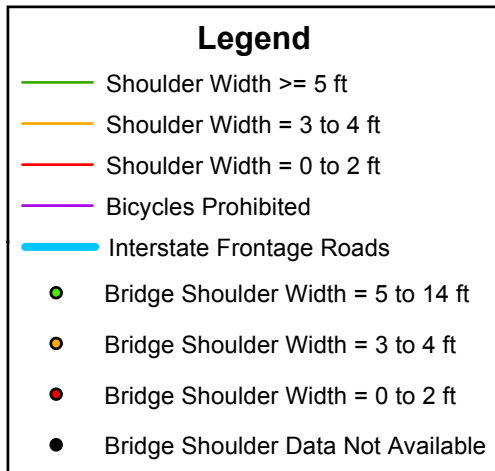
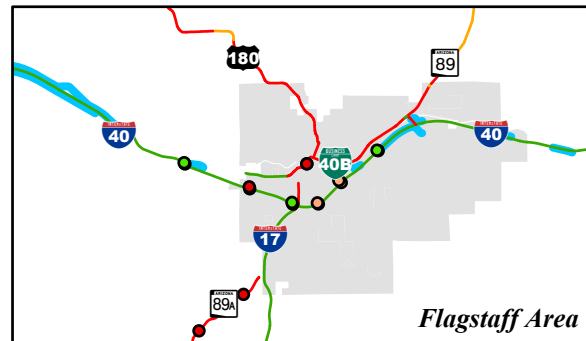
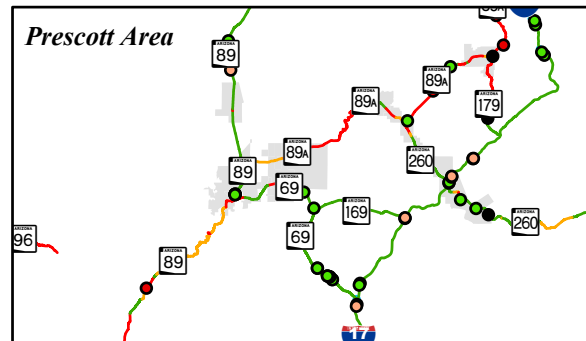
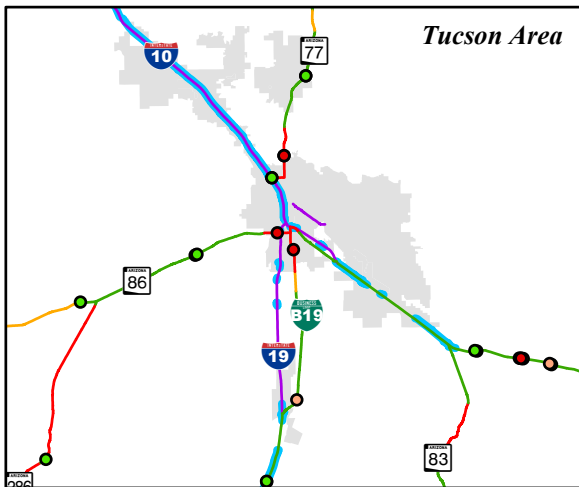
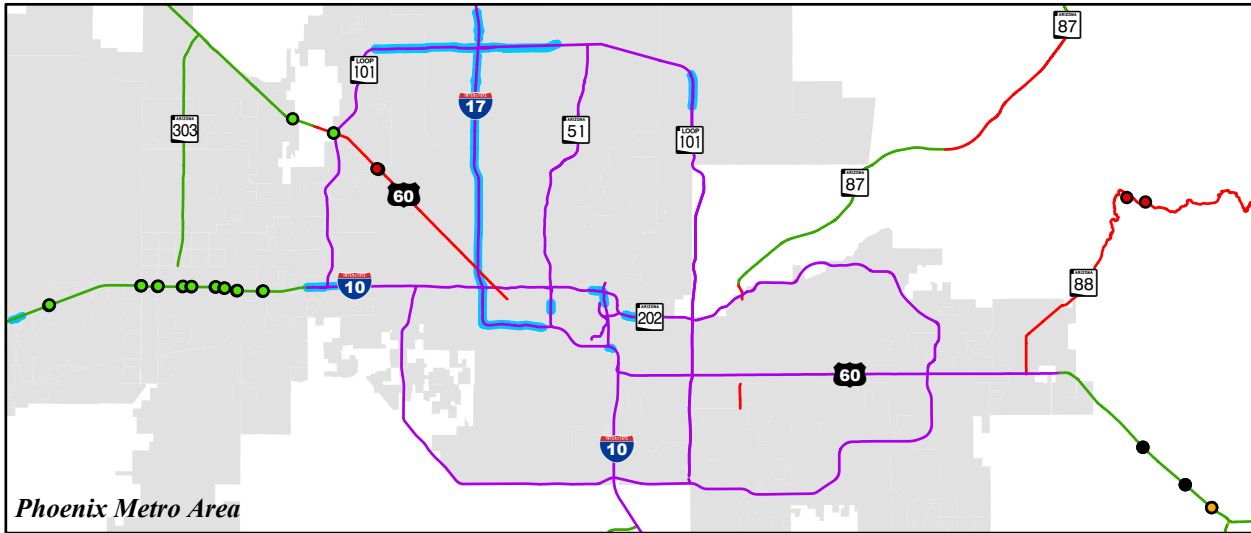
**Legend**

- Shoulder Width  $\geq$  5 ft
- Shoulder Width = 3 to 4 ft
- Shoulder Width = 0 to 2 ft
- Bicycles Prohibited
- Interstate Frontage Roads
- Bridge Shoulder Width  $\geq$  5 ft
- Shoulder Width = 3 to 4 ft
- Shoulder Width = 0 to 2 ft
- Data Not Available



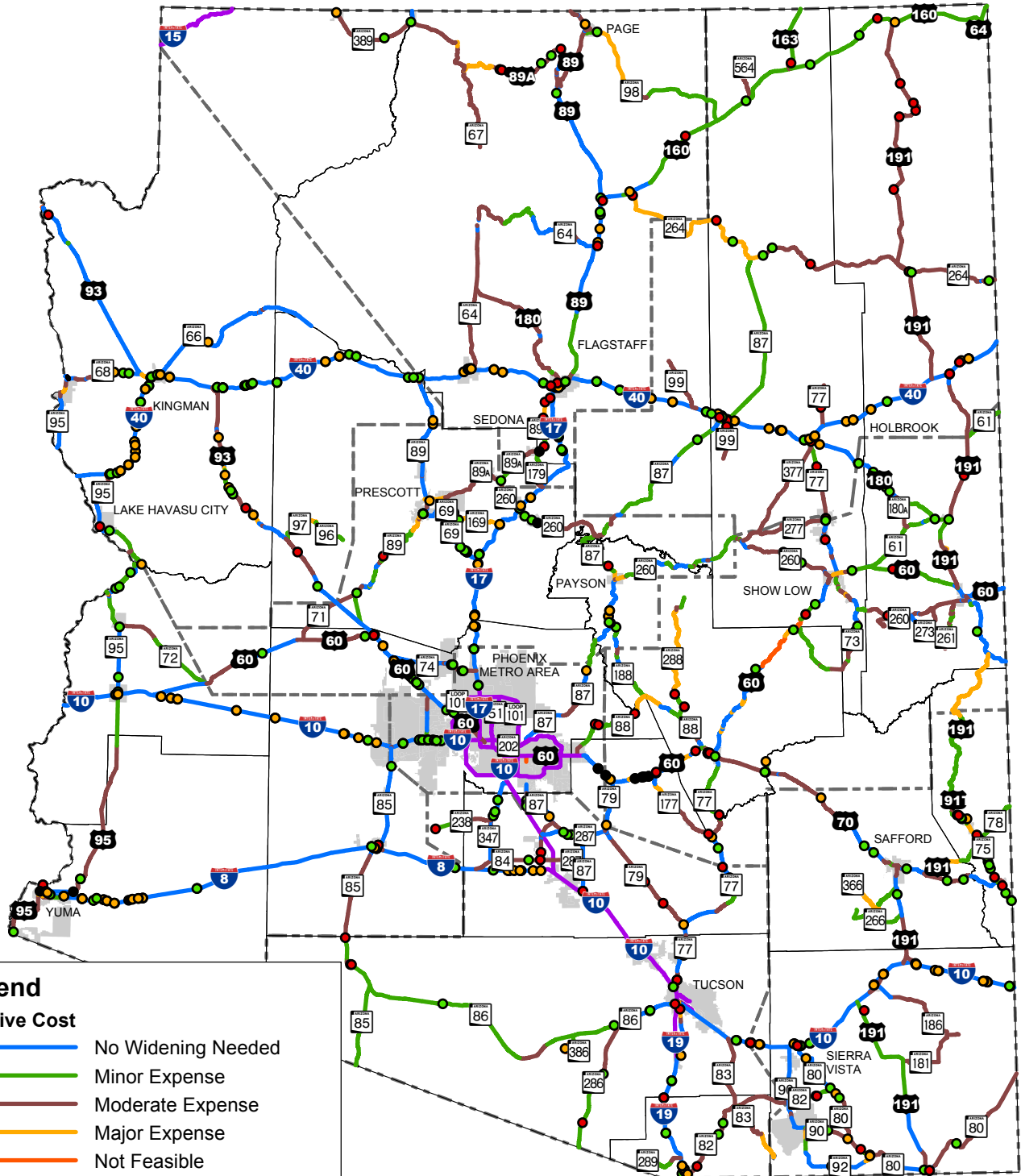
# ARIZONA STATEWIDE BICYCLE AND PEDESTRIAN PLAN

## EXHIBIT 3B: RIGHT SHOULDER WIDTH (LOCAL AREAS)



ARIZONA STATEWIDE BICYCLE AND PEDESTRIAN PLAN

EXHIBIT 4: RELATIVE COST OF SHOULDER IMPROVEMENTS



**Legend**

**Relative Cost**

- No Widening Needed
- Minor Expense
- Moderate Expense
- Major Expense
- Not Feasible
- Data Not Available
- Bicycles Prohibited

**Bridge Right Shoulder Width**

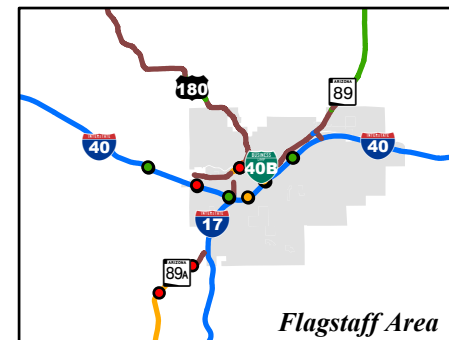
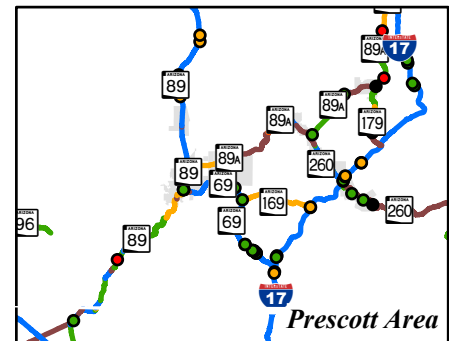
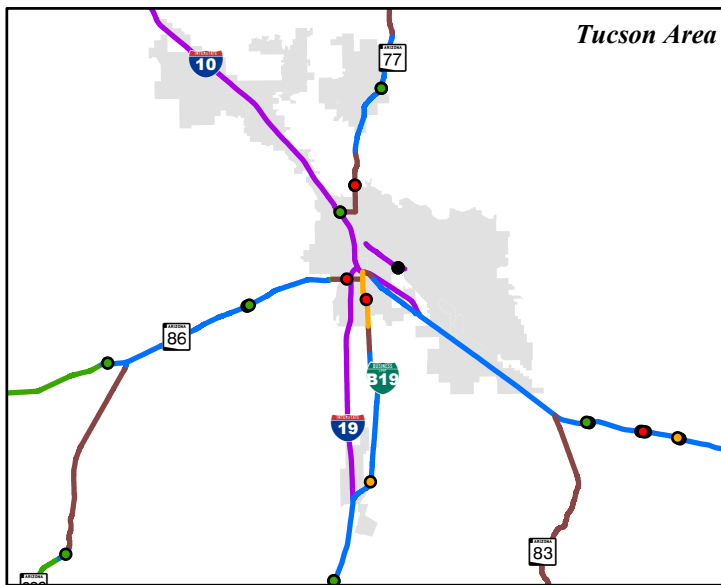
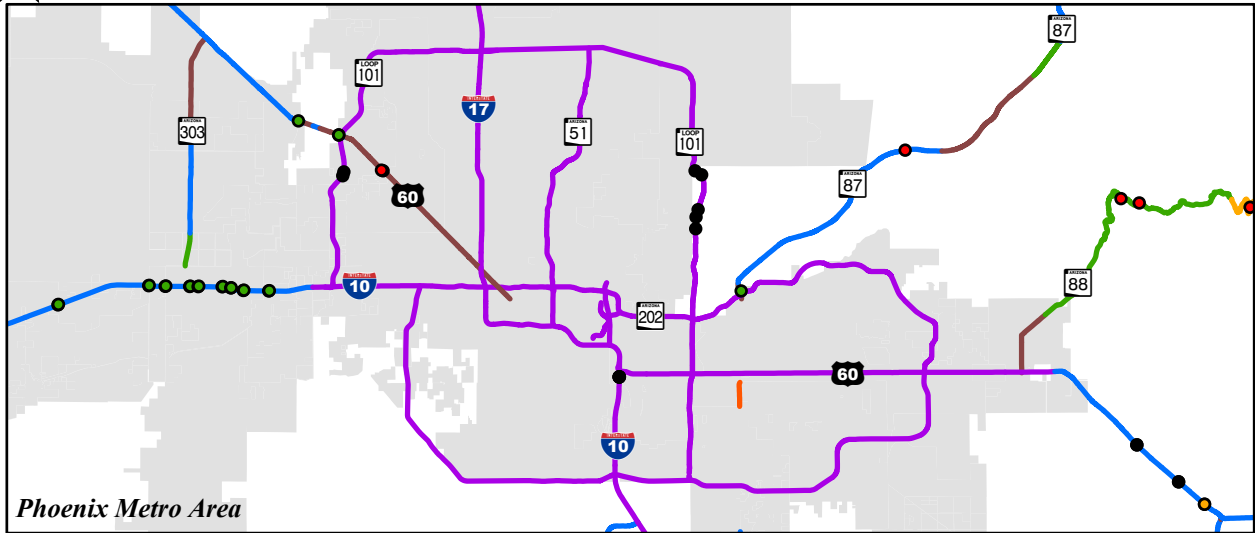
- Shoulder Width = 5 to 14 ft
- Shoulder Width = 3 to 4 ft
- Shoulder Width = 0 to 2 ft
- Data not available



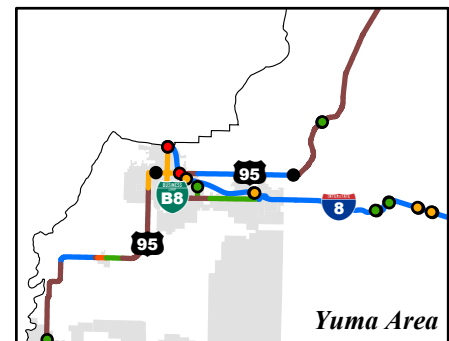


# ARIZONA STATEWIDE BICYCLE AND PEDESTRIAN PLAN

## EXHIBIT 4B: RELATIVE COST OF SHOULDER IMPROVEMENTS (LOCAL AREAS)



Legend	
Relative Cost	Bridge Right Shoulder Width
<span style="color: blue;">—</span> No Widening Needed	<span style="color: green;">●</span> Shoulder Width = 5 to 14 ft
<span style="color: green;">—</span> Minor Expense	<span style="color: yellow;">●</span> Shoulder Width = 3 to 4 ft
<span style="color: brown;">—</span> Moderate Expense	<span style="color: red;">●</span> Shoulder Width = 0 to 2 ft
<span style="color: orange;">—</span> Major Expense	<span style="color: black;">●</span> No Data Available
<span style="color: black;">—</span> Not Feasible	
<span style="color: black;">—</span> Data Not Available	
<span style="color: purple;">—</span> Bicycles Prohibited	





## 5.2. *Bicycle Conditions Score*

There are various roadway criteria that impact bicycling conditions on State Highways. By evaluating certain parameters of the available roadway data described above, it is possible to approximate bicycling conditions. The following criteria are the most appropriate of the available data to approximate bicycling conditions:

- Right shoulder width;
- Traffic volume to capacity ratio;
- Percent trucks; and
- Speed limit.

A score is assigned to all State Highway segments for the criteria above to quantitatively represent bicycling conditions. The weighting of the criteria recognizes that not all criteria are equally important. For example, the speed limit on a State Highway is less important to a bicyclist than the right shoulder width and the traffic volume; therefore, the right shoulder width and traffic volume criteria are weighted more than the speed limit criterion. The following is an explanation of the scoring assigned to each criterion.

### **Right Shoulder Width**

Right shoulder width is an important criterion in determining bicycling conditions. A wider shoulder width provides more separation between the bicyclist and motorized vehicles and is more comfortable for the bicyclist; therefore, route segments with wide shoulders were given more points than route segments with little or no shoulder. Specifically, points are assigned as follows:

- Route segments with shoulder widths of eight feet or greater get ten points;
- Route segments with shoulder widths greater than four feet but less than eight feet get seven points;
- Route segments with shoulder widths greater than two feet but less than or equal to four feet get three points; and
- Route segments with shoulder widths of two feet or less get no points.

### **Traffic Volume to Capacity Ratio**

The traffic volume to capacity ratio is an important indicator of the ability of a bicycle and a motor vehicle to share the road. On roadway segments with a low traffic volume to capacity ratio, it is typically more feasible for a bicyclist to ride on a roadway with little or no shoulder because motorized vehicles are able to easily pass bicyclists using another lane. Points for traffic volume to capacity ratio are assigned as follows:

- Route segments with a ratio of 0.10 or less get ten points;
- Route segments with a ratio greater than 0.10 and less than or equal to 0.30 get seven points;
- Route segments with a ratio greater than 0.30 and less than or equal to 0.50 get three points; and
- Route segments with a ratio greater than 0.50 get no points.



### Percent Trucks

The percentage of trucks utilizing the route segment impacts bicycling conditions. The lower the percentage of large trucks utilizing the route segment, the more points given to that route segment. Points are assigned as follows:

- Route segments with less than five percent trucks get five points;
- Route segments with the percentage of trucks greater than five percent and less than or equal to ten percent get three points;
- Route segments with the percentage of trucks greater than ten percent and less than or equal to fifteen percent get one point; and
- Route segments with the percentage of trucks more than fifteen percent were given no points.

### Speed Limit

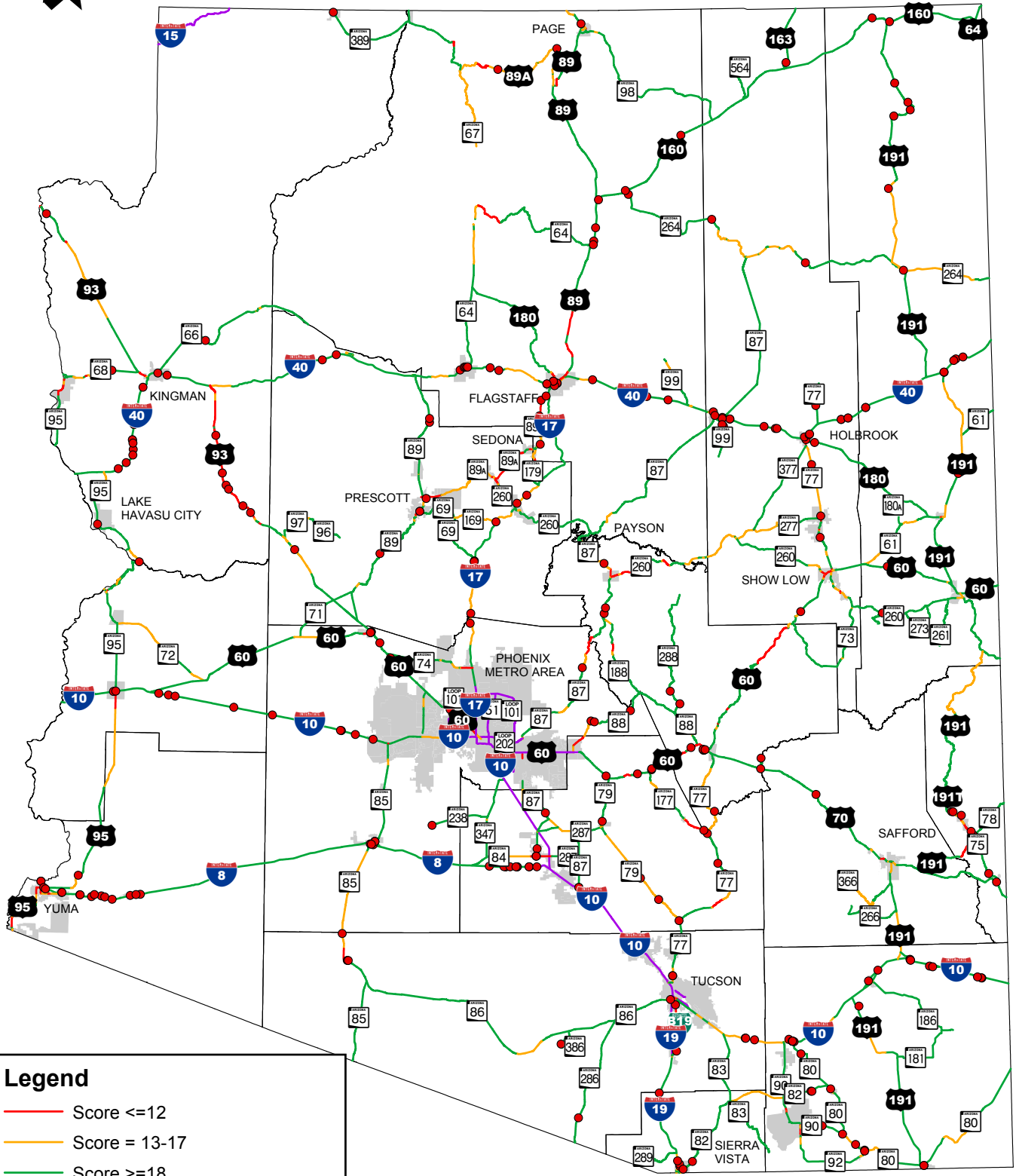
Vehicles traveling at higher speeds typically create more air turbulence and drivers at higher speeds typically have less reaction time available to respond to potential conflicts between motorists and bicyclists; therefore, State Highways with lower speed limits are given more points than routes with higher speed limits. Route segments were assigned points as follows:

- Route segments with a posted speed limit of 45 mph or less get five points;
- Route segments with a posted speed limit of 50 or 55 mph get three points; and
- Route segments with a posted speed limit over 55 mph get no points.

The points for a particular route are summed together to create a bicycling conditions score. **Exhibits 5** and **5B** show this bicycling conditions score. The bicycling conditions score is grouped as those that are greater than 18, 13 through 17, and less than 12. Segments that have scores greater than 18 are considered to have conditions favorable to bicycling. Segments with scores between 13 and 17 typically have a favorable condition such as a wide right shoulder or low traffic volume, with one or two other parameters having average conditions. Lastly, those segments with scores of less than 12 have less favorable conditions for all criteria. The bicycle conditions score is utilized in the Implementation Plan to prioritize recommended improvements.



EXHIBIT 5: BICYCLING CONDITIONS SCORE



**Legend**

- Score <=12
- Score = 13-17
- Score >=18
- Bicycles Prohibited
- Bridge with Shoulder Width < 4 ft

Note: Facilities for which the data is more suitable to bicycling have a higher Bicycle Conditions Score.

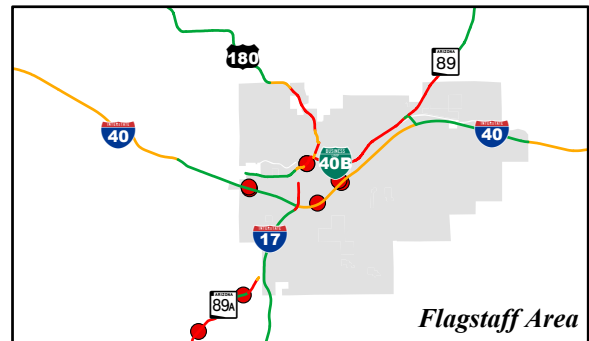
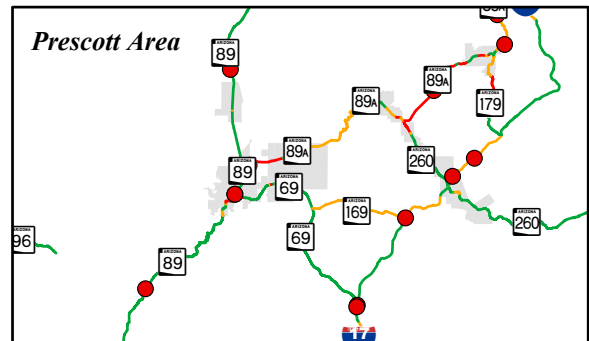
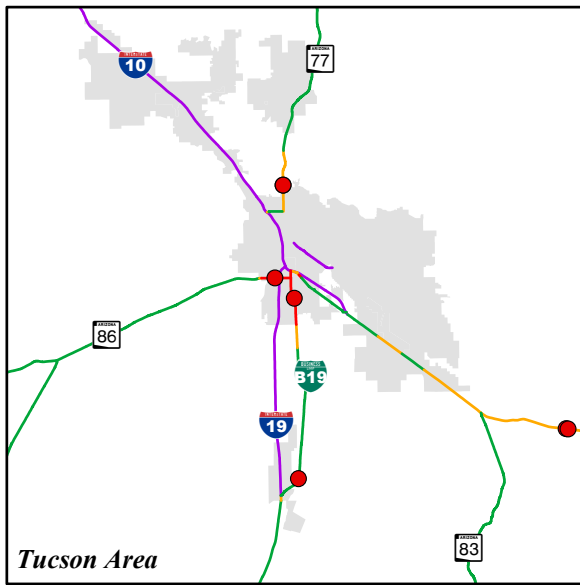
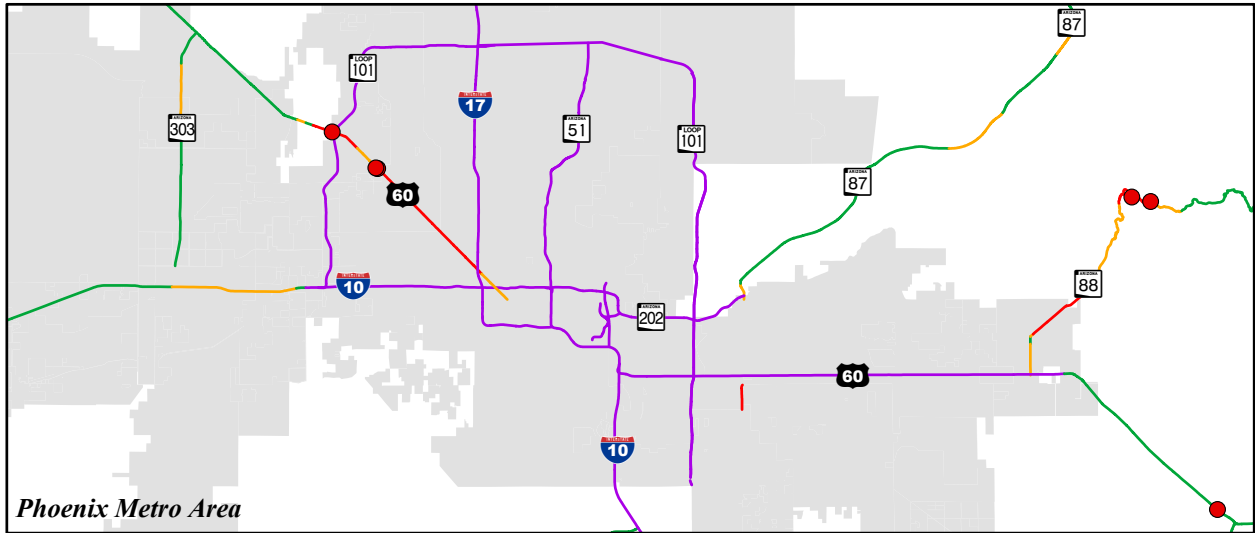






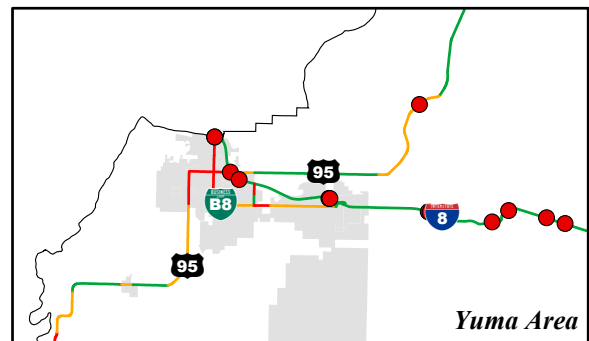
# ARIZONA STATEWIDE BICYCLE AND PEDESTRIAN PLAN

## EXHIBIT 5B: BICYCLING CONDITIONS SCORE (LOCAL AREAS)



**Legend**

- Score  $\leq 12$
- Score = 13-17
- Score  $\geq 18$
- Bicycles Prohibited
- Bridge with Shoulder Width < 4 ft



Note: Facilities for which the data is more suitable to bicycling have a higher Bicycle Conditions Score.



### 5.3. Stakeholder Input

The process to receive feedback from Review Committee members, Steering Committee members, ADOT District and Regional Traffic Engineers, Open House attendees, and survey respondents is described in **Section 3**. The following is a summary of the survey responses and the comments that were provided on the surveys and by other stakeholders.

#### **Bicycle User Survey Responses**

There were 563 Bicycle User Surveys returned. The following is a summary of the responses.

1. Do you ride a bike? Yes 97% No 2% *If no, skip to Question 6.*
2. Where do you like to ride your bike? (Please rank the items in order of preference - 1 is most preferred, 4 is least preferred):

	Average	Standard Deviation	Mode (Common)
Shared use paths	1.93	1.14	1.00
Bike lanes	1.57	1.57	1.00
Roadways without bicycle lanes	2.86	1.21	4.00
Residential roadways	2.29	1.01	3.00
Other (mostly mountain bike trails)	1.28	0.79	1.00

3. How often do you ride a bike?

1x per day or more 25% 1 - 6x per week 60% 1-3x per month 9% Very rarely 2%

4. Why do you ride a bike? (Please rank the reasons why you ride your bike: 1 is most often, 5 or 6 are least often)

	Average	Standard Deviation	Mode (Common)
Work	2.26	1.54	1.00
School	3.75	1.88	5.00
Errands	2.50	1.28	1.00
Social	2.27	1.21	1.00
Recreation/exercise	1.33	0.83	1.00
Other (mostly environment and training)	1.76	1.43	1.00

5. How far do you ride your bike on average?

0-5 miles 22% 6-10 miles 18% 11 or more miles 58%



6. Why don't you ride a bike more often? (Please rank the reasons why you don't ride your bike more often: 1 is most important, 7 is least important)

	Average	Standard Deviation	Mode (Common)
Concerns about safety	2.22	1.65	1.00
No bike paths or bike routes to ride on	2.16	1.58	1.00
No bicycle parking	4.46	2.07	7.00
Weather/Darkness	3.26	1.88	1.00
Destination too far	4.03	2.12	7.00
Need access to car	3.90	2.18	1.00
No changing/shower facilities	4.51	2.25	7.00
Other (mostly environment. or health or no time)	1.42	1.29	1.00

7. Which State Highways do you bike on most often? A map of Arizona is provided to help you identify State roadways. What are the biggest problems for bicycling at these locations (dangerous intersections, no marked bicycle lanes or routes, no bicycle parking, poor pavement or shoulder condition, aggressive motorists, too many cars, cars going too fast, too many trucks, etc.)

The answers to this question are included in the comments and issues section that follows the pedestrian user survey.

### Pedestrian User Survey Responses

There were 260 Pedestrian User Surveys returned. The following is a summary of the responses.

1. How often do you walk to or from work, school, errands, for recreation or exercise, during lunch, or to go to a business or social activity? (Please count each round-trip as one trip.)

1x per day or more 31%    1 - 6x per week 51%    1-3x per month 7%    Very rarely 9%

2. Why do you walk? (Please rank the reasons why you walk: 1 is most often, 5 or 6 are least often)

	Average	Standard Deviation	Mode (Common)
Work	2.68	1.70	1.00
School	3.85	1.89	6.00
Errands	2.12	1.28	1.00
Social	2.32	1.35	1.00
Recreation/exercise	1.38	0.90	1.00
Other (mostly environment or walk dogs)	2.37	1.74	1.00

3. About how far do you walk on an average walk trip? (Check all that apply)

Several Blocks (1/4 mile or less) 24%    1/4 to 1-mile 37%    1-2 miles 34%    Over 2 miles 26%



4. How far do you live from work or school?

0-1 mile 12% 1-2 miles 14% 2-5 miles 28% 6-10 miles 15% 11 or more miles 17%

5. Describe the reason you don't walk or walk more often to get to your destinations: (Mark 1 as most important, 2...)

	Average	Standard Deviation	Mode (Common)
Concerns about safety	2.52	1.41	1.00
Lack of walkways to walk on	2.07	1.39	1.00
Weather/Darkness	2.70	1.39	1.00
Destination too far	2.72	1.63	1.00
Need access to car	1.76	1.23	1.00
Other (mostly not enough time or riding bike)	1.51	1.21	1.00

6. Please identify the five biggest problems for walking, such as dangerous intersections, stretches of road without sidewalks, etc. A map of Arizona is provided to help identify particular State roadways.

The answers to this question are included in the comments and issues section that follows.

### General Comments

Comments and issues regarding statewide issues are provided first, followed by input that is grouped by ADOT District Boundaries.

- 1907 Road Guide: This includes Arizona's first highways and some may be suitable for bicycling.
- Arizona Trail: Review the alignment of the Arizona Trail, which is part of the National Trail System, for reference as a regionally significant non-ADOT route.
- Crossings: Crossings are becoming a VERY big issue. Signalized pedestrian crossings are spaced too far apart on many State Highways (miles in some cases) so many pedestrians cross at unsafe locations. I see this as a huge barrier to achieving a pedestrian and bicycle friendly community and any significant mode shift away from automobiles.
- Grades: Provide grade information on user map, potentially using one chevron for a slight grade and two chevrons for a steeper grade.
- Innovative Design Solutions: It is not entirely the responsibility of the State to resolve these issues, but the State could be more receptive to innovative solutions and suggestions. The Plan needs to address the unique opportunities and constraints in the urbanized areas of the State, and not only the rural highways and smaller towns.
- Local routes: The Interstates have shoulders, but the disparity in speeds is unforgiving! It needs to be better handled at the local levels and utilize specific "county routes" as connectors where possible.
- Maintenance: Maintenance is an issue due to cinder removal. This is becoming less critical with the recent move to chemical deicers.
- Pavement Lip: There should not be a lip between the pavement and the gutter, it should be flush.
- Pedestrian Facilities: Pedestrian facilities are needed wherever State Highways travel through communities.



- **Public Input:** Saturday and Sunday mornings before El Tour in November in Tucson, is a great time to contact large groups of bicyclists.
- **Rumble Strips:** The narrow rumble strips with gaps are the best treatment. In many cases, the 24” rumble strips use up too much of the paved shoulder. Rumble strips adjacent to guard rails, which tend to collect debris, will often make the shoulder unusable to bicyclists. Rumble strips can also make the shoulders undesirable when located on downhill sections. Crossing a rumble strip at high speeds (30+ mph) can be very challenging and could easily cause a bicyclist to crash.
- **Race Across America:** The Race Across America travels through Arizona and passes through Flagstaff. Check the route and include it in the bicycle corridors.
- **Shared Lanes:** Need minimum 15 foot shared lanes, when there is not a shoulder or bicycle lane.

### **Flagstaff District Comments**

- **Downtown Flagstaff:** The downtown has decent sidewalks but these deteriorate or disappear as one radiates from the center.
- **Eastside/Sunnyside/Greenlaw:** Sidewalks are being constructed over time in Sunnyside. Greenlaw has narrow streets with roll curbs and small lots. People convert garages so park on the sidewalks.
- **Forest Service Road No. 3 (Mary Lake) (87 to Flagstaff):** It is paved and has low traffic volume and should be shown on map.
- **Fourth Street Corridor:** Narrow sidewalk at the back of curb often has parking lot asphalt immediately adjacent with no parking barriers.
- **Historic Beall Wagon Route:** There is a Historic Beall Wagon Route that parallels 40 and is paved.
- **I-17:** There are no rumble strip gaps at off ramps.
- **I-17 (Flagstaff to Phoenix):** This is used by many bicyclists.
- **Milton Road:** Flagstaff MPO trying to establish bike lanes on “back roads” on each side of Milton.
- **Milton Road:** The sidewalks are only five feet wide, placed back of curb and place pedestrians between heavy traffic and parking (US 89 suffers similar conditions).
- **Northern Arizona University (NAU):** NAU has wayfinding problems as bike and pedestrian paths interweave and jog around buildings.
- **Old Route 66 (F-40) (west of Mall):** South side is very poor as it relates to sidewalks/bicycle paths. The two way shared-use path does not meet current or previous standards, and is considered dangerous to many bicyclists. In addition, bicyclists proceeding with the flow of traffic on the path are required to stop at intersections, while motorists on the road surface are not. This creates many opportunities for misinterpretation of intent.
- **Route 66:** This has/will have a FUTS trail running its full length on the south side. The north side is a narrow sidewalk, back of curb, intersected by many driveways.
- **Route 66 (B-40):** There are good shoulders heading west from Woodlands village.
- **Route 66 (F-40) (east of 89 by Mall):** This is a nice recreational route to Walnut Canyon National Monument but there are narrow shoulders and poor surface condition.
- **Route 66 (B-40):** There is an adjacent separated path along B-40 (Route 66) in Flagstaff; however, the design, construction, and operation of the path is not in accordance with the recommendations in the AASHTO Guide for Development of Bicycle Facilities.
- **Schnebly Hill Road (I-17 to Sedona):** This is a dirt Forest Service Road that could be included as a regionally significant route.
- **Schnebly Hill Road (I-17 to Sedona):** This road is not maintained and should not be included as a regionally significant route.



- Schneibly Hill Road: I did not want to attempt 89A to Flagstaff, so I took this road again. I would say this road is in worse shape than several years ago and was brutal. Jeeps could barely negotiate it. I don't imagine this road is on the map!
- SR 64: This highway has rumble strip in middle of shoulder, not next to fog line.
- SR 180 (Flagstaff and SR 64): This is highly used, but the shoulders need widening (comment from many people).
- SR 89A (through Sedona): This should have bicycle lanes.
- US 89 (north of Mall): There are plans in place for FUTS trail on west side, limited options going north, but may be able to run on USFS land out to Townsend Winona Road, then good shoulders. Problem with high truck traffic volumes.
- US 89A (Flagstaff to Sedona): This is a very popular bicycle route, and provides an opportunity for designation; however, horizontal and vertical sight distances are poor in places and there is virtually no shoulder. Due to its physically challenging nature throughout the switchbacks and dramatic scenery, this has the potential of becoming a very popular route for bicyclists if it were safer (designed to accommodate bicyclists).
- US 89A (Flagstaff to Sedona): There is a possibility for a shared-use path paralleling US 89A from Flagstaff to Sedona.
- US 89A (Flagstaff to Sedona): It would be even more expensive and potentially environmentally damaging to construct a path than to widen the roadway. Although it is not likely that there will be any new construction in this area.
- US 180 (north of Columbus): Better shoulders (four feet from lip of gutter) are being developed over time, but implementation should be accelerated.
- US 180 (north of Columbus): There is almost no sidewalk on the east side and the west side has crumbling, alligator cracked four-foot wide section of asphalt that has utility poles and non-ADA grades along its length.
- Woodlands Village in the southwest quad of the city: There are sidewalks missing on one side of the street or other and there are several key pieces missing waiting for development to arrive and do it.

### Globe District Comments

- SR 88 (Northwest of Globe): This is a good route to bicycle.
- US 70: This has minimal shoulder in the Globe District and you have to deal with the very long, narrow, Gila River Bridge.
- US 79: The expansion bridges on US79 north of Florence are so bad that I flatted on one last year.

### Holbrook District Comments

- I-40 (Flagstaff to eastern State line): This route is used by many touring bicyclists.



### Kingman District Comments

- SR 93 (south towards Phoenix): US 93 south toward Phoenix, and north of Kingman on the Southbound side, some stretches of highway do not have sufficient shoulders to accommodate bikes.
- SR 95 (Bullhead City south to I-40): very nice route, some narrow or non-existent shoulders, but low traffic and nice road. In Bullhead City itself, there is NO shoulder in the downtown. Given the growing residential population, it would seem to be a good idea to try to restripe the road to be able to squeeze some accommodation for bikes in there. People seem to ride on the narrow sidewalks for safety (not good for pedestrians).
- SR 95 (near Topock): Although this did not have shoulder (I think), traffic was so minimal it was not a problem.
- SR 95 (I-40 to Parker Dam): Great road, despite sprawl at Lake Havasu City. I crossed at Parker Dam and rode along BLM scenic backway on the CA side (very nice).
- US 93, SR68, and SR95: All three have rumble strip problems through the unincorporated areas which reduce the shoulder widths.

### Phoenix District Comments

- Gilbert: According to surveys completed by the Town, bicycle riders in Gilbert spend a little over half of their time riding their bikes in their neighborhood as compared to time spent on a shared-use path. Because a majority of bicycle riding and pedestrian activity is done throughout local neighborhoods, we have not received complaints on constraints or road conditions. Our shared-use paths are not paved yet so shared-use path users are not expecting to find pavement along the canals. The canals are used by our surrounding cities and are pathways also in those cities. These canals are being formed into a pedestrian transportation network. The power line shared-use path will intersect the canals and create an east/west pathway for the shared-use path users to use. Southern Gilbert is still developing. Many new homes are being built in subdivisions and the area is being transformed from an agricultural setting to a residential setting. While bike lanes and sidewalks are included in all new developments, the areas that are between several developments are still seen as local streets with no sidewalk or bike lane.
- Glendale: Crossing of Loop 101, Grand Avenue, and eventually Loop 303 will need to be investigated. If crossings are built in Glendale, pedestrian accommodations along frontage roads should be included.
- Goodyear: The City of Goodyear has initiated a long-range planning effort to preserve natural open space and develop parkland and shared-use paths, including bicycle facilities and pedestrian improvements. Starting at an early stage before large-scale development has yet occurred, the City has many opportunities that have been outlined in the City's Parks, Trails, and Open Space Master Plan. Some of these include rivers, washes, and irrigation channels as well as projects to develop and improve some of these channels in the future. Bike lanes are planned along virtually every arterial street in the City. Trails are being considered adjacent to I-10 and the proposed Loop 303 Freeway. Constraints may include the rapid pace of development and ensuring that open space and trail development keeps up with the pace of residential and business development. Trail development in the City includes provisions for pedestrians. Sidewalks are proposed with all new development and in coordination with open space conservation and development.



- I-10 at Guadalupe: The Guadalupe Road Bridge at I-10 has a sidewalk on one side but the ramp to it doesn't.
- I-17: The long diagonal cuts all the way across the shoulder make riding on I-17 north of Phoenix very challenging.
- Phoenix: Phoenix is a major metropolitan area consisting of approximately 500 square miles, which poses a unique set of opportunities and constraints for bicycling. Phoenix does have a plan which generally provides for the implementation of bike facilities on arterial and collector streets where there is sufficient pavement width to accommodate both the vehicular traffic and bicycle traffic. All new arterial and collector streets are being planned to include bike lanes. The freeways in Phoenix, I-17, SR 51, Loop 202, I-10, and Loop 101, create many opportunities and constraints for bicyclists. Because the State continues to build freeways in Phoenix, there are opportunities to construct parallel paths for bicyclists along the corridors. But more often, the freeways create a barrier to cycling because of the lack of any provisions for bicyclists on the traffic interchanges, which makes crossing very difficult.
- SR 87 and I-10: Milled shoulders still exist on SR 87 south of Chandler and on I-10 near Bowie.
- Tempe: Tempe is an infill community, with the highest residential density in the state, a pedestrian-oriented downtown, and Arizona State University. Census data from 1990 and 2000 indicate that Tempe has the highest percentage of bicycle commuters in the state, with several high volume bikeway corridors. The freeway system in Tempe is substantially complete and our most recent General Plan identifies the goal of no more street widening. In 1996, Tempe citizens passed a half cent sales tax to fund transit improvements, including bicycle and pedestrian facilities. Given these conditions, Tempe is focused on maximizing the multi-modal potential of our transportation system. The urban freeway system, however, presents some of the largest challenges to our bicycle and pedestrian network. The following list of projects is included in Tempe's Comprehensive Transportation Plan and the Tempe General Plan 2030. In all cases, the projects identified would complete a gap in our bicycle/pedestrian system. Projects are not listed in order or priority: bicycle/pedestrian bridge at 101 Freeway and Balboa Drive, at I-10 and Alameda Drive, at I-10 and Western Canal, at UD 60 and Dorsey Lane and bicycle/pedestrian access to Sky Harbor International Airport.
- US-60: The rumble strips on US60 west of Florence Junction wander all over a shoulder that is rougher than the travel lane.

### Prescott District Comments

- Prescott: All Prescott area State highways need additional shoulder width for safe bicycle access. All rumble strips in the Prescott area have been laid down without consideration of bicyclists and cause enormous hazards. Prescott Area State highways connect communities and often run through residential/commercial area with high volumes of bicycle and pedestrian traffic. White Star Road in and Highway 69 between Prescott and Prescott Valley are dangerous due to high speeds.
- SR 71 (Jct. US 60 to Jct 89, MP 86.0 to MP 109.6): Rural roadway section without shoulders. Potential bicycle corridor.
- SR 87 (Payson City Limits to MP 264, MP 255.0 to MP 267.5): HES Project to construct eight-foot shoulders from 254.88 to 256.13 and 265.88 to 267. 8'. Shoulders need to be constructed between these two segments in order to establish a bicycle corridor. There is also a forest service trailhead at MP 266.5 and a small community.





- SR 87 (MP 267.5 to MP 278.8): There are no shoulders in this area which begins in the community of Pine, passes through Strawberry, and ends at the junction of SR 87 and SR 260. This is a scenic route.
- SR 89 (89/93 Junction to Congress, MP 258 to MP 268): Mostly rural section without shoulders. Would provide bike corridor to the residents of Congress and Wickenburg.
- SR 89 (Yarnell to Peeples Valley, MP 278 to 280): Shoulders in this section would create a 17 mile bicycle corridor between Peeples Valley and Wilhoit (MP 278 and MP 295) with the completion of the project below.
- SR 89 (Black Hills to Wilhoit, MP 286 to 295.03): Shoulders in this section would create a 15 mile bicycle corridor between Peeples Valley and Wilhoit (MP 280 and MP 295).
- SR 89 (Wilhoit to Hidden Valley, MP 295.03 to 308.98): Scenic road with periods of high bicycle use. The down side is that this section is mountainous and would be expensive to widen.
- SR 89 (Granite Dells Old Jct. 89/89A, MP 316.85 to 317.5): Shoulders were eliminated with the striping of a two way left-turn lane.
- SR 89 (Fain Road to Forest boundary, MP 329.5 to MP 331.5): Shoulders were eliminated with the striping of a two way left-turn lane.
- SR 89 (Congress to Prescott): Fabulous road, despite grueling climb. Wow. Fortunately, there are enough services along the way for water, etc.
- SR 89 (approximately two miles north of Congress to Yarnell): This refers to the segment beginning at the diversion of the road at the base of Yarnell Hill, and continues to the rejoining of the roadway at the north end of the hill. Though the shoulder width is sufficient, the condition of the shoulder is unstable for bicycle use. Though the route is listed as “More Suitable” in the current ADOT Bicycle Suitability Map, in reality, it is not. It is a curvy, mountainous route with limited sight distances containing shoulder conditions that force the bicyclists onto the traveled portion of the roadway.
- SR 89 (Prescott to Chino Valley): Shoulder has rumble strips that take up a majority of the shoulder.
- SR 89A (Road 4 South to Road 1 South, MP 325.18 to 326.19): HES Project to construct a continuous two way left turn lane. Project will grade for future sidewalks. Sidewalks needed for pedestrians.
- SR 89 (SR 89A to Jerome and Clarkdale): Traffic is heavy, but there's good shoulder through Prescott Valley. I am sure the new divided highway under construction will have a good shoulder and properly (per FHWA guidance) rumble strips. Beyond Prescott Valley on the two-lane road, traffic is light and the road is good (even with the climb!).
- SR 260 (I-17 to Sedona): This road is quite beautiful, but when the shoulder disappears, it's bad. Tourists aren't prepared for cyclists and they aren't paying attention and pass too close. This is a road that promotes its trails for bikes and hikers, but everyone needs to drive to the trailheads. Widening for 5-ft bike lane is optimal solution, but tough sell.
- SR 260 (Tyler Parkway to Star Valley, MP 253.7 to MP 255.8): Shoulders would provide a bicycle corridor that would connect two communities.
- US 60: Great road. Good shoulder, gentle grade change, many RV parks, low volumes.
- US 60 (ADOT Yard to beginning of Highway, Milepost (MP) 111.31 to 112.8): Hazard, Elimination, and Safety (HES) Project to construct a continuous two way left turn lane. Project will grade for future sidewalks. Sidewalks needed for pedestrians.
- US 93 (north of Wickenburg to Congress): Really narrow and scary. Edge stripe is partly on the blacktop, partly on the ground next to the road. If traffic were any heavier, I would have been terrified.



### Safford District Comments

- B-10 (Wilcox): There is parallel parking through downtown Wilcox.
- I-10 (SR 83 to New Mexico border): Narrow shoulder in Cienega Creek/Marsh Station area (MP 289 to 290). Very narrow shoulder across San Simon River Bridge (MP 381.7). Rumble strips on I-10. Cattle guards on most traffic interchanges.
- I-10/B-10 (Benson): There is about 50 percent truck traffic. Little to no shoulder. Very narrow shoulder across the 401 foot San Pedro River Bridge (MP 306.4). There is parallel parking along B-10 through downtown Benson.
- Local Roads: The only non-state roads I can think of that might be applicable to a state-wide bicycle plan are roads like Davis Road, Frontier Road, Kansas Settlement Road or for connectivity between State Routes, something like Buffalo Soldier Trail.
- Shoulder conditions: Pretty much any route in SE Arizona has little to no shoulder except selected “short stretches”, very short stretches. Only SR 90, SR 92, SR 75, and US 70 have adequate shoulders; US 191, SR 181, SR 366, SR 82, SR 78, and SR 186 are out due to numerous stretches of little to no shoulders. The State highway network can provide access across the entire state. Primary State Routes like SR 80, 82, 83, 90, 92, 181, 186, and US 191 and 70 would provide access in and out of the region. All of these State Routes have sections that would constrain the system. The rumble strips that ADOT are currently constructing on State highways are sometimes hazardous.
- SR 78 (SR 75/US 191 to New Mexico State Line): There is very little shoulder, many places less than 1 foot on the entire route. There is very limited sight distance throughout.
- SR 80: This is out because of the Bisbee Tunnel, which has no shoulder and restricted visibility (MP 339), the San Pedro River Bridge at St. David, which has narrow shoulder across the 415 foot bridge (MP 298.8), the traffic circle at SR 92 (MP 343.6) presents many significant problems and the Lowell underpass, which has no shoulder and limited visibility.
- SR 82 (Cochise County Line to SR 80): Shoulder is 2 feet or less the entire length. Shoulder is less than 1 foot across the San Pedro River Bridge, Fair bank railroad overpass and adjacent embankment fill (MP 61 to 61.7)
- SR 82 and SR 90: These are excellent bicycle routes.
- SR 90 (San Pedro River Bridge): This is almost 300 ft long and is but 26' wide! One foot shoulder across the 280 foot bridge (MP 382.6).
- SR 92 (SR 90 to SR 80): Very heavy Average Daily Traffic (25,000+) in Sierra Vista area. Rumble strips on entire length.
- SR 181 (US 191 to end SR 181): There are very narrow shoulders, sometimes less than 1 foot, the entire length. Some “dips” in roadway for drainage purposes.
- SR 186 (Wilcox to SR 181): Very narrow shoulder from Dos Cabezas to SR 181 (MP 342.9 to 359.4).
- SR 266 (US 191 to Bonita): The shoulder is less the 2 feet the entire length.
- SR 366 (US 191 to end of route): There are too many issues to list. There is absolutely no shoulder from MP 117.0 to end of route, MP 143.2).
- SR 75 (Duncan to SR 78/191): The 162 foot Sand Wash Bridge has no shoulder. There are rumble strips the entire route. There is a very heavy concentration of industrial truck traffic, and extreme over size loads, servicing the Phelps Dodge Morenci Mine.
- US 70 (MP 287 to MP 385.3 at New Mexico State Line): Very narrow shoulders across the 1,829 feet Gila River Bridge (MP 292.6). Rumble strips majority of route. Heavy exposure of oversized farm implements can be expected from MP 300 to MP 344.



- US 191 (I-10 to Safford): Little to no shoulder from MP 87.5 to MP 104.0. Limited sight distance and many vertical curves from MP 87.5 to MP 104.0. Not recommended for bicyclists.
- US 191 (Morenci Mine Entrance to Blue Vista): There are little to no shoulder the entire length of the Coronado Trail. There are no shoulders and restricted visibility through the Morenci Tunnel, and Morenci Mine railroad tunnel. One can expect a very heavy concentration of industrial vehicle traffic throughout the segment of highway through the Morenci Mine (approximately seven miles). There is very limited sight distance the entire length. The section of Coronado Trail from approximately MP 173 to MP 253 is signed and regulated for length restrictions for vehicles not to exceed 40 feet.
- US 191 (SR 75/78 to Morenci Mine entrance): Many location shave little to no shoulder. There is heavy mine commuting traffic in this area. The Union Pacific Railroad crosses US-191 at grade in two locations in downtown Clifton. There is a very heavy concentration of industrial truck traffic and extreme oversize loads servicing the Phelps Dodge Morenci Mine.
- US 191 (US 70 to SR 75/78): There is little to no shoulder from Greenlee County Line to Threeway (MP 144.0 to 154.5). The roadway is under construction with new alignment (MP 144.0 to 151.0). No shoulder across 707 foot Guthrie Bridge across Gila River (MP 153.5). This route not recommended for bicyclists until the roadway is completely reconstructed, which is scheduled for 2006.

### Tucson District Comments

- B-10 and I-10 Frontage Road (Park Avenue to Kolb Road): Minimal sidewalk or shade landscaping along urban section, Park Avenue to Alvernon Way. Paved shoulder bike route generally consistent 10-foot width; sections southeast of Valencia Road are reduced to only two-foot in width, but very low traffic volumes. Section crossing at Valencia Road under I-10 does not include bike route, but does include sidewalk on both sides. Sidewalk and shade landscaping can be installed in urban section. TE approved to provide five-foot bike route on Valencia Road under I-10 to connect both frontage roads; funds not yet obligated but anticipated for next fiscal year.
- B-19 (Irvington Road to Duval Mine Road): Minimal sidewalk or shade landscaping along urban section, Irvington Road to Valencia Road. Bike route only four-foot width from Irvington Road to Drexel Road. Paved shoulder in poor condition, Hughes Access Road to Duval Mine Road. Rumble strip in middle of paved shoulder from Pima Mine Road to Duval Mine Road, reduces available shoulder space for bicyclists to approximately one-foot width near traffic lane. Available space for sidewalk construction and installation of shade landscaping in urban section. ADOT to repave entire width of B-19 from Hughes Access Road to Duval Mine Road next fiscal year; rumble strip to be eliminated and roadway turned back to Pima County.
- B-19 (Tucson south): A popular route that gets heavy and regular use. Shoulder is narrow from Irvington to Valencia, then wider to Hughes Access Road, then wider still all the way to the road's end at I-19. Surface condition of the sections south of Hughes Access road are generally poor, including a section more than two miles long (from Pima Mine Road to Sahuarita Road) where the Grooves were mistakenly installed across the entire width (approximately five feet) of the shoulder, and have been left that way for more than ten years . . . Rumble grooves exist on most of the highway, and vary as to their placement, type, and effect on rideability. The pavement on the bridge on B-19 near MilePost 53 is so bad it can only be ridden at a very low speed.
- Bicycle use: All the State Highways connecting into the Tucson area, and serving all of Pima County, are currently used, some extensively, for bicycle travel, and are all included in the adopted PAG Regional Plan for Bicycling. Others that are not in Pima County, but connect to those that are, are important routes for bicyclists.



- I-10 (NW of Tucson): All the frontage roads are used for cycling, those closer to Tucson more, but all regularly. The new urban frontage roads have a wide shoulder without rumble grooves; the rural frontage roads do not have shoulders (except in a short stretch near the Pima County line) or rumble grooves, but do not have much traffic either, so they work well for cycling.
- I-10 (SE of Tucson): The frontage roads exist only in the urban area, then the only route is the mainline. Most of the frontage roads have modest shoulders, and the mainline has the standard 10 foot shoulders. There are no rumble grooves on the frontage roads, and those on the mainline are, in combination with the shoulder width, conducive to cycling for the tourists and other bicyclists who ride this section (southeast of Tucson).
- I-10 (Tucson to Picacho Peak at SR 87): Frontage road parallels this section. Although the frontage road does not have a shoulder, the low traffic volume makes it a good ride.
- I-10 and I-10 Frontage Roads (Valencia Road east): Paved shoulder width on frontage roads are generally no greater than one-foot (not usable); no rumble strip except on I-10 mainline sections legal for bicycle travel (diagonal rumble strip or groove located approximately every 50 feet across full width of shoulder; approximately 12-foot wide paved shoulder); I-10 interchanges potentially hazardous for bicyclists who remain on I-10 rather than exiting I-10 then re-entering I-10 using on-ramp; potentially hazardous cattle guards on frontage roads and on and off-ramps and arterial cross streets (parallel gaps periodically open within guards); few walkable areas (rural section). Potential to implement consistent five-foot to six-foot wide paved shoulders on I-10 frontage roads over time with safety improvements and/or through repaving projects. May wish to consider addition of advisory signs suggesting bicyclists exit I-10 at off-ramps then re-enter using on-ramps. TE approved but not yet obligated to construct five-foot bike lanes under I-10 on Valencia Road. This project will connect two sections of frontage road to enable bicyclists to continue parallel in each direction along the I-10 frontage roads.
- I-10, I-10 Frontage Roads, and additional State Routes (Phoenix metropolitan area to Tucson metropolitan area): Bicycle Suitability Map indicates bicycling prohibited on I-10; Map does not address frontage roads and other State Routes. Currently, bicyclists ride between Tucson and Phoenix utilizing various State Routes and the I-10 frontage roads. The two main routes are 1) I-10 frontage to Picacho, then north on 87 to Phoenix area; or 2) North on 77/79 to Florence, then either west on 287 to 87, thence north to Phoenix area, or, continue north on 79 to US 60, then into Apache Junction/east valley); Bicycle Suitability Map should be updated to reflect this. Frontage road generally has paved shoulders 10-feet in width in urban Tucson; no paved shoulders on frontage roads north of Tucson; State Route paved shoulders range from one-foot (not usable) to six-foot in width; some locations with rumble strip. Potential to implement consistent five-foot to six-foot wide paved shoulders on I-10 frontage roads and other State Routes over time with safety improvements and/or through repaving projects. Need to review traffic volumes, run-off-the-road incidents, and potential for bicycle and pedestrian travel for justification of paved shoulders on frontage roads. Provision of paved shoulders on other State Routes should be done to link existing sections that have paved shoulders.
- I-19 (south of Green Valley): One section of the mainline has to be ridden, as there is no continuous frontage road (Chavez Siding Road to Aqua Linda). This section has modern rumble grooves and is wide enough (approximately ten feet) that it works well. All the frontage roads are moderately to heavily used, especially those close to Green Valley. They do not have shoulders, or rumble grooves.
- I-19 and I-19 Frontage Roads (Green Valley to Nogales): Paved shoulder width on frontage roads are generally no greater than one-foot (not usable); no rumble strip except on I-19 mainline sections legal for bicycle travel (approximately 12-foot wide paved shoulder); I-19 interchanges potentially hazardous for bicyclists who remain on I-19 rather than exiting I-19 then re-entering I-19 using on-



ramp; potentially hazardous cattle guards on frontage roads and on and off-ramps and arterial cross streets (parallel gaps periodically open within guards); few walkable areas (rural section). Potential to implement consistent five-foot to six-foot wide paved shoulders on I-19 frontage roads over time with safety improvements and/or through repaving projects. May wish to consider addition of advisory signs suggesting bicyclists to exit I-19 at off-ramps then re-enter using on-ramps.

- I-19: The limits where bicycles are prohibited on I-19 should be reviewed.
- I-19: The long diagonal cuts all the way across the shoulder make riding on I-19 south of Tucson very challenging.
- Mission Road (Tucson): It has no shoulders, but because of low traffic volume it is usually good to ride.
- Pedestrian Accommodation: There are a few urban portions of the State system that have pedestrian accommodation, but in general, especially in this rapidly growing urban area, there are many miles that do not, and should. In a nutshell, there should be pedestrian facilities within the urbanized area.
- South 6<sup>th</sup> Avenue (B-19) (18<sup>th</sup> Street to Irvington Road): No five-foot bike route; total roadway width 60 feet for five-lane cross section. Sidewalks good condition—five-foot minimum width with eight-foot width from 22<sup>nd</sup> Street to Ajo Highway, and good shade landscaping provided throughout nearly all of segment. Five-foot bike route can be implemented on roadway through restriping to ten-foot lanes, which can be acceptable due to volumes, speeds, and vehicle classification. High potential local bicycle use; also, implementation of bike route on this section will contribute to north-south continuous regional bike route. Opportunities to install shade landscaping from Ajo Highway to Irvington Road for pedestrians and for beautification.
- SR 77: This is a commonly used route to north from Tucson with good shoulders. Road up to Mount Lemmon is commonly used.
- SR 77 (I-10 to Oracle Highway): Five-foot bike route located on section only from Flowing Wells to Oracle Road; TE grant approved for sidewalks, I-10 to Oracle Highway, but funds not yet obligated. Five-foot bike route can be extended by restriping roadway from Flowing Wells to I-10 frontage road, which has 10-foot paved shoulders. TE grant for sidewalks should be obligated next fiscal year. Opportunities to install shade landscaping in locations for pedestrians and for beautification.
- SR 77 (Jct 79 to Oracle): Used moderately, and a favorite ride for the growing NW side population. Good shoulders with older non-gapped ground-in rumble grooves. The section closer to Oracle has almost no shoulder as the road was restriped to put a center left turn only lane in – this is not a good area.
- SR 77 (Miracle Mile to Town of Oracle): Paved shoulder width varies from zero to twelve foot; rumble strip from 1<sup>st</sup> Avenue north to Town of Oracle unsuitable for bicycle travel; narrow curb lane width and lack of shoulder from Roger Road to Ina Road; lack of sidewalks in suburban and rural locations, intermittent sidewalks in urban Tucson. Repaving currently underway, Miracle Mile to Pusch View Lane—ADOT indicates that standards and specifications do not currently allow designation of bicycle lane or striping of lane to left side of right-turn only lane. Miracle Mile to Roger Road will include five-foot “bike route” (designated by City of Tucson with sign only); Roger Road to River Road will include 14 to 15-foot wide curb lane or four to five-foot paved shoulder with striped edgeline. TE grant approved to build six-foot paved shoulder for bicycle and pedestrian use from River Road to Ina Road. Roger Road to River Road can include five-foot bike route if travel lanes narrowed to 11 feet. TE grant approved to build pedestrian enhancements, Miracle Mile to Prince Road. TE grant previously submitted but not yet approved to improve paved shoulder and replace rumble strip with more bicycle-suitable rumble strip, 1<sup>st</sup> Avenue to Town of Oracle. Striping of paved shoulder to the left side of right-turn only lane and designation of bike lane should be pursued to markedly improve the safety and convenience of all the road users on



Oracle Highway, especially bicyclists. Opportunities to install shade landscaping in locations for pedestrians and for beautification.

- **SR 77 (Tucson north):** Used heavily, out to the junction with SR 79. This highway receives moderate use from the 79 junction to Oracle. Urban portions vary greatly in suitability for cycling, but in general (Ina south) there is no shoulder; the Ina north section has a shoulder that is generous in almost all cases (the Catalina section is tight); rumble grooves exist in sections north of 1st Avenue, and should not, as this entire section, to the County line, is an Urban classification.
- **SR 79 (Jct 77 north):** Use drops off, as this Scenic Highway, after the first three miles or so, has the same non-functional shoulders (one to two feet) as 86 does, but in this case most bicyclists opt to continue on 77 instead, as it has a shoulder.
- **SR 79 (SR 77 to Florence):** Shoulder width approximately one-foot for full distance; no pedestrian walkway (rural section). Potential to implement consistent five-foot to six-foot wide paved shoulders over time with safety improvements and/or through repaving projects.
- **SR 82 (Sonoita to Nogales):** Paved shoulder width ranges from two feet to five feet and has poor surface where rumble grooves were filled in; rumble strip; few walkable areas (rural section). Potential to implement consistent five-foot to six-foot wide paved shoulders over time with safety improvements and/or through repaving projects.
- **SR 82 (SR 90 to Nogales):** Popular route that is a part of many individual and group rides; guest ranches in Sonoita – Patagonia area offer road cycling and use this highway. Rumble grooves vary, but are sometimes located so they are a hazard for bicyclists. Some rumble grooves were filled when a prominent guest ranch owner 'raised Cain' with the Governor, and the resulting surface is *just* tolerable.
- **SR 83 (I-10 to Sonoita):** Popular route that gets heavier use in the non-summer months. Shoulders in the non-mountainous portions; none where the highway climbs/descends. No rumble grooves.
- **SR 83 (I-10 to SR 82/Sonoita):** Paved shoulders are not present in the more mountainous sections, and where they exist the width ranges from one foot to five feet; no rumble strip; few walkable areas (rural section). Potential to implement consistent five-foot to six-foot wide paved shoulders over time with safety improvements and/or through repaving projects.
- **SR 85 (Ajo area):** Paved shoulder width generally one-foot (poor condition makes it unusable for extensive distances); few walkable areas (rural section). Potential to implement consistent five-foot to six-foot wide paved shoulders over time with safety improvements and/or through repaving projects. TE project approved to build sidewalks in Ajo area along SR 85.
- **SR 86 (I-19 to Three Points):** Paved shoulder width varies from one-foot to twelve-foot; rumble strip results in many sections of the route as unsuitable for bicycle travel. Sidewalk facilities are included on both sides of road in urban section, I-19 to La Cholla Boulevard. TEA-21 Transportation Enhancement (TE) grant approved to provide consistent paved shoulder width for bicycles and pedestrians and replace rumble strip with more bicycle-suitable rumble strip. Five-foot bike route can be installed in urban section, I-19 to La Cholla, if roadway restriped to 11-foot lane widths. There is an opportunity to install street trees for shade and landscape improvements for pedestrians in the urban sections.
- **SR 86 (Three Points to Why):** Paved shoulder width generally one-foot (poor conditions make it unusable for extensive distances); no rumble strip; few walkable areas (rural section). Potential to implement consistent five-foot to six-foot wide paved shoulders over time with safety improvements and/or through repaving projects. Route is used periodically by bicyclists traveling from Tucson to top of Kitt Peak and back, or bicyclists driving to Three Points then riding to top of Kitt Peak and back, or bicyclists riding to either Sells, IR-15, or points west. TE grant approved to build pedestrian bridge along SR 86 over Sells Wash.



- SR 86 (Tucson west): Tucson to SR 386 is used most heavily, but organized rides and individuals use the sections west of 386. From Tucson to Junction 286, shoulder is currently dangerous for most of the distance (due mostly to rumble grooves), then poor condition for about five miles, then there effectively is no shoulder for the remainder of the distance (yes, I know the log shows a one to two foot 'shoulder' – but that is a laugh, as it is usable only in some locales for shy distance – the rest of the time straying onto it would create great risk of a crash.) Existing rumble grooves are present, not appropriate, out to Junction Valencia, as this is Urban classified
- SR 286: Although it does not have wide shoulders, SR 286 is a good ride because it has low traffic volume.
- SR 286 (Jct 86 south): Lightly traveled, but great potential. No usable shoulder, and to the best of my knowledge, no rumble grooves.
- SR 286 (SR 86 to Sasabe): Paved shoulder width generally less than one-foot (not usable); no rumble strip; few walkable areas (rural section). Potential to implement consistent five-foot to six-foot wide paved shoulders over time with safety improvements and/or through repaving projects. Need to review traffic volumes, run-off-the-road incidents, and potential for bicycle and pedestrian travel for justification of paved shoulders.
- SR 386 (entire length): Lightly traveled, but regularly used as it is a great training ride. Has a small to moderate shoulder, without rumble grooves, the entire distance.
- SR 386 (SR 86 to top of Kitt Peak): Paved shoulder width ranges from three-foot to five-foot; no rumble strip; few walkable areas (rural section). Potential to implement consistent five-foot to six-foot wide paved shoulders over time with safety improvements and/or through repaving projects; however, current low traffic volumes may not warrant overall shoulder improvements except for specific priority locations such as popular recreational and training routes.

### Yuma District Comments

- I-10 (east of US 60): This has bad rumble strips.
- SR 72 (Parker to SR 60): Lots of trucks! Very low traffic volumes, but I would estimate close to 25 percent BIG trucks. But again, low volumes so trucks could easily pass. I don't remember if your bike map shows camping, but I was surprised to find that the town of Bowse has a municipal campground and several RV parks. Also nice RV Park at Hope (junction Route 60).
- US 95 (north from Yuma): Highway 95 is a regular route for our club to access YPG and Lake Martinez to the North, and San Luis/Somerton to the South. Thus, it is important that they be encouraged to at least repave the shoulders and stripe them on the southern route and provide the maintenance necessary for our protection on both the northern and southern routes to those locations. We recommend a higher ranking construction implementation score for the northern route at least for the 15-18 miles to S24 (which begins in California and ends in Arizona) should be shown on map. It is paved and has low traffic volume.

### 5.4. Summary

The assessment of current conditions used ADOT's vast database of roadway characteristics within the State Highway Log and the Highway Performance Monitoring System as a backbone. The main criteria that were evaluated included right shoulder width, volume to capacity ratio, speed limit, and percent truck traffic. Although it was extremely beneficial to utilize this existing data, it is recognized that the data is not completely accurate and that by definition it is insufficient because it only records data for



one direction of travel. With this in mind, there was a significant effort made to get existing conditions comments from ADOT engineers, Steering Committee members and the public.

A majority of the rural roadway segments within Arizona received a high bicycling conditions score primarily based on the shoulder being five feet or greater in width (53 percent of State Highways) or the roadway having a low volume to capacity ratio. On the other hand, virtually all of the non-interstate Highways have sections that received a low bicycling conditions score based on there being a narrow shoulder and also a reasonably high volume to capacity ratio. There also are a significant number of shoulders that have rumble strips that transform a shoulder with a reasonable width into an undesirable bicycle segment. A typical ride on one of Arizona's rural highways would include acceptable conditions for a majority of the ride with sections of the ride that are undesirable due to narrow shoulders or shoulders filled with rumble strips.

Urban State Highways within Arizona typically have below average bicycling conditions based on there being either a shoulder less than four feet wide or a shared lane that is less than 15 feet wide, high vehicular speeds and a reasonably high volume to capacity ratio. There are also a significant number of urban highways that have an excessive number of driveway access points and that lack the proper maintenance of bicycling and walking facilities. ADOT has worked with implementing agencies that plan to improve roadway conditions within urban areas; however it is the primary responsibility of local and regional agencies to program roadway improvements within the urban area.





## 6. Bicycle and Pedestrian Committees, Coordinators, Documents, and Maps

The information in the Plan builds upon information provided from Bicycle and Pedestrian Committees and Coordinators regarding existing guidelines, standards, and plans set forth by national organizations, and State, city, and county entities. This section of the Plan outlines these documents that have been compiled and reviewed. At the national level, several documents have been drafted by the Institute of Transportation Engineers (ITE), AASHTO, FHWA, and other authors to guide planners and engineers based on experience and research. At the state/local level, state, county, and city entities have developed bicycle and pedestrian plans that summarize their respective design guidelines and existing/proposed bicycle and pedestrian facilities. These documents have provided the foundation to build the Statewide Plan and framework for design standards.

### 6.1. *Bicycle and Pedestrian Committees and Coordinators*

Maintaining a Bicycle and/or Pedestrian Committee is an effective way communities can put bicycle and pedestrian issues in the forefront of their community. It is recommended that all communities within Arizona consider having Bicycle and Pedestrian Advisory Committees. The following is a list of the Bicycle and Pedestrian Advisory Committees within Arizona:

- Flagstaff Bicycle Advisory Committee;
- Flagstaff Pedestrian Committee;
- Glendale Bicycle Advisory Committee;
- Maricopa Association of Governments Bicycle Advisory Committee;
- Maricopa Association of Governments Pedestrian Working Group;
- Maricopa County DOT Bicycle Advisory Committee;
- Prescott Bicycle Advisory Committee;
- Tucson-Pima County Bicycle Advisory Committee; and
- Tempe Bicycle Advisory Committee (includes pedestrian issues).

The ideal situation is that all planners and engineers would sincerely consider the needs of bicycles and pedestrians in all planning and design projects. In that situation, there would not be less of a need to designate a specific Bicycle and/or Pedestrian Coordinator. In most jurisdictions however, that is not the case. Maintaining Bicycle and/or Pedestrian Coordinator positions acknowledges the importance of improving conditions for bicyclists and pedestrians. It is recommended that implementing agencies within Arizona consider having at least one full time Bicycle and/or Pedestrian Coordinator. In addition, it is recommended that ADOT designate one Bicycle and Pedestrian Contact for each district. The following is a list of the Bicycle and or Pedestrian Coordinators positions within Arizona:

- ADOT Bicycle/Pedestrian Coordinator;
- Maricopa Association of Governments Bicycle/Pedestrian Coordinator;
- Maricopa County DOT Bicycle/Multi-Modal Planner;
- Mesa Bicycle Coordinator;
- Mesa Trails Coordinator;
- Oro Valley Bicycle/Pedestrian/Trail Coordinator;
- Pima Association of Governments Intermodal Manager;



- Pima Association of Governments Regional Bicycle Coordinator;
- Pima County DOT Bicycle/Pedestrian Coordinator;
- Phoenix Trails Coordinator;
- Prescott Trails Coordinator;
- Tempe Bicycle/Pedestrian Coordinator; and
- Tucson Bicycle/Pedestrian Coordinator.

Due to the responsibilities of ADOT to regulate roadways throughout the State, including coordination with jurisdictions throughout the state, it is recommended that ADOT have the current Bicycle and Pedestrian Coordinator position solely dedicated to bicycle and pedestrian projects. In addition, it is recommended that a Bicycle/Pedestrian Coordinators Assistant Position be developed. This staffing level currently exists at the Nevada Department of Transportation and is typical for numerous Departments of Transportation.

## 6.2. *Bicycle and Pedestrian Planning Documents*

### Federal/National Documents

Documents exist that provide guidance for the planning of non-motorized facilities. These documents help local agencies plan for, fund, build, and maintain non-motorized facilities. Several design guidelines have been written based on research. Some of the nationally accepted documents include:

- *Manual on Uniform Traffic Control Devices, FHWA, Millenium Edition Revision 1 with an Arizona Supplement.* This manual includes standards for signage of bikeway facilities and provides guidelines for their application.
- *A Policy on Geometric Design of Highways and Streets, AASHTO, 2001 4<sup>th</sup> Edition.* This manual mainly focuses on the geometric design of highways and streets; however, bicycle facilities are briefly discussed for design consideration.
- *Guide for the Planning, Design, and Operation of Pedestrian Facilities, AASHTO, August 2001.* This document provides pedestrian design guidelines relating to roadway and intersection design.
- *Guide for the Development of Bicycle Facilities, AASHTO, 1999.* This manual addresses bicycle facilities, defines elements of the bikeway network, and provides design standards.
- *Implementing Bicycle Improvements at the Local Level, Institute of Transportation Engineers.* This manual provides guidelines for successful implementation of bicycle facilities.
- *Selecting Roadway Design Treatments to Accommodate Bicycles, FHWA, 1994.* This document provides recommendations for the appropriate facility design to accommodate different levels of bicyclists on different types of roadways. The recommendations are based on the opinion of the author, Wilkinson.
- *Traffic Control Devices Handbook, Chapter 14, Institute of Transportation Engineers, 2001.* This handbook provides guidelines for successful implementation of traffic control devices.



## State of Arizona

- Arizona Revised Statutes Title 28. These statutes outline traffic laws. The statutes related to bicycle and pedestrian transportation are listed in **Section 2**.

## Arizona Department of Transportation

- Provision of Bicycle and Pedestrian Facilities on the State Highway System. *SCI*. December 2000. A review of bicycle standards and policies for Arizona and recommendations for improving conditions for bicyclists and pedestrians on the State Highway System are presented.
- Bicycle Suitability Map. This map contains suitability ratings for roadways on the State Highway System. The map is available on the ADOT ATIS website at <http://map.azfms.com/maps/pdf/biksuit.pdf> and a link is provided to it from the ADOT Bicycle and Pedestrian Plan website, <http://www.azbikeped.org/>.
- GIS-Illustrations. 1999, 2000, 2001. The GIS-illustrations of Arizona contain color-coded districts (locations of District Offices, State Milepost System, Arizona Highway System, Engineering and Maintenance Districts, Councils of Governments, Transportation Board Districts, Levels of Road Development, American Indian Reservations, Arizona Legislative Districts, Arizona Congressional Districts, and Arizona Non-Attainment Areas).
- Cycle Arizona. This map of bicycle networks includes major destinations, major street names, descriptions of attractions with pictures and information on bicycle events, average temperatures, and resources.
- MGT 02-1 Bicycle Policy. *ADOT Intermodal Transportation Division Policy, March 1, 2002*. This policy provides uniform guidelines for accommodating bicycle travel on the State Highway System.
- Regional Freeway System. *January 2002*. This map of the regional freeway system in Arizona illustrates remaining life cycle cost.
- Traffic Engineering Policies, Guidelines, and Procedures. *January 2000*. Guidelines for general traffic engineering functions and responsibilities and traffic study guidelines.
- Roadway Design Guidelines. *May 1996*. This document provides design guidelines for roadway facilities under the jurisdiction of ADOT.
- Arizona Motor Vehicle Crash Facts 2000. This document contains data for different types of crashes that occurred in 2000 in Arizona and data on the total number of licensed drivers in Arizona.
- Arizona Trails 2000, 1999. Arizona State Parks. This is a plan for the State Park System in Arizona.



### **City of Chandler**

- *Chandler Bike Plan Update. Drake & Associates, October 14, 1999.* The Chandler Bike Plan Update provides recommendations for bike lanes and other facilities, education and bicycle-related programs, and enforcement of bicycle-related laws in the City of Chandler.

### **City of Flagstaff**

- *Flagstaff Area Regional Land Use and Transportation Plan.* This Transportation Plan includes a section on the open space, parks, recreation, and trails systems. This document can be found at the following web address: [http://flagstaffplanning.com/regional\\_plan/index.cfm](http://flagstaffplanning.com/regional_plan/index.cfm).

### **City of Glendale**

- *Glendale Transportation Plan, 2002.* This plan includes bicycle and pedestrian elements.

### **City of Goodyear**

- *Parks, Trails, and Open Space Master Plan, 2001.*

### **City of Kingman**

- *Kingman Master Plan.* This plan addresses bicycle and pedestrian facility development.

### **City of Mesa**

- *Mesa 1997-2000 Bike Plan Revised. 1997.* This plan identifies the existing and recommended bicycle networks in the city of Mesa with included maps.
- *Draft Final Transportation Plan. City of Mesa, April 30, 2002.* This multi-modal plan outlines long term plans for streets, public transportation, bicycles, pedestrians, the Town Center, and transportation demand management and includes maps of existing and future bicycle facilities.

### **City of Prescott**

- *Prescott Bicycle Planning Guide. 1998.* This plan provided guidelines for bicycle facilities.
- *Prescott Trails Plan.* This plan identifies recreational trails within Prescott.
- *Prescott Bicycle and Pedestrian Plan.* This plan is currently in draft form.

### **City of Scottsdale**

- *Scottsdale Bikeways Map.* This document maps out the existing bikeways within Scottsdale.



### City of Tempe

- *Pedestrian, Bicycle, Transit Design Criteria. 2001.* This document provides design criteria for pedestrian, transit and bicycle facilities in the City of Tempe.
- *Tempe Comprehensive Transportation Plan-Second Draft. January 23, 2001.* This document provides the vision statement and overall goals of the Plan.
- *Transportation Design Toolbox. 2003.* This document provides design options addressing various bicycle and pedestrian issues.
- *Tempe Bikeway Map. 2003.* This document displays the existing and proposed bicycle facilities in Tempe.
- *Tempe Multi-Use Path Detail Plan. 2003.* Included in this plan is a map of the path alignments within Tempe.

### City of Tucson

- *Tucson Bike Guide. 1995.* This plan provides key information needed to move from plan to bikeway network in the city of Tucson including design criteria for bicycle networks.

### City of Yuma

- *Bicycle Element City of Yuma General Plan. 1995.* This plan provides key information needed to move from plan to bikeway network in the City of Yuma, including design criteria for bicycle networks.

### Maricopa Association of Governments

- *Bike Ways – Metropolitan Phoenix Area.* A map of the bicycle network in the Phoenix area including different types of non-motorized facilities, major destinations, and major street names.
- *Pedestrian Plan 2000 Technical Appendix. December 1999.* This plan identifies and quantifies potential pedestrian trip activities by using travel demand analysis.
- *Regional Off-Street System Plan, Creating Non-Motorized Paths/Trails in Existing Corridors. Maricopa Association of Governments, February 28, 2001.* This document provides an off-street system of paths/trails for non-motorized users.
- *MAG Regional Bicycle Plan. Maricopa Association of Governments, Revised January 1999.* This plan updates the regional and local plans and maps, re-defines the goals and objectives, identifies a project rating system, and outlines a recommended action plan.
- *Pedestrian Area Policies and Design Guidelines. Maricopa Association of Governments, October 1995.* This document provides design guidelines and recommendations for the design of pedestrian facilities.



- *Pedestrian Plan 2000*. Maricopa Association of Governments, September 24, 1999. This document updates the 1993 Pedestrian Plan and outlines programs and actions to promote pedestrian facilities.
- *West Valley Multi-Modal Transportation Corridor Plan*. Maricopa Association of Governments, October, 2001. This document addresses multi-modal options for the West Valley Corridor, including bicycle and pedestrian accommodation.

### **Lake Havasu City**

- *Lake Havasu City Master Plan*. This plan addresses bicycle and pedestrian facility development.

### **Maricopa County Department of Transportation**

- *Maricopa County Regional Trail System Plan: Phase One*. September 4, 2002. This plan identifies the goals and policies for a regional trail system that will ultimately link together the largest regional park system in the United States. Phase One identifies corridors between four of the parks. Phases Two and Three, currently in the planning process, will complete the loop.
- *MCDOT Roadway Design Manual Draft*. This draft design manual includes illustrations of cross-sections of roads with dimensions.
- *MCDOT By-Cycle*. December 2000. This paper includes statistics on national pedestrian and bicycle fatalities and a listing of problems with bicycling on sidewalks.
- *PowerPoint Presentations by Reed Kempton*. The presentation slides give statistics on bicycling nationwide and in Maricopa County.

### **Maricopa County Parks and Recreation Department**

- *Proposed Maricopa County Regional Trail System*. August 21, 2001. This map illustrates proposed trails with different major corridors and land uses in Maricopa County.

### **Pima Association of Governments**

- *Regional Plan for Bicycling*. July 2000. This plan identifies the policies, priorities, and funding for the regional bicycle system and includes a Bike Map. This document can be found at the following web address: <http://www.pagnet.org/TPD/IMSP/Bicycle/bikeplan.pdf> and the Bike Map can be found at <http://www.pagnet.org/TPD/IMSP/Bicycle/default.htm>.
- *Regional Pedestrian Plan*. July 2000. This Plan identifies the policies and priorities for the regional pedestrian system. This document can be found at the following web address: <http://www.pagnet.org/tpd/imsp/pedestrian/pedplan.pdf>.
- *Tucson Bike Map. 11<sup>th</sup> Edition*. 2001. This regional map of bicycle networks in Tucson, South Tucson, Oro Valley, Marana, Sahuarita, and Pima County. This map also includes major destinations and major street names. This publication is distributed by the Pima Association of



Governments and funding is provided by the City of Tucson, Pima County, and the Arizona Departments of Environmental Quality and Transportation and the Federal Highway Administration.

### **Northern Arizona Council of Governments (NACOG)**

- *NACOG Regional Transportation Plan, 1997.* This plan includes goals and objectives for improving alternative modes of transportation.

### **Town of Gilbert**

- *Gilbert Bicycle Plan, June 2002.* This plan includes information on trails and bicycling.
- *The Town of Gilbert 1996 – 2001 Parks, Open Space and Trails Plan.* This plan includes information on trails.

### **Town of Oro Valley**

- *Oro Valley Pedestrian and Bicycle Plan, Curtis Lueck & Associates, December 1999.* A guideline for developing a safe, convenient, and efficient non-motorized network in the Town of Oro Valley.

### **Western Arizona Council of Governments**

- *1998 Regional Intermodal Transportation Study – Alternatives Modes of Transportation.* The goal of this plan is to provide mobility options throughout Western Arizona.

### **Yuma Metropolitan Planning Organization**

- *YMPO 2000-2023 Regional Transportation Plan Final Report, December 2000.* This final report summarizes the facilities plan for Yuma County, including figures for the locations of bicycle lanes and shared-use paths.

### **Other Documents**

- *Analysis of Gap Patterns in Longitudinal Rumble Strips to Accommodate Bicycle Travel, Moeur, Richard C.* This article discusses the feasibility of placing gaps in a rumble strip pattern to permit bicycle traffic to cross the rumble strip area without striking the rumble strip pattern itself.
- *Street Smarts: Bicycling's Traffic Survival Guide, Allen, John S., 2001.* This document provides guidance on how to ride a bicycle safely and enjoyably by riding with the right attitude and it can be seen at <http://www.bikexpert.com/streetsmarts/usa/>.



### 6.3. *Non-Motorized Bikeway Maps*

The following bicycle and pedestrian plan maps have been obtained from jurisdictions and are provided in **Appendix C** of this report for reference.

- City of Chandler Bike Plan Update Map, 1999;
- Flagstaff Area Regional, Land Use, and Transportation Plan, Map 12: Circulation: Regional Bikeways Plan;
- City of Glendale Bicycle and Pathway System Map. Obtained in 2002;
- City of Goodyear Parks – Figure 3-2 of Trails, and Open Space Master, Plan by RBF Consulting, November 14, 2001;
- Maricopa County Department of Transportation, Bicycle Transportation System Plan, Planned Bicycle Facilities Map, 1999;
- Maricopa County Parks and Recreation. Proposed Maricopa County Regional Trail System Map. August, 2001;
- Maricopa County Regional Trail System Plan. Executive Summary. Proposed Trail Alignments, June 2002;
- City of Mesa Existing Bicycle Facilities Map, Transportation Plan: Mesa 2025 A Shared Vision, April 2002;
- City of Mesa Future Bicycle Facilities Maps, Transportation Plan, Mesa 2025 A Shared Vision, April 2002;
- Town of Oro Valley Pedestrian Systems Plan, December 1999;
- Town of Oro Valley Bikeways Plan, December 1999;
- City of Phoenix Bikeway Network, Received from City of Phoenix in 2002;
- Pima Association of Governments Existing, Programmed, and Planned Regional Bikeway System, November 2000;
- Town of Prescott Valley Pedestrian and Bicycle System Master Plan, September 2001;
- City of Scottsdale On-Street Bikeway System, December 1994;
- City of Scottsdale Off-Street Multiuse System, December 1994;
- City of Tempe 2030 Bicycle and Pedestrian Facilities Map, January 14, 2003;
- City of Yuma Bikeway Location Plan, 2002 General Plan, Summer 2001;
- Yuma MPO 2000-2023 Regional Transportation Plan, Recommended Non-Motorized Plan 2000-2025, December 2000;
- Bicycle and Pedestrian User Maps:
  - Arizona Department of Transportation;
  - Maricopa Association of Governments;
  - City of Mesa;
  - Phoenix Sonoran Bikeway;
  - City of Scottsdale;
  - City of Tempe; and
  - City of Tucson.





The Arizona Bicycle Network includes both the State Highway System and local bicycle facilities that are regionally significant. Regionally significant local bicycle facilities are those that provide a connection between two State Highways. The following agencies within Arizona have an adopted Bicycle Map that is depicted in **Exhibit 6**:

- Flagstaff;
- Maricopa Association of Governments;
- Pima Association of Governments; and
- Prescott Valley.

The Maricopa Association of Governments (MAG) and the Pima Association of Governments (PAG) have adopted bicycle maps that have connectivity through the two major metropolitan areas within Arizona; however, within the Phoenix metropolitan area there is discontinuity in the State Highway System. SR 88 and SR 79 to the east of Phoenix do not continue through the Phoenix metropolitan area and a bicycle route is not currently provided through the metropolitan area. It is recommended that ADOT coordinate with MAG and additional relevant implementing agencies to provide that connection. Within the Tucson Metropolitan Area and the Flagstaff Area, a large percentage of the local bicycle routes that provide an alternative to the State Highway System do not exist at the current time. It is recommended that the relevant implementing agencies put a high priority on implementing these bicycle facilities. Lastly, bicycle route continuity between adjacent local jurisdictions can be improved. Many bicycle routes are on alternating roadways at the boundary between the City of Mesa and the City of Chandler and there is not a bicycle connection between the Cities of Tempe and Phoenix. It is recommended that the two adjacent agencies work together to provide bicycle route connectivity across city boundaries. Connectivity of bicycle facilities is provided in the cities and towns outside of the metropolitan areas of Arizona by the State Highway System.

Major bicycling events often generate the most intensive use of a bicycle facility. Arizona is host to numerous local, regional, national, and international bicycling events. The following is a summary of the known events within Arizona that cover a minimum of 100 miles:

	<b>Organization</b>	<b>Time of Year</b>
Adventure Cycling Southern Tier Route*	Adventure Cycling Association	NA
Fast America	America By Bicycle	April/May
MS 150 Best Dam Bike Tour	National MS Society	November
Grand Canyon to Mexico	GABA Tucson	Sept./Oct.
Race Across America	Race Across America	June
Tour de Phoenix	Perimeter Bicycling Assoc. of America	April
Tour de Tucson	Perimeter Bicycling Assoc. of America	Nov.
Tucson Bicycle Classic	Tucson Bicycle Classic	March

\* Entire route information not available at time of printing, see [www.adventurecycling.org](http://www.adventurecycling.org)

The routes are displayed in **Exhibit 7**. ADOT is finalizing the process for attaining a permit to hold an event on an ADOT facility. Each race organizer should contact the ADOT District Engineer, in the district where the race will start within Arizona, as much in advance as possible to confirm the appropriate procedure for attaining a use permit.



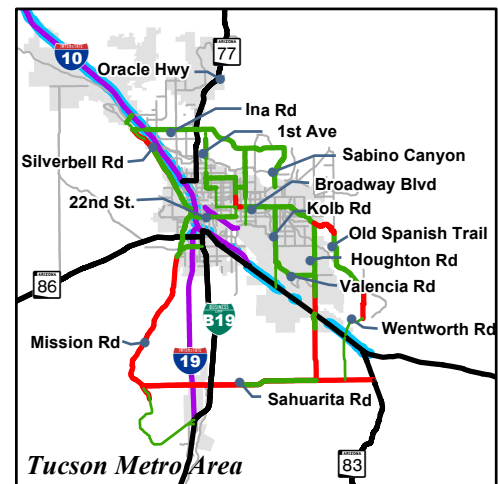
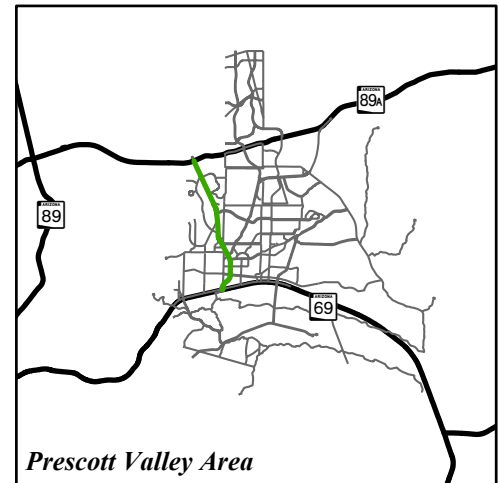
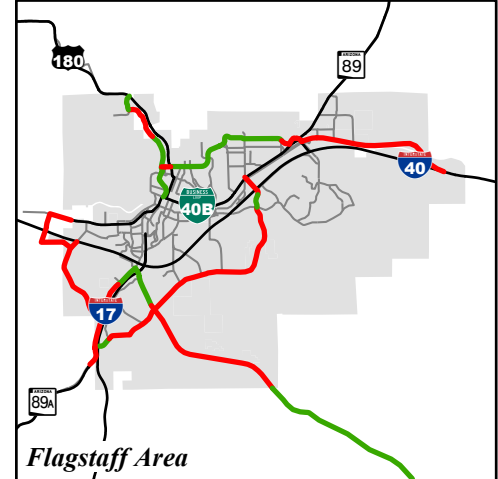
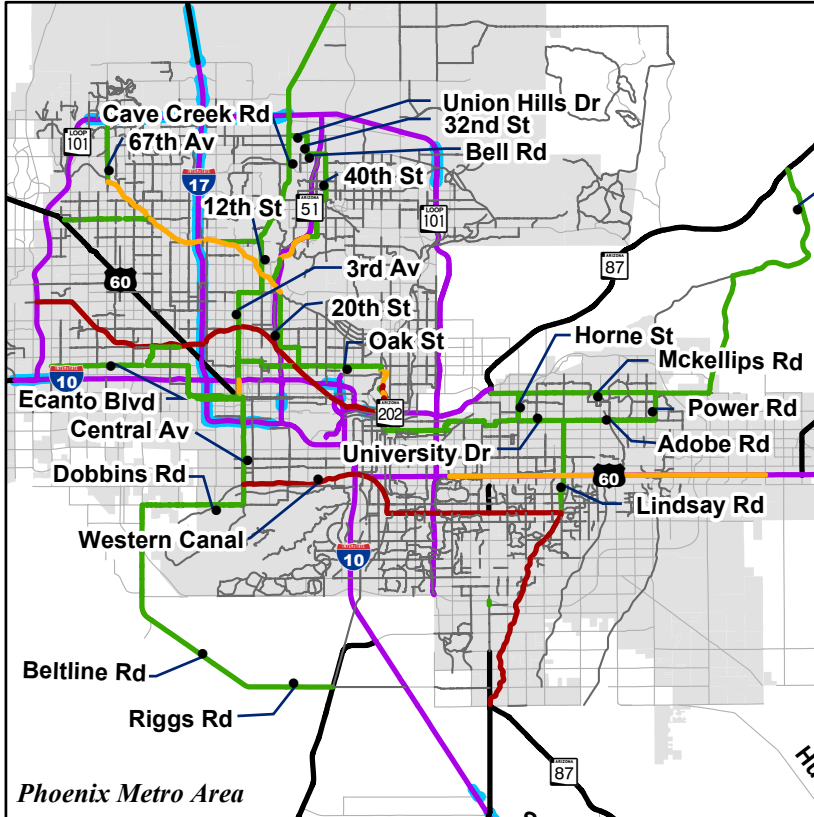
#### **6.4. Recommendations**

**Section 6 includes the recommendations that:**

- All communities within Arizona consider having Bicycle and Pedestrian Advisory Committees.
- ADOT have the current Bicycle and Pedestrian Coordinator position solely dedicated to bicycle and pedestrian projects and a Bicycle and Pedestrian Coordinator's Assistant position be developed at ADOT. In addition, it is recommended that ADOT designate one Bicycle and Pedestrian Contact for each district.
- Implementing agencies within Arizona consider having at least one full time Bicycle and/or Pedestrian Coordinator.
- Implementing agencies put a high priority on implementing proposed local routes that fill a gap between existing bicycle routes.
- That two adjacent implementing agencies work together to provide bicycle route connectivity across jurisdictional boundaries.
- Each organizer of a major event to be held on an ADOT facility should contact the ADOT District Engineer, in the district where the race will start within Arizona, as much in advance as possible to confirm the appropriate procedure for attaining a use permit.

ARIZONA STATEWIDE BICYCLE AND PEDESTRIAN PLAN

**EXHIBIT 6: REGIONALLY SIGNIFICANT  
NON-ADOT ROUTES (LOCAL AREAS)**



Local Area Bicycle Route Data provided by:

- Maricopa Association of Governments**
- City of Flagstaff**
- Town of Prescott Valley**
- Pima Association of Governments**

**Legend**

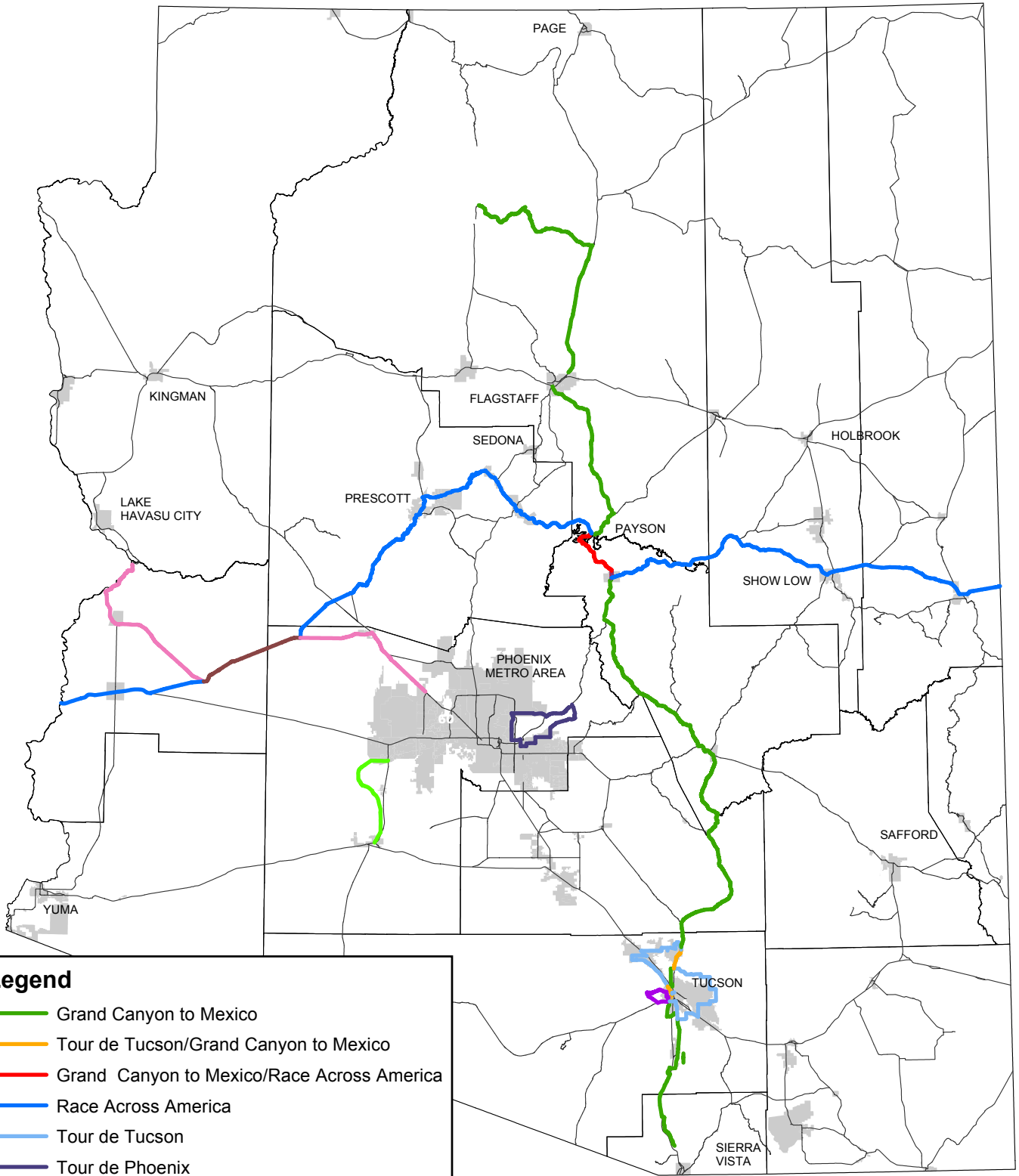
- Existing Non-ADOT Bicycle Route
- Planned Non-ADOT Bicycle Route
- Unpaved Shared Use Path
- Paved Shared Use Path
- Non-Regional Bicycle Routes
- ADOT Roadways
- Bicycles Prohibited
- Interstate Frontage Roads

Note: Available Shared Use Path data does not distinguish between existing and proposed facilities.





# EXHIBIT 7: REGIONALLY SIGNIFICANT BICYCLE EVENTS



**Legend**

- Grand Canyon to Mexico
- Tour de Tucson/Grand Canyon to Mexico
- Grand Canyon to Mexico/Race Across America
- Race Across America
- Tour de Tucson
- Tour de Phoenix
- Tucson Bicycle Classic
- Parker 150
- Parker 150/Race Across America
- Gila Bend 150





## 7. Arizona Bicycle Network

The Statewide Bicycle Network includes the ADOT State Highways that are described in **Section 5**, plus the regionally significant non-ADOT bicycle facilities from the existing plans that are described in **Section 6**. Together they provide mobility for bicyclists throughout the state. A description of the data that was evaluated to assess the bicycling conditions on the ADOT State Highway System is provided in **Section 5.2**. The Arizona Bicycle Network is comprised of roadways within the State Highway System, except where bicycles are specifically prohibited, and it includes regionally significant non-ADOT bicycle facilities. Combining this information onto one map provides users with valuable information regarding the major bicycle routes within the State and specifies where there are alternative routes to the State Highway System.

Bicycling conditions on ADOT's State Highway System were last evaluated by ADOT in 1996 and they are depicted on the 1996 Bicycle Suitability map shown in **Exhibit 2**. As described in **Section 5**, each roadway segment is ranked as more suitable, less suitable, or prohibited. Instead of updating this map in its current format, the Steering Committee prefers to show certain bicycling conditions, similar to states such as Montana and Kansas. With this format, specific roadway conditions are provided directly to the user for the user to select what is suitable. It is acknowledged that there will need to be a disclaimer on the map stating that information is not guaranteed to be accurate due to the extensive roadway network and changing roadway conditions.

The Arizona Bicycle Network map includes the both regionally significant non-ADOT routes and roadways within the State Highway System. The following information was considered for inclusion on ADOT State Highways:

- Traffic volume;
- Percent grade;
- Right shoulder width;
- Roadway speed limit;
- Rumble strip location; and
- Shoulder pavement condition.

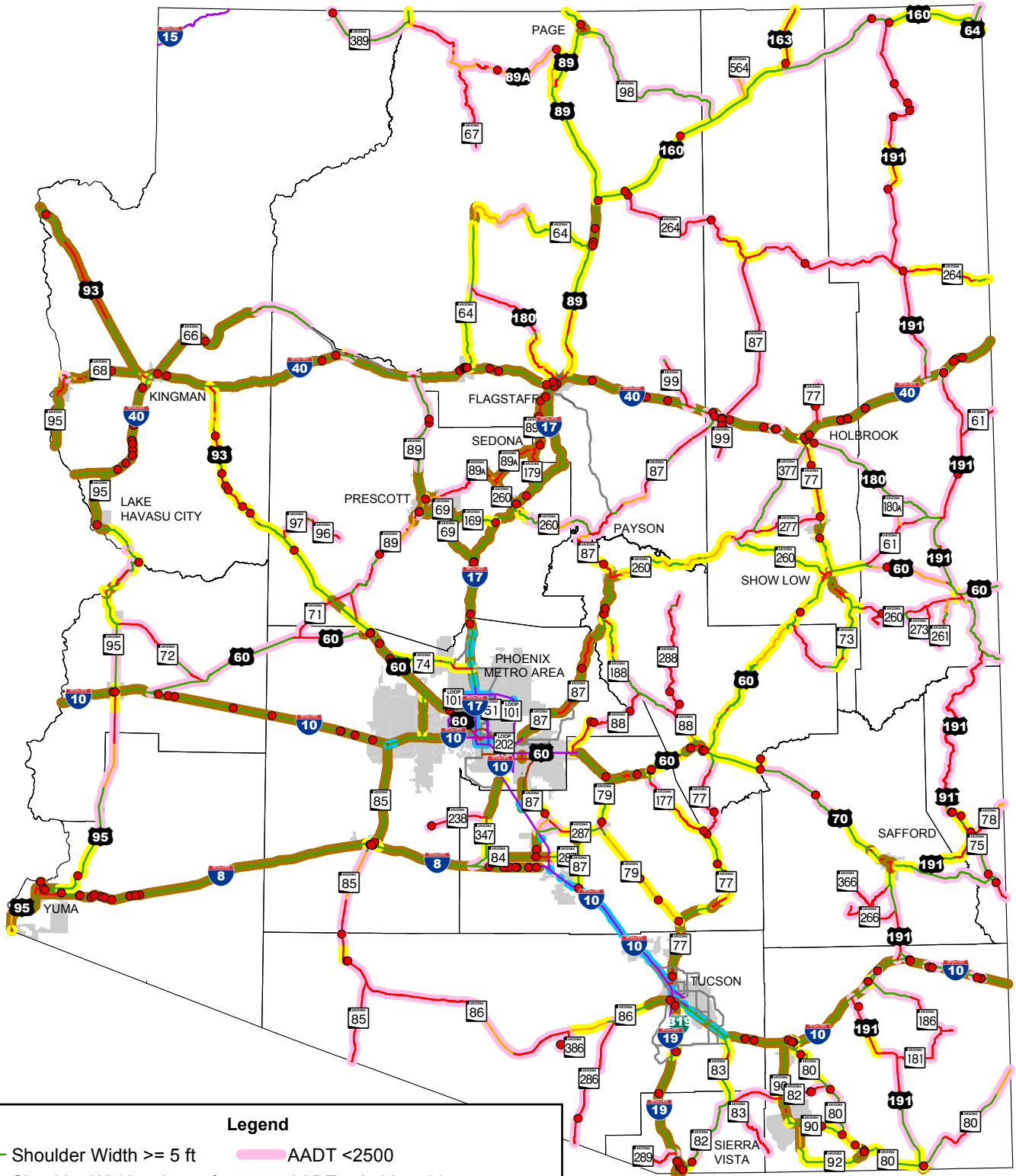
It is important to keep the information simplified on user maps, so users are able to easily interpret the map. It is possible to have one data set colored along the route segment with a second data set providing the border color of the segment. The right shoulder width of both the segment and any bridges along the segment is the most critical information. The presence of rumble strips is very important; however, definitive information on the location of rumble strips and the effective width of the shoulder is not currently available. The second most important criterion of the available data is the traffic volume to capacity ratio. **Exhibits 8** and **8B** depict the Arizona Bicycle Network and include right shoulder width and traffic volume data. The traffic volume range is shown with the corresponding approximate hourly traffic volume referenced.

It is recommended that implementation of the Plan include the development, printing, and distribution of a fold out user map that combines the data presented in **Exhibit 8** with educational information and other resources for bicyclists. This user map is anticipated to be similar to the Cycle Arizona Map of Suitable Bicycle Routes on the State Highway System that ADOT printed in 1998 for free distribution.



# ARIZONA STATEWIDE BICYCLE AND PEDESTRIAN PLAN

## EXHIBIT 8: ARIZONA BICYCLE NETWORK



**Legend**

— Shoulder Width $\geq$ 5 ft	— AADT < 2500
— Shoulder Width = 3 to 4 ft	— AADT = 2500-7500
— Shoulder Width = 0 to 2 ft	— AADT > 7500
— Bicycles Prohibited	— Interstate Frontage Roads
— Non-ADOT Bicycle Routes	• Bridge with Shoulder Width < 4 ft

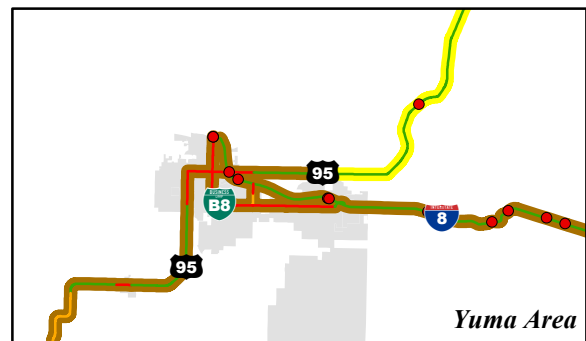
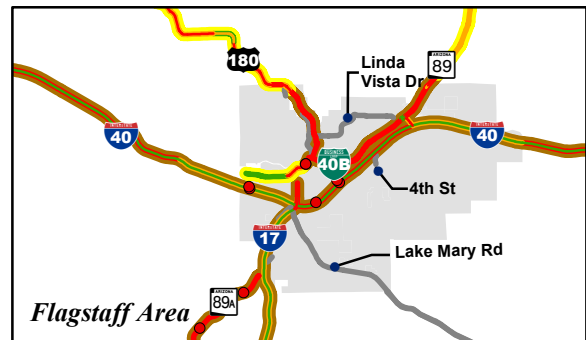
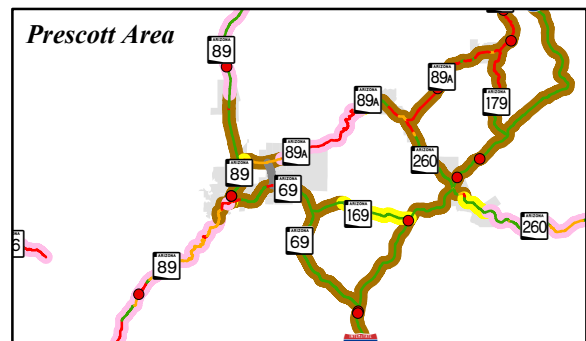
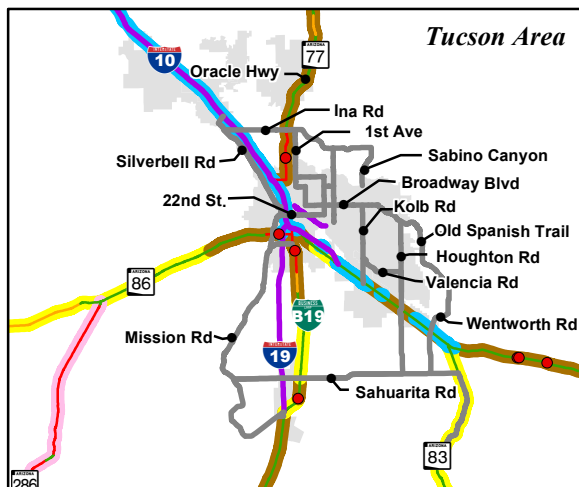
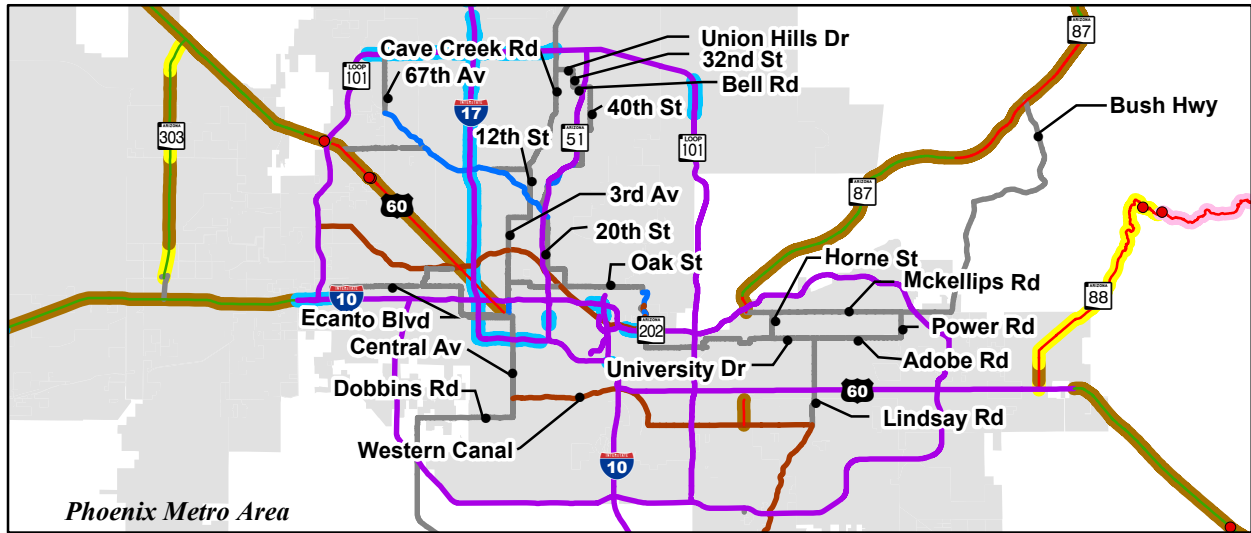
Notes: All ADOT state highways not designated as bicycles prohibited are included in the Arizona Bicycle Network. Facilities conditions shown on this map are not guaranteed and often vary from one side of the road to the other.

\* A typical hourly traffic volume in one direction is approximately equal to 6% of the Average Daily Traffic Volume (AADT), so a 7,500 AADT is approximately 450 vehicles per hour (vph), and a 2,500 AADT = 150 vph.





# ARIZONA STATEWIDE BICYCLE AND PEDESTRIAN PLAN EXHIBIT 8B: ARIZONA BICYCLE NETWORK (LOCAL AREAS)



**Legend**

- Shoulder Width  $\geq$  5 ft
- Shoulder Width = 3 to 4 ft
- Shoulder Width = 0 to 2 ft
- Bicycles Prohibited
- Unpaved Shared Use Path
- Paved Shared Use Path
- Non-ADOT Bicycle Route
- AADT < 2500
- AADT = 2500-7500
- AADT > 7500
- Interstate Frontage Roads
- Bridge with Shoulder Width < 4 ft



\* The hourly traffic volume in one direction is approximately equivalent to 6% of the Average Daily Traffic Volume (AADT), so a 15,000 AADT = 900 vehicles per hour (vph), a 7,500 AADT = 450 vph and a 2,500 AADT = 150 vph.

Note: All ADOT state highways not designated as bicycles prohibited are included in the Arizona Bicycle Network. Facilities conditions shown on this map are not guaranteed and often vary from one side of the road to the other.



## 8. Design Guidelines for Consideration

ADOT and other implementing agencies within Arizona should consider the appropriate accommodation of bicyclists and pedestrians in planning and construction projects. This section includes design guidelines that are important to the betterment of bicycling and walking within Arizona. At this time, it is not possible to address all impacts and fiscal implications these guidelines would have on any particular implementing agency within Arizona; therefore, the guidelines within this plan are provided for consideration by all agencies and are not a specific requirement on ADOT or any other agency within Arizona.

AASHTO developed national design guidelines for bikeways with input from state departments of transportation, including ADOT. Currently, ADOT recognizes design guidelines including the 1999 AASHTO *Guide for the Development of Bicycle Facilities* and the MUTCD, Millennium Edition Revision 1 with an Arizona Supplement. AASHTO is currently developing pedestrian facility design guidelines that will be reviewed by ADOT and adopted accordingly. The following design guidelines may be considered in addition to the above referenced guidelines.

### 8.1. Bicycle Facility Design Guidelines

The following design guidelines for consideration address bike lanes, shared-use paths, and bike routes. Where possible, it may be desirable to exceed the minimum guidelines for shared-use paths or bike lane widths, signage, lighting, and traffic signal detectors.

#### Bike Lane Facilities Design

The ADOT Bicycle Policy states that the 1999 AASHTO *Guide* and the MUTCD Part 9 will be utilized as the design guides for roadway features to accommodate bicyclists. The AASHTO guide states that all roadways should be designed to accommodate bicycles, which may include the designation of bicycle lanes on State Highways. In addition, the width and placement of roadway shoulders should follow these guidelines when practical.

The following guidelines should be considered in the construction and designation of bike lanes. Comprehensive design guidance and standards for bike lanes are found in the AASHTO *Guide for the Development of Bicycle Facilities* and Part 9 of the MUTCD.

1. All bike lanes should conform to the design guideline of AASHTO, which is displayed in **Figure 1** and the ITE Traffic Control Handbook. Under restricted circumstances, bike lanes may be four feet in width, including bike lanes located on lower-speed roadways that are uncurbed, or in some cases between through traffic lanes and right-turn only lanes. Four-foot bike lanes also may be utilized for paved shoulder locations where right-of-way is restricted or there are topographical constraints. Generally, bike lane widths of five to six feet are desirable. Bike lanes should be striped, signed, and marked in accordance with the MUTCD. Intersections with bike lanes should follow the MUTCD and the ITE Traffic Control Handbook and stripe the bike lane to the left side of right-turn only lanes. Please see **Figures 2A** through **2D** for this detail and other details for bike lane approaches to intersections.





Note: The ADOT Roadway Design Manual requirements for shoulder widths in Section 302.4 provide widths to accommodate bicycle lanes by specifying a six-foot to ten-foot shoulder based on roadway type for all roadways except urban undivided highways, where the shoulder has a two-foot minimum. On urban undivided highway cross sections, the ADOT typical 12-foot lane width plus the two-foot minimum shoulder does meet the recommended 14-foot shared lane width of AASHTO.

2. Signal detectors that sense bicycles should be considered for signalized intersections. A stencil of a bicycle can identify the location for bicyclists to stop in order to be detected. The stencil is typically only needed with loop detection systems. Curbside push buttons should not be considered a replacement for effective signal detection and they encourage bicyclists to stop in a location that places them too far to the right at the stop line and at a disadvantage to right-turning traffic. Curbside push buttons may be appropriate in certain situations such as when there is an island separating right turning traffic from through traffic and when other detection methods are not effective. As stated in Section 9D of the MUTCD 2000, the needs of bicyclists shall be considered when setting signal timing on bikeways.
3. Bike lanes should be continuous where practical. Where right-of-way or other constraints preclude continuous bike lanes, the bike lane segments can be connected with local bike routes until such time as a continuous bike lane can be provided; however, in most cases bicyclists should be permitted to continue along the roadway and not be required to use an alternate route. Signage confirming to the MUTCD should be provided to designate the facility changes along the bicycle route. Bike routes are discussed in the following section.
4. Standard bike lane signs as contained within Part 9 of the MUTCD must be utilized where bike lanes are designated. Part 9 also includes examples of optional signs, which help in the guidance of bicyclists utilizing regional routes. All signing and striping of bike lanes must conform to most recent MUTCD as approved by ADOT.

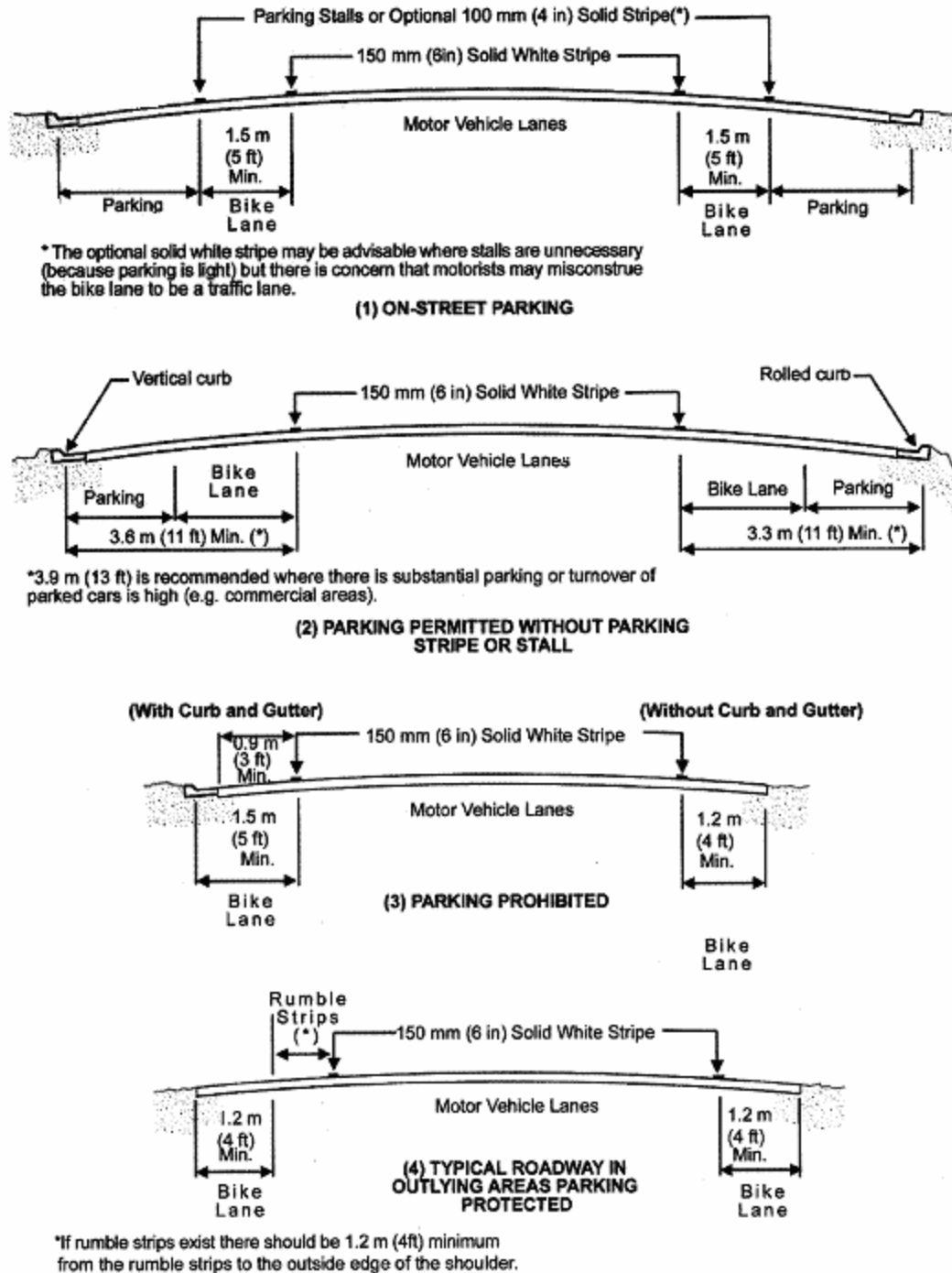
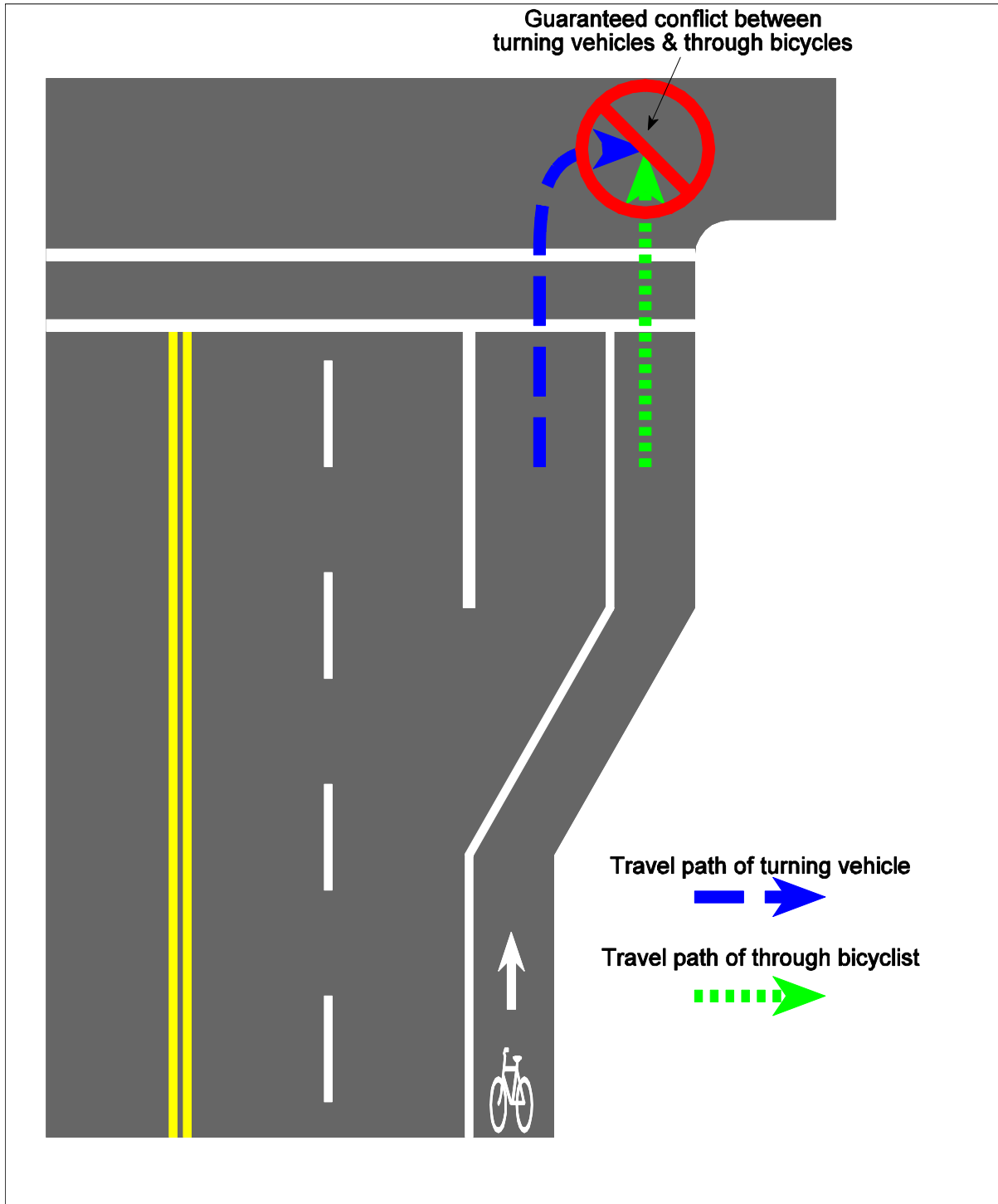


Figure 1 – Typical Bike Lane Cross Sections  
(Source: AASHTO)



**Figure 2A – Problems with Placement of Bike Lane to the Right of a Right Turn Lane**  
(Source: ITE Traffic Control Devices Handbook)

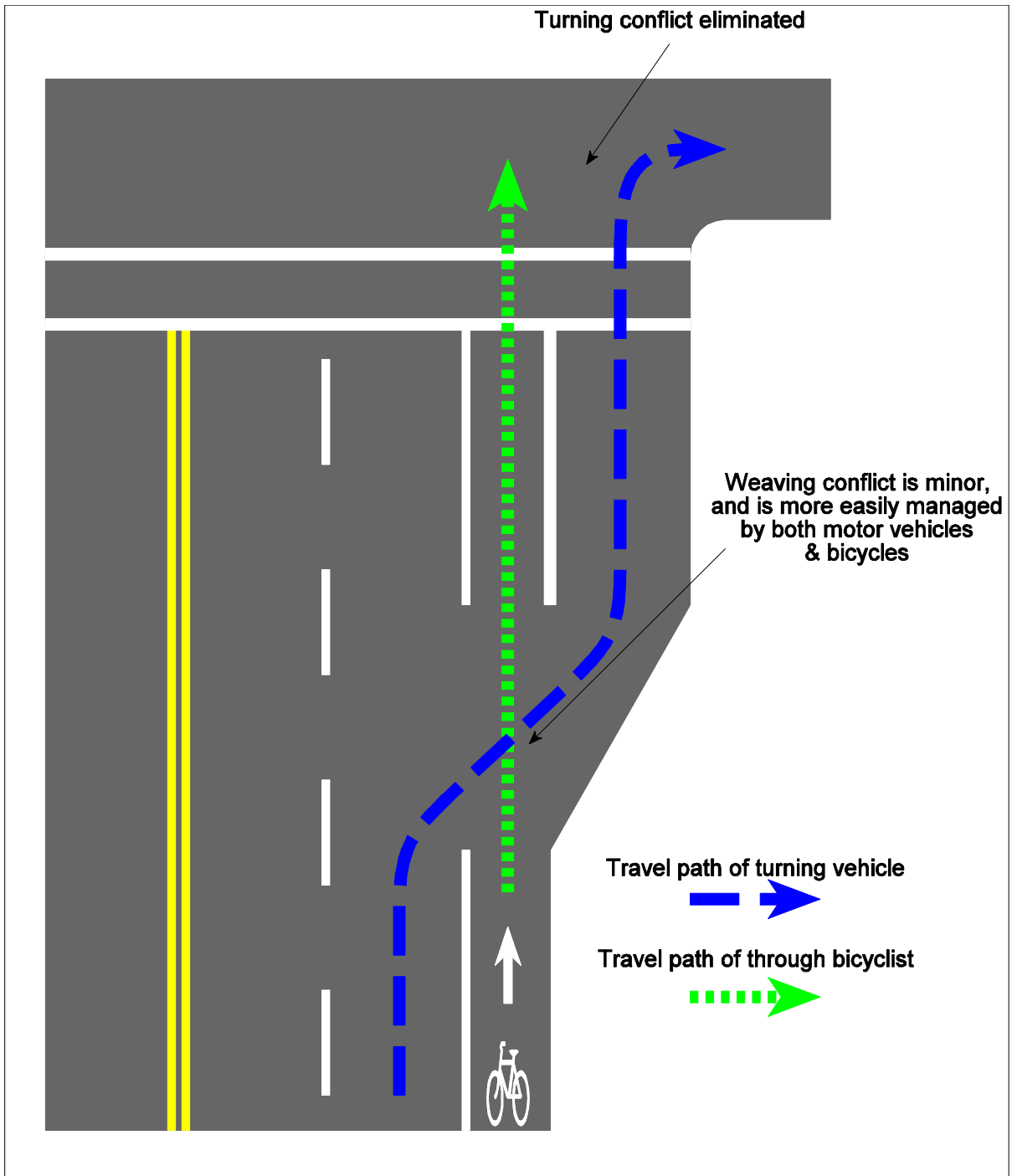
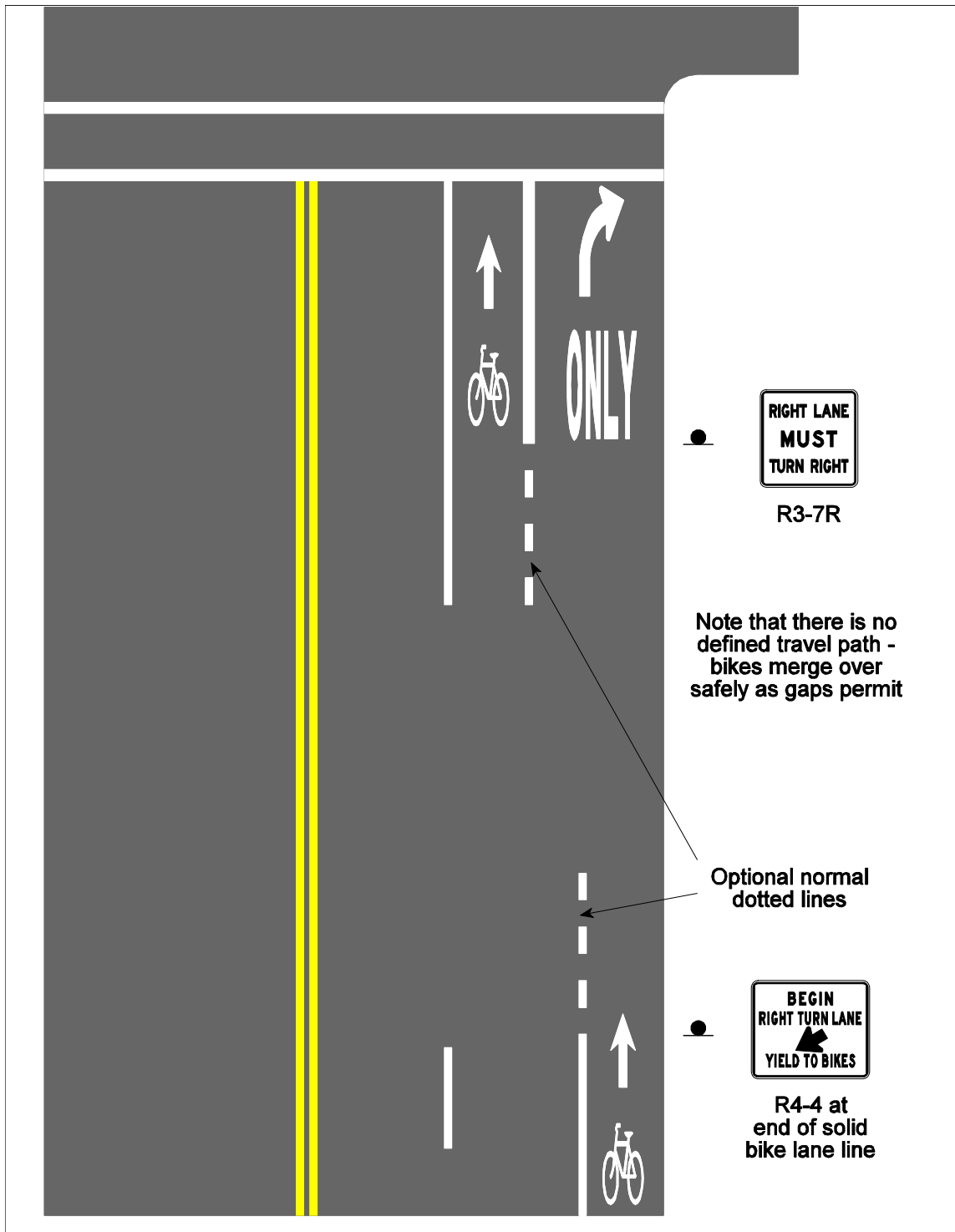


Figure 2B – Correct Placement of Bike Lane to the Left of a Right Turn Lane  
(Source: ITE Traffic Control Devices Handbook)



**Figure 2C – Optional Bike Lane Treatment Where Right Lane Becomes Right Turn Only Lane**  
(Source: ITE Traffic Control Devices Handbook)

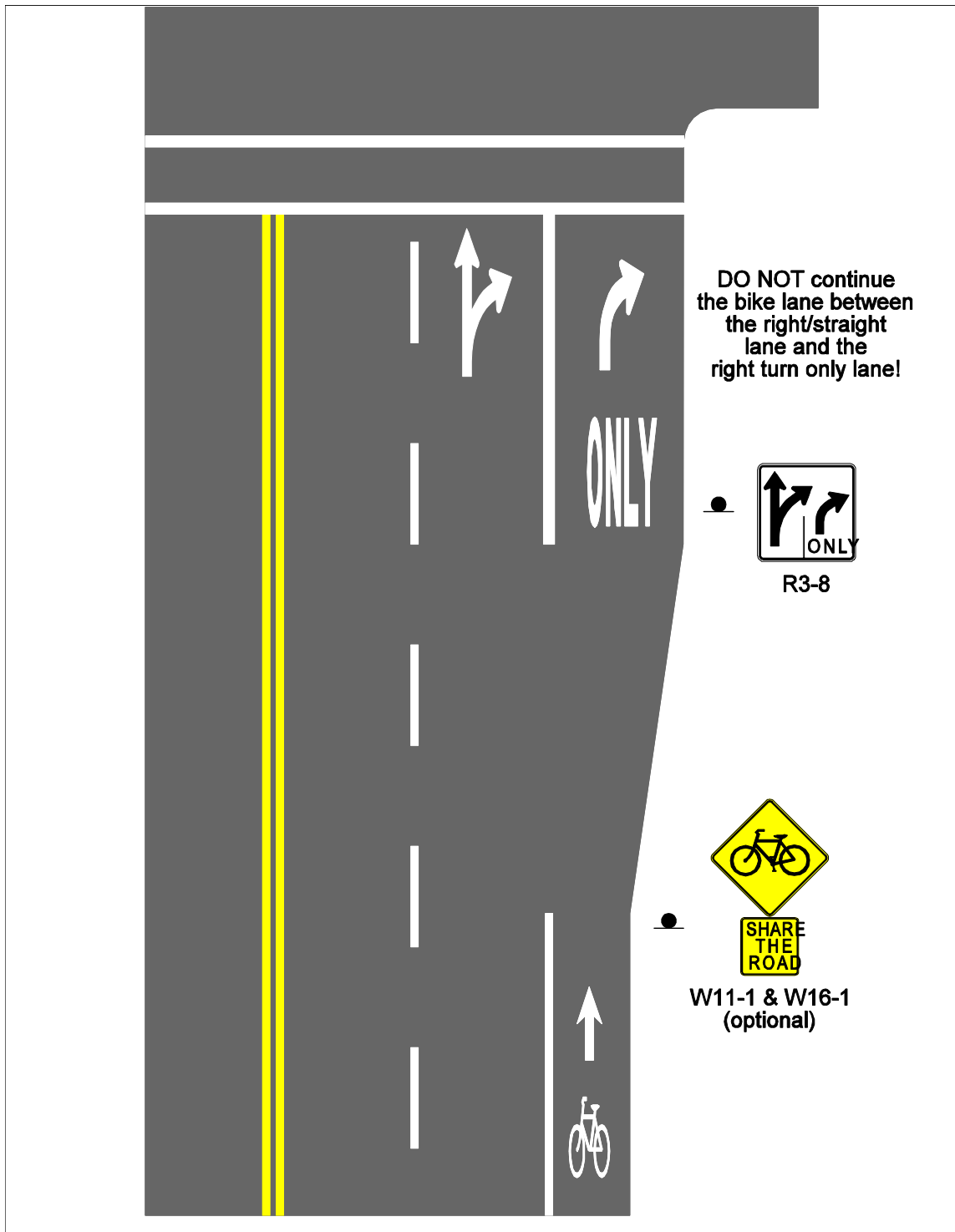


Figure 2D – Optional Bike Lane Treatment at Multiple Right Turn Lanes  
(Source: ITE Traffic Control Devices Handbook)



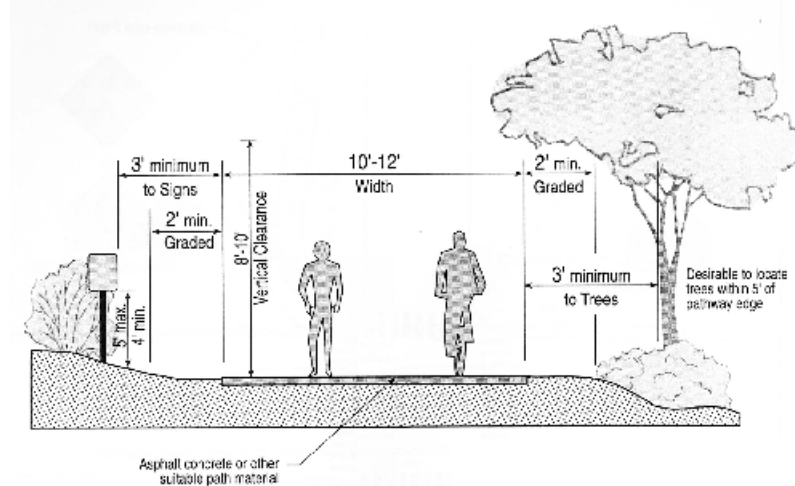
### Shared-Use Path Facilities Design

The following guidelines should be considered in the construction and designation of shared-use paths. Comprehensive design guidance and standards for shared-use paths are found in the AASHTO *Guide for the Development of Bicycle Facilities* and Part 9 of the MUTCD.

Sidewalk paths and shared-use paths located immediately adjacent to the roadway are discouraged by AASHTO. This is due to several factors including the potential for high numbers of intersecting roadways, conflicts at intersections particularly with bicyclists traveling in the opposite direction of the adjacent roadway travel lane, potential insufficient sight distances due to walls and other obstructions, and possible conflicts within the right-of-way such as utility poles.

### Shared-Use Path Facilities Design Considerations

1. Shared-use path crossings of roadways and driveways must be carefully considered during the design process. Pathways built adjacent to roadways are discouraged by AASHTO; however, where pathways are built adjacent to roadways it is recommended that street crossings be minimized. Generally speaking, shared-use paths that cross roadways with high traffic volumes may require signalization or grade separation.
2. Shared-use paths should be located a minimum of five feet and preferably more from the traveled way or a suitable barrier should be provided between the pathway and roadway. The pathway should be a minimum of 10 feet wide and should include a minimum two feet of shoulder on each side and preferably four feet on each side (see **Figure 3**). In areas of high usage, 12 feet of pavement or more is recommended, and in some cases an additional separate unpaved parallel path is optimal for pedestrian travel. Pavement widths of 10 feet or more also better accommodate maintenance vehicles and reduces damage to the pavement edge from these vehicles.



**Figure 3 – Shared-Use Path Standard Cross-Section (Curtis Lueck & Associates)**



3. Landscaping for shared-use paths should generally be low water use native vegetation. Selected plant species should generally be native plants. Selecting species that require minimal maintenance, including falling litter and debris is an important consideration. Shade landscaping should be considered as a valuable enhancement for bicycle and pedestrian use, and should be considered as a continuous design element along the pathway or at nodes within reasonable spacing along the pathway. Trees trunks are recommended to be located between three and five feet from the shared-use path edge so that the tree provides the path with shade but not so close as to cause future pavement damage from root intrusion (root guard may be needed); however, consideration should be taken so that the tree typically does not encroach into the vertical clearance of the path.
4. Pedestrian-scale lighting should be considered where bicycle users and others will likely use the shared-use path in the evenings or early mornings. This is an important safety and security consideration in warmer areas of the State where users may frequently use the path during early or late hours in order to avoid the heat.
5. Barriers such as posts or bollards to prevent unauthorized motor vehicle use of shared-use paths may be used as appropriate. Ideally, fewer restrictions at entry points are preferred; however, if barriers are used, the barriers should be clearly marked as per MUTCD standards and should be Americans with Disability Act (ADA) accessible.
6. Shared-use path construction should take into consideration maintenance and emergency vehicles particularly for shared-use path surface material, width, shoulders, and vertical clearance requirements.
7. Unpaved smooth shoulders two to four feet in width should be provided where feasible for pedestrians and runners. The shoulders provide a softer running and walking surface, increase capacity of the path, and provide a clear zone for bicyclists and in-line skaters who may unexpectedly leave the path. Bicyclists and pedestrians may be directed to the right side of the pathway with signing and/or stenciling, and signs may be provided illustrating the rules of the path.
8. Where paths are heavily used, consideration may be made to install emergency phone service.
9. Grades that meet ADA provisions are important to accommodate users with disabilities. ADA requires that the grade of shared-use paths not exceed 8.33 percent.
10. Where shared-use path design occurs in environmentally sensitive areas, design exceptions may be pursued to minimize environmental impacts; however, the minimum AASHTO design guidelines should be followed, or if not feasible (e.g., if only a six-foot width can be achieved), the path should not be designated for bicycle use.
11. Shared-use paths should not be considered a substitute for on-road bicycle facilities. Paved shoulders or bicycle lanes should be considered along roadways that have adjacent shared-use paths. As stated within AASHTO, many bicyclists will use the roadway instead of the shared-use path because they have found the roadway to be safer, more convenient, or better maintained. AASHTO





lists several additional operational and safety reasons why paved shoulders or bike lanes should be implemented on the roadway if adjacent shared-use paths are built.

### **Bike Route Facilities Design**

Bike routes have been typically designated as signed routes along street corridors, usually on local streets and sometimes on collectors. With proper route signing, reasonably direct connectivity, and good street maintenance bike routes can be effective in guiding bicyclists to local and regional destinations. Bike routes also can be good incubators for beginning bicyclists to develop their skills. Bike routes can become more useful when coupled with such techniques as:

- Special route name, directional, and distance signing;
- “Share the Road” signs along roadways where additional guidance is needed for motorists to share the road with bicycles, including locations where the bikeway narrow to substandard conditions;
- Wide curb lanes on collector roadways (14 feet to 16 feet in width);
- Routine pavement maintenance schedules;
- Traffic signals timed for bicyclists and signalized crossings specifically for bicyclists and/or pedestrians, where high use warrants increased safety and accessibility across major roadways; and
- Traffic calming and development of “bicycle boulevards” (e.g., includes provision of speed humps, traffic circles, curb extensions, entrances to neighborhoods limited only to bicyclists, and pedestrians, etc).

### **Riding on Sidewalks**

The use of sidewalks as bicycle facilities should not be encouraged especially as a bike route. Some communities prohibit bicycle riding contrary to the flow of traffic (e.g., Tempe). Others prohibit bicycle riding on all sidewalks (e.g., Tucson) except for bicycles with wheel diameters less than 16 inches (technically Arizona Revised Statutes do not classify these as bicycles). Yet other jurisdictions do not have any restrictions on bicycle riding on sidewalks, including such entities as ADOT and several rural counties. Although bicycle and motor vehicle speeds are generally lower at sidewalk intersections with roadways, potential conflicts can still result in severe injuries. It is inappropriate to sign these facilities as bikeways. Significant safety issues arise when those riding on the sidewalk, especially contrary to the flow of traffic, encounter driveways and side streets where motorists do not expect to see them. Bicyclists should not be encouraged to ride facilities that are not designed to accommodate bicycle travel.

The following excerpt is from the 1999 AASHTO Design Guidelines on the use of sidewalks for bicycle facilities.

### **Undesirability of Sidewalks as Shared-Use Paths**

Utilizing or providing a sidewalk as a shared-use path is unsatisfactory for a variety of reasons. Sidewalks are typically designed for pedestrian speeds and maneuverability and are not safe for higher speed bicycle use. Conflicts are common between pedestrians traveling at low speeds (exiting stores, parked cars, etc.) and bicyclists, as are conflicts with fixed objects (e.g., parking meters, utility poles, sign posts, bus benches, trees, fire hydrants, mail boxes, etc.). Walkers,



joggers, skateboarders, and roller skaters can, and often do, change their speed and direction almost instantaneously, leaving bicyclists insufficient reaction time to avoid collisions.

Similarly, pedestrians often have difficulty predicting the direction an oncoming bicyclist will take. At intersections, motorists are often not looking for bicyclists (who are traveling at higher speeds than pedestrians) entering the crosswalk area, particularly when motorists are making a turn. Sight distance is often impaired by buildings, walls, property fences, and shrubs along sidewalks especially at driveways. In addition, bicyclists and pedestrians often prefer to ride or walk side-by-side when traveling in pairs. Sidewalks are typically too narrow to enable this to occur without serious conflicts between users.

It is especially inappropriate to sign a sidewalk as a shared-use path or designated bike route if to do so would prohibit bicyclists from using an alternate facility that might better serve their needs. It is important to recognize that the development of extremely wide sidewalks does not necessarily add to the safety of sidewalk bicycle travel. Wide sidewalks might encourage higher speed bicycle use and can increase potential for conflicts with motor vehicles at intersections, as well as with pedestrians and fixed objects.

*Source 1999: AASHTO Guide for the Development of Bicycle Facilities*

### **Drainage Grates**

ADOT and other agencies should require that all newly constructed drainage grates on roadways open to bicyclists have a maximum gap of four inches in the direction of bicycle travel. Where driveways or curb cuts are present, drainage grates should be avoided. If grates must be placed in these locations, they need to have a maximum gap of four inches in any direction. See **Section 10** for retrofit considerations on existing drainage grates.

### **Signing**

All bikeway signing for State Highways in Arizona shall conform to signing standards identified in the MUTCD (Millennium Edition Revision 1 with an Arizona Supplement) when adopted by ADOT including addenda. This document provides specific information on the type and location of signing for bikeway systems. Stencils and pavement markings as indicated in the MUTCD also can be included on bicycle facilities to help bicyclists and motorists more easily identify travel lanes and bike facilities and routes.

### **Access Management**

The Transportation Research Board's Access Management Committee defines access management as follows:

- Access management is the process that provides access to land development while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity, and speed.

The spacing and frequency of driveways and the provisions for access between adjacent parcels has a significant impact on bicyclists and pedestrians. Implementing agencies should consider having an



Access Management Plan that regulates the spacing of driveways and requires new developments to include direct access for pedestrians and bicyclists from the adjacent roadway and to adjacent parcels.

## 8.2. *Pedestrian Guidelines*

Pedestrian travel can be encouraged or discouraged through basic design features. While most pedestrian activity is concentrated in urbanized areas, both urban and rural, State Highways in Arizona should consider the unique circumstances and needs of pedestrians. The fundamental ethic should be that the pedestrian is considered an important form of mobility and that accessibility for all persons is an important consideration (i.e., facilities must conform to the ADA of 1990). State Highway routes through every community in Arizona should be designed with consideration of the safety and convenience of pedestrians. In larger metropolitan areas and smaller jurisdictions as well, safe and accessible pedestrian movement is critical to establishing livable communities. When more people choose to walk in our communities, people reap the benefits in several ways:

- Reduced traffic congestion;
- Reduced air pollution, global warming gases, and energy consumption;
- Quieter, more convivial streets;
- Safer environment;
- Increased use of public transit; and
- Healthier economic conditions for local merchants.

In addition, with improved access and mobility, pedestrians benefit on a personal level from walking with increased exercise and by enjoying the ambiance of pedestrian-friendly streets. When people choose to walk, they save money by not driving or parking, and surveys show that people like to live in communities and neighborhoods where they can walk. The design of roadways should consider pedestrian needs and identify areas to improve safety for pedestrians and persons with physical challenges.

These guidelines will assist ADOT to provide assistance to local jurisdictions and others on how they might incorporate pedestrian concepts into future planning efforts. These are not to be thought of as requirements. Rather, they are merely guidelines for the State to consider and apply where appropriate.

### **Pedestrian Facility Guidelines**

The following is a listing of pedestrian specific needs:

1. Sidewalks should be considered 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 original and destination. A transit stop is considered a destination. 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, if available.



2. Sidewalks should almost always be placed on both sides of a highway. Exceptions could include commercial strips entirely on one side with absolutely no destinations on the other side (e.g. railroad tracks). In most instances, placing a sidewalk on only one side leads to pedestrians walking on the roadway without a sidewalk, or crossing the highway twice to access the sidewalks.
3. The minimum clear width for comfortable walking is five feet. This allows two pedestrians to walk side by side. Six feet is preferable, as this allows two pedestrians to pass another pedestrian. Eight feet is needed for two pedestrians to pass two other pedestrians. Clear width means no obstructions such as poles, signs, trees, and benches. Sidewalk dimensions are approximately equivalent when they are two feet wider when sidewalks are adjacent to the roadway. For example, a five-foot separated sidewalk is equivalent to a seven-foot curbside sidewalk.
4. Sidewalks may be separated from traffic by five feet or more. The offset serves three essential purposes:
  - Comfort;
  - The ability to keep sidewalks level (two percent ADA requirement) through driveways; and
  - This provides an area in which to place signs and hydrants, keeping the sidewalk clear of obstructions. Sidewalks should typically not be offset more than five feet at intersections, where pedestrians need to be seen by drivers.
5. The amount and placement of street furniture is very dependent on surroundings. The most common features are benches, water fountains, and trash receptacles. Street furniture provides some of the same comforts drivers enjoy in their cars, including seats, cup holders, and trash receptacles.
6. As stated in the FHWA November 2000 study, *Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations*, pedestrian needs in crossing streets should routinely be identified and appropriate solutions should be selected to improve pedestrian safety and access. This study researched and documented that on many roadways, improvements more substantial than simply striping a crosswalk are often needed for safe pedestrian crossings, such as adding traffic signals (with pedestrian signals) when warranted, providing raised medians, speed-reducing measures and others.
7. Shade is essential in a climate like Arizona's. It will take many years to see trees planted now to grow to maturity. Water restrictions may make this difficult. In central business districts, municipalities should consider adopting ordinances requiring awnings that provide shade over the walking area.
8. Lighting is critical for pedestrian safety at intersections, midblock crossing points, and also along sidewalks. Lighting enables pedestrians to take walking trips at all hours. Pedestrian-scale lighting illuminates the entire walking area, without too much glare. Lighting is often too bright, creating a prison yard feel. It should be bright enough so drivers on the road sense the sidewalk area is different from the roadway. At intersections and midblock street crossings, overhead illumination should be considered so pedestrians in crosswalks are visible. Overhead illumination along suburban arterials often illuminates sidewalks adequately, unless there are trees casting shadows. Pedestrians-scale lighting is preferred though.
9. Pedestrian oriented signs have not been used much in the U.S., but they help provide useful information to tourists, newcomers, or even residents who had not previously considered walking to their destination. Signs should be to a pedestrian-scale, offer information useful to pedestrians (e.g., distance in blocks or minutes rather than miles), and indicate a route that is not obvious if one drives



(e.g., pedestrians can walk “against traffic” on one-way streets). The design of one-way streets should consider having small-scale street signs mounted at pedestrian level, so those walking against traffic can see the names of cross streets.

10. Bus ridership and use of other modes of transit are 100 percent dependent on walking trips at both ends of every trip. All drivers become pedestrians the instant they step out of their cars. The preferred way to improve access to walking by drivers is with on-street parking. Then a sidewalk system needs to be in place so drivers can access several destinations on foot once they leave their parked car. Safe street crossings are essential for both transit patrons and drivers, as bus riders will need to cross the street at one leg of their journey, and drivers often park on one side to access a destination on the other side (or else they will make U-turns).
11. Pedestrian-activated signals are appropriate in suburban locations where pedestrians won’t be present at every cycle, and where the cycle time needs to be lengthened to accommodate adequate pedestrian clearance time. They are not appropriate in central business districts or downtown, where signal cycles are short and a high volume of pedestrians is expected.
12. Connectivity of facilities is paramount. Sidewalks are functional only when they connect – to destinations, to land uses, to other streets, and to transit. Pedestrians are at the greatest risk at intersections and when crossing the street. Most modern intersection designs do not consider pedestrian safety – multiple lanes, right- and left-turn lanes, long crosswalks, and large radii are the most detrimental to pedestrian safety.
13. Shared-use paths serve pedestrians well, if they are located where they serve destinations (as opposed to “paths in the middle of nowhere”). They are particularly helpful when provided in corridors not served by the street system (along canals and streams, abandoned railroad tracks etc.) From the pedestrian’s perspective, a bicyclist riding on a sidewalk is a negative, as cyclists riding at higher speeds can be threatening to pedestrians. It’s one of the main reasons bicyclists should be accommodated on the roadway.
14. A separated grade crossing over a roadway should be considered when the roadway separates a significant public destination from residential homes or commercial destinations and the alternate route for pedestrians or bicyclists is significantly longer than a separated grade crossing would provide.

### **Pedestrian-Friendly Design Features**

The following general design features will impact pedestrian mobility within the State Highway System. Not all of these features will be present in every location. Every situation requires a tailored approach that best suits the particular project or area.

Pedestrian-friendly design starts with several key attributes:

- Accessibility;
- Safety;
- Facilities;
- Connectivity;
- Continuity; and
- Aesthetics.



The design features that follow generally include:

- Compact, concentric development locates a greater number of destinations within walking distance compared to linear development.
- Mixed land use makes it possible to walk between land uses—from home to work, from home to the store, from work to restaurants, etc.
- Good transit access encourages a mode of travel that stimulates walking at either end of the trip.
- Compact parking structures spread walking destinations less than large surface parking lots.
- Lower parking codes make for smaller parking structures or lots and also spread walking destinations less than larger parking facilities. This can often function best with shared parking among land uses that have varying peak demand times.
- Sidewalks adjacent to business and storefronts make access more convenient than those with parking separating sidewalks from entrances. This is safer for pedestrians as well. Sidewalks next to businesses attract window shoppers and make for interesting and pleasant walking environments.
- Zero lot line zoning allows buildings to abut one another, keeping the distance between them convenient for walkers.
- Ground floor retail and other interesting uses on the ground floor of buildings also attract window shoppers and make for interesting and pleasant walking environments, as opposed to large windowless walls.
- Adequately wide sidewalks and street lighting comfortably accommodate pedestrians and increase safety, as well as the perception of safety.
- Lower speed limits in high pedestrian activity areas make for safer, quieter, more pleasant walking.
- Intersections designed for the blind and people in wheelchairs including wheelchair ramps, textured mats to alert the blind to intersections, and audio indications for the blind to cross make it safer for those with disabilities to travel along roadways.
- Textured or colored crosswalks may draw more attention to pedestrians and they also enhance the aesthetics of the walking area.
- Adequately wide crosswalks and adequate crossing times accommodate users well and give them time to cross. Crossing times should be set with consideration of the need to provide for slower walkers to cross safely.
- Scramble intersections in busy pedestrian areas allow pedestrians to cross diagonally and reduce the walking distance between stores, restaurants, and businesses.



- Narrowed streets in busy pedestrian areas provide for easy crossing, make walking more interesting, and bring land uses closer to pedestrians. They also slow motor vehicle traffic.
- Design standards for commercial signage enhance the aesthetics of public space.
- Pedestrian-activated flashing lights help pedestrians to cross with greater ease, convenience, and perception of safety.
- Lighted/reflective markings at crosswalks add visibility to nighttime walkers, thereby increasing safety.

### **Pedestrian Activity Center Streetscape Features**

Pedestrian-friendly activity areas have a number of features that add to convenience and aesthetics of being on the sidewalk. Some of these features also are common in auto-free areas.

- Bus shelters;
- Trees and landscaping;
- Benches and other street furniture;
- Textured or colored sidewalk paving;
- Attractive street lights;
- Attractive, standard trash and recycling receptacles;
- Attractive news racks;
- Matching street furniture;
- Clocks;
- Public art;
- Banners and flags;
- Regulated food vendors;
- Information kiosks;
- Fountains;
- Area wide logo/signage programs;
- Street performers; and
- Bicycle parking.

### **Guidelines for Pedestrian-Friendly New Development**

Arizona's cities and counties are responsible for development requirements and they can encourage the design of future neighborhoods with pedestrians in mind. The communities have many tools at their disposal, including development standards and guidelines, zoning, community plans, density bonuses, transfer of development rights, and review boards. Key guidelines are listed below.

- Zoning for compact, mixed land use. Denser commercial and retail planned around intersecting transit lines. Multi-family housing planned near, or within downtown areas. Short, as opposed to long, blocks. Parking constructed in compact structures.
- Developers can be given density bonuses for putting housing in commercial areas.

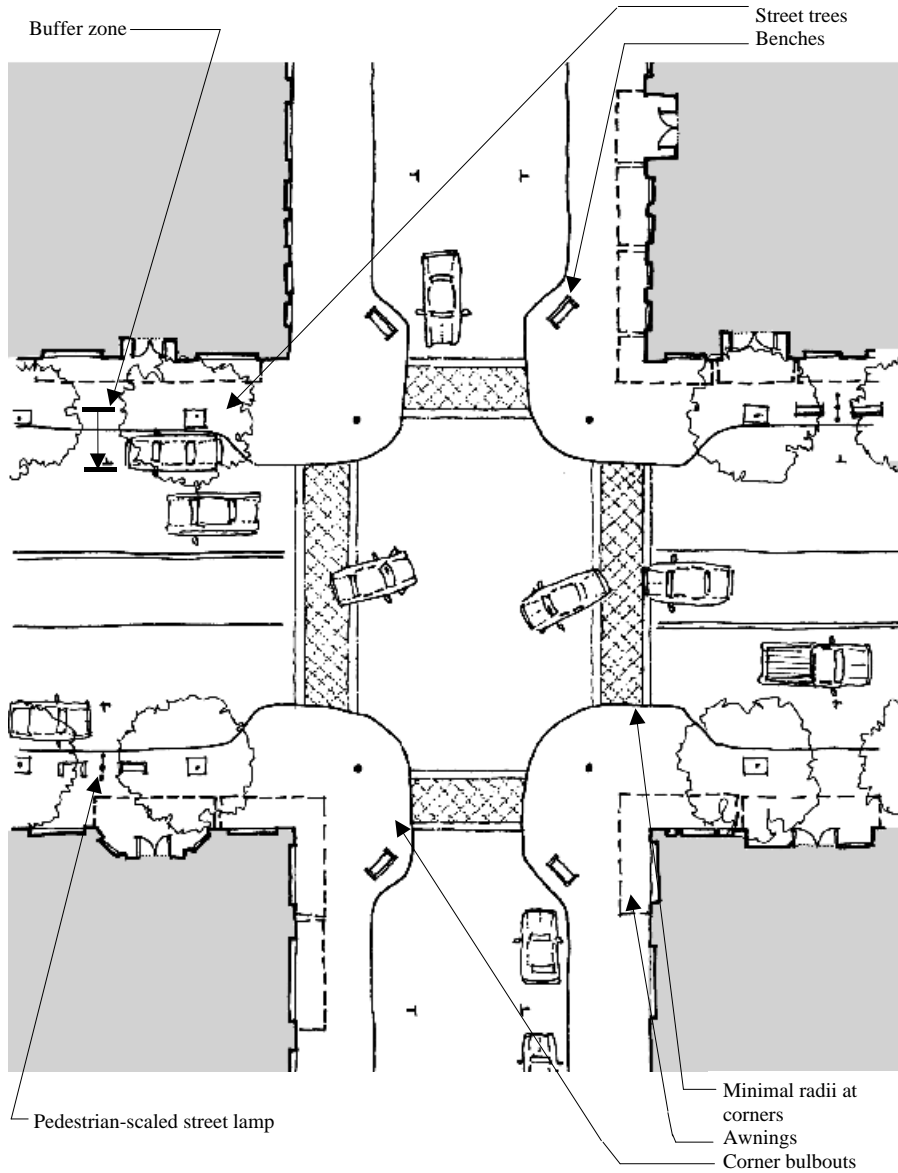


- Pedestrian activity centers planned and accommodated in denser commercial and retail areas.
- Shared parking in downtown areas, as opposed to building parking at each new building. The number of driveways minimized.
- Developers can be given incentives to build compactly with lower parking requirements.
- In commercial and retail activity centers sidewalks at least ten feet wide, and wide enough to accommodate the anticipated foot traffic.
- Multi-story commercial office buildings provide ground floor retail. No blank walls in commercial and retail activity centers. Development not entirely internally focused. Building entrances facing sidewalks.
- Locate sidewalks adjacent to store and business door fronts. Locate parking so that it doesn't separate pedestrians from door fronts.
- Sidewalks at least eight feet wide in multi-family residential areas. Landscaped parkways can be used to buffer sidewalks from the street.
- Sidewalks at least five feet wide in single-family residential areas. Landscaped parkways can be used to buffer sidewalks from the street.
- Street lighting on new non-rural streets.
- Architectural design standards for all commercial, retail, and multi-family residential developments, as well as for commercial signage. Design review boards also can be established to guide the quality of new architecture.
- Design standards for attractive landscaping and streetscape attributes. Street lighting, street furniture, bus shelters, trash/recycling receptacles, and other street level features within an area or community that follow a set standard to be aesthetically pleasing, consistent, and compatible with the surroundings.
- City streets generally planned for motor vehicles to move at pedestrian-compatible speeds. Intersection design in circulation plans that include crosswalks, signals where warranted, and other features that make the crossing safe and convenient.

### Design Diagrams

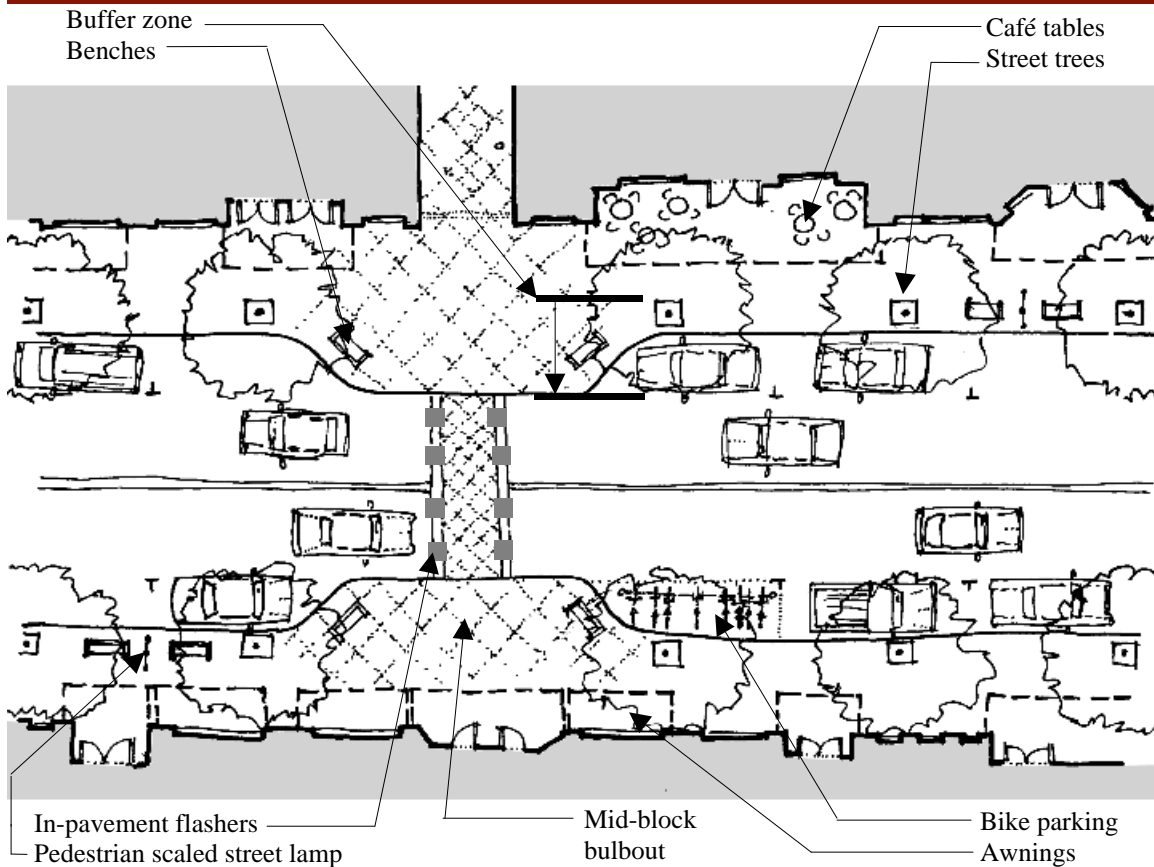
**Figures 4 and 5** illustrate samples of pedestrian-friendly designs for intersection and mid-block treatments in urban (commercial or retail) areas. The primary corridor illustrated could be an urban arterial that is part of the State Highway System in any jurisdiction or city in Arizona. The design concept suggests enhancements to the pedestrian curb area by including 'bulb-outs' at intersections or roadway 'neck-downs' to reduce the crossing distance for pedestrians at intersections.





**Figure 4 – Intersection Treatment in Retail Areas**

**Source: Marin County Bicycle and Pedestrian Plan – Design Community and Environment**



**Figure 5 – Mid-Block Treatment in Retail Areas**

**Source: Marin County Bicycle and Pedestrian Plan – Design Community and Environment**

Additional methods to alert motorists to the presence of pedestrians in the crosswalk, such as in-pavement warning lights or flashing beacons, are being investigated. Although included in this picture, in-pavement warning lights at two-lane, low speed crosswalks such as shown is minimal due to the fact that such crosswalks eliminate many other hazards. New designs should review current standards and recent research to determine the appropriate design and if an experimental treatment is appropriate. The following section discusses some issues with experimental treatments and the appropriate procedures to follow.



## **Experimentation**

Section 1A.10 Interpretation, Experimentation, and Changes of the 2000 MUTCD includes the following:

The Manual on Uniform Traffic Control Devices recognizes that continuing advances in technology will produce changes in the highway, vehicle and road user proficiency; therefore, portions of the system of traffic control device in this Manual will require updating. In addition, unique situations often arise for device applications that might require interpretation or clarification of this Manual. It is important to have a procedure for recognizing these developments and for introducing new ideas and modifications.

The reason for the need to follow the MUTCD experimentation procedure is that many innovative treatments have the real potential for serious unintended consequences and there is a need for before and after studies to document the actual impacts of the experimental traffic control device. Furthermore, Arizona Revised Statute 28-641 requires the MUTCD to be followed. It is recommended that before and after studies specified in the MUTCD for traffic control experimentation be followed for roadway design changes as well.

It is important to recognize the importance of improving upon existing established design guidelines and standards. As such, a higher level of discussion and awareness of current ongoing practices in use in other areas of the United States is a valuable tool for ADOT and other Arizona jurisdictions.

The 2002 Institute of Transportation Engineers (ITE) publication, *Innovative Bicycle Treatments* identifies and shares information on approximately 50 bicycle treatments. The treatments include on-street innovations such as contra-flow bike lanes, shared bike/bus lanes, bicycle boulevards, raised bike lanes, and colored bike lanes. There is information on trail facilities including one-way trails and median trails. This technical report, divided into eight sections, also summarizes treatments for bicycles at intersections, bicycle detection, unique bicycle signs, traffic calming accommodations, and bicycle parking. The intent of the ITE report is to identify and share information on the application, advantages and disadvantages of each innovation, but does not include a complete evaluation of each treatment and does not necessarily encourage or discourage their use.

AASHTO is sponsoring a pedestrian guideline document that is currently in draft form. Once finalized, this document will provide valuable information on alternative treatments to address numerous pedestrian facility design issues.



## 9. Maintenance Guidelines for Consideration

An appropriately funded and responsive maintenance program is important to the success of pedestrian and bicycle facilities. Poorly maintained facilities can become a liability, discourage use, and diminish the integrity of the investment. Maintenance programs will prolong the life of the infrastructure and encourage the use of non-motorized modes of transportation. Pedestrian and bicycle facilities should routinely be maintained and maintenance programs should include provisions to respond to maintenance complaints regarding bicycle and pedestrian facilities within their respective maintenance programs.

These guidelines focus on addressing bicycle and pedestrian maintenance issues. Similar to **Section 9**, it is not possible to address all impacts and fiscal implications these guidelines would have on ADOT or any other implementing agency within Arizona as part of this plan; therefore, the guidelines within this plan are provided for consideration by all agencies and are not a specific requirement on ADOT or any other agency within Arizona.

### 9.1. Existing ADOT Maintenance Policies and Operations

ADOT has intergovernmental agreements (IGAs) with cities and counties that define the maintenance responsibilities of State roadways and/or off-street pathways within their jurisdictions. Many of the original IGAs drawn up in the 1980s are vague. More recent IGAs are much more specific on the maintenance responsibilities for the cities and counties.

ADOT has relatively limited responsibilities for the maintenance of pedestrian and bicycle facilities within city/county limits. Typically, the local jurisdictions are responsible for maintaining pavement markings, pedestrian push buttons, streets/curbs/gutters, sidewalks, and signs. In general, with relatively mild weather conditions throughout the state, pavement overlay, or replacement schedules are approximately seven to ten years for major pavement infrastructure investments; however, ADOT must respond to citizen complaints regarding roadways with adequate repairs as necessary.

ADOT's current policy is to install sidewalks during construction only if the city or county is willing to maintain them. The proposed Pedestrian Policy, presented in **Section 10**, includes a revision to this policy such that sidewalks would be provided based on pedestrian demand and not only when another agency is willing to maintain them.

ADOT has an informal procedure to address citizen concerns. If citizens have a maintenance complaint, they call the District office, and the maintenance managers will meet with the maintenance team to discuss the concerns and ask them to remedy the situation. Some maintenance managers meet with bicycle advisory committees and ask members to share their maintenance concerns.

ADOT did have a street sweeping schedule in place. Unfortunately, recent budget cuts have caused the termination of this service. The current lack of funding keeps ADOT from supporting more aggressive maintenance measures.

### 9.2. On-Street Bikeways

On-street bikeway maintenance should typically be conducted when streets are maintained for vehicles. For instance, bikeway facilities should typically be resurfaced at the same time the roadway is



resurfaced. Regularly scheduled street sweeping practices will remove roadway debris, benefiting all users. Below are examples of general maintenance guidelines that ensure bicyclists' needs are addressed in roadway maintenance.

- Implement a regularly scheduled sweeping program for bike lane facilities and local street bike routes. Conduct inspection for pavement repair needs as part of the sweeping program (or as part of separate inspection program) and respond appropriately to repair needs. Schedules for sweeping/inspection are dependent on many unique factors, but a schedule of bi-weekly sweeping/inspection for on-street bicycle facilities is desirable.
- Dense graded asphalt concrete surfaces are generally preferable to open graded or seal-coated surfaces. Asphalt Concrete (AC) surfaces vary greatly in smoothness and ride quality. Some open-graded surfaces such as Asphalt Concrete Friction Course (ACFC) and ARACFC are very smooth and quite suitable for bicyclists, whereas a chip seal or other open-graded surfacing can be rough and provide a less desirable riding surface. A low volume chip seal using stones between 1/4 to 3/8 inches is a suitable surface for bicycles.
- Manhole and utility covers, drop inlet and other drainage grates, and construction joints should be located outside of paved shoulders or bike lanes when practicable. If covers or drainage grates are located within the paved shoulders or bike lanes, they should be kept level with the surrounding pavement and free of bicycle wheel-trapping gaps.
- The condition of bike lane striping, markings, and bike signage should be monitored and maintained to keep their intended purpose. Faded signs and pavement markings are difficult to see, especially at night, and lose their effectiveness.
- Timely response to citizen maintenance requests should be provided. An Arizona Bicycle Program Facility Improvement Request Form, which sets forth goals to address routine maintenance requests within 48 hours after notification and/or inspects within 48 hours and schedules repairs within a reasonable time frame, should be considered when feasible given resource limitations. When practicable, immediate response to requests of a more serious nature, in which citizens may indicate an emergency condition, is important. These efforts are desired to build a strong rapport and good public image with citizens. This request form can be utilized for other concerns and issues in addition to maintenance requests. A form should be developed and then routed to appropriate maintenance or engineering staff.
- Bike lanes and routes should typically be maintained as part of routine roadway maintenance; however, as bicycle lanes do require occasional re-striping and other maintenance, an annual cost of \$2,000 (2003 dollars) per centerline mile is estimated based on experience in other jurisdictions. This includes costs for sweeping, replacing signs and markings, and bike lane repair; however, this cost may vary significantly based on the location of the bicycle lane within Arizona.

Some elements of the roadway have a larger impact on bicyclists than on motorists. Gutter-to-pavement transitions and drainage grates are two, in particular, that should be monitored.



### **Gutter-to-Pavement Transition**

The path of travel for bicyclists is most often near the curb of a given roadway. On streets with concrete curb and gutter, one to two feet of this curbside area is typically devoted to the gutter pan, where water collects and drains into catch basins. At this location, water can erode the transition, creating potholes and a rough surface for travel. Also, many streets' pavements do not meet flush with the gutter, creating a vertical transition between these two segments of the roadway. This issue is significant for bicycle travel and safety, although bicyclists typically operate to the left of such transitions on the roadway pavement. This type of vertical separation, parallel to a bicyclist's line of travel, can result in what is termed a diverting type fall.

#### **Guidelines**

- Gutter-to-pavement transitions should have no more than a 0.25-inch vertical transition at the time of construction and 0.5 inches over the service life of the paving course.
- Pavement transitions should be examined during roadway projects for new construction, maintenance activities, and construction project activities that occur in streets.

### **Driveway Curb Cuts**

The vertical separation (lip) between the asphalt concrete pavement and the portland cement concrete gutter pan is often one inch. This vertical separation can cause a bicyclist to crash and should be minimized along bikeways when practical, but especially along driveway curb cuts.

### **Drainage Grates**

Drainage grates are encountered in the gutter area near the curb of a roadway. Bicyclists typically travel to the left of the gutter area; however, less experienced bicyclists and experienced bicyclists that need to avoid an object in the roadway, sometimes travel in the gutter. Drainage grates typically have slots through which water drains into the municipal wastewater system. Many grates are designed with bars that are parallel to the direction of travel and spread wide enough for a tire to become caught or there is a gap between the grate and the adjacent concrete surface, potentially causing a bicyclist to crash and sustain serious injuries. Because drainage grates are sometimes wider than the gutter, they are difficult and sometimes dangerous to avoid, pushing bicyclists out into the travel lane.

#### **Guidelines**

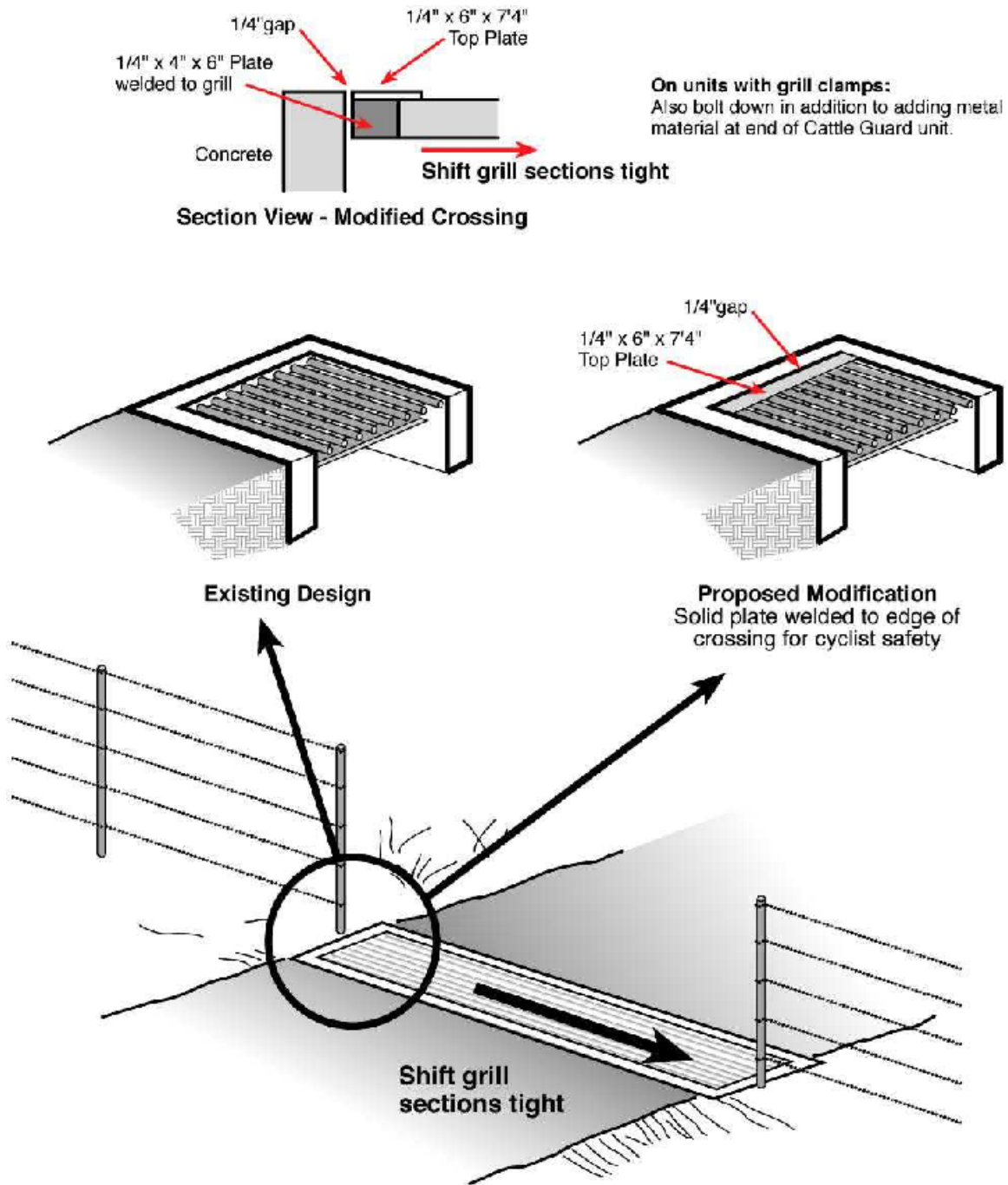
- Conduct periodic review of drainage grates to document if parallel gaps exist that have a length greater than four inches or if the maximum vertical transition is greater than 0.5 inches. Once documented, grates not meeting the above standards should be replaced or retrofitted. Where it is not immediately feasible to replace existing grates with standard grates designed for bicycles, one quarter-inch steel cross straps may be welded to the grates at a spacing of four inches on center to reduce the size of the openings adequately.
- Respond to citizen requests to repair or replace drainage grates that do not meet the above standards.



### Cattle Guards

Cattle guards located on State Highways and routes in Arizona can present difficulties for bicyclists. Because of the inherent design nature of the cattle guards, which are constructed in steel sections that can develop gaps parallel with the direction of travel, a bicycle wheel can drop into the gaps and can cause a bicyclist to crash. Specific maintenance policies should be developed for cattle guards that have gaps in the direction of bicycle travel greater than four inches and that are located on bikeways. A financial feasibility or cost-benefit analysis should be conducted to determine overall costs to upgrade or remove unnecessary cattle guards in comparison with potential tort liability claims associated with bicycle crashes at cattle guards.

Some jurisdictions such as Pima County have developed techniques to improve the safety of cattle guards for bicyclists. Pima County utilizes cautionary signs on the approaches to the cattle guards that state “Cattle Guard” with a placard below that reads “Bicyclists Cross with Caution”. The County inspects cattle guards on a monthly or more frequent basis, and responds to bicyclist’s requests to repair cattle guards with high priority. The County clamps cattle guard sections in place on guards installed prior to 1983. With guards built since 1983, thin steel plates are welded onto the guards to cover longitudinal cracks, while still allowing the cattle guard sections to be removed for cleaning of debris that has accumulated within the cattle guard (see **Figure 6**). Estimated costs to upgrade the cattle guards to improve compatibility for bicyclists are approximately \$1,000 per guard, with guards adjusted as necessary based on standard maintenance inspections or service calls.



1" = 8'

Figure 6 – Cattle Guard Modifications to Improve Bicycle Compatibility Used in Pima County





### 9.3. Off-Street Pathways

Maintenance of shared-use paths is typically the responsibility of the local or regional agency and not ADOT. **Table 4** can be used to estimate the total annual maintenance needs and costs associated with paved shared-use paths. The annual cost of path maintenance for a path with high use is approximately \$10,000 (2003 dollars) per mile, which covers labor, supplies, and amortized equipment costs for weekly trash removal, monthly sweeping, and bi-annual resurfacing and repair patrols; however, the maintenance cost may vary significantly based on the path material, landscaping, and location of the shared-use path within Arizona. A schedule of bi-monthly sweeping/inspection for off-street bicycle facilities is appropriate. An inspection program for shared-use paths should be considered for potholes, cracking, landscape maintenance, and sweeping needs. Shared-use paths may be paved or unpaved. The maintenance cost of unpaved shared-use paths will vary significantly based on the level of use, type of use, and the erosion of the path surface. While bicyclists often share paved shared-use paths with pedestrians, unpaved shared-use paths are often provided for bicyclists, pedestrians, and equestrians.

**Table 4 – Bikeway Maintenance Checklist and Schedule**

Item	Frequency
Sign replacement/repair	5 – 10 years
Pavement marking replacement	1 – 5 years
Tree, shrub, and grass trimming/fertilizing	5 months – 1 year
Pavement sealing/potholes	5 – 15 years
Clean drainage system	1 year
Pavement sweeping	Weekly/monthly, as needed
Shoulder and grass mowing	Weekly, as needed
Trash disposal	Weekly, as needed
Lighting replacement/repair	1 year
Graffiti removal	Weekly/monthly, as needed
Maintain furniture	1 year
Fountain/restroom cleaning/repair	Weekly/monthly, as needed
Pruning	1 – 4 years
Bridge/tunnel inspection	1 year
Remove fallen trees	As needed
Weed control	Monthly, as needed
Maintain emergency telephones, CCTV	1 year
Maintain irrigation lines	1 year
Irrigate/water plants	Weekly/monthly, as needed



#### 9.4. Walkways

Pedestrian facilities must accommodate a wide range of users, including people that may have special mobility needs such as children, the elderly, and people who are mobility impaired. As mentioned earlier in the section, ADOT does not currently maintain sidewalks. The maintenance responsibility of walkways will be up to either the public agency or adjacent land owner, depending on the jurisdiction. The following list highlights some of the more common maintenance issues that must be addressed:

- Uneven surfaces are a tripping hazard and may cause difficulties for wheelchair users. For safe use, sidewalks should have a smooth surface. Agencies may want to implement a program that reimburses property owners for sidewalk repairs.
- Motorists are less likely to respect the pedestrian right-of-way if crosswalk markings and related signage are faded. Maintenance programs should include replacement of markings that are no longer reflective.
- Landscaping should be trimmed to prevent branches from hanging low and shrubs from encroaching into the walkway, allowing motorists to effectively see pedestrians at intersections.

#### 9.5. Temporary Traffic Control Zones

Temporary traffic control zones are difficult environments in which to manage traffic. Priorities exist to maintain vehicular traffic flow, to maintain transit service at an acceptable level, to preserve pedestrian access to businesses and the street, and to support bicycle traffic flow to minimize inconveniences to riders. Many of these issues, including bicycle traffic, are often overlooked in temporary traffic control zones. Some of these issues are discussed in this section, including:

- Lane Closures;
- Signage;
- Pavement Smoothness and Compaction;
- Enforcement of Guidelines and Inspection; and
- Trenching and Plate Use.

The purpose of this section is to provide planning-level guidance for the accommodation of bicycles in temporary traffic control zones. This guidance is based on national and state sources. Actual treatments for addressing bicycles in temporary traffic control zones is dealt with in traffic control plans submitted by contractors to ADOT or other agencies and in Part 6 of the MUTCD. Contractors and agencies can use this document to assist them with specific traffic control measures in each temporary traffic control zone.

#### Signage

Signage is a critical component of construction activities. Due to the temporary nature of roadway work, information regarding temporary detours and reduced capacity does not appear on conventional maps. Aside from public notification through various media, roadside signage and signals are the only methods a public agency has to notify road users of construction activities; therefore, signage is crucial to successfully manage traffic flow for motorists, pedestrians, and bicyclists.



Signage alerting roadway users of construction activities can provide information to motorists and bicyclists alike; however, signage specific for bicyclists should be employed if the circumstances warrant it. Such circumstances may include a detour route that is different for bicyclists and motorists, the loss of a bike lane, or reductions in the travel way width that require bicyclists to share a travel lane with motor vehicles.

Another issue with signage is its placement along a roadway. Often, typical construction signs are placed either squarely in a bike lane or in the riding area of a wide curb lane. Sign placement should be made with bicyclists and pedestrians in mind. Because many sidewalks are directly adjacent to the roadway, placing signage on sidewalks would obstruct the pedestrian pathway and may not be visible to motorists. Sign placement is a critical issue when construction activities take place.

### Guidelines

- Signage related to construction activities and other temporary signs should be in a location that does not obstruct the path of bicycles or pedestrians. Separate facilities for bicyclists and pedestrians should be considered.
- Temporary guidance, warning, and regulatory signage related to bicycle travel should be considered on bikeways where construction activities occur. Regulatory and guidance signage for detours of bicyclists and pedestrians, where required, should also be provided through temporary traffic control zones and on the detour roadways.
- Potential signage includes the following signage now being used in the City of Denver, Colorado, and Clark County, Nevada, respectively. The “Share the Road” sign is included within the 2000 MUTCD while the “Detour” sign is proposed as part of the draft 2003 MUTCD.



Other signs that may be used in coordination with construction activities include those found in the MUTCD. Some of these signs may be used in conjunction with one another to enhance the visibility of bicyclists and provide enhanced guidance to them through temporary traffic control zones and detours.

### Lane Closures

Accommodating bicycle space during a lane closure is typically considered only when a bikeway facility (such as a bicycle lane) is affected by construction activities; however, measures that provide for



the continuity of a bicyclist's trip through a lane closure should be considered wherever bicycles are allowed. The most important consideration is to maintain adequate width of travel lanes to accommodate bicycle travel and to allow safe overtaking. Where bike lanes exist, it may be possible to continue the bike lane through the temporary traffic control zone. A second option is to provide a wide outside lane through the temporary traffic control zone for shared-use by motor vehicles and bicycles. Based on AASHTO guidelines, 14 feet of usable width is recommended for shared-use in a wide curb lane; however, a 14-foot lane may not be feasible in all traffic control zones and bicyclists are legally empowered to use the travel lane regardless of width. Only in rare cases should bicycles be detoured to another street, if the detour is of reasonable length and is practicable, when travel lanes remain open on the street under construction.

A complete road closure affects bicyclists in a similar manner as motorists. If an entire roadway segment is closed for construction activities, a sufficient detour route should be provided for all modes of travel. The implementation of these detour routes, however, should take into consideration attributes of alternative routes as they pertain to bicycles versus motor vehicles. The same detour route may not be suitable for both modes. For example, a motorist detour may traverse several hills on a major thoroughfare. A bicycle detour might be provided on another set of streets that minimizes changes in elevation that impact bicyclists more than motorists. Maintaining a direct route should be a primary goal as bicycles are detoured.

### Guidelines

In order to accommodate bicyclists through various lane closures and detours, the following guidelines are recommended. These are based on sources including the MUTCD and the AASHTO *Guide for the Development of Bicycle Facilities* published by the American Association of State Highway and Transportation Officials.

- Continuing a bike lane through a temporary traffic control zone:
  - Efforts should be made to continue the bike lane if enough space exists to do so. The standard width of a bike lane is five feet.
  - **Figure 7** illustrates the design of a temporary traffic control zone treatment making it possible to continue the bike lane through the zone. In the example, one of two travel lanes in the same direction is closed for construction. Taper lengths for temporary traffic control zone barricades are provided as a function of travel speed per Part 6 of the MUTCD.
  - Standard temporary traffic control zone signs are part of the recommended design per the 2000 MUTCD and, when approved, the proposed 2003 MUTCD.
  - Channelizing devices delineate the edge of the temporary traffic control zone and also indicate the outer (i.e., curbside) edge of the bike lane. Steady-burn lights are required on channelizing devices used at night.
- Transitioning a bike lane to a wide travel lane in a temporary traffic control zone:
  - Where there is insufficient space to continue a bike lane through a temporary traffic control zone, a wide travel lane within the temporary traffic control zone should be considered. The travel lane width should be 14 to 15 feet within which bicyclists can share the travel lane with motor vehicles.



- **Figure 8** illustrates the design of a transition of a bike lane to a shared travel lane in a temporary traffic control zone. In the example, one of two travel lanes in the same direction is closed for construction.
- Standard temporary traffic control zone signs are part of the recommended design per the 2000 MUTCD and, when approved, the proposed 2003 MUTCD.
- Construction channelizing devices equipped with flashers delineate the edge of the temporary traffic control zone and also indicate the outer edge of the bike lane. The channelizing devices delineating the outer bike lane edge do not continue through the work zone.
- Transitioning a bike lane to a standard travel lane in a temporary traffic control zone:
  - In areas where there is insufficient space to provide a wide travel lane within the temporary traffic control zone, a standard 11-foot to 12-foot wide travel lane should be provided. Bicycles are legally empowered to use the travel lane in this condition. The rules of overtaking and passing apply in this case, as in similar situations in which only one travel lane is provided in one direction.
  - Standard temporary traffic control zone signs are part of the recommended design per the 2000 MUTCD and, when approved, the proposed 2003 MUTCD.

Where appreciable bicycle traffic is anticipated, the bicycle warning sign is recommended in combination with the Share the Road placard. This effectively warns motorists of the presence of bicycles at the lane drop and also where the work zone begins.

- Construction channelizing devices equipped with flashers delineate the edge of the temporary traffic control zone.
- A complete roadway closure:
  - A sufficient and reasonable detour route should be outlined with adequate signage similar to that provided for motor vehicle traffic.
  - Consideration should be given to alternative detour routes that minimize vertical transitions and situations in which bicyclist safety may be an issue.
  - A bicycle detour route, different from the one outlined for motor vehicle traffic, may be appropriate for cases in which significant grades or levels of traffic and/or traffic speeds make the route less than desirable for the average bicyclist.
  - Signage specific to bicyclists should be installed on the detour route to ensure proper guidance through the roadway closure.



Figures 7 and 8 follow on the next pages.

- A shared-use path closure:
  - If there is space within the shared-use path right-of-way, such as along a parkway or rail trail, construction of a temporary pavement surface around the closed section should be considered. The need for the paved detour is based on the anticipated volume of users, length of the closure, ability to walk around the closure and the duration of the closure.
    - Signage alerting bicyclists of the detour should be placed in advance of the detour.
    - If the detour section of the shared-use path is narrower than the main path, the sign Bikeway Narrows (W5-4) should be considered for placement in advance of the condition.
    - Signage guiding bicyclists through the detour should be provided.
  - If a shared-use path is completely closed due to construction activities, an on-street detour route should be created for bicyclists if practical.
    - The shared-use path should be closed at the nearest street intersection on each end or at another location that provides full access.
    - A sufficient detour route should be outlined with adequate signage, similar to that provided for motor vehicle traffic.
    - The detour should be as direct as possible.
    - Factors that affect bicycle suitability, such as topography, motor vehicle volumes and speeds, and roadway cross-section should be considered when selecting the detour route.
  - Shared-use path intersections with streets closed for construction activities:
    - If there is feasible route for bicyclists through this street, efforts should be considered to provide this route.
    - If there is no feasible route for bicyclists through this area, a suitable detour route as described above should be considered.
- Temporary traffic control zone speed limits:
  - Speed limits should be set with the safety of construction crews, pedestrians, and bicyclists in mind. Speed limits are established in temporary traffic control zones per the MUTCD and in accordance with the ADOT Traffic Control Supplement.
- Construction Site Sweeping:
  - Sweeping of paved temporary traffic control zones can be considered for two times daily in residential or commercial areas. Sweeping can be considered for once a day in industrial areas.



W5-4



- Advertisements in local media can be considered when a bikeway facility is closed for construction activities or for any other purpose.



*W21-4*



*W20-5*



*W4-2R*



*W11-1*



*W16-1*



**NOTES:**

1. SEE THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) FOR TAPER AND SIGN PLACEMENT REQUIREMENTS. ALL WORK SHALL CONFORM TO THE MUTCD AND THE AASHTO GUIDE FOR THE DEVELOPMENT OF BICYCLE FACILITIES.
2. REMOVE BY GRINDING ANY PAVEMENT MARKINGS THAT CONFLICT WITH PAVEMENT MARKINGS SHOWN ON PLAN OR AS DIRECTED BY THE ENGINEER.
3. PAINT BIKE LANE AS SHOWN, OR AS DIRECTED BY THE ENGINEER.
4. RESTORE ALL PAVEMENT MARKINGS TO ORIGINAL LAYOUT AFTER WORK IS COMPLETED.

FOR SPEED LIMITS OF 40 MPH OR LESS:

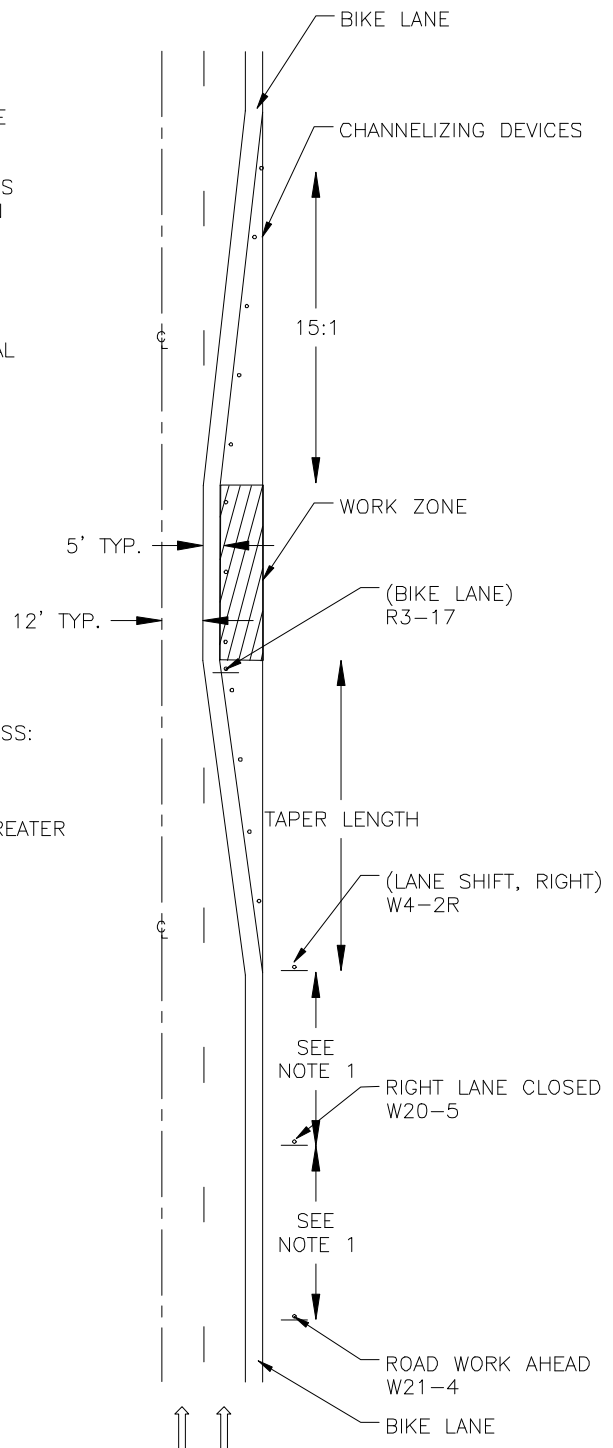
$$L = WS^2/60$$

FOR SPEED LIMITS OF 45 MPH OR GREATER

$$L = WS$$

WHERE:

- L = TAPER LENGTH IN FEET
- W = WIDTH OF OFFSET IN FEET
- S = SPEED IN MILES PER HOUR



**Figure 7 – Bike Lane Through Temporary Traffic Control Zone**





NOTES:

1. SEE THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) FOR TAPER AND SIGN PLACEMENT REQUIREMENTS. ALL WORK SHALL CONFORM TO THE MUTCD AND THE AASHTO GUIDE FOR THE DEVELOPMENT OF BICYCLE FACILITIES.
2. REMOVE BY GRINDING ANY PAVEMENT MARKINGS THAT CONFLICT WITH PAVEMENT MARKINGS SHOWN ON PLAN OR AS DIRECTED BY THE ENGINEER.
3. PAINT BIKE LANE AS SHOWN, OR AS DIRECTED BY THE ENGINEER.
4. RESTORE ALL PAVEMENT MARKINGS TO ORIGINAL LAYOUT AFTER WORK IS COMPLETED.

FOR SPEED LIMITS OF 40 MPH OR LESS:

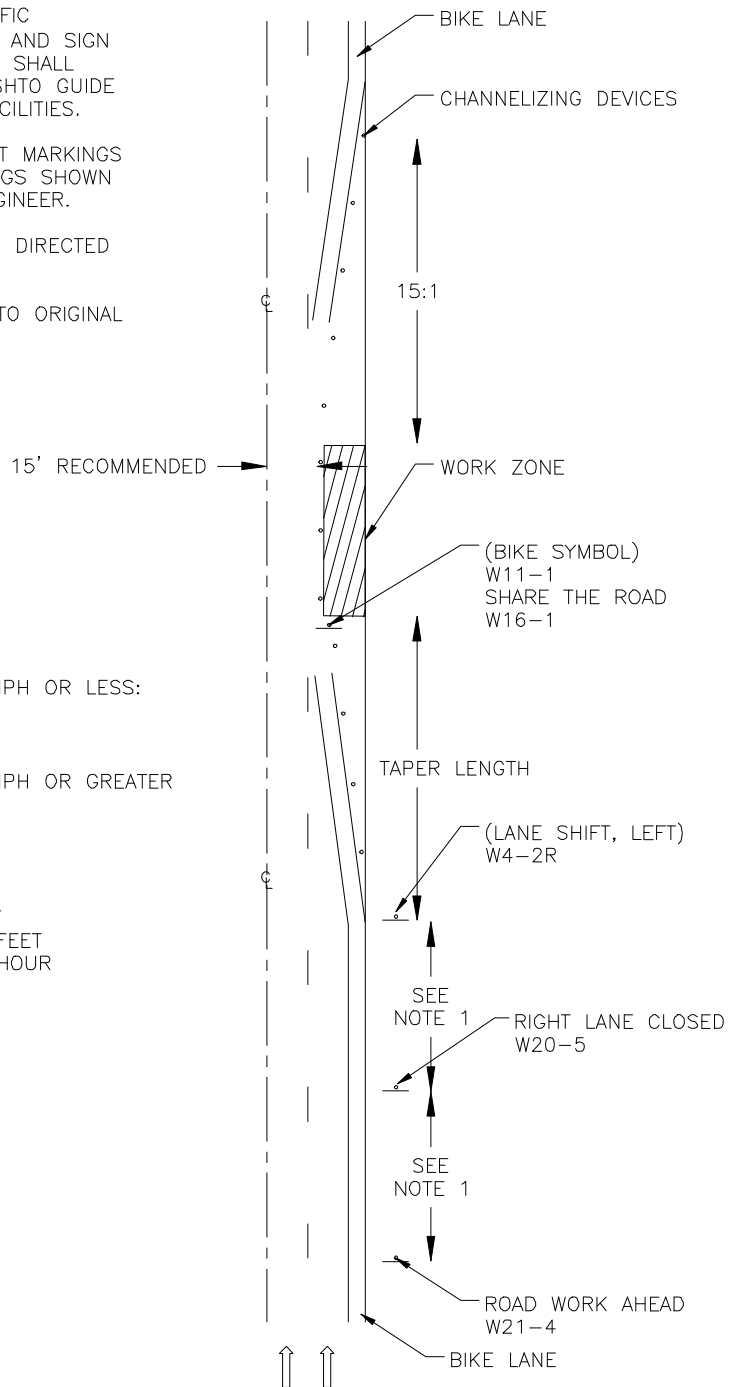
$$L = WS^2/60$$

FOR SPEED LIMITS OF 45 MPH OR GREATER

$$L = WS$$

WHERE:

L = TAPER LENGTH IN FEET  
W = WIDTH OF OFFSET IN FEET  
S = SPEED IN MILES PER HOUR



**Figure 8 – Bike Lane Transition to Shared Travel Lane in Temporary Traffic Control Zone**



### **Roadway Smoothness and Compaction**

The condition of the roadway surface is a critical issue for bicyclists, especially in temporary traffic control zones. As mentioned previously, bicycles are much more sensitive to subtle changes in roadway surface than are motor vehicles. Various pavement materials are used to pave roadways, and some are smoother than others. Compaction is also an important issue after trenches and other construction holes are filled. Uneven settlement after trenching can affect the roadway space nearest the curb, where bicycles travel. Sometimes compaction is not achieved to a satisfactory level, and an uneven pavement surface can result due to settling over the course of days or weeks. This has become a critical issue for bicyclists throughout Arizona due to the high number of utility and telecommunications companies performing trenching work throughout the cities in recent years.

### **Guidelines**

- During construction, temporary AC pavement patches should be maintained by the contractor so there is not more than a 0.4 inch (10 mm) vertical edge between the permanent pavement and the temporary patch.
- It is desirable for the surface of a roadway open to bicycle travel to be smooth and free of potholes, and have a uniform pavement edge.
- Pavement should be maintained so ridge buildup does not occur at the gutter-to-pavement transition or adjacent to railway crossings.
- The pavement should be inspected two to four months after trenching construction activities are completed to ensure that excessive settlement did not occur.
- Require smooth paving of utility cuts to ensure there are no harsh edges or rippled pavement, which can cause bicycle crashes or pedestrian trips. Require contractors to re-inspect paving of cuts within two weeks and repair paving to ensure a smooth surface. Require paved ramps on all sides of steel covers that are temporarily used to cover utility cuts. It is desirable that steel plates provide appropriate traction for bicyclists and pedestrians during wet conditions.

### **Trenching and Plate Use**

Plates used to cover open trenches and other open areas typically are not flush with the adjacent surface and have a one- to two-inch vertical transition on the edges. This can puncture a narrow bicycle tire and can cause the bicyclist to lose control due to the shock of the vertical transition. This vertical transition also can cause difficulties for pedestrians who have limited mobility.

Coordination among different trenching entities also is a significant problem. Trenching performed by different departments, utility companies, telecommunication companies, and others sometimes creates a situation in which a street segment may be trenched several times over the course of a year. Duplication of trenching activities is a problem, especially for bicyclists whose riding space is often interrupted during trenching activities.

The interim condition of the trenches during non-construction hours also is of concern to bicyclists and pedestrians. Although the common practice is to use steel plates during non-construction hours, these



plates can be slippery, especially when wet. Slippage can be a significant problem for bicyclists riding over steel plates and pedestrians walking on the plates in any weather.

### **Guidelines**

- Steel plates that are used as a temporary measure during construction activities should not have a vertical edge greater than 0.4 inches (10 mm), without a temporary asphalt lip. The temporary asphalt lip should have a slope angle a maximum of 3 to 1.
- Non-skid steel plates with no raised steel bar on top should be considered.
- Wherever possible, inlaid steel plates that are flush with the surrounding pavement surface should be used to minimize or eliminate the vertical transition between plates and the pavement for bicyclists.
- Steel plates should be used only as a temporary measure during construction and not for extended periods of time.
- Signs alerting bicyclists and/or pedestrians to the existence of a vertical transition should be considered as a means to aid bicyclists and pedestrians at night.
- Cracks or openings parallel to the direction of bicycle travel can sometimes occur between sections of steel plate or at the edges where the steel plate is adjacent to the asphalt. This presents a hazard similar to substandard drainage grates, where a bicycle wheel can fall into the crack and the bicyclist can have a severe crash. Placement and maintenance of steel plates must ensure that no cracks parallel to the direction of travel are permitted greater than 0.25 inches in width (6 mm).
- A detour route for bicyclists should be established if the time between grinding and repaving a street surface exceeds 48 hours.

### **Enforcement of Guidelines and Inspection**

Regulations and policies are only as good as the enforcement that accompanies them. Sometimes inspections do not occur during construction or after construction is completed. Insufficient resources can affect the ability of a municipality to conduct proper inspections. To ensure that proper construction procedures are followed, it is imperative that inspectors are used to field inspect construction sites while construction activities are occurring and again once they have been completed. When roadway surfaces are not inspected, the surface may be left in an unacceptable condition, such as in an uneven or concave fashion, for months or years. Because these conditions are more likely to occur in the portion of the roadway where bicyclists travel, it is a critical issue for bicyclists.

One of the most important issues related to construction activities is enforcement. It is often difficult to manage a team of contractors and subcontractors on a given project. The contractor is responsible for the subcontractors' work, and the public agency has very little interaction with subcontractors. The only way for an agency to ensure that procedures and guidelines are being followed is through periodic inspection. Some contractors neglect to draft a traffic control plan or implement one as required. Enforcement is certainly a key issue to ensure that proper regulations are followed during construction activities. Guidelines should be enforced for contractors, bulk permit holders, and municipal agencies.



### **Guidelines**

- A traffic control plan that adequately addresses the needs of bicycle traffic through a temporary traffic control zone should be made and approved by the implementing agency's engineer prior to the start of construction.
- Inspection should be made during construction activities on bikeways and on city streets to ensure that the traffic control plan is being followed.
- Inspection of the construction site should be made by the day after construction is completed.
- If settling is likely once construction ends, as with trenching activities, the implementing agency should inspect the pavement surface quality two to four months after construction activities cease to ensure that excessive settlement did not occur. The unit that performed the work should be responsible for the repair of any aspect of the project that does not conform to established design standards.
- Agencies should have adequate staff and budget for inspection and monitoring of construction activities because they affect bicycle traffic on bikeways.

### **Pedestrian Considerations**

Pedestrians are especially vulnerable in construction areas. Uneven walking surfaces, dust, noise, fumes, and inconvenient detours are factors that have a far greater effect on pedestrians than motorists. Three primary aspects should be noted when accommodating work zones for pedestrians:

- Conflicts with work site vehicles, equipment, and operations are to be avoided;
- Conflicts with vehicles through and around the work site should be avoided; and
- A walkway should be provided that minimizes diversions.

The following procedures should be followed to provide a walking route that minimizes the inconvenience for pedestrians.

- Traffic control plans should be required that address pedestrian movements so that pedestrians are provided separation from construction activities, motorized vehicles, and bicycles.
- The walking surface should not have a vertical edge greater than 0.4 inches (10 mm), without a temporary asphalt lip. The temporary asphalt lip should have a slope angle maximum of 3 horizontal to 1 vertical.
- When sidewalks must be closed, appropriate signing must be placed just before the point at which pedestrians are being redirected to the opposite side of the street (see signs on following page). If a sidewalk is closed mid-block, warning and detour signs must be placed at the intersections to avoid dangerous mid-block crossings.
- In some instances, pedestrians may be channeled through or around a construction area. A route without sudden changes in grade or terrain should be installed. Separate facilities for bicyclists and



pedestrians should be considered. In these cases, crashworthy temporary traffic barriers must be in place to protect pedestrians from motor vehicles.

- Fencing or other protective barriers are recommended around construction sites to prevent pedestrian access.
- Covered, lighted walkways are needed to shield pedestrians from falling debris where structures under construction are adjacent to the sidewalk.
- Where sidewalks exist, temporary facilities must be accessible to people with disabilities.

Chapter 6D “Pedestrian and Worker Safety” of the MUTCD outlines the pedestrian considerations necessary in work zones.



*R9-9*



*R9-10*



*R9-11*



*R9-11a*



## 10. Policies, Ordinances, Codes and Standards

ADOT has policies in place that address bicycle policy, rumble strip policy, and the use of controlled access freeways as bikeways. Cities and counties have a number of tools that can provide and enforce bicycle and pedestrian provisions. Ordinances and land use codes are the legal means by which jurisdictions can influence the quality of development. Design and construction standards are recommended guidelines that support the goals of ordinances and codes.

### *10.1. ADOT Policies*

ADOT policies are developed in order to define the roles and responsibilities of ADOT staff. The existing ADOT policies relating to bicyclists are: the Bicycle Policy (MGT 02-1), the Continuous Longitudinal Rumble Strips Policy (PGP # 1030), and the Controlled Access Highways as Bikeways Policy (PGP # 480). The ADOT Bicycle Policy is scheduled for a review on March 1, 2004; however, the consensus of the ADOT Bicycle and Pedestrian Committee is that these policies should be updated and an ADOT Pedestrian Policy be established following the completion of this Plan. The ADOT Statewide Bicycle and Pedestrian Plan Steering Committee provided input in the development of the revisions to ADOT policy and the new ADOT Pedestrian Policy for consideration. The three existing policies and potential revisions to these documents are provided on the following pages. In addition a new ADOT Pedestrian Policy is provided for consideration. It is recommended that implementation of the Statewide Bicycle and Pedestrian Program includes a detailed review of the revisions included herein such that appropriate ADOT policies can be in adopted.

As stated in **Section 6.3**, ADOT is finalizing the process for attaining a permit to hold an event on an ADOT facility. It is recommended that each race organizer contact the ADOT District Engineer, in the district where the race will start within Arizona, as much in advance as possible to confirm the appropriate procedure for attaining a use permit.



**Existing ADOT Bicycle Policy**



**Intermodal  
Transportation  
Division  
Policy**

March 1, 2002  
Effective Date

Policy Memo (11-19-08)  
Supersedes

March 1, 2004  
Review Date

  
Dick Wright,  
State Engineer

**MGT 02-1 BICYCLE POLICY - EXISTING**

**Purpose**

To establish uniform guidelines for accommodating bicycle travel on the State Highway System.

**Authority**

*Arizona Revised Statute 28-812 Traffic laws apply to persons riding bicycles grants bicycle riders all the rights and subjects them to all the duties applicable to the driver of a vehicle except where special regulations apply.*

*Arizona Revised Statute 28-641 Traffic Control Device Manual and Specifications requires ADOT to adopt a manual for a uniform system of traffic control devices that correlates with the most recent edition of the national manual on uniform traffic control devices for streets and highways.*

*Arizona Revised Statute 28-733 Restrictions on use of Controlled Access Highway authorizes ADOT to prohibit the use of any part of a controlled access highway by bicyclists. Requires ADOT to regulate prohibitions on controlled access highways through official signs.*

(Note: See reference 3.a. below)

**References**

1. AASHTO *Guide for the Development of Bicycle Facilities.*
2. Manual on Uniform Traffic Control Devices, Part 9 – “Traffic Controls for Bicycle Facilities”
3. ADOT Traffic Engineering Policies, Guidelines and Procedures
  - a. PGP # 1030 “Controlled Access Highways as Bikeways”
  - b. PGP # 480 “Continuous Longitudinal Rumble Strips”

**Definitions**

*“Shared Roadway” (AASHTO) a roadway which is open to both bicycle and motor vehicle travel. This may be an existing roadway, street with wide curb lanes, or road with paved shoulders.*

*“Bicycle Lane” (AASHTO) a portion of a roadway which has been designated by striping, signing, and pavement markings for the preferential or exclusive use of bicyclists.*

*“Shared Use Path” (MUTCD) 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 alignment. Shared use paths may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users.*

*“Bikeway” (AASHTO and MUTCD) a generic term for any road, street, path, or way which in some manner is specifically designated for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.*



*“Designated Bicycle Route”* (MUTCD) is a system of bikeways designated by the jurisdiction having authority with appropriate directional and informational route markers, with or without specific bicycle route numbers. Bicycle routes, which might be a combination of various types of bikeways, should establish a continuous routing.

**Policy**

1. It is ADOT’s policy to develop a transportation infrastructure that provides safe and convenient bicycle access. 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. 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. Pavement preservation, minor and spot improvement projects are not included; 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 ARS 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.
  - e. Consider, as a part of major new construction and major reconstruction in urban areas, wide curb lanes up to 15’ in width (exclusive of gutter pan) and placement of a stripe at the vehicle lane edge where appropriate. 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 bicycle lanes for inclusion with major new construction or major reconstruction when: 1) fully funded for construction and maintenance by a local agency AND 2) the bicycle lane is included as a part of a planned designated bicycle route approved by ADOT.
  - g. As a part of major new construction and major reconstruction, ADOT will fund and construct at-grade or grade separated crossings (including bridges) of state highway system roadways to meet cross section templates adopted as a standard by the local agency to accommodate bicyclists.
  - 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 TGP # 1030 to designate route sections where bicycle traffic is prohibited on fully access-controlled State Highways.

MGT 02-1

Page 2 of 5 EXISTING





- 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 bicyclists when restriping roadways in conjunction with new construction, reconstruction, pavement preservation and minor spot improvement projects.
  - m. Utilize Intergovernmental Agreements to define funding and maintenance responsibilities with local governments for bicycle facilities within ADOT right-of-way.
2. It is ADOT's Policy not to:
- a. Reduce existing vehicle travel lane widths to accommodate bicycle traffic unless supported by a traffic study. Concurrence by the State Traffic Engineer and the Assistant Engineer, Roadway Engineering Group are required.
  - b. Sign or designate bikeways on any roadways on the State Highway System or roads on State-owned right of way with the exception of bicycle facilities identified and approved by ADOT and applicable local governments. The signing or designating of bikeways does not apply to local government projects or projects funded through the enhancement program or other bicycle projects not on State owned right of way.
  - c. Sign or designate sidewalks as bicycle routes or bikeways.
  - d. Use transportation enhancement funds for maintenance of bicycle facilities.
3. It is ADOT's policy to require written approval from the State Traffic Engineer and the Assistant State Engineer, Roadway Engineering Group for any deviations or exceptions to this policy.
4. A state bicycle plan will be developed by the State Bicycle/Pedestrian Coordinator.



**Proposed Revision to ADOT Bicycle Policy**

**MGT 02-1 BICYCLE POLICY -  
REVISIONS FOR CONSIDERATION**

**Purpose**

To establish uniform guidelines for accommodating bicycle travel on the State Highway and State Route System.

**Authority**

*Arizona Revised Statute 28-812 Traffic laws apply to persons riding bicycles grants bicycle riders all the rights and subjects them to all the duties applicable to the driver of a vehicle except where special regulations apply.*

*Arizona Revised Statute 28-611 Traffic Control Device Manual and Specifications requires ADOT to adopt a manual for a uniform system of traffic control devices that correlates with the most recent edition of the national manual on uniform traffic control devices for streets and highways.*

*Arizona Revised Statute 28-733 Restrictions on use of Controlled Access Highway authorizes ADOT to prohibit the use of any part of a controlled access highway by bicyclists. Requires ADOT to regulate prohibitions on controlled access highways through official signs.  
(Note: See reference 3.a. below)*

**References**

1. AASHTO Guide for the Development of Bicycle Facilities
2. Manual on Uniform Traffic Control Devices, Part 9 "Traffic Controls for Bicycle Facilities"
3. ADOT Traffic Engineering Policies, Guidelines and Procedures
  - a. PGP # 1030 "Controlled Access Highways as Bikeways"
  - b. PGP # 480 "Continuous Longitudinal Rumble Strips"

**Definitions**

*"Shared Roadway" (AASHTO) a roadway which is open to both bicycle and motor vehicle travel. This may be an existing roadway, street with wide curb lanes, or road with paved shoulders. (ADOT) A shared roadway may be a narrow roadway. In some cases, overtaking drivers must wait until there is adequate space to pass bicyclists.*

*"Bicycle Lane" (AASHTO) a portion of a roadway which has been designated by striping, signing, and pavement markings for the preferential or exclusive use of bicyclists.*

*"Shared Use Path" (MUTCD) 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 alignment. Shared use paths may be used by pedestrians, skaters, wheelchair users, joggers and other non-motorized users.*

*"Bikeway" (AASHTO, MUTCD and ADOT) a generic term for any road, street, path, or way legally used for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be*

Deleted: and  
Deleted: which in some instances specifically designated



shared with other transportation modes.

*“Designated Bicycle Route”* (MUTCD) a system of bikeways designated by the jurisdiction having authority with appropriate directional and informational route markers, with or without specific bicycle route numbers. Bicycle routes, which might be a combination of various types of bikeways, should establish a continuous routing.

**Policy**

1. It is ADOT’s policy to develop a transportation infrastructure that provides safe and convenient bicycle access. 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. 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. Pavement preservation, minor and spot improvement projects are not included; existing widths for bicycles will be maintained and additional widths will be provided as appropriate and practical. In some instances, such as on a slow-speed downtown main street or a low-volume rural scenic route, it may be desirable or necessary to maintain narrow pavement widths. 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 ARS 28-641 for design of traffic controls for bicycle facilities.
  - 1. Utilize MUTCD 9C-3 for designation of bicycle lanes on the left side of right turn only lanes, including provision of double lines of skip stripes, bicycle symbol and arrow in lane, and R4-4 “Begin Right Turn Lane, yield to Bike” sign.
- 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.
- e. Consider as a part of major new construction and major reconstruction in urban areas, wide curb lanes up to 15’ in width (exclusive of gutter pan) and placement of a stripe at the vehicle lane edge where appropriate. 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 bicycle lanes for inclusion with major new construction or major reconstruction when fully funded for maintenance by a local agency. Minimum width for a paved shoulder or bike lane of 5 feet with 6 feet desirable. In some locations such as downtown slow-speed main streets, a wide curb lane or bike lane may not be feasible and may increase pedestrian crossing distances unnecessarily.

Deleted: construction and  
Deleted: AND 2) the bicycle lane is included as a part of a planned designated bicycle route approved by ADOT.



- g. As a part of major new construction and major reconstruction, ADOT will: 1) fund and construct at-grade or grade separated crossings (including bridges) of state highway system roadways to meet cross section templates adopted as a standard by the local agency to accommodate bicyclists and pedestrians AND 2) ensure that the shoulder is paved and that no vertical lip greater than 0.5 inches exists between the shoulder and travel lane or between the pavement and the gutter; AND 3) not reduce shoulder widths below ADOT standards to add exclusive left or right turn lanes.
  - 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 AND 3) safe crossing(s) of the ADOT highway have been planned, designed and accepted by ADOT.
  - i. Utilize the ADOT Traffic Engineering PGP # 1030 to designate route sections where bicycle traffic is prohibited on fully access-controlled State Highways. The State Bicycle Coordinator will be involved in all decisions regarding this policy.
  - j. Utilize the ADOT Traffic Engineering PGP # 489 for placement of longitudinal rumble strips on State Highways. Provide minimum smooth paved shoulder width of 5.0 feet to outside of rumble strip and where feasible provide smooth paved shoulder width of 6.0 feet to outside of rumble strip.
  - k. Use pavement surfacing materials that provide reasonably smooth surfaces on travel lanes and shoulders in conjunction with paving projects.
  - l. Evaluate and provide for bicyclists when restriping roadways in conjunction with new construction, reconstruction, pavement preservation and minor spot improvement projects. Deleted: consider the impacts of
  - m. Utilize Intergovernmental Agreements to define funding and maintenance responsibilities with local governments for bicycle facilities within ADOT right-of-way.
  - n. Utilize the Manual on Uniform Traffic Control Devices, Part 6 to provide improved safety for bicycle travel through or around construction zones. Provide wide curb lanes (15 feet) when feasible through construction zones. Consider utilization of MUTCD Shared the Road (W11-1) construction signs at inception of construction zones and at ¼ mile intervals where bicycle use is anticipated. Formatted. Underline
2. It is ADOT's Policy not to:
- a. Reduce existing vehicle travel lane widths below 12 feet to accommodate bicycle traffic unless supported by a traffic study. Concurrence by the State Traffic Engineer and the Assistant Engineer, Roadway Engineering Group are required.
  - b. Sign or designate bikeways on any roadways on the State Highway System or roads on State-owned right of way with the exception of bicycle facilities identified and approved by ADOT and applicable local governments. The signing or designating of bikeways does not apply to local government projects or projects funded through the enhancement program or other bicycle projects not on State owned right of way.



- c. Sign or designate sidewalks as bicycle routes or bikeways.
- d. Use transportation enhancement funds for maintenance of bicycle facilities.
- 3. It is ADOT's policy to require written approval from the State Traffic Engineer and the Assistant State Engineer, Roadway Engineering Group and the State Bicycle Coordinator for any deviations or exceptions to this policy.
- 4. It is ADOT's policy that the State Bicycle Coordinator be involved in decisions for roadway improvements that will impact bicycling. In addition, the State Bicycle Coordinator will have access to all preliminary design plans for improvement projects.
- 5. That Statewide Bicycle and Pedestrian Plan design and maintenance guidelines will be considered on ADOT projects. Brief written documentation for reasons the guidelines were considered by not incorporated will be provided to the State Bicycle Coordinator upon request.

**Deleted.** A state bicycle plan will be developed by the State Bicycle/Pedestrian Coordinator.

MGT 02-1

Page 4 of 4 REVISIONS FOR CONSIDERATION



**Existing ADOT Rumble Strip Policy**

AL-01 Traffic Engineering Policies, Guidelines, and Procedures  
Section 430 - Pavement Markings

March 2002

**480 CONTINUOUS LONGITUDINAL RUMBLE STRIPS**

**480.1 INTRODUCTION**

The purpose of this policy is to define when and where continuous longitudinal rumble strips may be applied on the state highway system. Also refer to ADOT ITD policy MGT 02-1 Bicycle Policy.

The purpose of continuous longitudinal rumble strips is to enhance safety by preventing run-off-road (ROR) collisions with fixed object and rollovers due to driver overcorrection type crashes. These rumble strips are intended to alert drivers by creating an audible (noise) and tactile (rumble or vibratory) warning sensation that their vehicle is leaving the traveled way (traffic lane) and that a steering correction is required. Before and after accident studies have indicated that ROR type crashes may be reduced significantly by the use of continuous longitudinal rumble strips.

**480.2 POLICY**

Continuous longitudinal ground-in rumble strips may be applied to the mainline roadway on projects per the recommendations and requirements of this document.

The following table should be used as a guideline in determining the groove width of the rumble strips to be installed:

<u>Type of Roadway</u>	<u>Right Shoulder Width</u>	<u>Groove Width (both shoulders)</u>
Undivided	less than 4'	6"
Undivided	greater than or equal to 4'	8"
Divided	less than 6'	8"
Divided	greater than or equal to 6'	12"

For divided roadways, the groove width for the left shoulder of the roadway should be the same as the width applied to the right shoulder, where possible.

On undivided two lane highways with shoulders four (4) feet and greater in width, longitudinal rumble strips should be applied. The use of longitudinal rumble strips on shoulders less than four (4) feet may be considered on a case by case basis when supported by a written traffic evaluation.

On divided highways, longitudinal rumble strips should be applied on the right (outside) shoulders with a width of four (4) feet or more and on left (median)



shoulders which have a width of two (2) feet or more. The use of longitudinal rumble strips on divided highways with narrower shoulders than those noted may be considered on a case by case basis when supported by a written traffic evaluation.

**The use of longitudinal rumble strips on all roadway shoulders less than six (6) feet wide with sections of guardrail and/or barrier shall be evaluated. The effective clear width of the shoulder in these areas if a continuous longitudinal rumble strip is installed shall be determined.** The effective clear shoulder width is defined as the distance between the outside edge of the proposed rumble strip and the front face of the guardrail or barrier.

The effective clear shoulder width is important for the following reasons:

- (a) Constructibility - To allow for installation equipment, i.e. grinding, a minimum effective clear shoulder width of two (2) feet is needed from the outside edge of the rumble strip groove to the front face of the barrier or guardrail. If the barrier is on a sharp curve additional width may be needed. This constructibility issue applies to all shoulders and all types of highways.
- (b) Bicycle Traffic - If appreciable bicycle traffic exists or is anticipated then a minimum effective clear shoulder width of three feet and five inches (3' 5") should be provided from the outside edge of the rumble strip groove to the front face of the barrier or guardrail. If this clear area can not be maintained then a change of configuration and/or deletion of the rumble strip should be considered.

If these minimum clear shoulder width dimension criteria can not be maintained, then there are four possible solutions that may be considered. These possible solutions should be considered in the order that they are presented here. The first solution is to reevaluate lane widths; if the lanes are wider than 12 feet it may be permissible to reduce their width. The second solution is to move the location of the rumble strip closer to the traveled way and/or use a narrower strip width (6 inch or 8 inch). If the strip is moved closer to the traveled way it shall not infringe on the actual traffic lane. The third solution is to consider using an alternative rumble strip treatment such as profile pavement markings and/or raised pavement markers; this solution only applies to non-snow removal areas. The fourth solution is to omit the use of the longitudinal rumble strip in the area of the guardrail or barrier.

**Details for rumble strip configuration and placement shall be shown on the plans.** Typically the details will be included in conjunction with project striping plans. **In addition, the limits of the various type of improvements shall be indicated on the plans.**

On non-access-controlled highways, newly installed rumble strip on the right shoulder should use a pattern incorporating periodic gaps as shown on standard drawing M-22.



Continuous rumble strips shall be installed on shoulders of all controlled access highways, and may be installed on shoulders of non-access controlled highways when supported by a written traffic evaluation.

Generally, continuous longitudinal rumble strips should not be applied on the shoulders of roadways within developed and urban areas. In suburban and developing areas, the design team should decide whether rumble strips are appropriate. These types of rumble strips can produce noise that may be objectionable to citizens that reside nearby. The use of continuous longitudinal rumble strips in urban areas should only be considered if there are no other reasonable alternatives and/or it is to mitigate a specific area problem.

#### 480.3 OTHER CONSIDERATIONS

Continuous longitudinal rumble strips may be achieved through a number of different techniques and patterns (e.g. formed rumble strip, raised pavement markers like ceramic buttons, or profile pavement markings). This policy is not intended to restrict or prohibit the use of any of these other alternatives. If an alternative technique is shown to offer an advantage over the ground-in rumble strip, then its use may be pursued.

Ground in rumble strip can be installed in portland cement concrete pavement (PCCP). However, at the writing of this policy it still has not been done in Arizona. Grinding of PCCP requires a diamond rip saw blade grinding drum that is water cooled. The grinding of asphaltic cement pavement (ACP) can be done with a steel grinding drum without water cooling. Thus, doing PCCP ground-in rumble strip would require a significantly different operation and payment structure than what is currently reflected in ADOT's ACP grinding practice. Careful study needs to be given prior to the application of ground-in rumble strip on PCCP.

The make-up of the new pavement or the thickness, condition, and type of existing pavement needs to be determined prior to the application of ground-in rumble strip. The installation of ground in rumble strip on pavement that is of questionable thickness, condition, or type (e.g. AC over PCCP) needs to be evaluated to ensure that the installation of the rumble strip will be possible without adverse impact to the pavement or the performance of the strip.

This policy or the rumble strip standard drawings do not account for all possible applications (e.g. rural gore areas). Therefore, it may be necessary for the designer to develop special application plans or details for the application of ground-in or alternative longitudinal rumble strip treatments. **All such plans and details shall be submitted to the Traffic Engineering Group for review and approval prior to their use on a project.** This includes the use of centerline rumble strip on two-way highways.

#### 480.4 WRITTEN TRAFFIC EVALUATION





ALDOT Traffic Engineering Policies, Guidelines, and Procedures  
Section 430 - Pavement Markings

March 2002

**The use of continuous longitudinal rumble strips on roadways with shoulders less than four (4) feet shall require a written traffic evaluation approved by the Manager of the HES Section.**

430-4



### **Considerations for Rumble Strip Policy Revisions**

The ADOT shoulder rumble strip policy and specifications has been revised over the years to improve the compatibility of the rumble strip for bicyclists. Recent revisions include reducing the width of the rumble strip to as narrow as six inches (depending on roadway type and paved shoulder width); reducing the depth of the rumble strip cut from 0.5 inches (plus or minus 0.125 inches) to 0.375 inches (plus or minus 0.125 inches); locating the rumble strip immediately adjacent to or partially sharing the space of the white edge-line; and providing 10-foot gaps of no rumble strip for every 30 feet of continuous longitudinal rumble strip. The ADOT rumble strip policy and specifications provide nearly full compatibility with bicycle travel, and can provide benefit to bicyclists by alerting drivers who may be straying from the travel lane into the shoulder where the bicyclist may be present.

Minor modifications of the current policy and specifications are proposed to further improve the compatibility of rumble strips for bicycles. The proposed modifications are based on the findings contained within research conducted by the Pennsylvania Department of Transportation, as published within TR News 215 in August 2001. The research resulted in two similar patterns that provide acceptable sound and vibration benefits for motorists while proving to be compatible for bicycle use. The modifications are also based on current rumble strip policy of other states, including Caltrans Policy 6-03, and of recommendations presented by the League of American Bicyclists, by the AASHTO Guide for the Development of Bicycle Facilities, 1999, and by the FHWA Technical Advisory on Roadway Rumble Strips, 2001.

Modifications to Section 480 are proposed as follows:

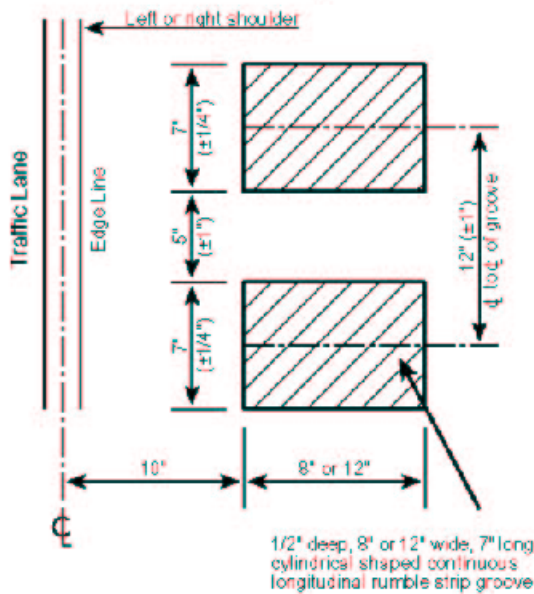
1. Section 480.2: On all State Highways where bicycling is permitted, provide a minimum of 5.0 feet of clear paved shoulder to the right of the rumble strip. Provide 6.0 feet of clear paved shoulder to face of guard rail if present. (League of American Bicyclists, 2001)
2. Modify existing ADOT 7-inch longitudinal length of rumble cut to 5-inch length. Modify existing ADOT 5-inch longitudinal length of gap between cuts to 7-inch length (see the Figure on following page)

Application of the proposed modifications presented above will result in a rumble strip policy and specifications that can be a model for rumble strip application across the U.S. This rumble strip can provide acceptable safety benefits to motorists while improving the ability of bicyclists to utilize State Highways.

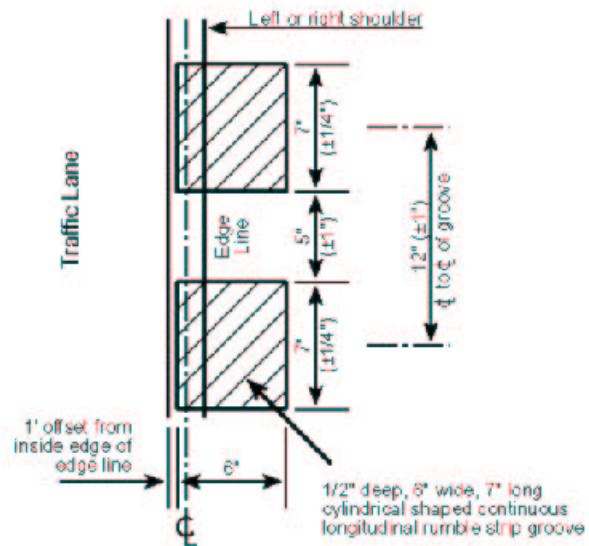


**Existing Standard**

**Typical Longitudinal Rumble Strip Location  
8" or 12" Wide Strip with Offset**

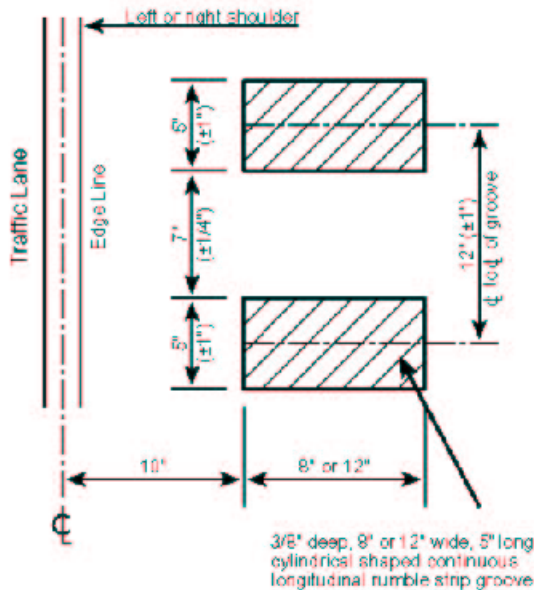


**Typical Longitudinal Rumble Strip Location  
6" Wide Strip without Offset**

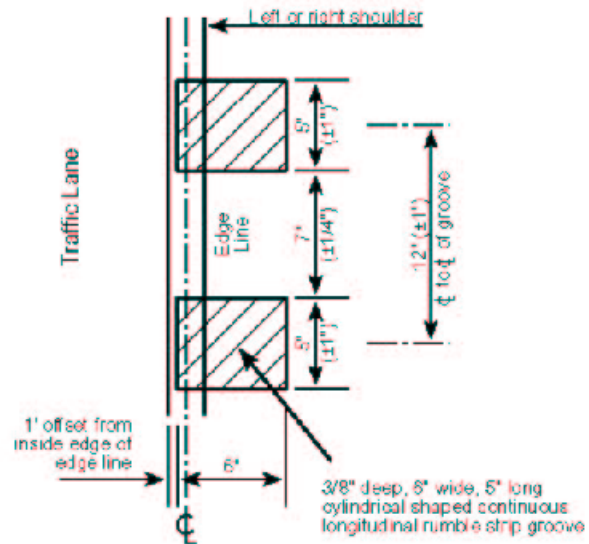


**Recommended Standard**

**Controlled-Access Highways  
Recommended Design**



**Non-Access-Controlled Highways  
Recommended Design**



**For all situations:** For every 30' of rumble strips is a 10' gap.

**Proposed ADOT Rumble Strip  
M-22 Modification**

12/02





**Existing ADOT Controlled-Access Highways as Bikeways**

A 2011 Traffic Engineering Policy, Ordinance, and Procedures  
Section 1000 - Miscellaneous

March 2002

**1030 CONTROLLED-ACCESS HIGHWAYS AS BIKEWAYS**

Bicycles are permitted by law to operate on all State highways, including controlled-access highways, except where excluded by administrative regulation and the posting of signs to give notice of a prohibition. Also refer to ADOT TTD policy MGT 02-1 Bicycle Policy.

**It is, therefore, intended that bicycles shall not be prohibited from controlled access highways except under those conditions where alternate routes are available and where such alternate routes are considered comparable or better in terms of convenience and safety.**

It is not practical to establish specific criteria or absolute values to determine alternate routes. Each case shall be judged on its own. Factors that may be considered in evaluating the situation include, but are not limited to, traffic volumes, roadway geometrics, pavement surface conditions, travel times and distances, and potential for conflicts.

**1030.1 BICYCLE RESTRICTIONS**

R17 3-407 of the Arizona Administrative Code restricts the use of controlled access highways. The following list contains the boundaries for the prohibition of bicycles on controlled-access highways in Arizona:

<u>Route</u>	<u>Bicycle Prohibition</u>
I-8	MP 174.04 (Trekeil Road) to MP 178.33 (Jct. I-10)
I-10	MP 132.66 (107 <sup>th</sup> Avenue) to MP 267.11 (Valencia Road)
I-15	no prohibitions
I-17	MP 193.89 (Jct. I-10) to MP 217.10 (Pinnacle Peak Road)
I-19	MP 43.24 (km 69.59) (Duval Mine Road) to MP 63.09 (Jct. I-10)
I-40	no prohibitions
SR 51	prohibited entire length
US 60 Road)	MP 160.65 (Jct. I-17 at Thomas Road) to MP 198.41 (Goldfield
SR 101	prohibited entire length
SR 143	prohibited entire length
SR 153	prohibited entire length

-1030-



SR 202	prohibited entire length
SR 210	prohibited entire length

1030.2 SIGNING

Figure 1030-A shows the minimum signing necessary for controlling bicycles on controlled-access highways.

Bicycles Prohibited

- A. Where access to the highway is prohibited to bicyclists, the PEDESTRIANS / BICYCLES / MOTOR DRIVEN CYCLES / PROHIBITED sign (R5 10a) shall be used and installed near the beginning of the on-ramp.
- B. Where continued bicycle operation on the highway is prohibited, the BICYCLES MUST EXIT sign (R5 11) shall be installed adjacent to the off ramp immediately preceding the prohibited highway segment.

Bicycles Permitted

Where bicycle access to the highway is permitted, the R9-3a sign shall be used and installed at the beginning of the on ramp. The (bicycle symbol) USE SHOULDER ONLY sign (R9 8) shall be installed adjacent to the entrance to the controlled access highway.

**Bicycles may be prohibited from using controlled access highways on the recommendation of the District Engineer with the approval of the State Traffic Engineer.**

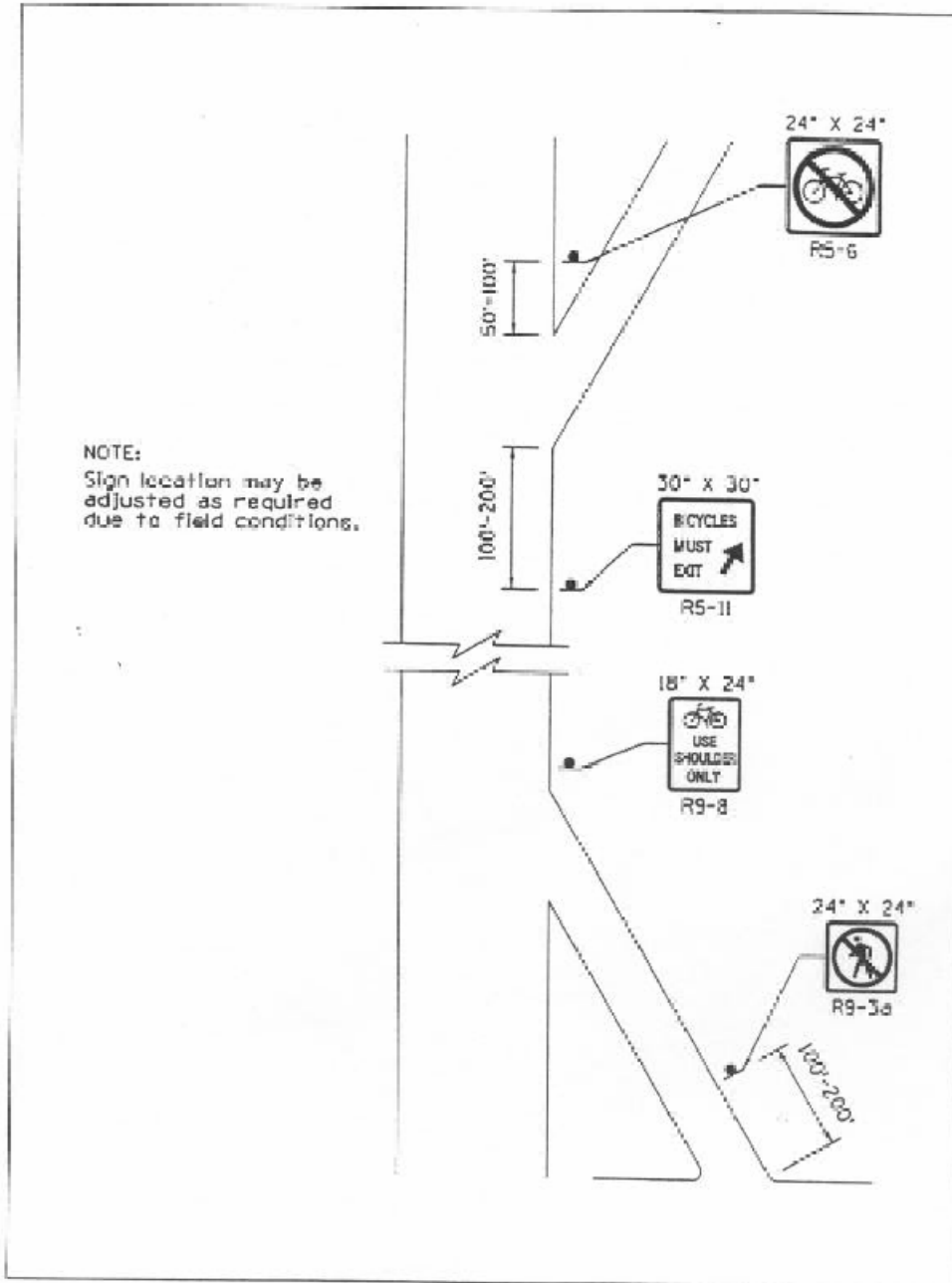


FIGURE 1030-A  
BICYCLE SIGNING FOR CONTROLLED-ACCESS HIGHWAYS



### **Considerations for Controlled-Access Highways as Bikeways Revisions**

The ADOT controlled-access highways as bikeways policy should be revised to include a requirement that the State Bicycle Coordinator be included in all issues regarding application of this policy. In addition, the current prohibition of bicyclists on I-19 from Duval Mine Road (Mile Post 43.24) to the north should be revised. There have been improvements to the shoulder widths of the bridges along this roadway such that it is no longer appropriate to prohibit bicyclists from this section of roadway.



## ADOT Pedestrian Policy for Consideration

### **Purpose:**

**To establish uniform guidelines for accommodating pedestrian travel on the State Highway and State Route System.**

### **Definition**

Arizona Revised Statute 28-101 Definitions

"Pedestrian" means any person afoot. A person who uses an electric personal assistive mobility device or a manual or motorized wheelchair is considered a pedestrian unless the manual wheelchair qualifies as a bicycle. For the purposes of this paragraph, "motorized wheelchair" means a self-propelled wheelchair that is used by a person for mobility.

### **Background**

The U. S. Department of Transportation has established specific goals to improve the role and function of bicycling and walking as modes of transportation. Simply stated, these goals are to double the number of person trips made by bicycling or walking and to simultaneously reduce by 10 percent the number of bicyclist and pedestrian deaths and injuries associated with vehicular and bicycle/pedestrian crashes.

The Arizona Statewide Bicycle and Pedestrian Plan regards bicycling and walking as essential transportation modes, stating: 'Bicycling and walking are basic, fundamental modes of transportation that in today's motorized world of travel are commonly overlooked as an option to help manage our circulation issues and concerns.'

Bicycle and pedestrian networks should be developed and promoted in all urban areas to provide safe, direct and convenient access to all major employment, shopping, educational and recreational destinations in a manner that would double person trips by bicycle and walking. This fundamental objective is the basis for developing a PEDESTRIAN POLICY for the State of Arizona Department of Transportation (ADOT).

### **Current Policy**

ADOT does not have an existing pedestrian policy, however ADOT currently will not take on the maintenance responsibility for sidewalks. ADOT will install sidewalks during construction and only if the city or county agrees and is willing to maintain them through an Intergovernmental Agreement (IGA).





## Proposed 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 demand for pedestrian travel.

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. 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. Sidewalks should almost always be placed on both sides of a highway. Exceptions could include commercial strips entirely on one side with absolutely no 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). 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 Coordinator for any deviations or exceptions to this policy.

### ACTION 1:

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:

**STRATEGY 1A.** 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.

**STRATEGY 1B.** Retrofit existing roadways with sidewalks and retrofit crossings to accommodate pedestrians as a component of major reconstruction where there are origins and destinations within close proximity.



**STRATEGY 1C.** Provide financial and technical assistance to local governments for construction of walkway projects.

**ACTION 2:**

*Develop education programs that improve pedestrian safety.*

**STRATEGY 2A.** Monitor and analyze pedestrian crash data to formulate ways to improve pedestrian safety.

**STRATEGY 2B.** Assist with the publication of walking maps and guides that inform the public of pedestrian facilities and services.

**STRATEGY 2C.** Develop walking safety education programs to improve skills and observance of traffic laws, and promote overall safety for pedestrians.

**STRATEGY 2D.** Develop safety education programs aimed at motor vehicle drivers to improve awareness of the needs and rights of pedestrians.

**STRATEGY 2E.** Develop a promotional program and materials to encourage increased walking.



## **10.2. Ordinances, Codes and Standards**

A review of ordinances, codes, and standards in Arizona communities found that several cities have some provisions for bike parking, many cities require sidewalks in new developments, and some have codes that require minors to wear bicycle helmets. Aside from these basic requirements, some cities within Arizona have developed in-depth bicycle and pedestrian design standards and innovative methods to promote bicycle and pedestrian use. Below are summaries of some of these insightful approaches. **Table 5** lists more examples of non-motorized transportation ordinances, codes, and standards. Implementing agencies within Arizona should review the codes and standards included herein and build upon the vast amount of successful codes and standards that current exist within Arizona and nationally.

### **Motor Vehicle and Bicycle Parking Requirements**

#### **City of Tucson Land Use Code Division 3**

Division 3 of Tucson's *Land Use Code* provides detailed instructions for the number of bicycle parking spaces required for each land use class. The number of bike parking spaces is calculated based on a percentage of required motor vehicle parking spaces. The type of required bicycle parking, Class 1 and/or Class 2, is also provided. While the Tucson Motor Vehicle and Bicycle Parking code is currently undergoing a review and revision, this code serves as an example of a comprehensive approach and it should be reviewed by other Arizona communities as an example for bike parking requirements.

### **Pedestrian Access**

#### **City of Tucson Development Standard No. 2-08.0**

The Pedestrian Access development standard provides the design criteria for pedestrian circulation paths to housing, transportation, and public spaces *within* developments. This standard stresses the fact that pedestrian paths are required to all public access areas including parking, recreation, dumpsters, all buildings, and all other common use areas. Location requirements and construction standards are provided to help developers create pedestrian-friendly environments.

### **Bicycle Parking Facility Design Requirements**

#### **City of Tucson Development Standard No. 2-09.0**

The Bicycle Parking Facility Design development standard fulfills two purposes: to carry out the bicycle parking requirements of the Tucson *Land Use Code* and to provide bicycle facility design guidelines. These guidelines cover the proper locations for bike parking, layout of the parking facility, signage, and maintenance.

### **Tempe Pedestrian Overlay District**

The City of Tempe recently completed a draft of the Comprehensive Transportation Plan. One recommendation is the adoption of a Pedestrian Overlay District (POD) into the Land Use and Development Code. A POD would encourage land development practices and design considerations that promote not only walking but also bicycling and transit use. The City of Tempe is currently revising this pedestrian overlay ordinance, and a revision is expected to be published in 2003.



### **Programs and Incentives to Reduce Parking Requirements**

#### **Scottsdale Revised Code, Appendix B, Article IX, Sec. 9.104.**

The City of Scottsdale has recently revised its requirements for off-street vehicle parking. In some situations, the minimum number of motor vehicle parking spaces may be excessive or detrimental to the City's goals of supporting alternative modes of transportation. With the approval of the City Manager or a designee, the number of vehicular parking spaces may be reduced when the amount of bicycle parking exceeds the minimum requirements or if showers and changing facilities are provided for bicyclists.

### **National Examples**

Arizona and its jurisdictions can learn about ways to improve walking and bicycling conditions by reviewing progressive examples of codes, ordinances, and guidelines found around the country. Recognizing that walking and bicycling are generally more local in nature, cities and counties have the authority to develop land use regulations that require pedestrian and bicycle facilities. Additionally, a few states have recognized the importance of a balanced transportation system and are urging cities to carry out these statewide goals. Brief summaries of some of these regulations and guidelines are provided. **Table 6** supplies links to their web sites.

### **State Model Codes**

Some State agencies around the country have developed resources that advise jurisdictions to make changes to codes, zoning ordinances, and general plans that encourage multi-modal transportation systems, often using the principles of "smart growth." Local planning agencies can customize these model codes and guidelines to encourage mixed-use development, transit oriented development, and modifications to street standards that support bicycling and walking.

The Minnesota Environmental Quality Board and Minnesota Planning released *From Policy to Reality: Model Ordinances for Sustainable Development* (September 2000) as a tool for Minnesota communities to promote sustainable development. It is particularly supportive of pedestrian circulation by recommending landscaped sidewalks on both sides of the street (minimum widths of five feet in residential areas and ten feet in commercial areas) that are fully accessible to people of all abilities and have visible crosswalks.

Envision Utah is a public/private partnership that guides the development of the State's Quality Growth Strategy, particularly the Greater Wasatch Area. The organization released *Urban Planning Tools for Quality Growth* as a guidebook to build better communities. Chapters such as "Strategies for Walkable Commercial Development" and "Public Safety and Residential Street Design" enforce the necessity of designing our cities for pedestrians. *Wasatch Front Transit Oriented Development Guidelines* (2002) can be used by local communities not only for transit oriented development but for all forms of compact, walkable environments that initiate a more balanced transportation system. A Model Transit Oriented Development Ordinance is provided that calls for cities to provide a pleasant walking experience through design standards, landscaping, varied facades, and a development scale that is more suitable for pedestrians than automobiles.

The Washington State Office of Community Development's Growth Management Program developed model code provisions for urban streets and subdivisions. The code advocates grid street patterns that also provide sidewalks, bike paths, street trees, and narrower streets.



## Local Regulations

Cities and counties can improve bicycling and walking conditions by taking a more pro-active approach by implementing innovative ordinances and standards. These measures prove a jurisdiction's commitment to improving the quality of life for its residents. Some examples of such practices around the country are provided here.

Successful Land Use Codes require bicycle and pedestrian facilities in all developments. Cities around the country are refining their Codes to achieve this. For example, the City of Fort Collins, Colorado, Land Use Code is especially supportive of multi-modal transportation, as revealed in the Purpose of the Code:

- Fostering the safe, efficient, and economic use of the land, the City's transportation infrastructure, and other public facilities and services.
- Facilitating and ensuring the provision of adequate public facilities and services such as transportation (streets, bicycle routes, sidewalks, and mass transit), water, wastewater, storm drainage, fire and emergency services, police, electricity, open space, recreation, and public parks.
- Encouraging patterns of land use which decrease trip length of automobile travel and encourage trip consolidation.
- Increasing public access to mass transit, sidewalks, shared-use paths, bicycle routes, and other alternative modes of transportation.
- Reducing energy consumption and demand.

Inadequate bicycle parking is a common criticism of bicyclists. Bike parking requirements must be an integral part of city codes. In addition to the Tucson bicycle parking requirement, the City of Eugene, Oregon, has devised comprehensive bike parking standards according to land use and type of parking. The San Francisco Planning Code requires bike parking in all parking garages and shower and locker facilities in new and major renovations of commercial and industrial buildings.

Design Guides are effective tools cities can develop to enforce quality design practices. One of the nation's premier examples of design guides is Portland's *Pedestrian Design Guide*. It is a comprehensive document issued by the City Engineer, and every project built in the city is expected to abide by its guidelines. Similar pedestrian guidelines were recently developed for the San Diego, California region. Portland also developed the "Bikeway Design and Engineering Guidelines" as an appendix to the City's *Bicycle Master Plan*.

Cities often develop street standards so new and reconstructed streets can adequately move traffic. Street standards can be revised to include bikeways and sidewalks that promote friendlier streets. One such example is the Ashland (Oregon) Street Standards Handbook that "outlines the art and science of developing healthy, livable streets" by requiring bike lanes and sidewalks as well as traffic calming practices. Larimer County, Colorado, in cooperation with the Cities of Loveland and Fort Collins, adopted the *Larimer County Urban Area Street Standards* that are required for all new and reconstructed roadways within the growth management area. One objective of this document is to ensure public rights-of-way are properly designed and uniform bicycle and pedestrian facilities exist region-wide.



**Table 5 – Bicycle and Pedestrian Ordinances and Codes**

<b>AGENCY</b>	<b>ORDINANCE/CODE</b>	<b>PURPOSE</b>	<b>WEB SITE</b>
City of Kingman	Off-Street Parking and Loading Requirements (Section 22, Zoning Ordinance)	Bicycle parking requirements and basic design guidelines	<a href="http://www.ci.kingman.az.us/downloads/codes/zoning_ordinance.pdf">http://www.ci.kingman.az.us/downloads/codes/zoning_ordinance.pdf</a>
City of Nogales	Code of Ordinances, Chapter 18 Article VI.: Bicycles	Governs a wide range of bicycling operations (including: must sit on seat, no more than two abreast, carrying packages, riding on the right side) and bike requirements (lamps, brakes)	<a href="http://livepublish.municode.com/2/lpext.dll?f=templates&amp;fn=main-hit-h.htm&amp;2.0">http://livepublish.municode.com/2/lpext.dll?f=templates&amp;fn=main-hit-h.htm&amp;2.0</a>
City of Phoenix	Code of Ordinances, Chapter 36 Article IX.: Bicycles	Includes the licensing requirement, and obeying the pedestrian right-of-way	<a href="http://livepublish.municode.com/2/lpext.dll?f=templates&amp;fn=main-hit-h.htm&amp;2.0">http://livepublish.municode.com/2/lpext.dll?f=templates&amp;fn=main-hit-h.htm&amp;2.0</a>
City of Scottsdale	Sec. 9.104. Programs and incentives to reduce parking requirements (Revised Code, July 1, 2002)	On-site vehicular parking credits are granted when bike parking exceeds minimum spaces and where shower and changing facilities are provided	<a href="http://www.ci.scottsdale.az.us/clerk/citycode.asp">http://www.ci.scottsdale.az.us/clerk/citycode.asp</a>
City of Tucson	Ordinance	Bicycles of wheel size greater than 16" diameter prohibited from sidewalks	
	Ordinance	Established Tucson-Pima County Bicycle Advisory Committee to advise the Mayor and Council and the Board of Supervisors on matters related to bicycling. Includes representatives from other jurisdictions such as Marana, Oro Valley, and University of Arizona	<a href="http://www.dot.co.pima.az.us/tpcbac/">www.dot.co.pima.az.us/tpcbac/</a>



AGENCY	ORDINANCE/CODE	PURPOSE	WEB SITE
City of Tucson (continued)	Land Use Code 3.3.0 Motor Vehicle and Bicycle Parking Requirements	Established short-term and long-term bicycle parking requirements for new and expanded businesses and public buildings	<a href="http://www.ci.tucson.az.us/planning/luc/art3div3.pdf">http://www.ci.tucson.az.us/planning/luc/art3div3.pdf</a>
	Development Standard No. 3-01: Street Development Standard	Establishes bike lane requirements, sidewalk requirements, and basic design standards for both	<a href="http://www.ci.tucson.az.us/planning/ds/ds301.pdf">http://www.ci.tucson.az.us/planning/ds/ds301.pdf</a>
	Development Standard No. 2-09.0: Bicycle Parking Facility Design Requirements	Bicycle parking design guidelines to support the bicycle parking requirements of the <i>Land Use Code</i>	<a href="http://www.ci.tucson.az.us/planning/ds/ds209.pdf">http://www.ci.tucson.az.us/planning/ds/ds209.pdf</a>
	Major Streets and Routes Plan (Ordinance No. 7816)	All new and reconstructed arterial and collector roadways will include bicycle lanes. Major street improvements must include sidewalks on both sides.	<a href="http://www.ci.tucson.az.us/planning/genplan/msr.pdf">http://www.ci.tucson.az.us/planning/genplan/msr.pdf</a>
	Land Use Code 3.2.8 Access Provisions	To assure that all parcels have legal and physical access to a public street; require reasonable improvements for pedestrian facilities; increase public safety by lessening the conflict between vehicular and pedestrian activities; aid in improving air quality; and provide design standards for pedestrian circulation paths	<a href="http://www.ci.tucson.az.us/planning/luc/art3div2.pdf">http://www.ci.tucson.az.us/planning/luc/art3div2.pdf</a>
	City Code Sec. 20-29: Requirement for helmet use	No one under the age of 18 shall ride a bike without a helmet that meets the standards of the American National Standards Institute	<a href="http://livepublish.municode.com/2/lpext.dll?f=templates&amp;fn=main-hit-h.htm&amp;2.0">http://livepublish.municode.com/2/lpext.dll?f=templates&amp;fn=main-hit-h.htm&amp;2.0</a>

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AGENCY	ORDINANCE/CODE	PURPOSE	WEB SITE
City of Yuma	Municipal Code §213-05	No person shall operate any of the vehicles coming under this chapter upon a sidewalk within a business district, unless in a designated bike lane	<a href="http://www.amlegal.com/nxt/gateway.dll?f=templates&amp;fn=default.htm&amp;vid=alp:yuma_az">http://www.amlegal.com/nxt/gateway.dll?f=templates&amp;fn=default.htm&amp;vid=alp:yuma_az</a>
	Municipal Code §154-264	On lots required to provide 20 or more off-street parking spaces by §§ 154-395 through 154-403 of this chapter, a minimum of one bicycle parking space per every five required off-street parking spaces shall be provided. The bicycle parking space may be provided via a bicycle rack or similar device.	
Pima County	Major Streets and Scenic Routes Plan (DOT Policy 1987)	All new and reconstructed arterial and collector roadways include bicycle lanes	
	Board of Supervisor's Resolution 1986	Established Tucson-Pima County Bicycle Advisory Committee to advise the Mayor and Council and the Board of Supervisors on matters related to bicycling. Includes representatives from other jurisdictions such as Marana, Oro Valley, and University of Arizona	<a href="http://www.dot.co.pima.az.us/tpcbac/">www.dot.co.pima.az.us/tpcbac/</a>
	Use of Bicycle Helmets by Minors (Chapter 10.43 Pima County Code)	No one under the age of 18 shall ride a bike without a helmet that meets the standards of the American National Standards Institute	<a href="http://www.co.pima.az.us/cob/code/c.42.htm#10.43">http://www.co.pima.az.us/cob/code/c.42.htm#10.43</a>



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AGENCY	ORDINANCE/CODE	PURPOSE	WEB SITE
Town of Oro Valley	Section 27.6 Off-Street Parking (Draft General Development Regulations)	Requires at least two bike parking spaces; ten percent of bike parking in professional office/retail uses/recreational use/theaters/industrial uses must be Class 1; reduces number of required vehicle parking spaces when additional bike parking or showers are provided	<a href="http://www.ci.oro-valley.az.us/commdev/draft%20code/111501_parking_code.pdf">http://www.ci.oro-valley.az.us/commdev/draft%20code/111501_parking_code.pdf</a>



Table 6 – National Examples

AGENCY	DOCUMENT	WEB SITE
Ashland, OR	Street Standards Handbook	<a href="http://www.ashland.or.us/Files/Street_Standards.pdf">http://www.ashland.or.us/Files/Street_Standards.pdf</a>
Envision Utah	Urban Planning Tools for Quality Growth	<a href="http://www.envisionutah.org/">http://www.envisionutah.org/</a>
Envision Utah	Wasatch Front Transit Oriented Development Guidelines	<a href="http://www.envisionutah.org/tod1.pdf">http://www.envisionutah.org/tod1.pdf</a>
Eugene, OR	Eugene Code, General Standards for All Development, §§ 9.6100-9.6110	<a href="http://www.ci.eugene.or.us/cityreco/CITYCODE/ch9%20temp/General%20Standards%20for%20All%20Development.pdf">http://www.ci.eugene.or.us/cityreco/CITYCODE/ch9%20temp/General%20Standards%20for%20All%20Development.pdf</a>
Fort Collins, CO	City of Fort Collins Land Use Code	<a href="http://bpc.iserver.net/codes/fortcoll_landuse/index.htm">http://bpc.iserver.net/codes/fortcoll_landuse/index.htm</a>
Larimer County, Cities of Loveland and Fort Collins, CO	Larimer County Urban Area Street Standards (2001)	<a href="http://www.larimer.org/engineering/GMARdStds/GMARdStds.htm">http://www.larimer.org/engineering/GMARdStds/GMARdStds.htm</a>
Minnesota Environmental Quality Board and Minnesota Planning	From Policy to Reality: Model Ordinances for Sustainable Development	<a href="http://www.mnplan.state.mn.us/pdf/2000/eqb/ModelOrdWhole.pdf">http://www.mnplan.state.mn.us/pdf/2000/eqb/ModelOrdWhole.pdf</a>
Portland, OR	Bikeway Design and Engineering Guidelines	<a href="http://www.trans.ci.portland.or.us/designreferences/bicycle/appenda.htm">http://www.trans.ci.portland.or.us/designreferences/bicycle/appenda.htm</a>
Portland, OR	Pedestrian Design Guide	<a href="http://www.trans.ci.portland.or.us/DesignReferences/Pedestrian/default.htm">http://www.trans.ci.portland.or.us/DesignReferences/Pedestrian/default.htm</a>
San Diego, CA	Planning and Designing for Pedestrians (2002)	<a href="http://www.sandag.org/uploads/publicationid/publicationid_713_1271.pdf">http://www.sandag.org/uploads/publicationid/publicationid_713_1271.pdf</a>
San Francisco, CA	San Francisco Planning Code, Article 1.5 Off-Street Parking and Loading	<a href="http://www.amlegal.com/sanfran/viewcode.htm">http://www.amlegal.com/sanfran/viewcode.htm</a>
Washington State Office of Community Development's Growth Management Program	Model Code Provisions: Urban Streets and Subdivisions (1998)	<a href="http://www.ocd.wa.gov/info/lgd/growth/publications/detail.tpl?key=1026">http://www.ocd.wa.gov/info/lgd/growth/publications/detail.tpl?key=1026</a>



### **10.3. Recommendations**

Implementing agencies within Arizona should review the codes and standards included herein and built upon the vast amount of successful codes and standards that current exist within Arizona and nationally.

Implementation of the Plan should include a task to further review the existing policies and the policy revisions included herein for consideration. Additional meetings with Steering Committee members will be needed to come to agreement on the appropriate ADOT policy language such that bicyclists and pedestrians will be better accommodated on ADOT facilities.



## 11. Programs

Education, marketing, and law enforcement programs help make the general public aware of bicycling and pedestrian issues. Targeted campaigns are beneficial to reach out to specific segments of the population such as children for rules-of-the-road courses, transportation planners and engineers for bicycle- and pedestrian-friendly design strategies, commuters for encouragement and incentive campaigns, and the general traveling public for safety awareness campaigns. Law enforcement programs help ensure that all road users are abiding by the rules. This section discusses various programs in Arizona used to promote bicycling and walking as well as examples of successful programs around the nation.

### *11.1. Bicycle Safety and Education Guides*

Several agencies have developed guides that teach safe bicycling and walking, laws, and tips for bicycle commuters. A sampling of available resources is listed below.

- The Maricopa County Transportation Department has two PowerPoint presentations on its web site focused on bicycle safety: “Bicycle Safety: Rules of the Road” and “Bicycling 101.”  
<http://www.mcdot.maricopa.gov/bicycle/bike.htm>
- A “Bicycle Commuter Handbook” is available through the Chandler Police Department.
- The Phoenix and Mesa Police Departments post bicycle safety information on their web sites.  
<http://www.ci.phoenix.az.us/POLICE/bikesa1.html> and  
<http://www.ci.mesa.az.us/police/literature/bikes.asp>
- A “Bicycle and Pedestrian Safety Program” brochure was developed by the Pima County Department of Transportation in 2002.
- The “Tucson Area Bicycle Commuter Handbook” was funded and published by the City of Tucson, the Pima Association of Governments, the Tucson-Pima County Bicycle Advisory Committee, and the ADEQ Air Quality Funds.
- Tucson’s Alternative Modes Office created the “City of Tucson Bicycle Guide” that describes safety tips, Tucson and Arizona bicycle laws, and information numbers.
- Pima County Department of Transportation in conjunction with the Brad P. Gorman Memorial Bikeway Fund and other entities prepared a “Share the Road” pocket guide in 2003, which presents laws and safety tips for bicyclists and motorists to more safely share the road.

### **Bike to Work Events**

For adults, Bike to Work Days presents an opportunity for individuals to give bicycling a try as a way to commute to work. Organized bike to work days and weeks have been growing throughout Arizona.

Valley Bike Week has taken place in Maricopa County for 12 years. The weeklong celebration, sponsored by the Clean Air Campaign and Valley Metro, includes prizes for bike commuters, a vanpool vs. bicycle lunch race, bike safety rodeos, swap meet, and “Bike Mania” for skills clinics, bike safety checks, and a bike fashion show. Many cities in the Phoenix Metropolitan Area sponsor bike to work days, safety fairs, and family rides in conjunction with Valley Bike Week.

The Pima County Department of Environmental Quality (DEQ) sponsors the Clean Air Fiesta during two weeks in the spring. This event encourages the use of alternate modes to reduce traffic congestion



and air pollution. Participants have a chance to win prizes, participate in fun rides and races, and join in celebrations to promote clean commuting. The program is funded by a grant from the Arizona Department of Environmental Quality and by funding from the City of Tucson Department of Transportation and the Pima County Department of Transportation

Prescott Alternative Transportation and the Prescott Bicycle Advisory Committee, with help from sponsors throughout the Tri-Cities, hold a Bike Month every May. It includes Bike to Work Week, Bike to School Week and Bike to Shopping Week. There are also diverse events that match bicycling with other community elements like the art district, schools, museums, and businesses.

Newly formed Flagstaff Biking.org developed a weeklong celebration during national Bike to Work Week in May. Special events included recreational rides, fun rides, a film festival, swap meet, biketo-shop, and a worksite challenge.

Other communities, such as Yuma Arizona are becoming more aware of the need to establish programs to address alternative modes and encourage individuals to walk or ride to work.

### **Adult Bicycle Education Programs**

Bicycle education is often taught in elementary schools, but education for adults is less common. The League of American Bicyclists and the Effective Cycling Program offer cycling education programs for adults. The Coalition of Arizona Bicyclists offers a “Science of Bicycling” clinic for adults to become more confident riding in traffic and learn basic bicycle maintenance. The Greater Arizona Bicycling Association also provides bicycling skills and maintenance training. The Phoenix Parks and Recreation Department has offered shared-use path bicycle clinics that teach shared-use path safety and etiquette.

### **Safe Routes to Schools**

“Safe Routes to School” programs are becoming increasingly popular around the country. Through education and incentives, cities and school districts are encouraging children to walk and bike to school. Not only does this improve the health of schoolchildren, but it also decreases traffic congestion and pollution. It is imperative that both engineering (designing and constructing safe routes) and education (getting people to use them safely) are included in safe routes to school programs.

These programs are just starting to emerge in Arizona. Prescott Alternative Transportation has used grant money to start a Safe Routes to School program in Prescott with intentions to expand to Chino Valley and Prescott Valley when more funding is acquired. The *Pima County – Tucson Safe Routes to School and Bicycle and Pedestrian Education Program* recently received an Arizona TEA-21 Transportation Enhancement Grant in the amount of \$454,000 to develop a comprehensive community-based program to develop safe routes for children to walk and bike to school. This program will include a safety education element by focusing on eight pilot elementary schools in the region. The Pima County and Tucson’s Safe Routes to School Program is supported by the Pima County and City of Tucson Departments of Transportation on a local level as well with financial contributions from the local Greater Arizona Bicycle Association (GABA) and other sponsors.

International Walk to School Day in October is a good opportunity for schools to spur interest in Safe Routes to School programs. In October 2002, nearly 50 schools throughout Arizona participated in the event. In Tempe, the day included tree plantings to demonstrate how they make walking more enjoyable



and their importance to the environment. Pima County Environmental Quality sponsored Tucson and Pima County's Walk to School Day and supplied participating schools with promotional materials and prizes.

**Table 7** is a sampling of a number of bicycle and pedestrian programs and events in Arizona.

## *11.2. National Examples*

### **Oregon Smart Development Workshops**

The Oregon Department of Transportation and the Department of Land Conservation and Development have developed the Transportation and Growth Management (TGM) Program. This program aims to enhance Oregon's livability through integrated land use and transportation planning that encourages bicycle, pedestrian, and transit-friendly development. TGM will make free presentations to community groups that are interested in learning how to improve the quality of their community. These workshops summarize smart development principles and offer implementation ideas specific to the conditions in each community. TGM also provides free videos on creating livable communities.

### **Nevada Bike and Pedestrian Safety Program**

The Nevada Office of Traffic Safety sponsors a Bicycle and Pedestrian Safety Program that offers courses that focus on bicycle education. One class, the Instructors Course, trains law enforcement officers, educators, and community volunteers to conduct the Nevada Elementary Traffic Safety Program that teaches children safe bicycling and pedestrian skills. A second course, Bicycling for Fun and Fitness, is a free seminar teaching basic riding skills and maintenance to beginning and intermediate-level adult bicyclists.

### **Illinois Bicycling Maps**

The Illinois Department of Transportation (IDOT) promotes bicycling by producing a set of bicycle maps for the state. Developing these maps begins by querying their computer database of roads to determine which roadways have the characteristics that are most conducive for bicycling. A group of bicyclists then devised a rating system to illustrate the comfort level of the roadway and field-tested some areas to check for accuracy. These roadways are reassessed every one or two years. Maps are available in a paper format or on the IDOT web site. A number of other states have produced bicycle suitability maps for State and county roads (Nebraska, Wisconsin, Iowa, Connecticut, and Montana, to name a few).

### **North Carolina Bicycle and Pedestrian Crashes**

The North Carolina Division of Bicycle and Pedestrian Transportation and the UNC Highway Safety Research Center have developed a database of bicycle and pedestrian crashes with motor vehicles reported to the NC Division of Motor Vehicles between 1997 and 1999. The online database allows the user to find collision statistics based on geographic area; pedestrian, bicyclist, and motorist characteristics; roadway conditions; and weather.



### **Maryland Live Near Your Work Program**

The Live Near Your Work program is a partnership between the Maryland Department of Housing and Community Development (DHCD), local governments, and businesses that provides cash incentives for people to purchase homes. The State of Maryland, local governments, and participating businesses provide at least \$1,000 in cash grants to employees who choose to buy homes in designated neighborhoods. Because workers choose to live closer to work, the program enables employees to opt for commuting alternatives to the automobile. The program benefits employers by supporting their compliance with the 1990 Clean Air Act.

### **Florida Traffic and Bicycle Safety Education Program**

The Florida Department of Transportation and the University of Florida have teamed to develop a number of training workshops. The “Ten-Hour Teach Workshop” trains elementary and middle school physical education and health teachers how to teach pedestrian and bicycle skills. A “Seven-Hour Community Workshop” provides bicycle safety training information to youth group leaders, law enforcement officials, community safety specialists, and school resource officers. An “Adult Cycling Road I Course” helps beginning adult bicyclists learn the basic principals of bicycling. Finally, a “Driver’s Education for Bicycle and Pedestrian Program” prepares driver’s education instructors with the necessary knowledge of bicycle and pedestrian laws, common crash types, and sharing the road.

### ***11.3. Recommendations***

Programs with safety strategies incorporating education and enforcement elements are an important and integral part of this statewide plan, and it will require cooperation among numerous agencies and interest groups to achieve valuable results. ADOT should develop a program to provide data, data analysis, resources, tools, standards, and guidance on bicycle and pedestrian safety. Local governments, school districts, and civic groups need to continue and expand sessions on traffic safety, including adult courses such as the Bicycle Ed Program of the League of American Bicyclists. ADOT should also develop a program to provide important instructional and informational brochures and safety literature, including guides that will expand knowledge of laws implementing pedestrians and the safe operation of bicycles and motor vehicles.

A number of recommendations are listed below that ADOT and agencies around the State could implement to improve bicycling and walking conditions.

- Provide planning and design training of bicycle and pedestrian accommodations to other ADOT staff, MPOs, and city staff;
- Assist in the development of state, regional, and local bicycle maps;
- Support advertising campaigns and public service announcements that educate the public on the virtues of non-motorized transportation;
- Develop basic pedestrian and bicycle education programs for communities and schools;
- 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;
- Continue to consider additions to driver’s education products that emphasize safe motorist driving when encountering bicyclists and pedestrians on the road;



- Assist in promoting bike-to-work days and safe routes to school programs; and
- Promote the link between land use and transportation by encouraging smart growth initiatives.

**Table 7 – Bicycle and Pedestrian Programs in Arizona**

AGENCY	PROGRAM	PURPOSE	WEB SITE
City of Mesa	Bike Rodeo	Education	<a href="http://www.ci.mesa.az.us/police/bikes/bikerodeo.htm">http://www.ci.mesa.az.us/police/bikes/bikerodeo.htm</a>
	Bike/Pedestrian Safety Classes in Schools	Education	<a href="http://www.ci.mesa.az.us/transportation/traffic_safety_education/educationt.htm">http://www.ci.mesa.az.us/transportation/traffic_safety_education/educationt.htm</a>
	Helmet Safety Program	Education, safety; held at various events	
City of Prescott, Prescott Alternative Transportation, and Prescott Bicycle Advisory Committee	Safe Routes to Schools Program	Help more children safely bike and walk to school	<a href="http://www.prescottbikeped.org">http://www.prescottbikeped.org</a>
	Bike Month	Help more citizens rediscover bicycling in their everyday lives	<a href="http://www.prescottbikeped.org">http://www.prescottbikeped.org</a>
City of Tucson	Alternate Modes Program	Promotes bicycle and pedestrian access, safety, and use through engineering, education, enforcement, and promotional programs	<a href="http://dot.ci.tucson.az.us/planning/alt_modes.html">http://dot.ci.tucson.az.us/planning/alt_modes.html</a>
City of Tucson/Pima County	Bike Week/Clean Air Fiesta	Includes promotional programs throughout week to support use of bicycling, transit, telecommuting, and walking	<a href="http://www.deq.co.pima.az.us">www.deq.co.pima.az.us</a>





AGENCY	PROGRAM	PURPOSE	WEB SITE
City of Yuma	Bicycle Rodeo (Dept. of Parks and Recreation)	Safety Education	
	Yuma Police Dept Juvenile/School Resources	Safety education for 3 <sup>rd</sup> graders	<a href="http://www.ci.yuma.az.us/coypd/sro.html">http://www.ci.yuma.az.us/coypd/sro.html</a>
	Traffic Safety Village	Interactive educational tool to help reinforce pedestrian, bicycle, and passenger safety and procedures	
Coalition of Arizona Bicyclists	Bike Safety Clinic	Education	<a href="http://64.33.70.190/clinic.htm">http://64.33.70.190/clinic.htm</a>
Flagstaff Biking.org	Bike to Work Week	Encourage more citizens to bike to work and increase interest in bicycling	<a href="http://www.flagstaffbiking.org/">http://www.flagstaffbiking.org/</a>
Greater Arizona Bicycle Association		Offers education on safe bicycling skills and bicycle maintenance	<a href="http://www.bikegaba.org/">http://www.bikegaba.org/</a> <a href="http://www.sportsfun.com/gaba/">http://www.sportsfun.com/gaba/</a>
Phoenix Children's Hospital	Helmet Safety Program	Education	<a href="http://www.phoenixchildrenshospital.com/about/services/injury_prevention_center.html">http://www.phoenixchildrenshospital.com/about/services/injury_prevention_center.html</a>
	Bicycle Safety Program	Education – on-site and Glendale 4 <sup>th</sup> Grade, Middle School and High School students	
	Drivers' Education	Video presented to students on bike safety	
Pima County	Bicycle and Pedestrian Safety Program	Promotes bicycle and pedestrian access, safety, and use through engineering, education, enforcement, and promotional programs	



AGENCY	PROGRAM	PURPOSE	WEB SITE
Valley Metro	Valley Bike Week	Education, promotion	<a href="http://www.valleymetro.org">www.valleymetro.org</a>
	Bicycle Education Program	Education	<a href="http://www.valleymetro.org/Rideshare/Bike/index.htm">http://www.valleymetro.org/Rideshare/Bike/index.htm</a>
	Bike Buddy	Match riding partners	<a href="http://www.sharetheride.com/bike_walk.asp">http://www.sharetheride.com/bike_walk.asp</a>
Yuma County Health Department	Yuma County SAFE KIDS Coalition	Injury Prevention	<a href="http://www.co.yuma.az.us/health/web4_07.htm">http://www.co.yuma.az.us/health/web4_07.htm</a>
	Firehouse Healthy Kids Day	Provide helmets, safety education	
	Yuma County Safety Pedestrian Task Force		



## 12. Existing and Potential Funding Sources

There are various Federal, State, regional, and local funding sources available to implement the Arizona Statewide Bicycle and Pedestrian Plan, with potential for additional private funds or facilities constructed *in-lieu* by developers as part of development agreements with local jurisdictions. This section lists and discusses the primary funding sources available for design, construction, implementation, and maintenance of bicycle and pedestrian facilities and implementation of safety programs. It is important to note that funding for *roadways*, although not included in this funding review, can be beneficial to bicyclists because every roadway, except controlled access highways that are specifically designated to exclude bicyclists, is a bikeway. Funding sources for educational and outreach programs have been included because of the many benefits these provide, such as increased awareness and safety knowledge, more people choosing to walk and bike, and reductions in crashes.

**Table 8** is included at the end of this section, which includes deadlines, contact information, and funding estimates for bicycle and pedestrian improvements and safety programs throughout Arizona. Total available annual funding from these sources for all modes is estimated. Many of these sources have traditionally been reserved for highway and street purposes, with bicycle and pedestrian facilities often provided as part of the roadway cross section; however, these sources can also be utilized or “flexed” for use on independent stand-alone bicycle and pedestrian improvements, though depending upon the source may be used only on projects within the roadway right-of-way.

This section has data on funding sources that are currently used for bicycle and pedestrian projects and programs and to present potential funding sources where the funding can be flexed from traditional roadway purposes for bicycle and pedestrian purposes. When funding for bicycle and pedestrian projects is pursued, it should be noted that bicycle and pedestrian fatalities and serious injuries in Arizona often make up 10 percent or more of total annual traffic fatalities and injuries. In addition, Federal Bureau of Transportation Statistics data that indicate over 21 percent of American adults ride bicycles on at least a part-time basis, the vast majority of who also pay motor vehicle use taxes and fees (*USBTS Omnibus Survey*, 2000 and 2001). Also, based on Census data, approximately five percent of total commute trips made in Arizona are currently made by bicycle and pedestrian modes (*US Census*, 2000). In addition, the American Automobile Association conducted a survey of its members in Arizona and found that they would spend 11.5 percent of highway user funds on bicycle and pedestrian projects (*2002 AAA Public Affairs Survey, December 2002*).

### 12.1. Federal Revenues

#### **Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21)**

On June 9, 1998, the “Transportation Equity Act for the 21<sup>st</sup> Century” (TEA-21) was signed into law, authorizing highway, safety, transit, and other surface transportation funding programs for a six-year period. TEA-21 followed upon and strengthened the bicycle and pedestrian funding categories provided within its groundbreaking predecessor, the Intermodal Transportation Efficiency Act or ISTEA. TEA21 revenues available for pedestrian and bicycle uses are primarily authorized through the Surface Transportation Program (STP), which includes set-aside funding categories specifically available for pedestrian and bicycle facilities and programs such as the Transportation Enhancement Activities (TEA) program and Congestion Mitigation and Air Quality (CMAQ) program.



The STP provides flexible funding categories and ensures the consideration of bicyclists and pedestrians in the planning process and facility design. STP funds can be used for provision of sidewalks and modification of sidewalks to meet ADA requirements, for shared-use paths, paved shoulders and bicycle lanes, and for pedestrian and bicycle safety and educational programs. When highway bridges are being replaced or rehabilitated with Federal funds on a highway where bicycles are permitted, the bridge must then provide accommodation for bicycles.

Ten percent of STP funding is set aside for Transportation Enhancements, which can be spent on environmentally related improvements including pedestrian and bicycle provisions. Enhancement funds can be used for paved shoulders, bicycle lanes, sidewalks, and both paved as well as unpaved pathways that primarily serve a transportation purpose.

Additional Federal revenues that are eligible for use on various pedestrian and bicycle projects include Bridge Replacement and Rehabilitation (BR) funds, National Highway System (NHS) funds, and other funding sources. For all of the TEA-21 programs, up to 94.3 percent of the project costs can be funded with Federal money while the remaining 5.7 percent must come from State and local obligations. Following is a brief summary of the primary Federal programs:

### **Transportation Enhancement Activity Funds**

Transportation Enhancement funds are a major source of Federal funds available directly for twelve project types which go above and beyond the typical transportation project. These funds are set aside by TEA-21 in order to add community or environmental value to a completed or ongoing transportation project. Currently, Arizona receives about \$13.0 million per year for transportation enhancement projects divided between ADOT and local governments. Approximately 50 percent (\$6.5 million) of the Transportation Enhancement funds are retained by the Arizona State Transportation Board for ADOT projects, including \$2.0 million for enhancements for ongoing ADOT highway projects and an additional \$4.5 million for enhancements to existing ADOT highways. The remaining \$6.5 million in Transportation Enhancement funds are available for local projects recommended by the metropolitan planning organizations (MPOs) and rural councils of governments (COGs).

The eligible transportation enhancement activities include the following:

- Provision of facilities for pedestrians and bicycles;
- Provision of safety and educational activities for pedestrians and bicyclists;
- Acquisition of scenic easements and scenic or historic sites;
- Scenic or historic highway programs;
- Landscaping and other scenic beautification;
- Historic preservation;
- Rehabilitation and operation of historic transportation buildings, structures, or facilities;
- Preservation of abandoned railway corridors (including the conversion to pedestrian or bicycle shared-use paths);
- Control and removal of outdoor advertising;
- Archaeological planning and research;
- Mitigation of water pollution due to highway runoff; and
- Establishment of transportation museums.



### **Congestion Mitigation and Air Quality Improvement Program**

These funds are programmed by TEA-21 for projects that are likely to contribute to the attainment of a national ambient air quality standard, and congestion mitigation. These funds can be used for a broad variety of bicycle and pedestrian projects, particularly those that are developed primarily for transportation purposes. The funds can be used either for construction of bicycle transportation facilities and pedestrian walkways or for non-construction projects related to safe bicycle and pedestrian use (maps, brochures, etc.). The projects must be tied to a plan adopted by the State and MPO, and currently the funds are only available in the MAG Region.

### **Bridge Replacement and Rehabilitation**

These funds may only be used for replacing and rehabilitating highway bridges. Bicycle lanes and sidewalks can be built as part of bridge rehabilitation, as well as pathway under crossings or bridges.

### **National Highway System**

These funds are for improvements to the National Highway System (NHS), which consists of an interconnected system of principal arterial routes that serve major population centers, international border crossings, airports, public transportation facilities, and other inter-modal transportation facilities as well as other major travel destinations. These funds can be used to provide pedestrian and bicycle facilities constructed on NHS routes.

### **Federal Lands Highway (FLH) Funds**

These funds may be used to build bicycle and pedestrian facilities in conjunction with roads and parkways at the discretion of the department charged with administration of the funds. The projects must be transportation-related and tied to a plan adopted by the State and MPO.

Two programs within FLH provide transportation funds for Indian tribes:

- Indian Reservation Roads (IRR) Transportation Planning Funds– Indian Tribal Governments can obtain funds for transportation planning on Indian lands, including bicycle and pedestrian planning.
- Indian Reservation Roads Program Funds– The Bureau of Indian Affairs regional offices are allocated funds that are then distributed to the construction of roads, bridges, and transit facilities to and within Indian reservations or other Indian lands.

### **Highway Safety Funds**

Bicycle and pedestrian safety remain priority areas for highway safety program funding. The Office of Traffic Safety administers funding for safety-related programs in Arizona, including pedestrian and bicycle projects that improve safety along or across roadways and bicycle and pedestrian education. Grants are in the form of reimbursable contracts and do not require a local match. Section 402 Highway Safety Funds are generally available for the first one to three years of a program's life and can be used for development costs and for equipment purchase costs. This source of funding has been utilized successfully across the U.S. to pay for start-up costs of bicycle and pedestrian education courses, primarily for children.



### **Hazard Elimination and Railway-Highway Crossing Program**

Another ten percent of each State's STP funds are set-aside for the Hazard Elimination and Railway-Highway Crossing Program to address bicycle and pedestrian safety issues. Each State is required to implement a Hazard Elimination Program to identify and correct locations that may constitute a danger to motorists, bicyclists, and pedestrians. Funds may be used for activities including a survey of hazardous locations and for projects on any publicly owned bicycle or pedestrian pathway or shared-use path, or any safety-related traffic calming measure.

### **Federal Transit Funding**

Federal transit funding, including the Transit Enhancements program, can be used to provide valuable "support facilities" to promote transit use by bicyclists and pedestrians. This includes bicycle parking facilities for transit stops, bicycle racks on buses, walkways, amenities (benches, trash receptacles, street lighting), and education and marketing materials. Only urbanized areas with a population over 200,000 that offer public transit service qualify to receive Transit Enhancements funding.

### **National Recreational Trails Fund**

The Recreational Trails Program provides funds to states to develop and maintain recreational trails and trail-related facilities for both non-motorized and motorized recreational trail uses. Examples of trail uses include hiking, bicycling, in-line skating, equestrian use, and other non-motorized as well as motorized uses. The program was authorized in 1998 under TEA-21.

Recreational Trails Program funds may be used for:

- Maintenance and restoration of existing trails;
- Development and rehabilitation of trailside and trailhead facilities and trail linkages;
- Purchase and lease of trail construction and maintenance equipment;
- Construction of new trails (with restrictions for new trails on Federal lands);
- Acquisition of easements or property for trails;
- State administrative costs related to this program (limited to seven percent of a State's funds); and
- Operation of educational programs to promote safety and environmental protection related to trails (limited to five percent of a State's funds).

States must use 30 percent of their funds for motorized trail uses, 30 percent for non-motorized trail uses, and 40 percent for diverse trail uses. Diverse motorized projects (such as snowmobile and motorcycle) or diverse non-motorized projects (such as pedestrian and equestrian) may satisfy two of these categories at the same time. States are encouraged to consider projects that benefit both motorized and non-motorized users, such as common trailhead facilities. Many states give extra credit in their selection criteria to projects that benefit multiple trail uses.

Recreational Trails Program funds may not be used for:

- Property condemnation (eminent domain);
- Constructing new trails for motorized use on National Forest or Bureau of Land Management lands unless the project is consistent with resource management plans; or
- Facilitating motorized access on otherwise non-motorized trails.



These funds are intended for recreational trails; they may not be used to improve roads for general passenger vehicle use or to provide shoulders or sidewalks along roads.

### **Community Development Block Grants**

The Community Development Block Grant (CDBG) program is administered by the U.S. Department of Housing and Urban Development to assist low- to moderate-income neighborhoods. Residents of the neighborhood work closely with city staff to develop a plan for their awarded funds. A neighborhood can choose to spend CDBG monies on sidewalk installation and repair. The City of Avondale has used CDBG funds for curb, gutter, and sidewalk repair in the Cashion community. Bullhead City's Riviera Neighborhood used CDBG funds to install 288 streetlights.

## ***12.2. State Revenues***

State revenues include the State sales tax, Highway User Revenue Funds, Local Transportation Assistance Funds (LTAF), Arizona State Parks Heritage Funds, and Arizona Game and Fish Department Heritage Funds. Additional funding was considered as part of the State of Arizona Vision 21 process, which was a recent multi-year study to determine multimodal transportation needs and potential funding sources to meet those needs. Following is a brief summary of each source.

### **State Sales Tax**

The State sales tax revenues, as with local jurisdiction sales tax revenues, are generally budgeted to high priority programs and needs which generally have not included bicycle and pedestrian improvements; however, these revenues are available for bicycle and pedestrian facilities and programs. An increase in the State sales tax is currently under consideration for dedication to transportation purposes. This increase can and should be utilized in part for bicycle and pedestrian transportation projects and safety programs.

### **Highway User Revenue Fund (HURF)**

The HURF, made up of State gas tax revenues, the vehicle license tax, and other miscellaneous fees and services, is a revenue source constitutionally restricted to roadway purposes, which includes all improvements contained within the roadway right-of-way. Arizona jurisdictions have utilized HURF to provide landscaping and to construct bicycle lanes, paved shoulders, sidewalk facilities, and shared-use pathways that are within the right-of-way. The State Highway Fund receives 50.5 percent of annual HURF monies, while cities and counties receive the remainder.

### **Local Transportation Assistance Fund (LTAF)**

Recent legislation has changed the eligibility of LTAF funds, which are generated by the Arizona Lottery. LTAF must now be used for transit purposes in all jurisdictions. These funds may be available for construction of sidewalks, bicycle racks, and other facilities that directly relate to transit use. In FY 2001, the lottery contributed \$23 million to the LTAF; however, due to State budget constraints, funding from the program is currently not available for use for transit purposes.



### **Arizona State Parks Heritage Funds**

Monies are appropriated statewide from this fund to a variety of State Parks projects including trail development. Trail funds are a 50-50 match to locally provided money. When trails are a part of other projects, such as an interpretive center, park development, trailheads, etc., they may be eligible for other Heritage Fund categories. The specific trails fund category of the Arizona Heritage Fund is only available to trails currently listed or nominated to the Arizona State Trails System.

### **Arizona Game and Fish Department Heritage Funds**

The Game and Fish Department provides 100 percent funding grants for projects including habitat creation, interpretive displays, signage, improved access areas for wildlife, and other improvements. The grants do not require agency matches, and are awarded annually through a nomination and approval process similar to that of the Arizona State Parks Heritage Funds.

### **Growing Smarter Planning Grant Program**

The Arizona Department of Commerce offers the Growing Smarter Planning Grant to help small and rural municipalities or counties in developing comprehensive plans that meet State Growing Smarter requirements. Revised comprehensive plan provisions entail greater attention towards multimodal transportation and recreational areas.

### **Vision 21**

The Vision 21 Governor's Transportation Task force was convened in 1999 to develop a longrange multimodal transportation vision for Arizona's transportation future. The mission statement of the Task Force is to evaluate needs and recommend funding strategies to meet those needs for all modes of transportation, including walking and bicycling. The Task Force is not limited to State-only facilities, but is incorporating and planning for all levels including local jurisdiction needs

The Task Force evaluated a large selection of potential funding sources, including increased gas tax, gas tax indexed to inflation, vehicle miles traveled tax, BTU/Energy taxes, motor fuels sales tax, general statewide sales tax surcharge, personal income tax surcharge, property tax increase for transportation, and exactions/developer impact fees. Several of these potential revenue sources can either specifically be designated in part to non-motorized transportation needs including bicycling and walking, or can at least be eligible for spending on these needs. It is the stated intent of the Task Force to comprehensively address multimodal needs, and therefore the Task Force attempted to arrange its revenue package recommendations to include spending on non-motorized forms of transportation. The Vision 21 final report was published in December 2001.

### ***12.3. Regional Revenues***

#### **Maricopa Association of Governments (MAG) Regional Funds**

MAG Regional funds are derived from the current half-cent regional sales tax dedicated primarily to controlled-access roadway improvements in the MAG planning area. A small portion of this funding





source is also utilized for transit purposes. The funding source has a sunset clause for the year 2005, although additional controlled-access roadway improvements will likely be desired well into the future.

Although this source currently is not utilized for pedestrian and bicycle improvements within the MAG region, there is potential to include multimodal provisions including sidewalks, bike lanes, and pathways as eligible facilities if the sales tax is proposed for voter renewal when it expires. As a funding source with specific projects developed under the auspices of MAG, there is reasonably good justification and public support to propose multimodal improvements valley-wide. This source, in fact, should be considered for broader transportation improvements in addition to the freeway system because it is not a user-based fee, yet is paid by all citizens and visitors to the region regardless of the travel mode utilized.

#### *12.4. Local Revenues*

##### **General Funds**

One of the primary local revenue sources of cities, towns, and counties available for use on pedestrian and bicycle-related improvements are general funds resulting from sales taxes, property taxes, and other miscellaneous taxes and fees. There are generally few restrictions on the use of these funds, which are utilized for a large variety of local needs. As such, there is typically high demand for these funds for numerous government services. Design and construction of bikeways and walkways using this funding source usually receives limited support from local governments unless their constituents lobby effectively for such use.

In some cases a component of local general funds can be dedicated to transportation improvements, including pedestrian amenities and bikeways. Some cities have voted to collect a percentage of city sales tax specifically for transportation. Examples include:

- A half-cent sales tax became effective on January 1, 2002, that will fund Glendale's new transportation plan. Some of the projects programmed in the 2003-2012 Capital Improvement Plan utilizing transportation sales taxes include downtown pedestrian circulation enhancements, bike route improvements along 63<sup>rd</sup>, and the citywide shared-use paths system.
- Of the three percent tax on utilities in Peoria, 1.5 percent goes to the Streets fund for street light maintenance and electricity.
- Scottsdale voters approved a 0.2 percent sales tax for use strictly on transportation-related capital projects. This fund will support citywide sidewalk improvements, the bikeways program, and neighborhood traffic calming. This "transportation privilege tax" and interest earnings brought in \$16.2 million for the city in FY 2001.
- The City of Yuma collects a 0.5 percent sales tax ("Road Tax") to fund design, construction, and maintenance to streets and roadways and their rights-of-way.

Counties, too, can choose to collect sales taxes specifically for transportation. The Arizona Department of Revenue collects an additional 0.5 percent transportation excise tax on sales in Pinal and Gila counties. This money may be used for the construction, reconstruction, and repair for a number of



public facilities, including streets, sidewalks, crosswalks, bridges, tunnels, steps, and recreational areas. In FY 2002, Gila County raised \$2.6 million, and Pinal County generated \$6.7 million for transportation projects.

### **Development Impact Fees**

New developments, both residential and commercial, place a strain on existing public facilities, such as parks and streets. Development impact fees are paid by developers to help cover the additional costs resulting from new construction, and these funds may be used for the provision of paved shoulders, bike lanes, and sidewalks built as part of the required roadway cross section. In some circumstances, shared-use paths have been constructed by jurisdictions using impact fees if they serve transportation needs generated by the new development. Examples include the Town of Payson, which collects \$600 for streets on each new residential dwelling unit, and Pima County, which charges \$1,550 for each new home built in the unincorporated areas for roadway improvement projects. Jurisdictions in the MAG region charge up to \$9,000 in impact fees per detached dwelling unit for the provision of parks, roadways, and other public improvements.

### **Parks and Recreation Funds**

Local parks and recreation funds are generally derived from property and sales taxes and some fee revenues. Bathrooms, pocket parks, lighting, landscaping, and pathways are sometimes funded through parks and recreation departments. Maintenance costs for shared-use paths are often incurred by these departments.

### **Flood Control District Funds**

Flood Control District funds can be used to construct shared-use pathways as well as flood control structures, railing, bridges, bank protection, and other devices that can facilitate pathway development. This source has limited availability but should be considered as pathway projects are developed that can be combined with flood control improvements. For instance, flood control maintenance roadways can be designed and constructed to accommodate maintenance vehicles while allowing use by bicyclists and pedestrians as well. New flood control district facilities can be designed to accommodate bicycle and pedestrian use, such as provision of new railing that can meet bike-pedestrian safety guidelines. Pathway undercrossings of major roadways and sidewalks on bridges can be “piggybacked” when any major bridge structure work is conducted or when new bridges are built.

### **Revenue and General Obligation Bonds**

Bonds are usually considered a financing mechanism rather than revenue source, and debt service obligations should receive consideration before this mechanism is pursued. In this discussion revenue and General Obligation (G.O.) bonds are considered as a funding source because when bond packages are presented for voter approval they are often tied to specific facility or program improvements. For instance, a G.O. bond package can be forwarded to voters for citywide sidewalk and lighting improvements or for specific sidewalk, pathway, bicycle lane, or other enhancements that are clearly defined in the legal language of the bond.



In this respect, bonds should be considered a revenue source because identified pedestrian and bicycle projects will be constructed according to truth-in-bonding requirements versus competing with numerous other local demands on general funds. Revenue bonds, such as those repaid through State Highway User Revenue Funds, also can be considered a revenue source because specific projects will be “locked in” and constructed (provided revenue projections and cost estimates bear out as projects are developed).

### **Tribal Casino Revenues**

Casino revenues can and are being used for pedestrian and bicycle facilities, plans, and safety programs. For example, the Pascua Yaqui Nation is currently developing a pedestrian and bicycle plan using these revenues for the nation located on the southwest side of Tucson. A portion of the revenues may be dedicated to implementing the plan as funds become available. These funds may be combined with other funds available to the Indian nations to construct pedestrian and bicycle improvements and implement safety programs, such as specific Federal revenue sources.

### ***12.5. Private Revenues***

Private “revenues” may come in the form of dedications, exactions, monetary contributions, corporate underwriting, donations of right-of-way, and construction of facilities to required standards

It is necessary to recognize the important contribution that private development can make to the bicycle and pedestrian system. A 1999 study of homebuyers by the market research firm American Lives, Inc. found that readily accessible bike and walking paths and natural open spaces were among the highest priorities for homebuyers, even above gated communities and golf courses. Developers who either pay for or construct pathways, or who contribute development impact fees for their construction are making wise investments that will directly benefit their developments and their clients.

Additional private sources include corporate underwriting and individual and non-profit donations. Private corporations have historically provided money for shared-use path projects. These contributions have been in the form of monetary donations, volunteer labor, and sponsorship of projects. Corporate underwriting by companies such as Recreational Equipment Incorporated (REI), Lever Brothers, American Express, Maxwell House, The Phoenician Resort, and Southwest Airlines have provided many dollars, commodities, and hours to the construction and maintenance of shared-use paths. These projects provide good publicity and exposure for the underwriters and highlight shared-use path and park issues.

Local agencies and organizations also can receive grants for facilities and programs that involve education, training, and promotion. Below are examples of grants that are available and programs that have benefited from these awards.

- Prescott Alternative Transportation (PAT) acquired private donations and a grant from the Margaret T. Morris Foundation for their Safe Routes to School program.
- Bikes Belong Coalition awards \$10,000 grants to local organizations, agencies, and citizens for bicycle projects that will be funded by TEA-21. Prescott Alternative Transportation received a grant to leverage funds for the Greenways Trail System, SR 89/SR 69 interchange shared-use path, and Rails-to-Trails Phase II.



- REI employees can nominate local trail projects for REI’s conservation or outdoor recreation grants.
- Arizona State University received a grant to construct a bicycle path at Spence Avenue that was recommended in the Parking and Transit Master Plan.
- The Arizona Bicycle Club received a grant from the Frank Kush Youth Foundation, which presents grants to programs that encourage youth health and physical fitness.
- The Robert Wood Johnson Foundation supports projects that meet one of its four goals, one of which is to promote healthy communities and lifestyles. The Foundation not only funds unsolicited projects directly but also national programs for specific issues. “Active Living by Design” is one of these national programs and it supports planning activities that encourage physical activity through the built environment. Safe Routes to Schools programs, mobility enhancements for people with disabilities, and promotional materials are just some of the many types of walking and bicycling projects supported by the program.
- The Phoenix Children’s Hospital has recently completed an instructional video for beginning drivers that focuses on how to drive safely around bicyclists. The video also includes numerous safety tips for bicyclists. Also, the Hospital, in conjunction with the Safe Kids Coalition of Maricopa County, developed the “Helmet your Brain– Avoid the Pain” program to encourage the use of helmets by children biking, using rollerblades, or riding scooters. The program receives requests from across the nation from groups who wish to purchase the safety training information and start their own programs.

### ***12.6. Recommendations***

It is recommended that future phases of the Bicycle and Pedestrian Program include an emphasis on prioritizing, applying, and politicking for an increased percentage of the funds to be applied to bicycle and pedestrian projects.

The review of funding sources indicates that a large potential exists for funding bicycle and pedestrian facilities and associated programs. As documented in the State of Arizona’s Vision 21 process and the ongoing MoveAZ study, there is currently a high desire among residents statewide for improved transportation services and facilities, including additional bikeways, sidewalks, and shared-use pathways. With the strong public demand for bicycle and pedestrian improvements, implementation of the Arizona Statewide Bicycle and Pedestrian Plan through a combination of these funding sources should be considered desirable and highly feasible.

It is important to realize that the majority of the funding sources described in this section fund projects based on a highly competitive application/selection process. It is anticipated that it will take targeted effort over a significant period of time to increase the percentage of funds that are applied to bicycle and pedestrian improvements. With strong public desire for bicycle and pedestrian facilities and programs, the current lack of adequate facilities and opportunities, the need to improve facilities to meet legal requirements such as the Americans with Disabilities Act, and the need to provide parity in funding to help reduce the disproportionate bicycle and pedestrian fatalities and serious injuries, attaining significant amounts of funding is necessary to meet the objectives of the Arizona Statewide Bicycle and Pedestrian Plan.



**Table 8 – Potential Annual Funding**

Summary of Potential Funding Sources							
Funding Programs	Modes	Trip Types	Project Types (Const., Non-Construction)	Required Matching Funds	Deadlines	Total Available Annual Funding (All Modes)	Contact and Website
<b>FEDERAL FUNDING</b>							
Congestion Mitigation and Air Quality Improvement Program	All	Transportation	Both	5.70%	September	Approx. \$40.9M (2002) /1 (\$31.4M to MAG)	MPOs, <a href="http://www.dot.state.az.us/ABOUT/air/cmaq.htm">www.dot.state.az.us/ABOUT/air/cmaq.htm</a>
Highway Bridge Repair and Replacement (HBRR)	Bike/Ped	Transportation	Construction	20%	See STP	Approx \$13.0 M /2 (\$600,000 max. per project)	<a href="http://www.dot.state.az.us/ABOUT/fms/fndsource.htm">http://www.dot.state.az.us/ABOUT/fms/fndsource.htm</a>
Highway Safety Program	All	Transportation	Non-construction	20%	April 1, annually	Approx. \$12M /2	Governor's Office of Highway Safety <a href="http://www.azgohs.state.az.us/downloadpdf/ProposalGuide.pdf">http://www.azgohs.state.az.us/downloadpdf/ProposalGuide.pdf</a>
National Highway System (NHS)	All	Transportation	Both	20%	See STP	Approx. \$106M /2	<a href="http://www.fhwa.dot.gov/tea21/factsheets/nhs.htm">www.fhwa.dot.gov/tea21/factsheets/nhs.htm</a>
Recreational Trails Program (RTP)	Paths	Recreational	Construction	20%	Currently N/A	Approx. \$1.1M annually /3	Annie McVay, Recreational Trails Coordinator, (602) 542-7116, <a href="http://www.pr.state.az.us/partnerships/grants/grants.html">http://www.pr.state.az.us/partnerships/grants/grants.html</a>
Surface Transportation Program (STP)	All	Transportation	Both	20% for bike and ped projects	Biennial Nov. 1	Approx. \$97.1M statewide /4 (\$350,000 max. per project)	MPOs



Summary of Potential Funding Sources							
Funding Programs	Modes	Trip Types	Project Types (Const., Non-Construction)	Required Matching Funds	Deadlines	Total Available Annual Funding (All Modes)	Contact and Website
Transportation Enhancements Program (TE)	All	Transportation	Both	5.7% (hard cash min.)	Variable	Approx. \$13M annually /2 (\$500,000 max. for local projects, \$1.5M for State projects)	Cheryl Banta, Transportation Enhancements Manager (602) 712-7906 <a href="http://www.dot.state.az.us/ROADS/tea/index.htm">www.dot.state.az.us/ROADS/tea/index.htm</a>
Transit Enhancements Program (Section 5307) pop. >200,000	All	Transportation	Both	20%		Phoenix = \$26.9M Tucson = \$8.9M (2003 est.) /5	<a href="http://www.fta.dot.gov/office/program/2003/5307g.html">http://www.fta.dot.gov/office/program/2003/5307g.html</a>
Transit Enhancements Program (Section 5307) pop. 50,000 – 200,000	All	Transportation	Both	20%		\$1.5M (2003 est.) for Flagstaff and Yuma /6	<a href="http://www.fta.dot.gov/office/program/2003/5307l.html">http://www.fta.dot.gov/office/program/2003/5307l.html</a>
<b>STATE FUNDING</b>							
Arizona Game and Fish Department Heritage Funds	Paths	Recreation	Construction	None	Last working day of November	\$160,000 (Public Access) (\$1,000 min.)	Robyn Beck (602) 789-3530 <a href="http://www.gf.state.az.us/frames/other/h_grant.htm">www.gf.state.az.us/frames/other/h_grant.htm</a>
Arizona State Parks Heritage Funds	Paths	Recreation	Construction	50%	Last working day of February	\$500,000 annually	Robert Baldwin (602) 542-7130 <a href="http://www.pr.state.az.us/partnerships/grants/grants.html">www.pr.state.az.us/partnerships/grants/grants.html</a>
Growing Smarter Planning Grant Program	All	Transportation	Non-construction	50%	October	\$60,000 annually	Marty Lynch, (602) 280-8144, <a href="http://www.commerce.state.az.us/CommunityPlanning/GSGrants.htm">www.commerce.state.az.us/CommunityPlanning/GSGrants.htm</a>
Highway User Revenue Fund (HURF)	Bike/Ped	Transportation	Construction	N/A	N/A	\$536.4 M ADOT (2003)	<a href="http://www.dot.state.az.us/ABOUT/fms/hurflink.htm">www.dot.state.az.us/ABOUT/fms/hurflink.htm</a>



Summary of Potential Funding Sources							
Funding Programs	Modes	Trip Types	Project Types (Const., Non-Construction)	Required Matching Funds	Deadlines	Total Available Annual Funding (All Modes)	Contact and Website
Local Transportation Assistance Fund (LTAF)	All	Transportation (bike/ped improvements directly related to transit)	Construction	N/A	N/A	\$23M (funding currently on hold)	<a href="http://www.dot.state.az.us/ABOUT/fms/fndsorce.htm">http://www.dot.state.az.us/ABOUT/fms/fndsorce.htm</a>
State Sales Tax (Gen. Fund)	All		Construction	N/A	N/A	N/A	N/A
<b>REGIONAL FUNDING</b>							
Maricopa Transportation Excise Tax (1/2 cent sales tax)	Bike/Ped	Transportation	Construction	N/A	N/A	\$267.6M (2002)	<a href="http://www.dot.state.az.us/ABOUT/fms/rarflink.htm">www.dot.state.az.us/ABOUT/fms/rarflink.htm</a>
<b>PRIVATE FUNDING</b>							
Developer Impact Fees	Bike/Ped	Both	Both	N/A	N/A	N/A	Local Jurisdiction
Bikes Belong Coalition	Bicycle	Both	Both	N/A	On-going	Each project not to exceed \$10,000	<a href="http://www.bikesbelong.org">www.bikesbelong.org</a>
American Greenways Kodak Awards	Bike/Ped	Both	Both	N/A	Early June	Each project not to exceed \$2,500	<a href="http://www.conservationfund.org/">www.conservationfund.org/</a>

/1 Source: <http://www.fhwa.dot.gov/legsregs/directives/notices/n4510479/n4510479a15.htm>

/2 Source: <http://www.dot.state.az.us/ABOUT/fms/fndsorce.htm> (FY 2001)

/3 Source: <http://www.fhwa.dot.gov/environment/refunds.htm>

/4 Source: "Revised Sub-Allocation of Fiscal Year 2002 Surface Transportation Program Funds," FHWA <http://www.fhwa.dot.gov/tea21/fy02sup/tbl12pl.htm>

/5 Source: <http://www.fta.dot.gov/office/program/2003/5307g.html>

/6 Source: <http://www.fta.dot.gov/office/program/2003/5307l.html>



## 13. Implementation

Implementation of the Statewide Bicycle and Pedestrian Plan begins with a continuation of the existing policy to accommodate bicycles and pedestrians on construction projects where practical and when adequate funding is available. This includes the application of the guidelines included in this Plan, where practical. The four components of implementation are the accommodation of bicyclists and pedestrians on major roadway projects within the state, the development of bicycle and pedestrian programs, the construction of non-ADOT bicycle facilities and the development of bicycle and pedestrian specific projects.

### *13.1. Accommodation of Bicyclists and Pedestrians on Roadway Projects*

It is recommended that the first priority of implementation be to assure that adequate bicycle and pedestrian facilities are provided as an integral component of all future ADOT projects, with the exception of projects that have no relation to bicyclists or pedestrians. It is recognized that it is 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.

A tracking system that provides 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. In addition to the tracking system, a communication procedure should be developed for discussion and resolution of issues between the State Bicycle and Pedestrian Coordinator and District or Regional Engineers. Issues that will be addressed will include the concerns that are brought to the State Bicycle and Pedestrian Coordinator from others and those generated by the State Bicycle and Pedestrian Coordinator. The procedure will establish the appropriate contact personnel for different types of issues and a standard procedure for ADOT staff to document the issues.

ADOT policies are developed in order to define the roles and responsibilities of ADOT staff and to guide procedures regarding the development of facilities. Implementation of the Plan should include a task to further review the existing policies and the policy revisions included herein for consideration. Additional meetings with Steering Committee members will be needed to come to agreement on the appropriate ADOT policy language such that bicyclists and pedestrians will be better accommodated on ADOT facilities.

It is anticipated that the accommodation of bicyclists and pedestrians on roadway projects will provide a significant impact on the accommodating of pedestrian facilities. Through the coordination within ADOT and the tracking of projects, ADOT and other implementing agencies will be able to work together to enhance pedestrian facilities. In addition, the tracking system is intended to provide bicycle and pedestrian advisory committees, coordinators, and advocates with a mechanism to stay informed of the accommodation of pedestrians and bicyclists on ADOT projects.





### *13.2. Development of Bicycle and Pedestrian Programs*

It is recommended that the Statewide Bicycle and Pedestrian Plan Steering Committee continue to meet on a regular basis to monitor and discuss implementation of this Plan and to further facilitate information sharing throughout the State regarding bicycle and pedestrian issues. It is recommended that all communities within Arizona have Bicycle and Pedestrian Advisory Committees. It is also recommended that implementing agencies within Arizona have at least one full time Bicycle and/or Pedestrian Coordinator. Due to the responsibilities of ADOT to regulate roadways throughout the state, including coordination with jurisdictions throughout the state, it is recommended that ADOT have the current Bicycle and Pedestrian Coordinator position solely dedicated to bicycle and pedestrian projects. In addition, it is recommended that an ADOT Bicycle and Pedestrian Coordinator's Assistant Position be developed. This staffing level currently exists at the Nevada Department of Transportation and is typical for numerous Departments of Transportation.

The continuation of the Statewide Bicycle and Pedestrian Steering Committee and the establishment of additional Bicycle and Pedestrian Advisory Committees and Coordinators will play a significant role in the advancement of bicycling and walking in Arizona. Education is a key component of bicycle and pedestrian safety and advocacy. It is recommended that ADOT seek \$400,000 in Transportation Enhancement funds in the Summer 2003 for a Statewide Education Program. A secondary funding source, the Highway Safety Program, is available with an annual submittal deadline of April. This education program could disseminate information statewide regarding the main issues about safety for bicyclists and pedestrians, emphasizing the importance of compliance with existing laws. In addition, this effort will further the coordination between agencies statewide on working together to develop a consistent message.

A program should be developed for ADOT to provide data, data analysis, information in regard to available resources, tools, standards, and/or guidance on bicycle and pedestrian safety issues to assist agencies statewide on education. Local governments, school districts, and civic groups need to continue and expand sessions on traffic safety, including adult courses such as the Bicycle Ed Program of the League of American Bicyclists. A program also should be developed for ADOT to provide important instructional and informational brochures and safety literature, including guides that will expand knowledge of laws implementing the safe operation of bicycles and motor vehicles.

A number of recommendations are listed below that ADOT and agencies around the State could implement to improve bicycling and walking:

- Provide planning and design training of bicycle and pedestrian accommodations to other ADOT staff, MPOs, and city staff;
- Assist in the development of state, regional, and local bicycle maps;
- Develop basic pedestrian and bicycle education programs for communities and schools;
- 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;
- Continue to consider additions to driver's education products that emphasize safe motorist driving when encountering bicyclists and pedestrians on the road;
- Assist in promoting bike-to-work days and safe routes to school programs; and
- Promote the link between land use and transportation by encouraging smart growth initiatives.



### ***13.3. Construction of Non-ADOT Bicycle Facilities***

The combination of non-ADOT bicycle and pedestrian facilities with the ADOT State Highway System creates a network that complements itself. The network has bikeways on highways that connect the communities and then bikeways on urban arterials within the communities. Evaluating **Exhibit 6**, which is shown in **Section 6**, it is apparent that there are certain gaps between the State Highway System and between neighboring jurisdictions.

It is recommended that ADOT coordinate with MAG, The Central Arizona Association of Governments (CAAG), and additional relevant implementing agencies to provide a bicycle route into Phoenix that connects SR 88 and SR 79 to the east of Phoenix with other non-ADOT bicycle facilities. Due to the importance of having alternative routes to the State Highway System within the larger communities, it is recommended that the relevant implementing agencies in the Tucson Metropolitan Area and the Flagstaff area put a high priority on implementing the regionally significant proposed bicycle facilities shown in **Exhibit 6**. Lastly, bicycle route continuity between adjacent local jurisdictions should be improved. Many bicycle routes are on alternating roadways at the boundary between the City of Mesa and the City of Chandler and there is not a bicycle connection between the Cities of Tempe and Phoenix. It is recommended that the two adjacent agencies work together to provide bicycle route connectivity across city boundaries. Connectivity of bicycle facilities is provided in the cities and towns outside of the metropolitan areas of Arizona by the State Highway System.

### ***13.4. Bicycle and Pedestrian Specific Projects***

The following three types of projects were evaluated for Bicycle and Pedestrian Specific Projects:

- Shared-use paths;
- Retrofit of through roadway cattle guards that have gaps greater than one quarter-inch by four inches parallel to the direction of travel; and
- Widening of shoulders that have an effective width of two feet or less.

#### **Shared-Use Paths**

The ADOT Bicycle Policy specifies ADOT to:

- 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.

ADOT should work with other implementing agencies to obtain funding from any of the various funding sources to construct shared-use paths within ADOT right-of-way when it is consistent with the adopted plan of an implementing agency. These shared-use paths within ADOT right-of-way are typically going to be of three types. The first type is a crossing of an ADOT State Highway by a shared-use path traveling perpendicular to the State Highway and the second is a 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 onstreet



bicycle facility and sidewalk adjacent to the interchange. An example of this is the SR 89/SR 69 interchange in Prescott which is currently scheduled to be funded through a Transportation Enhancement Grant. It is anticipated that future shared-use path projects are going to be an add-on to ADOT construction projects and/or driven by local/regional jurisdictional direction. The third type of project is a shared-use path that is parallel to the highway. An example of this is a potential shared-use path along the flood control channel on the north side of US 60 in the Cities of Mesa and Tempe. Shared-use paths that parallel a roadway must include special attention to the intersection treatments to address safety considerations. It is recommended that another implementing agency take the lead on shared-use path design with ADOT to provide support and cooperation.

Shared-use path design and construction is estimated at \$600,000 per mile for a typical path with landscaping and approximately one million dollars for a bridge structure with approach ramps; however, a prefabricated bridge that does not require approach ramps can cost as little as \$200,000. All cost estimates within this plan are typical costs and the actual cost may vary significantly throughout the state.

### **Cattle Guard Retrofit**

It is recommended that ADOT develop a program to systematically retrofit through roadway cattle guards as appropriate along State Highways open to bicycle travel that have gaps greater than one quarter-inch by four inch parallel to the direction of bicycle travel. Because cattle guards with gaps that can trap a bicycle tire can be a liability and it is estimated that cattle guards can be retrofitted for approximately \$1,000 per location, it is recommended that this program be given a high priority. An annual program should be initiated to retrofit cattle guards that meet the criteria above. It is recommended that \$200,000 be attained from Hazard Elimination funds for the first year.

### **Shoulder Widening**

Shoulder widening for segments that have an effective width of two feet or less includes narrow shoulders, shoulders with wide rumble strips reducing the effective width and narrow bridges. The desire is to widen shoulders to a width of six to ten feet, based on the width specified in the ADOT Roadway Design Guideline 302.4. Based on a desire to improve bicycling conditions along a long corridor for a limited cost, segments with the following criteria were selected as the highest priority (see **Section 5** for a description of the Bicycling Conditions Score and the Relative cost):

- Relative cost of minor or moderate expense;
- A Bicycling Conditions score of 17 or less; and
- Right shoulder width less than or equal to two feet.



The result of this implementation ranking is shown in **Exhibits 9** and **9B**. Priority is being placed on those facilities that can be implemented at a minor or moderate expense and that are adjacent to an urban area. It is recognized that there is greater demand for bicycling in and adjacent to the urban areas and there will be more benefit from the proposed improvements. It is recommended that funding be designated in locations where an improvement over a short distance can improve conditions along a corridor that typically has suitable conditions. The following is a list of projects recommended for shoulder widening (listed in alphabetical order):

- B-19 from MP 63 (Ajo Way) to MP 64 (I-10);
- B-40 from MP 196 to MP 200(US 180/SR 89 Junction);
- SR 77 from MP 69 (Glenn) to MP 72 (MP 72 to 75 programmed);
- SR 86 from MP 170 (La Cholla) to MP 173 (B-19);
- SR 87 from MilePost (MP) 177 to MP 178 (McKellips);
- SR 87 from MP 202 to MP 204;
- SR 87 from MP 194 to MP 198;
- SR 89/SR 69 Junction (programmed);
- SR 95 from MP 24 to MP 25;
- US 89 from MP 419 (B-40) to MP 421; and
- US 180 from MP 216 (B-40) to MP 219.

The above listing of route sections is a short list of potential shoulder widening projects. A budgetary cost for a six-foot wide shoulder widening along flat terrain is estimated at \$600,000 per mile for both sides of the highway; however, the cost of widening shoulders will vary significantly based on the existing pavement section that is to be matched and the terrain of the adjacent land. The recommended action is for there to be further evaluation on the corridors listed to determine more detailed information on the feasibility and cost estimate of widening the shoulder on the above listed roadways.

Only the bridges with a shoulder width less than or equal to three feet and within one of the corridors listed above are recommended to be improved. These bridges are recommended to be further evaluated for widening based on their location along a State Highway that otherwise has rideable shoulders. A budgetary cost of widening both sides of a bridge five feet is \$500,000 per 200 feet of length. The option of widening only one side of the bridge also should be evaluated. As stated above for shoulder widening, the cost of widening a bridge will vary significantly based on the existing bridge type and the adjacent terrain. For shorter bridge lengths, a new prefabricated bridge may be less expensive than widening the bridge and can often cost less than \$200,000. The recommended action is for there to be further evaluation on bridges listed to determine more detailed information on the feasibility and cost estimate of widening the bridges listed above.

Definitive information on the location of rumble strips which could be ground out and replaced with a rumble strip that at a minimum meets ADOT current rumble strip policy. As more data becomes available, ADOT should consider grinding and reinstalling rumble strips that meet the new standard.



### ***13.5. ADOT Bicycle and Pedestrian Plan Phase II and III***

Implementation of the Arizona Statewide Bicycle and Pedestrian Plan will build upon the momentum established during the development of the Bicycle and Pedestrian Plan. ADOT is committed to the continued effort to improve bicycling and walking statewide.

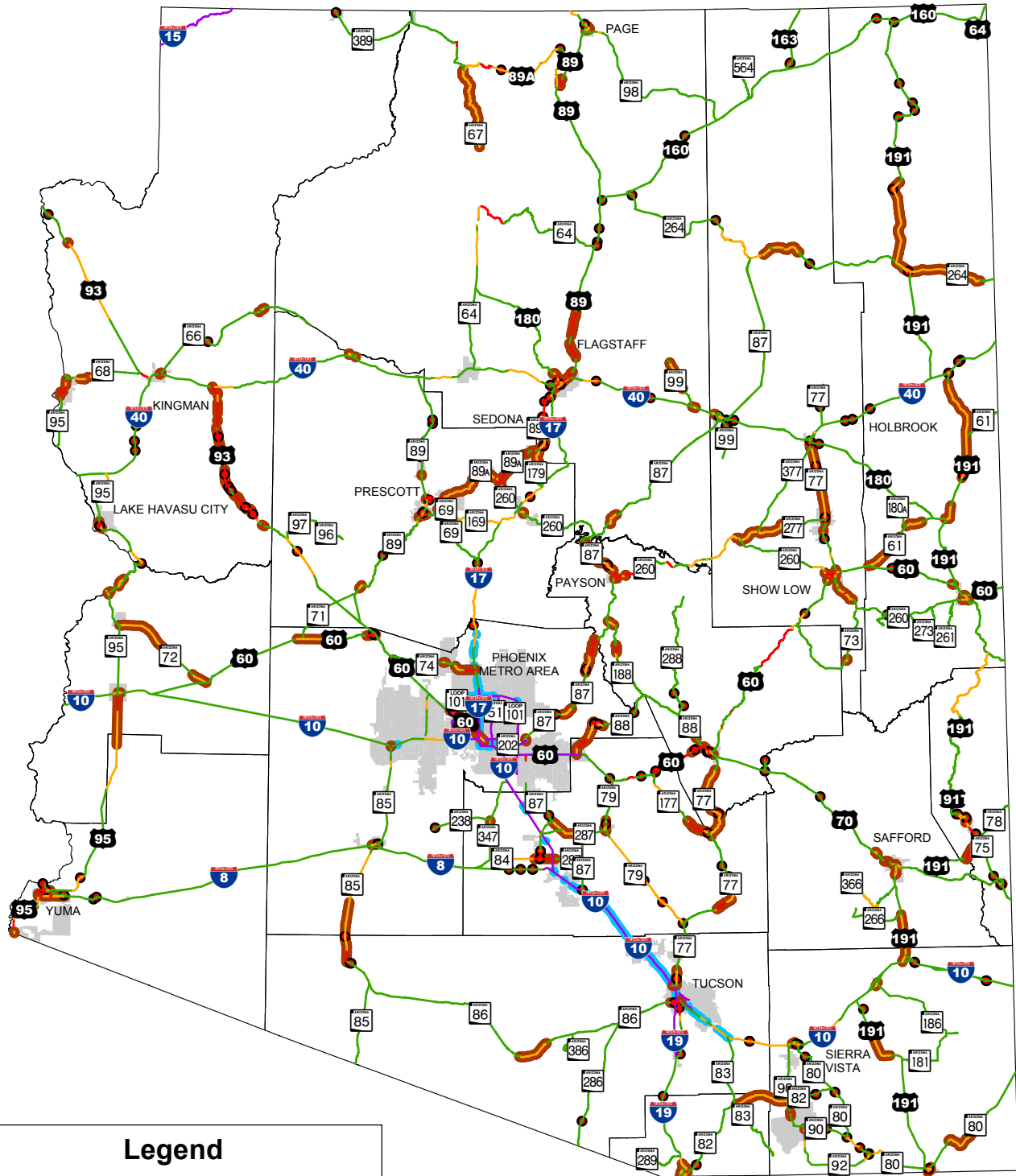
The Phase II and III tasks will begin to implement the recommendations of the Plan and will include the continued coordination with a Statewide Bicycle and Pedestrian Committee. The following implementation recommendations are some of the tasks that may be included in Phases II and III:

- Develop and Distribute a Bicycle User Map;
- Develop a Statewide Bicycle and Pedestrian Education Program;
- Develop and Print a Statewide “Share the Road” Guide for Bicyclists, Pedestrians and Motorists;
- Develop Grant and Funding Plans;
- Develop Bicycle and Pedestrian Facility Action Plans;
- Create a Maintenance and Facility Request System;
- Facilitate an Update of ADOT Bicycle and Pedestrian Policy;
- Develop a Statewide Bicycle and Pedestrian Committee;
- Pursue Statewide Training Opportunities;
- Create a Rural Specific Design Guideline; and
- Create a Pedestrian Focused Action Plan.



# ARIZONA STATEWIDE BICYCLE AND PEDESTRIAN PLAN

## EXHIBIT 9: HIGH PRIORITY IMPLEMENTATION CORRIDORS



**Legend**

- Criteria Score  $\leq 12$
- Criteria Score = 13-17
- Criteria Score  $\geq 18$
- Bicycles Prohibited
- Implementation Corridors
- Interstate Frontage Roads
- Bridge Shoulder Width  $\leq 3$  ft

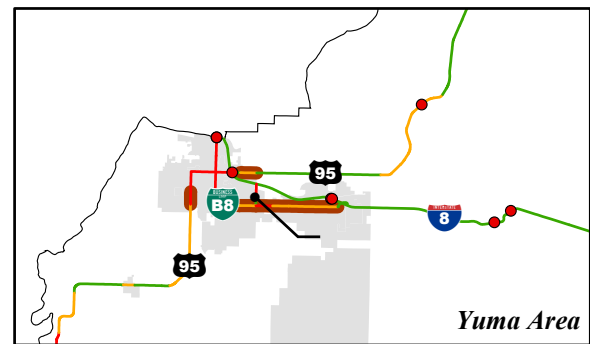
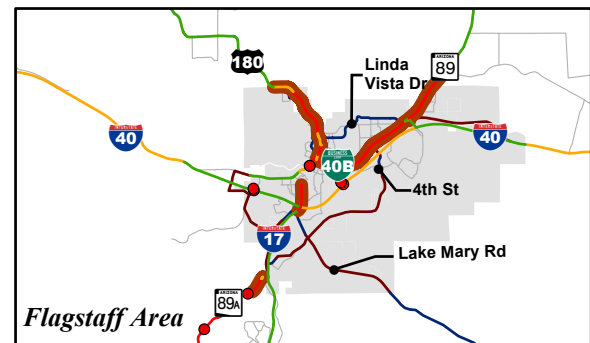
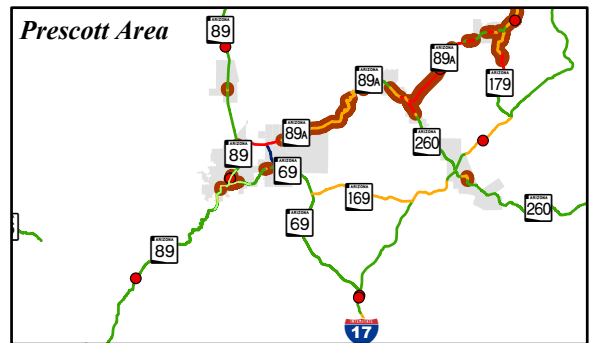
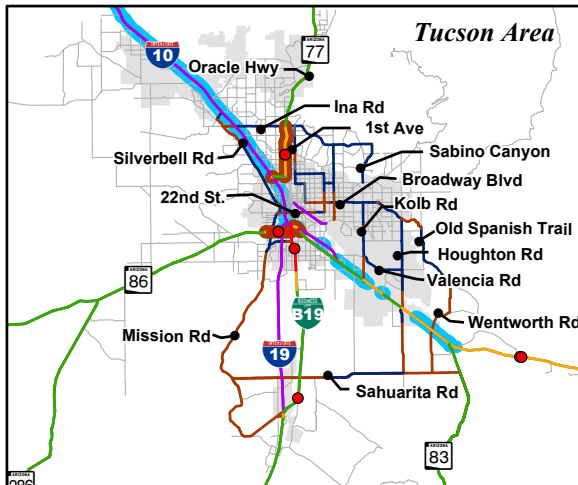
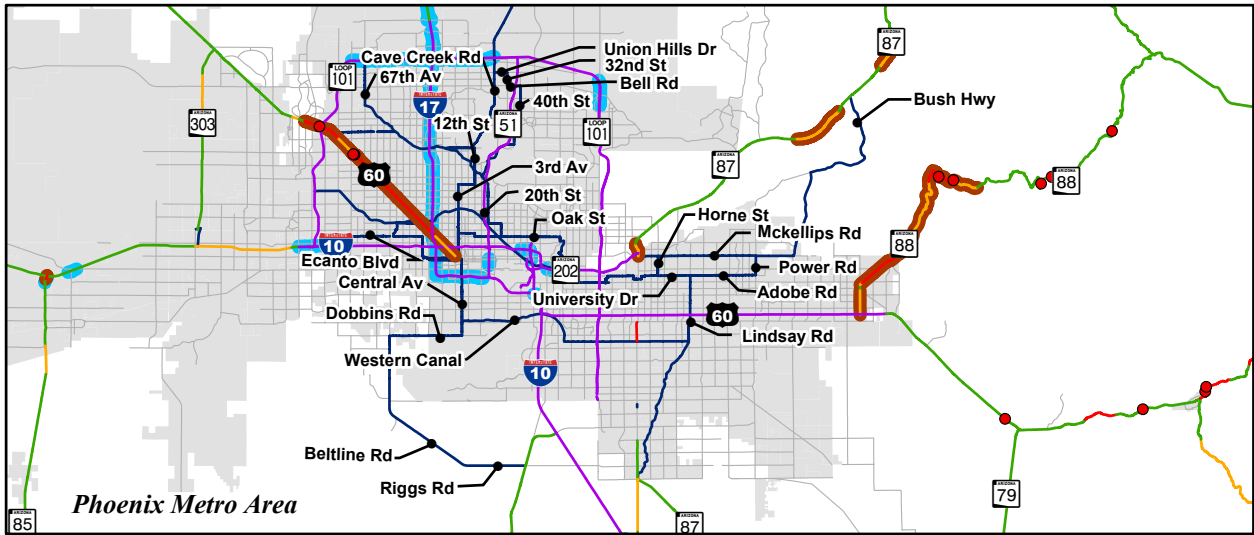
- Implementation Corridors meet the following conditions:
1. Widening feasibility = Minor Expense or Moderate Expense
  2. Right Shoulder Width  $\leq 2$  ft
  3. Criteria Score = 0 to 17





# ARIZONA STATEWIDE BICYCLE AND PEDESTRIAN PLAN

## EXHIBIT 9B: HIGH PRIORITY IMPLEMENTATION CORRIDORS (LOCAL AREAS)



**Local Area Bicycle Route Data provided by:**

- Maricopa Association of Governments
- City of Flagstaff
- Town of Prescott Valley
- Pima Association of Governments

### Legend

- Criteria Score  $\leq 12$
- Criteria Score = 13-17
- Criteria Score  $\geq 18$
- Bicycles Prohibited
- Existing Non-ADOT Bicycle Routes
- Planned Non-ADOT Bicycle Routes
- Implementation Corridors
- Bridge with Shoulder Width  $\leq 3$



Implementation Corridors meet the following conditions:

1. Widening feasibility = Minor Expense or Moderate Expense
2. Right Shoulder Width  $\leq 2$  ft
3. Criteria Score = 0 to 17



## Appendix A – User Surveys





## Bicycle User Survey State of Arizona

The Arizona Department of Transportation is developing a Bicycle and Pedestrian Plan for the state highway system in Arizona. The intent of this survey is to learn more about people's preferences for bicycle riding in Arizona. Please take a few minutes to complete the following questions:

### Bicycle Questions:

1. Do you ride a bike? Yes \_\_\_\_ No \_\_\_\_ *If no, skip to Question 6.*
2. Where do you like to ride your bike? (Please rank the items in order of preference - 1 is most preferred, 4 is least preferred):  
Off-street shared use paths \_\_\_\_ On-street bike lanes \_\_\_\_ Roadways without bicycle lanes \_\_\_\_  
Residential Roadways \_\_\_\_ Other \_\_\_\_\_
3. How often do you ride a bike?  
1x per day or more \_\_\_\_ 1 - 6x per week \_\_\_\_ 1-3x per month \_\_\_\_ Very rarely \_\_\_\_ Never \_\_\_\_
4. Why do you ride a bike? (Please rank the reasons why you ride your bike: 1 is most often, 5 or 6 are least often)  
Work \_\_\_\_ School \_\_\_\_ Errands \_\_\_\_ Social \_\_\_\_ Recreation/exercise \_\_\_\_ Other (specify) \_\_\_\_\_
5. How far do you ride your bike on average?  
0-5 miles \_\_\_\_ 6-10 miles \_\_\_\_ 11 or more miles \_\_\_\_
6. Why don't you ride a bike more often? (Please rank the reasons why you don't ride your bike more often: 1 is most important, 7 is least important)  
Concerns about safety \_\_\_\_ No bike paths or bike routes to ride on \_\_\_\_ No bicycle parking areas \_\_\_\_  
Weather/darkness \_\_\_\_ Destination too far \_\_\_\_ Need access to car \_\_\_\_ No change/shower facilities \_\_\_\_  
Other \_\_\_\_\_
7. Which state highways do you bike on most often? A map of Arizona is provided to help you identify state roadways. What are the biggest problems for bicycling at these locations (dangerous intersections, no marked bicycle lanes or routes, no bicycle parking, poor pavement or shoulder condition, aggressive motorists, too many cars, cars going too fast, too many trucks, etc.)  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Thank You!**

### Voluntary Information

Name: \_\_\_\_\_  
Address: \_\_\_\_\_ City \_\_\_\_\_ Zip \_\_\_\_\_  
Email \_\_\_\_\_  Yes, Send me updates on the planning effort  
Date Completed: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: M\_\_ F\_\_ Own a car:  Yes  No

Please return surveys no later than December 4, 2002 to Mike Colety by faxing to 602-944-7423, e-mailing to [mike.colety@kimley-horn.com](mailto:mike.colety@kimley-horn.com) or mailing to Kimley-Horn, 7600 N. 15<sup>th</sup> Street, Suite 250, Phoenix, AZ 85020. Surveys can be downloaded at [www.azbikeped.org](http://www.azbikeped.org).



## Pedestrian Survey State of Arizona

The Arizona Department of Transportation is developing a Bicycle and Pedestrian Plan for the state highway system in Arizona. The intent of this survey is to learn more about residents' walking preferences. Please take a few minutes to complete the following questions:

### Pedestrian Questions:

1. How often do you walk to or from work, school, errands, for recreation or exercise, during lunch, or to go to a business or social activity? (Please count each round-trip as one trip.)

1x per day or more \_\_\_\_\_ 1 - 6x per week \_\_\_\_\_ 1-3x per month \_\_\_\_\_ Very rarely \_\_\_\_\_

2. Why do you walk? (Please rank the reasons why you walk: 1 is most often, 5 or 6 are least often)

Work \_\_\_\_\_ School \_\_\_\_\_ Errands \_\_\_\_\_ Social \_\_\_\_\_ Recreation/exercise \_\_\_\_\_ Other \_\_\_\_\_

3. About how far do you walk on an average walk trip? (Check all that apply)

Several Blocks or Less (1/4 mile or less) \_\_\_\_\_ 1/4 to 1-mile \_\_\_\_\_ 1-2 miles \_\_\_\_\_ over 2 miles \_\_\_\_\_

4. How far do you live from work or school?

0-1 mile \_\_\_\_\_ 1-2 miles \_\_\_\_\_ 2-5 miles \_\_\_\_\_ 6-10 miles \_\_\_\_\_ 11 or more miles \_\_\_\_\_

5. Describe the reason you don't walk or walk more often to get to your destinations: (Mark 1 as most important, 2...)

Concerns about safety \_\_\_\_\_ Lack of walkways (e.g. sidewalks/multi-use paths) to walk on \_\_\_\_\_

Weather/darkness \_\_\_\_\_ Need access to car \_\_\_\_\_ Destination is too far \_\_\_\_\_

Other \_\_\_\_\_

6. Please identify the five biggest problems for walking, such as dangerous intersections, stretches of road without sidewalks, etc. A map of Arizona is provided to help identify particular state roadways.

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

**Thank You!**

### Voluntary Information

Name: \_\_\_\_\_

Address: \_\_\_\_\_ City \_\_\_\_\_ Zip \_\_\_\_\_

Email \_\_\_\_\_  Yes, Send me updates on the planning effort

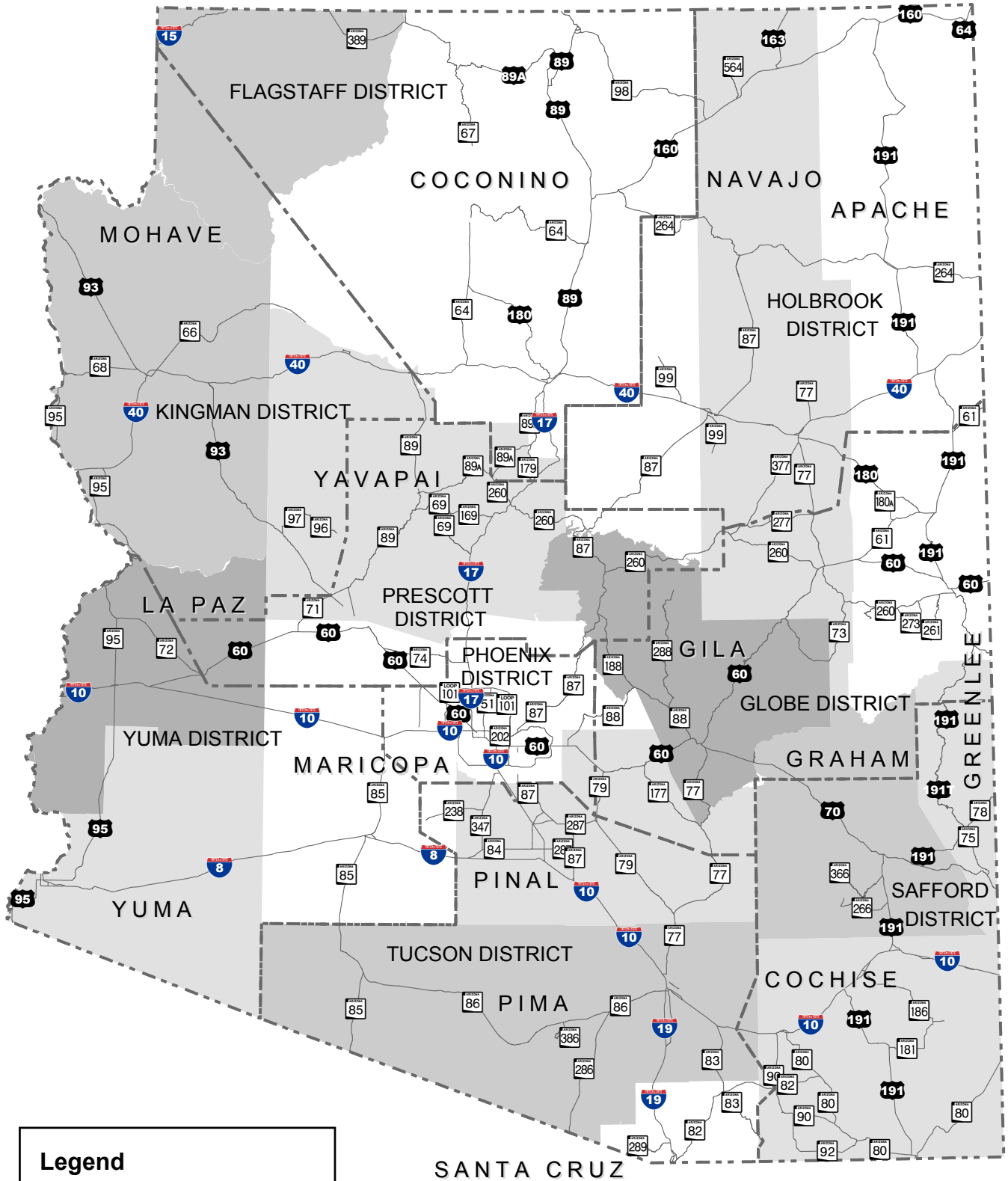
Date Completed: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: M\_\_ F\_\_

Please return surveys no later than December 4, 2002 to Mike Colety by faxing to 602-944-7423, e-mailing to [mike.colety@kimley-horn.com](mailto:mike.colety@kimley-horn.com) or mailing to Kimley-Horn, 7600 N. 15<sup>th</sup> Street, Suite 250, Phoenix, AZ 85020. Surveys can be downloaded at [www.azbikeped.org](http://www.azbikeped.org).



# ARIZONA STATEWIDE BICYCLE AND PEDESTRIAN PLAN

## SURVEY MAP A: STATE OF ARIZONA



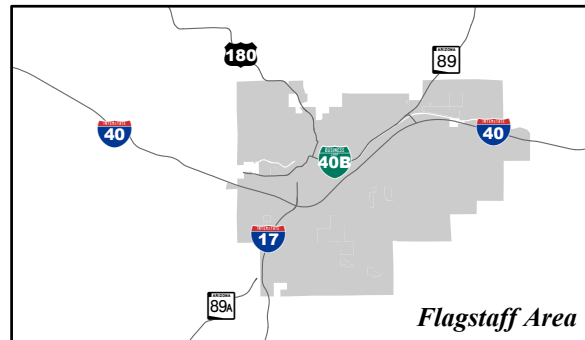
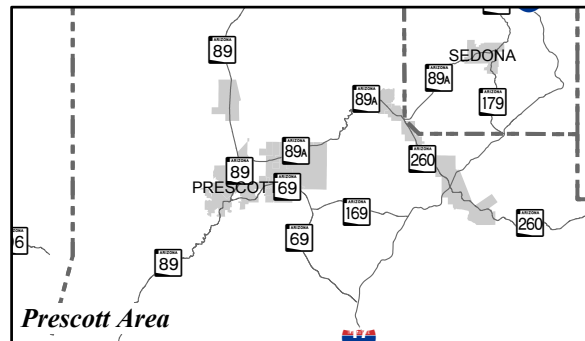
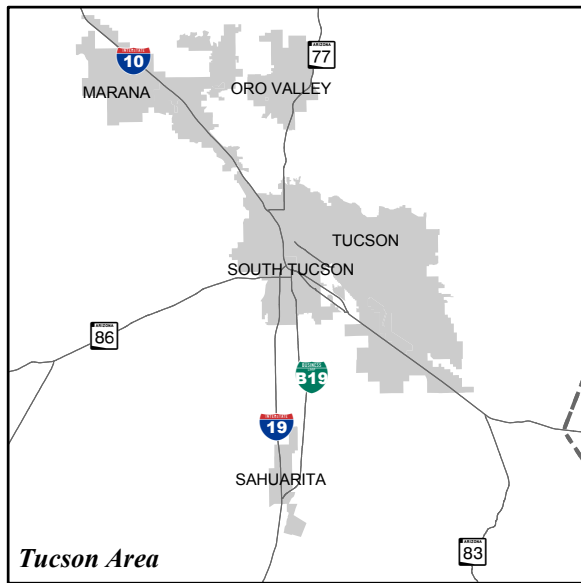
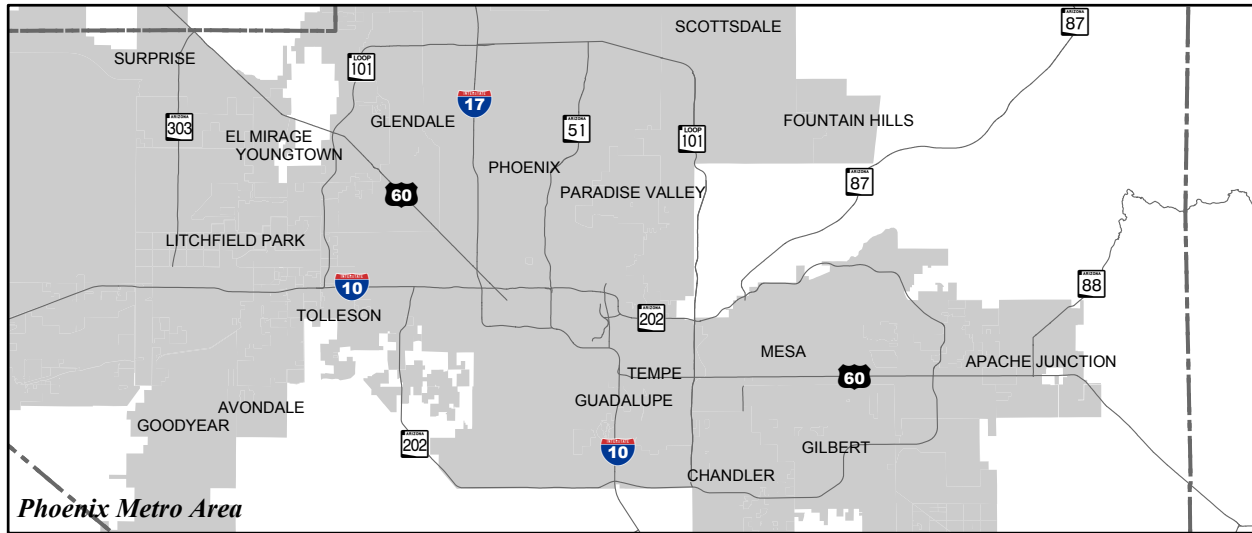
**Legend**

ADOT District Boundaries



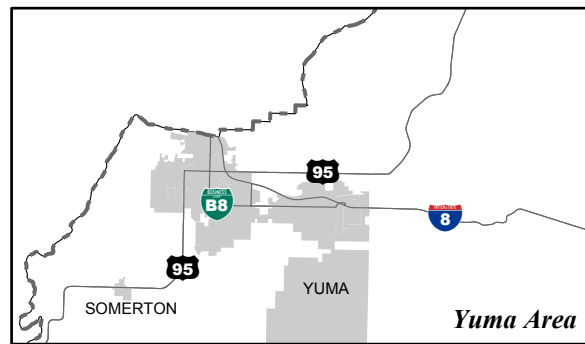
# ARIZONA STATEWIDE BICYCLE AND PEDESTRIAN PLAN

## SURVEY MAP B: LOCAL AREAS



**Legend**

- ADOT District Boundaries
- City Boundaries





## **Appendix B –Existing ADOT Data Parameters**



## HPMS by Item Number

### All records

- 1 Year of Submittal
- 2 State Code
- 3 English or Metric Reporting Units
- 4 County Code
- 5 Section Identification (ID)
- 6 Sample Panel? (yes/no)
- 7 Donut Panel? (yes/no)
- 8 State Control Field
- 9 Grouped Record? (yes/no)
- 10 LRS Identification
  
- 11 LRS Beginning Milepoint
- 12 LRS Ending Milepoint
- 13 Rural/Urban Designation
- 14 Urbanized Area Sampling Technique
- 15 Urbanized Area Code
- 16 NAAQS Nonattainment Area Code
- 17 Functional System Code
- 18 Generated Functional System Code
- 19 National Highway System
- 20 Planned Unbuilt Facility
  
- 21 Official Interstate Route Number
- 22 Route Signing
- 23 Route Signing Qualifier
- 24 Signed Route Number
- 25 Governmental Ownership
- 26 Special (funding) Systems
- 27 Type of Facility
- 28 Designated Truck Route/Parkway
- 29 Toll
- 30 Section Length
  
- 31 Donut area Sample Panel AADT Volume Group ID
- 32 Standard Sample Panel AADT Volume Group ID
- 33 AADT (value)
- 34 Number of Through Lanes
- 35 Measured Pavement Roughness
- 36 Pavement Condition
- 37 HOV Operations? (yes/no)
- 38 Surveillance by Real-time Electronics? (yes/no)
- 39 Ramp Metering? (yes/no)
- 40 Variable Message Signing? (yes/no)
  
- 41 Highway Advisory Radio? (yes/no)
- 42 Surveillance by Video? (yes/no)
- 43 Incident Management System?(yes/no)
- 44 Non-911 Cell Number Available? (yes/no)
- 45 Motorist Service Patrol? (yes/no)
- 46 In Vehicle Signing? (yes/no)

### Sample Panels Only

- 47 Sample Number
- 48 Donut Area Sample Expansion Factor
- 49 Standard Sample Expansion Factor
- 50 Surface/Pavement Type
  
- 51 SN or D (of pavement)
- 52 General Climate Zone
- 53 Year of Surface Improvement
- 54 Lane Width
- 55 Access Control
- 56 Median Type
- 57 Median Width
- 58 Shoulder Type
- 59 Shoulder Width – right
- 60 Shoulder Width – left
  
- 61 Peak Parking
- 62 Is Widening Feasible?
- 63-68 Curves by Class
- 69 Horizontal Alignment Adequacy
- 70 Type of Terrain
  
- 71 Vertical Alignment Adequacy
- 72-77 Grades by Class
- 78 Percent Passing Sight Distance
- 79 Weighted Design Speed
- 80 Speed Limit
  
- 81 Percent Single Unit Trucks (peak daily)
- 82 Percent Single Unit Trucks (avg daily)
- 83 Percent Combination Unit Trucks (peak daily)
- 84 Percent Combination Unit Trucks (avg daily)
- 85 K Factor
- 86 Directional Factor
- 87 Peak Lanes
- 88 Turning Lanes/Bays, Left
- 89 Turning Lanes/Bays, Right
- 90 Prevailing Type of Signalization
  
- 91 Typical Peak Percent Green Time
- 92 Signals, at-grade intersections controlled by
- 93 Stop Signs, at-grade intersections controlled by
- 94 Other or No Controls, at-grade intersections controlled by
- 95 Peak Capacity
- 96 Volume/Service Flow (V/SF) Ratio
- 97 Future AADT
- 98 Year of Future AADT



## Data Description for Bicycle/Pedestrian Related Parameters in HPMS

COLUMN NAME	HPMS DATA # (if applicable) or column heading from which entries are calculated	DATA DESCRIPTION
Street Name	NAME	The roadway name.
Mile Post	MP	The milepost of beginning point of the roadway section.
Section Length	Item 30 – Section Length (LENGTH)	This is the section length, in miles, as measured along the centerline of the roadway. On independently aligned, divided highways, centerline length may be reported as the average of the lengths of the directional roadways, measured along their centerlines.
From	SWTERM / SWO	<p>The data in the FROM column was derived from the SOUTHWEST TERMINATOR and SOUTHWEST OFFSET of the HPMS data. This information aids in the identification of the beginning point of the roadway section. The features identified are generally a town or city boundary, state border, milepost, a federal agency jurisdictional boundary, or a place such as a traffic interchange.</p> <p>The SWO (southwest offset) provides the distance, in miles, from the beginning point of the roadway section to the stated SWTERM feature.</p>
To	NWTERM / NWO	<p>The data in the TO column was derived from the NWTERM (Northwest Terminator) and NOW (Northwest Offset) of the HPMS data. This information aids in the identification of the ending point of the roadway section. The features identified are generally a town or city boundary, state border, milepost, a federal agency jurisdictional boundary, or a place such as a traffic interchange.</p> <p>The NWO (Northwest offset) provides the distance, in miles, from the ending point of the roadway section to the stated NWTERM feature.</p>



COLUMN NAME	HPMS DATA # (if applicable) or column heading from which entries are calculated	DATA DESCRIPTION
Functional Type	Item 17 – Functional System Code (FUNCCODE)	<p>This communicates the functional classification of the roadway. <i>Definitions of the highway functional systems can be found in Highway Functional Classification, Concepts, Criteria, and Procedures, FHWA, March 1989.</i> The data was originally reported numerically as shown in parentheses, and is presented as:.</p> <p><b>RURAL -</b>            (2): Principal Arterial – Other: <b>Rural Arterial</b>            (6): Minor Arterial: <b>Minor Arterial</b>            (7): Major Collector: <b>Rural Major Collector</b>            (8): Minor Collector: <b>Rural Minor Collector</b>            (9): Local: <b>Rural Local</b></p> <p><b>URBAN -</b>            (11) Principal Arterial – Interstate is <b>Urban Interstate</b>            (12) Principal Arterial – Other Freeways &amp; Expressways: <b>Urban Freeway</b>            (14): Principal Arterial – Other: <b>Urban Arterial</b>            (16): Minor Arterial: <b>Urban Minor Arterial</b>            (17) –Minor Collector: <b>Urban Collector</b>            (19)– Local: <b>Urban Local</b></p>
Designated Truck Route	Item 28 – Designated Truck Route (TRUCKWAY)	This data identifies whether a section is on or off a truck route designated under Federal regulatory authority. The data is either YES, or NO. YES means that the route is part of a designated truck route under Federal authority in 23 CFR 658. NO means that the truck is not on a designated truck route.
AADT	Item 33 – Annual Average Daily Traffic (AADT)	For two-way facilities, this is the AADT for both directions, and the directional AADT if part of a one-way couplet or for a one-way street.
# Lanes	Item 34 – Number of Through Lanes	This is the number of through lanes, according to striping, if present, on multi-lane facilities, or according to traffic if no striping or only centerline striping is present.





COLUMN NAME	HPMS DATA # (if applicable) or column heading from which entries are calculated	DATA DESCRIPTION
Pavement Condition	Item 36 – Present Serviceability Rating (PSR)	<p>This item provides information on pavement condition on the selected roadway sections. This data was originally reported on a scale of 0.0 to 5.0. The following is summary of each PSR rating, with the numerical classification in parentheses:</p> <p><b>New or Nearly New:</b> (4.0 to 5.0) Only new (or nearly new) superior pavements are likely to be smooth enough and distress free (sufficiently free of cracks and patches) to qualify for this category. Most pavements constructed or resurfaced during the data year would normally be rated in this category. .</p> <p><b>Little Deterioration:</b> (3.0 to 4.0) Pavements in this category, although not quite as smooth as those described above, give a first class ride and exhibit few, if any, visible signs of surface deterioration. Flexible pavements may be beginning to show evidence of rutting and fine random cracks. Rigid pavements may be beginning to show evidence of slight surface deterioration, such as minor cracks and spalling.</p> <p><b>Noticeably Inferior:</b> (2.0 - 3.0) The riding qualities of pavements in this category are noticeably inferior to those of new pavements, and may be barely tolerable for high-speed traffic. Surface defects of flexible pavements may include rutting, map cracking, and extensive patching. Rigid pavements in this group may have a few joint failures, faulting and/or cracking, and some pumping.</p> <p><b>Deteriorated:</b> (1.0 - 2.0) Pavements in this category have deteriorated to such an extent that they affect the speed of free-flow traffic. Flexible pavement may have large potholes and deep cracks. Distress includes raveling, cracking, rutting and occurs over 50 percent of the surface. Rigid pavement distress includes joint spalling, patching, cracking, scaling, and may include pumping and faulting.</p>



COLUMN NAME	HPMS DATA # (if applicable) or column heading from which entries are calculated	DATA DESCRIPTION
Pavement Condition (continued)	Item 36 – Present Serviceability Rating (PSR) (continued)	<p><b>Extremely Deteriorated:</b> (0.0 - 1.0) Pavements in this category are in an extremely deteriorated condition. The facility is passable only at reduced speeds, and with considerable ride discomfort. Large potholes and deep cracks exist. Distress occurs over 75 percent or more of the surface.</p>
Surface Pavement Type	Item 50 – Surface/Pavement Type (SURFACE)	<p>This item details the type of pavement surface on the roadway section. The pavement types were originally represented numerically as shown in parentheses:</p> <p><b>Unpaved:</b> (1) Road is unpaved.</p> <p><b>Low Type:</b> (2) Low type bituminous surface-treated—a bituminous surface course with or without a seal coat, the total compacted thickness of which is less than 25 millimeters (1 inch). Seal coats include those known as chip seals, drag seals, plant-mix seals, and rock asphalt seals.</p> <p><b>Intermediate Type:</b> (3) Intermediate type mixed bituminous or bituminous penetration surface—a surface course 25 millimeters (1 inch) or greater and less than 178 millimeters (7 inches) in compacted thickness com-posed of gravel, stone, sand or similar material, and mixed with bituminous material under partial control as to grading and proportions or bound with bituminous penetration material.</p> <p><b>High Type Flexible:</b> (4) High type flexible—mixed bituminous or bituminous penetration road on a flexible base with a combined surface and base thickness of 178 millimeters (7 inches) or more. Includes any bituminous concrete, sheet asphalt, or rock asphalt having a high load-bearing capacity. Includes any brick, stone, wood, or steel block pavement with or without a wearing surface of less than 25 millimeters (1 inch).</p>



COLUMN NAME	HPMS DATA # (if applicable) or column heading from which entries are calculated	DATA DESCRIPTION
Surface Pavement Type (continued)	Item 50 – Surface/Pavement Type (SURFACE) (continued)	<p><b>High type rigid:</b> (5) Portland cement concrete (PCC) pavement with or without joints; with or with-out mesh or similar reinforcement. Includes continuously reinforced PCC pavement, PCC pavement over a PCC pavement, bonded, unbonded, or partially bonded, and PCC pavement over a bituminous pavement, either mixed or penetration.</p> <p><b>High Type Composite:</b> (6) High type composite— mixed bituminous or bituminous penetration road on a rigid pavement with a combined surface and base thickness of 178 millimeters (7 inches) or more. Includes any bituminous concrete, sheet asphalt or rock asphalt overlay of rigid pavement that is greater than 25 millimeters (1 inch) of compacted bituminous material; otherwise coded as “5”.</p>
Lane Width	Item 54 – Lane Width (LANEWIDTH)	This item is a measure of the existing lane width, to the nearest foot, on a roadway section. This is recorded as to where the pavement/shoulder surface changes, or to the pavement lane striping if the should and pavement surface are the same, or according to traffic use if no striping or only centerline striping is present.
Shoulder Type	Item 58 – Shoulder Type (SHOULDER)	<p>This item provides information on the type of existing shoulders on the roadway section. If the shoulder changes back and forth in the section, the predominant type is recorded. If the left and right shoulders differ on a facility, the right shoulder is recorded. This data was originally numerically coded as shown in parentheses:</p> <p><b>None:</b> (1) No shoulders or curbs exist.</p> <p><b>Surfaced:</b> (2) Surfaced shoulder exists (bituminous concrete or Portland cement concrete surface).</p> <p><b>Stabilized:</b> (3) Stabilized shoulder exists (stabilized gravel or other granular material with or without admixture).</p>



COLUMN NAME	HPMS DATA # (if applicable) or column heading from which entries are calculated	DATA DESCRIPTION
Shoulder Type (continued)	Item 58 – Shoulder Type (SHOULDER) (continued)	<p><b>Combination:</b> (4) Combination shoulder exists (shoulder width has two or more surface types; for instance, part of the shoulder width is surfaced and a part of the width is earth, etc.).</p> <p><b>Earth:</b> Earth shoulder exists.</p> <p><b>Barrier Curb:</b> (6) Barrier curb exists; no shoulders in front of curb.</p>
Right Shoulder Width	Item 59 – Right Shoulder Width (SHOULDERR)	This item measures the existing shoulder width on a sample roadway section. Parking and bicycle lanes are not included in the measurement.
Left Shoulder Width	Item 60 – Left Shoulder Width (SHOULDERL)	This item measures the existing shoulder width on a sample roadway section. Parking and bicycle lanes are not included in the measurement.
Widening Feasibility	Item 62- Widening Feasibility (WIDENING)	<p>This item provides a measure of whether it is feasible to widen an existing section. Features such as large single family residences or office buildings, shopping centers and other large enterprises, severe terrain, cemeteries, wet lands, park land, or where otherwise widening would be cost or environmentally prohibitive. The data was originally numerically coded as shown in parentheses:</p> <ul style="list-style-type: none"> <li>(1) No Widening is Feasible</li> <li>(2) Yes, Partial Lane</li> <li>(3) Yes, One Lane</li> <li>(4) Yes, Two Lanes</li> <li>(5) Yes, Three Lanes or More</li> </ul> <p>For the purposes of this report, codes 2 through 5 were consolidated into one response, <b>YES</b>, while code 1 was changed to <b>NO</b>.</p>



COLUMN NAME	HPMS DATA # (if applicable) or column heading from which entries are calculated	DATA DESCRIPTION
Terrain	Item 70 – Type of Terrain (TERRAIN)	<p>This data provides information on the type of terrain through which the roadway section passes. The data was originally numerically coded as shown in parentheses:</p> <p><b>Urban:</b> (0) Not Applicable; this is an Urban Section.</p> <p><b>Level:</b> (1) Any combination of grades and horizontal or vertical alignment that permits heavy vehicles to maintain the same speed as passenger cars; this generally includes short grades of no more than 2 percent.</p> <p><b>Rolling</b> (2): Any combination of grades and horizontal or vertical alignment that causes heavy vehicles to reduce their speeds substantially below those of passenger cars but that does not cause heavy vehicles to operate at crawl speeds for any significant length of time.</p> <p><b>Mountainous</b> (3): Any combination of grades and horizontal or vertical alignment that causes heavy vehicles to operate at crawl speeds for significant distances or at frequent intervals.</p>
Speed Limit	Item 80 – Speed Limit (SPEEDLIMIT)	This item is the posted daytime speed limit on the section, in miles per hour.
% Trucks	Items 82 – Percent Average Daily Single Unit Trucks, and Item 84 – Percent Average Daily Combination Trucks	The data for this item was calculated by summing the Percent Average Daily Single Unit Trucks and the Percent Average Daily Combination Trucks. The data is recorded as a percentage of the AADT.
Volume/Service Flow Ratio	Item 96 – Volume/Service Flow Ratio (LOS)	This item is computed reflecting the peak hour congestion for the section, and is a function of the volume divided by the capacity of the roadway.
ROW Width	(ROWWIDTH)	This is the right-of-way of the roadway segment.
#RR Crossings	(RAILROADS)	



COLUMN NAME	HPMS DATA # (if applicable) or column heading from which entries are calculated	DATA DESCRIPTION
Bike Suitability		<p>This data was obtained from the ADOT Bike Suitability Table. <b>The data was originally numerically coded</b> as shown in parentheses:</p> <p>N/A – No Data Recorded                      No Data (0) – Recorded as No Data Available                      More Suitable (1) – This route is more suitable for bicycles.                      Less Suitable (2) – This route is less suitable for bicycles.                      Prohibited (3) – Bicycles are prohibited.</p>



## **Appendix C – Bicycle and Pedestrian Plan Maps for Arizona Agencies**

See website for Appendix C Materials



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9. **Pima Association of Governments Existing, Programmed, and Planned Regional Bikeway System, November 2000**
10. **Town of Prescott Valley Pedestrian and Bicycle System Master Plan, September 2001**
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14. **Yuma MPO 2000-2023 Regional Transportation Plan, Recommended Non-Motorized Plan 2000-2025, December 2000**
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  - Maricopa Association of Governments
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  - Phoenix Sonoran Bikeway
  - City of Scottsdale
  - City of Tempe
  - City of Tucson