Bicycle Element
Scottsdale Transportation Master Plan

Adopted January 2008

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City of Scottsdale

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INTRODUCTION

The purpose of the Bicycle Element of the *Transportation Master Plan* is to identify goals and make recommendations for the implementation of those goals, which make bicycling a safe, convenient and more comfortable travel option. The Bicycle Element describes the City's existing bicycling conditions, makes prioritized recommendations for the identified potential on-street bicycle network, provides other bicycle-related recommendations, and explores potential expansions to the City's off-street bicycle network.

1.0 GOALS

The Vision, Values and Goals component of this *Transportation Master Plan* identifies many over-arching goals. The recommendations contained in the Bicycle Element directly support several of these goals, including the following:

- Direct transportation policies, investments and decisions in ways which support the community's adopted vision and values;
- Increase the range and convenience of transportation choices;
- Focus investments on improvements which add long-term values;
- Maintain the transportation system in ways which minimize life cycle cost.

In addition to supporting these broader goals, three bicycle-specific goals have been identified:

- Provide a safe, connected, and convenient on-road bicycle network throughout the City of Scottsdale;
- Expand the network of off-street shared-use paths and trails within the City of Scottsdale;
- Achieve a Bicycle Friendly Community ranking of Gold from the League of American Bicyclists

Finally, the goals set forth in the City's *1994 Bicycle/Pedestrian Transportation Plan* apply and should remain a guiding force in current and future bicycle-related planning initiatives. These are:

1. Incorporate the needs of human-powered transportation into the policy-making, planning, design, construction and maintenance phases of all existing and new City policies, plans, programs, projects, facilities and operations.
2. Devise and adopt design guidelines and standards needed to implement a safe, functional, convenient, accessible, and pleasurable walking and cycling environment for recreation and transportation.
3. Develop and implement comprehensive and proactive safety, education and enforcement programs for all bicyclists, pedestrians, and motorists.
4. Employ comprehensive and proactive programs to promote cycling as a viable, economically desirable form of transportation and recreation for both residents and visitors.

Through the process of achieving these goals, progress will be made toward the bicycle-related effectiveness measures identified in the *Transportation Master Plan*: reducing gaps in the bicycle system; improving the citywide bicycle level of service (LOS); and reducing conflicts with other modes. Specific measurable components of the network include:

1. Miles of bike lanes, routes, paved paths, and unpaved trails.
2. Percentage of arterial streets with bike lanes.
3. Number of grade-separated crossings.
4. Percentage of address locations within 0.25 and 0.5 miles of a path.
5. Percentage of traffic signals on bike routes that can be actuated by a bicyclist.

The subsequent sections of the Bicycle Element describe the processes by which the identified goals should be pursued.

1.1 History

Many previous planning efforts have included bicycle provisions. These processes have been underway for several decades and steady progress has been achieved. Historical milestones and previous documents with bicycle components include:

- 1965 and 1974 Scottsdale Town Enrichment Program (STEP) Forum initiated the Indian Bend Wash (IBW) project and a bicycle planning document for the Indian Bend Wash and connections to it;
- 1971 Parks and Recreation Department study to determine public interest level in cycling and an expanded path system;
- 1975 Bikeway Planning Criteria and Design Guidelines;
- 1978, 1981, and 1991 General Plan Circulation Element including a Bikeways Plan with some design standards;
- 1984 Design Procedures and Criteria: Section 8, Bikeways & Horse Trails;
- 1988 Scottsdale Bicycle Task Force Final Report;
- 1994 City of Scottsdale Bicycle / Pedestrian Transportation Plan (adopted in January 1995); and
- 2004 City of Scottsdale Trails Master Plan.

2.0 EXISTING BICYCLING CONDITIONS

The City of Scottsdale currently maintains a wide network of on-street and off-street bicycle facilities. This combined on- and off-street bicycle network is shown in the *Existing Bicycle Facilities Map (Figure 1)* and described below. The mileage of each of the component parts of the City's existing bicycle network are as follows:

- Bike Lanes = 86 miles
- Paved Shoulders = 10 miles
- Bike Routes = 50 miles
- Paved Paths = 61 miles
- Unpaved Trails = 238 miles

A **bike lane** is a striped portion of a roadway with pavement markings and signs. It is for the exclusive use of bicyclists but bicyclists are not required to ride in it. Cyclists may leave a bike lane to pass other cyclists, avoid debris, and make left turns.

A **paved shoulder** is the roadway to the right side of an edge line. Shoulder widths of five feet or more are suitable for bicycle travel. An edge line is used to mark the outside edge of the travel lane for cars.

A **bike route** is any combination of paths, lanes, trails, or streets that are designated for bicycle travel by mapping or signing. Bike routes are typically used to help cyclists identify preferential travel routes.

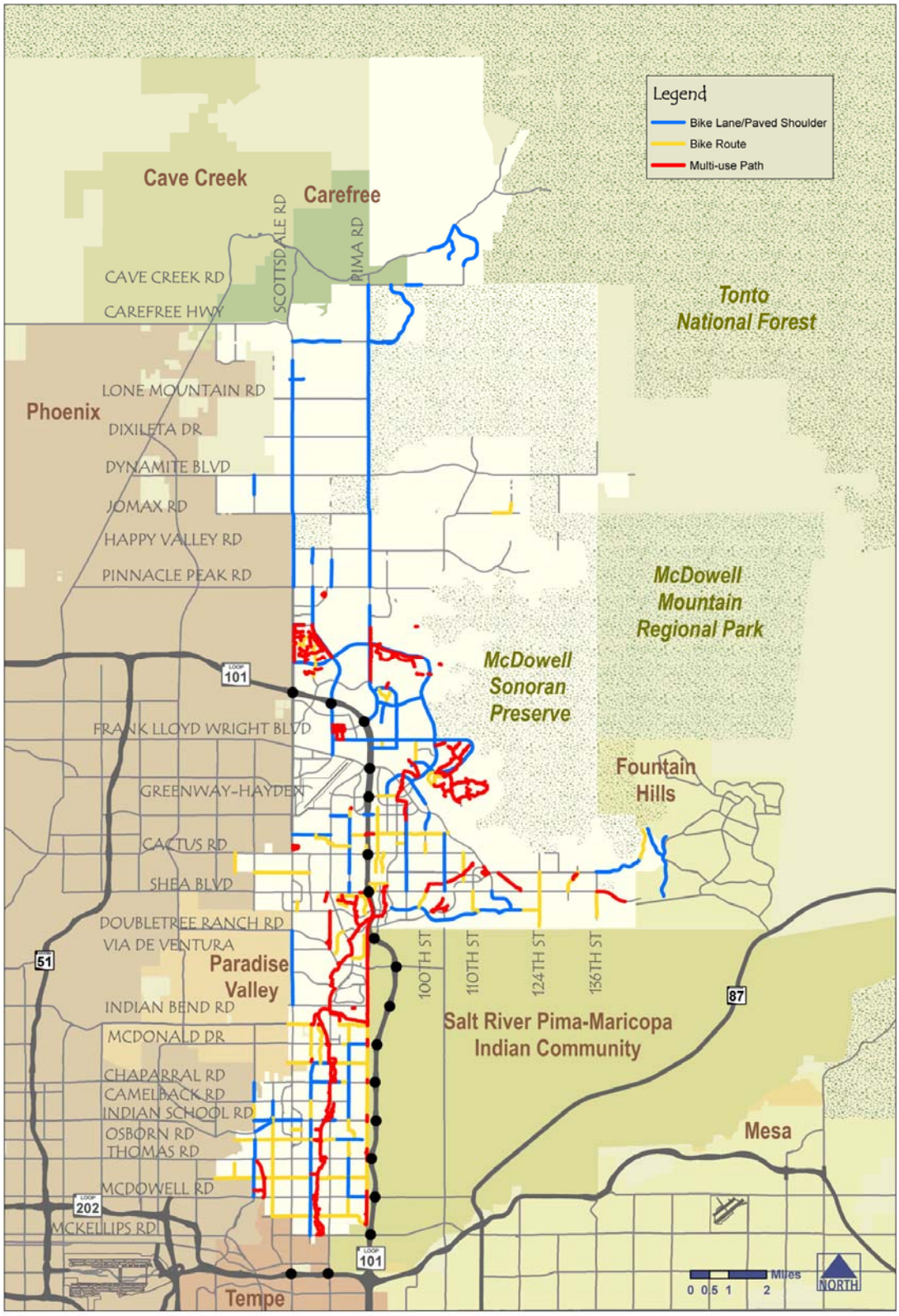
A **shared-use path** is a paved facility not open to motorized devices. It can be used by pedestrians, bicyclists, skaters, joggers, and other non-motorized users. A **shared-use trail** is an unpaved facility for use by equestrians, pedestrians, bicyclists, and other non-motorized users.

Further definitions are listed in the Glossary of this *Transportation Master Plan.* Definitions and specific design guidelines for bicycle facilities are listed in the *Design Standards & Policies Manual (DS&PM).* Bicycle parking requirements are included in the Scottsdale Revised Code, Appendix B, Basic Zoning Ordinance, Article IX.

The on-street and off-street bicycle networks are not mutually exclusive and both are necessary. Since homes, offices, and employment centers are located along streets, we should anticipate that cyclists and pedestrians need to use those streets to reach their destinations. A commute-to-work bicycle trip will typically begin on a residential street and end on an arterial street. Many experienced cyclists prefer to bicycle on the streets where they can travel greater distances in a shorter time.

The off-street network provides a more relaxed environment and fewer interactions with motorized traffic, although path users must still watch for cars at driveways, street crossings, and intersections. Paths like the Indian Bend Wash Path have grade-separated crossings at many roadways and can provide uninterrupted travel for long distances. Paths are appropriate locations for casual cyclists and children, as well as faster cyclists when few other users are present. Since bicyclists share paths with pedestrians, runners, inline skaters, and dogs, they must adjust their speeds to share the path or to safely pass other users. Many commuter cyclists will use a path for part of their ride to work, combining the use of on-street and off-street facilities to reach their destinations.

Figure 1: Existing Bicycle Facilities



2.1 League of American Bicyclists Bicycle Friendly Community Designation

In 2005 and 2007, Scottsdale was a recipient of a Silver Level Award from the League of American Bicyclists (LAB) as a Bicycle Friendly Community. This award recognizes municipalities that actively support cycling and encourage residents to use bicycles as an alternative mode of transportation, and for recreation. Two year awards range from Honorable Mention, to Bronze, Silver, Gold, and Platinum. In addition, many communities apply and receive no designation whatsoever. The process involves a screening application followed by a more in-depth application for those communities that qualify. A committee at LAB, using feedback from LAB members in the local community, scores the application. In 2005, Scottsdale became the first community without a university to reach the Silver level and in 2007 Scottsdale achieved Silver level again. Review and recommendations from LAB provide insights into what Scottsdale could do to achieve a Gold level in a future application. The 2007 application is included as *Appendix A*.

2.2 Bicycle Crash Analysis

An analysis was performed using complete City of Scottsdale crash data files. These files contained data on the report number, date and time of the crash, crash location, injury severity, date of birth, physical condition, violations, action, travel direction, and manner of collision. Bicycle crashes were extracted from the overall database for review.

The reported bicycle-vehicle collisions from 1994 through 2004 were divided into total collisions, injury collisions, and fatal collisions. The lowest number of bicycle-vehicle collisions occurred in 2003 with 40 total collisions, 35 of which resulted in injury and one resulted in a fatality. The highest number of bicycle-vehicle collisions occurred in 1995 with a total of 88 crashes, 77 of which resulted in injury and one resulted in a fatality. The majority of bicycle-vehicle collisions resulted in injury.

In addition to the computerized crash dataset, thirty-three crash reports were reviewed in detail. The crash reports were reviewed to determine root causes for the crashes, similar characteristics among the crashes, and potential countermeasures to prevent like crashes in the future. The review of the crashes yielded a clear trend. Sixty-four percent of the crashes reviewed in detail (21 of 33) involved motorists colliding with bicyclists riding against traffic on the sidewalk. An additional 15 percent (5 of 33) involved motorists colliding with cyclists riding against traffic on the roadway. In these crashes, motorists were most often exiting a side street or driveway onto the main road and failed to scan to the right for any approaching bicyclists or pedestrians coming from that direction. In one of these crashes, the cyclist crossed a side street against a “Don’t Walk” signal. This preponderance of crashes where cyclists rode against traffic illustrates the potential hazards associated with riding where motorists are not scanning for conflicting traffic.

The complete collision analysis and recommended countermeasures are included in *Bicycle Element Appendix B*. A summary of the recommended countermeasures follows:

2.2.1 Educational Countermeasures

Educational countermeasures will have a greater effect if they are implemented across the City, rather than solely on specific streets or at specific intersections. A broad application of these campaigns, with greater saturation within the high crash areas is appropriate.
Riding against traffic

Riding against traffic, either on the sidewalk or on the roadway appears to be common practice in Scottsdale. As indicated above, 64% of the detailed crashes analyzed involved motorists colliding with bicyclists riding against traffic on the sidewalk. An additional 15 percent (5 of 33) involved motorists colliding with cyclists riding against traffic on the roadway. It is imperative that cyclists who choose to ride on the sidewalk be aware of the hazards associated with this practice. Driver and cyclist-targeted campaigns are recommended. Graphics would include Scottsdale locations, demographics, and language. It is also important to target motorists with these campaigns to make drivers aware that they need to scan for traffic on the sidewalk in addition to looking where they expect to see other vehicles. These education campaigns must be run concurrently to maximize the potential for reducing crashes.

Riding at night without lights
Bicyclists operating at night without lights are nearly invisible to motorists. Informational posters showing sight distances for various colors of clothing and illustrating the limitations of reflectors may provide cyclists and pedestrians the information they need to make better choices when choosing gaps to cross the road or when anticipating driver behavior at driveways and intersections.

2.2.2 Enforcement Countermeasures

The effort to enforce the traffic laws as they relate to bicycle safety should be addressed in an overall, coordinated, citywide or countywide bicycle enforcement campaign.
The following behaviors should be targeted for enforcement:

- Riding against traffic on the roadway;
- Failure to yield to pedestrians and cyclists riding on the sidewalk;
- Riding at night without lights; and,
- Violating traffic signals.

3.0 ON-STREET BICYCLE NETWORK

The City of Scottsdale's street system provides the most direct access to nearly all destinations in the City. This section provides a strategy for creating new bicycle facilities on the City's roadways to improve bicycling accommodation for the area's cyclists. Since the City's design guidelines and cross-sections for arterial and collector streets include bike lanes, sidewalks, and trails, these facilities are typically included with new construction and major reconstruction projects. Creating bike lanes on existing streets can often be challenging and expensive. One of the most cost-effective ways to create new bicycle facilities is to restripe roadways to include bike lanes.

3.1 Roadway Restriping Guidelines

This section outlines recommended guidelines for identifying potential locations for roadway restriping to better accommodate bicyclists. These guidelines were used to recommend roadways from the study network for restriping. (see *Section 3.3*) On roadways where restriping is not a viable option, widening the roadway, adding paved shoulders, or removing travel lanes could be considered on a case by case basis (with the approval of the Traffic Engineering and Operations Director). The guidelines take into account the effect of restriping on both the motor vehicle and bicycle modes, using guidance from the following documents:

- *A Policy on the Geometric Design of Streets and Highways,* American Association of State Highway and Transportation Officials (AASHTO);
- *Guide for the Development of Bicycle Facilities,* AASHTO;
- *The Manual on Uniform Traffic Control Devices (MUTCD),* Federal Highway Administration; and
- *Highway Capacity Manual,* Transportation Research Board.

Using the criteria and analysis techniques found in these referenced documents, candidate projects for potential restriping can be identified and their benefits to bicyclists' safety and comfort can be measured for eventual prioritization.

3.1.1 Applicability of Restripe Projects

One of the most cost-effective and easily implemented solutions for improving roadway bicycle accommodation within existing curbed roadways is to identify roads with "surplus" pavement. Restriping these roads to accommodate bicycles involves reduction of lane widths, or (in limited cases after careful analysis) removal, of travel lanes to create space for striped paved shoulders or designated bike lanes. Because delineated lateral space is the predominant factor in creating a sense of safety and comfort for bicyclists, restriping can significantly improve a roadway's level of accommodating bicycling without the expenses associated with adding pavement to roads, or completely reconstructing them. Restriping can often be done at the same time as slurry seals or regular pavement maintenance.

The type of cross-section restriping that will be most generally applicable to Scottsdale roadways is through targeted reductions in existing lane widths. This opportunity usually presents itself on curbed multi-lane roadways where existing lanes are at least 12 feet wide. In many such cases, enough width can be removed from existing lanes to create an effective space for bicyclists without significantly affecting motor vehicle operations.

A primary concern associated with roadway restriping is the potential effect on motor vehicle capacity and operations. As roadway lanes are narrowed, capacity has been shown to be marginally reduced. In addition, roads with higher speeds and greater volumes of heavy vehicles do not operate as well with lanes of less than 12-feet as low-speed, low-truck volume roads do. There is an abundance of existing national guidance regarding appropriate lane widths for both motor vehicles and bicyclists, outlined below.

3.1.2 Identifying Restripe Candidates

Restripe candidates are those roadways where posted speeds are 50 mph or less, no current bicycle lane or paved shoulder exists, and where a paved shoulder or bike lane at least three feet wide can be created while typically maintaining other travel lane widths of at least eleven feet (as approved by the Traffic Engineering and Operations Director). There will be some roadway segments on which one or both of these dimensions is able to be larger and a very few circumstances where smaller lane widths may be considered. The minimum recommended lane widths are based on the 2004 AASHTO *Policy on Geometric Design of Highways and Streets*. The AASHTO *Policy* states in its foreword that its intent is to recommend a "range of values for critical dimensions." These ranges allow for flexibility, as the *Policy* describes:

> Minimum values are either given or implied by the lower value in a given range of values. The larger values within the ranges will *normally be used where the social, economic, and environmental impacts are not critical* (emphasis added).[1]

With regard to the width of lanes on Urban Arterials, the *Policy* states:

> Lane widths may vary from 10 to 12 feet. Lane widths of 10 feet may be used in highly restricted areas having little or no truck traffic. Lane widths of 11 feet are used quite extensively for urban arterial street designs. The 12-foot lane widths are most desirable and should be used where practical, on higher speed, free flowing, principal arterials.[2]

The *Policy* clarifies further,

> Under interrupted-flow operating conditions at low speeds (45 mph or less), narrower lane widths are normally adequate and have some advantages.[3]

A number of major roadways in Scottsdale have narrower than 12-foot lanes. They include Scottsdale Road north of Indian Bend Road, Hayden Road north of McKellips, Shea Boulevard east of 64th Street, Thomas Road, McDowell Road, and others.

When designating dimensions for the restriping of existing pavement cross-sections to include ridable shoulders, a minimum three-foot wide shoulder is recommended. Where more than three feet is available, the wider space is recommended, but three-foot shoulders have been shown to provide a tangible sense of comfort to cyclists.[4] While the AASHTO *Guide for the Design of Bicycle Facilities (1999)* expresses a preference for four-foot wide shoulders, it also states, "… where 4-foot width cannot be achieved, any additional shoulder width is better than none at all." In order for a restriped shoulder to be signed and marked as a bike lane in a location with curb and gutter, the new space should provide a minimum of five feet between the

[1] AASHTO *Policy,* 2004. xliii
[2] ibid., p. 472
[3] ibid., p.473
[4] Landis, Bruce W. et.al. "Real-Time Human Perceptions: Toward a Bicycle Level of Service" *Transportation Research Record 1578*, Transportation Research Board, Washington DC 1997.

face of the curb and the bike lane stripe, at least three feet of which consist of a ridable surface. The City currently increases the ridable surface in some locations by making the gutter pan flush with the pavement. On open shoulder roadways, four feet of pavement is recommended to designate a bike lane.[5]

An example of a restripe candidate is a 6 through-lane roadway with a posted speed limit of 40 mph where all lanes are currently 12 feet wide. In this case, each lane could be reduced to 11 feet, thereby creating three feet of bicycle space in each direction of travel. Alternatives would be to provide a lane width for two of the lanes of 10.5 feet to provide a 4-foot bike lane or to make the outside lane wider and not stripe an edgeline. Each project must be carefully evaluated to determine the best alternative and approved by the Traffic Engineering and Operations Director.

3.1.3 Evaluating Restripe Candidates

Once candidate roadways have been identified, the next step is to evaluate the level of accommodation provided to both motorists and bicyclists before and after the potential restriping occurs. Planning-level analysis tools for urbanized arterials are available that estimate motor vehicle level of service (LOS) based on certain readily available inputs, including the class and location of the roadway, traffic volumes, number of lanes, and signal spacing. For the purpose of these guidelines, the analysis should consider *forecast* traffic volumes.

According to the *Highway Capacity Manual*[6], a one-foot reduction in lane width can cause, in some cases, up to a 3 percent reduction in capacity depending on signal spacing. Based on the amount of width needed to create the desired bicycle facility, a corresponding reduction in capacity can be measured to determine whether desired motor vehicle LOS is still met. If desired motor vehicle LOS is met, lane restriping should be pursued.

3.2 Bicycle Level of Service

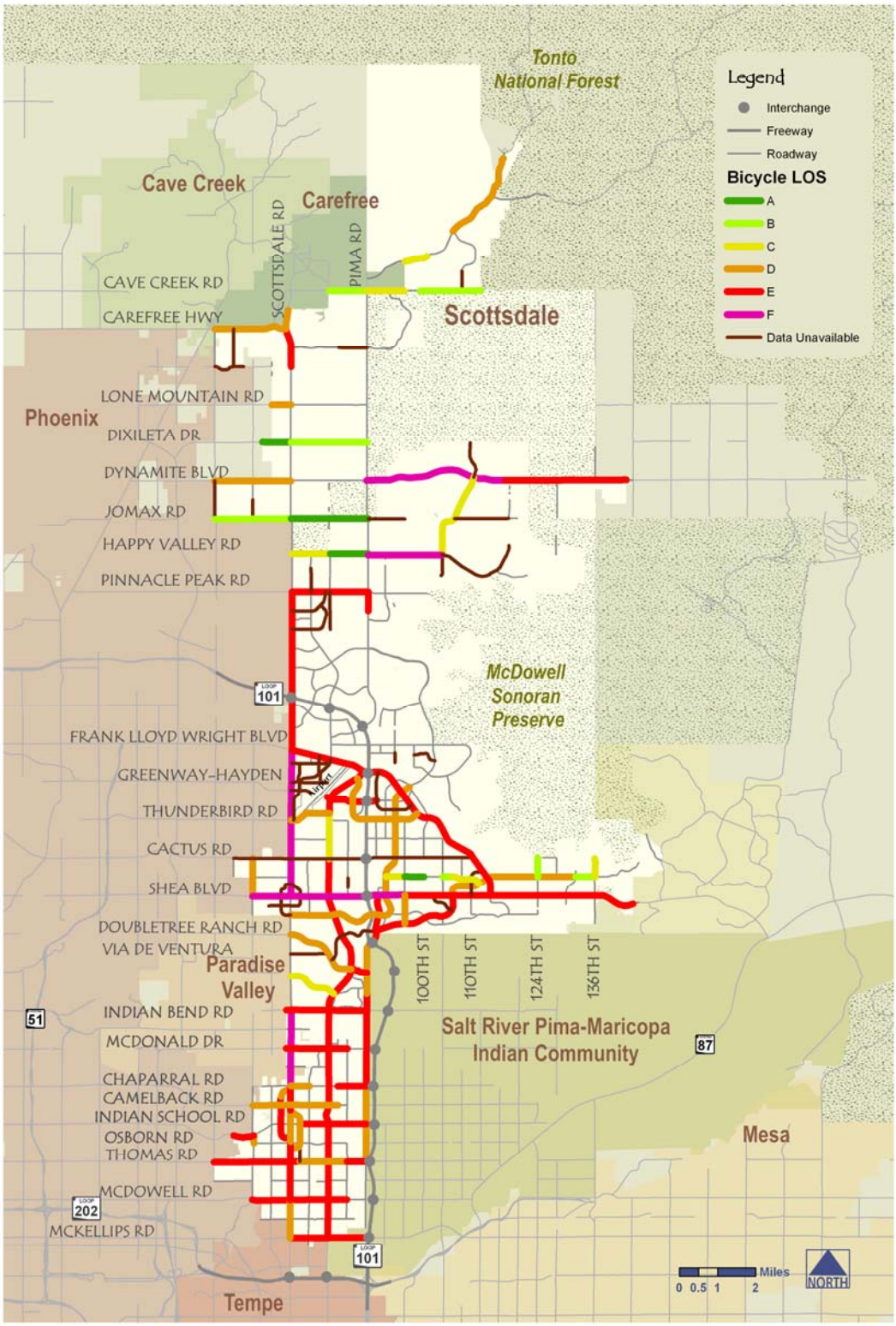
The *Bicycle Level of Service (Bicycle LOS) Model,* a bicycling conditions performance measure, is a "supply-side" criterion or an objective measure of the bicycling conditions of a roadway. The *Bicycle LOS Model* uses an evaluation of bicyclists' perceived safety and comfort with respect to motor vehicle traffic. This bicycling conditions performance measure or criterion is classified as the LOS for bicyclists that currently exists within the roadway environment. With statistical analysis, the *Bicycle LOS Model* can reflect the effect on bicycling suitability or "compatibility" due to factors such as roadway width, bike lane widths and striping combinations, traffic volume (some network segments within the City of Scottsdale were not evaluated because of the unavailability of volume data), pavement surface condition, motor vehicle speed and type, and the presence of on-street parking. Based on these data, a numerical bicycle LOS score is calculated and converted to a readily understood pseudo-academic (A-F) scale, with "A" representing the most compatible bicycling conditions and "F" representing the least compatible.

3.3 Facility Recommendations

Geometric and operational data were collected for the City's identified potential bicycle facility roadway segments. This data was used to produce an *On-Street Bicycling Conditions Map (Potential Network)* (*Figure 2*), showing the results of a bicycle level of service analysis for the

[5] AASHTO *Guide for the Development of Bicycle Facilities*, 1999, pp. 22-23.
[6] *Highway Capacity Manual* Transportation Research Board. Washington, DC, 2000, p. 16-11.

Figure 2: On-Street Bicycling Level of Service (Potential Network)



study network (also shown in tabular format in *Appendix C*). The restriping analysis was carried out based on these data and the guidelines set forth above. Restriping is a viable option for many of the evaluated segments. In cases where restriping would not be appropriate, alternative options were evaluated, and a recommended improvement type was identified. (These alternative options would be costlier than roadway restriping.) Each of the improvement types is defined and discussed below and shown in *Figure 3: On-Street Bicycle Facility Restripe Guide*.

3.3.1 Restripe Candidates

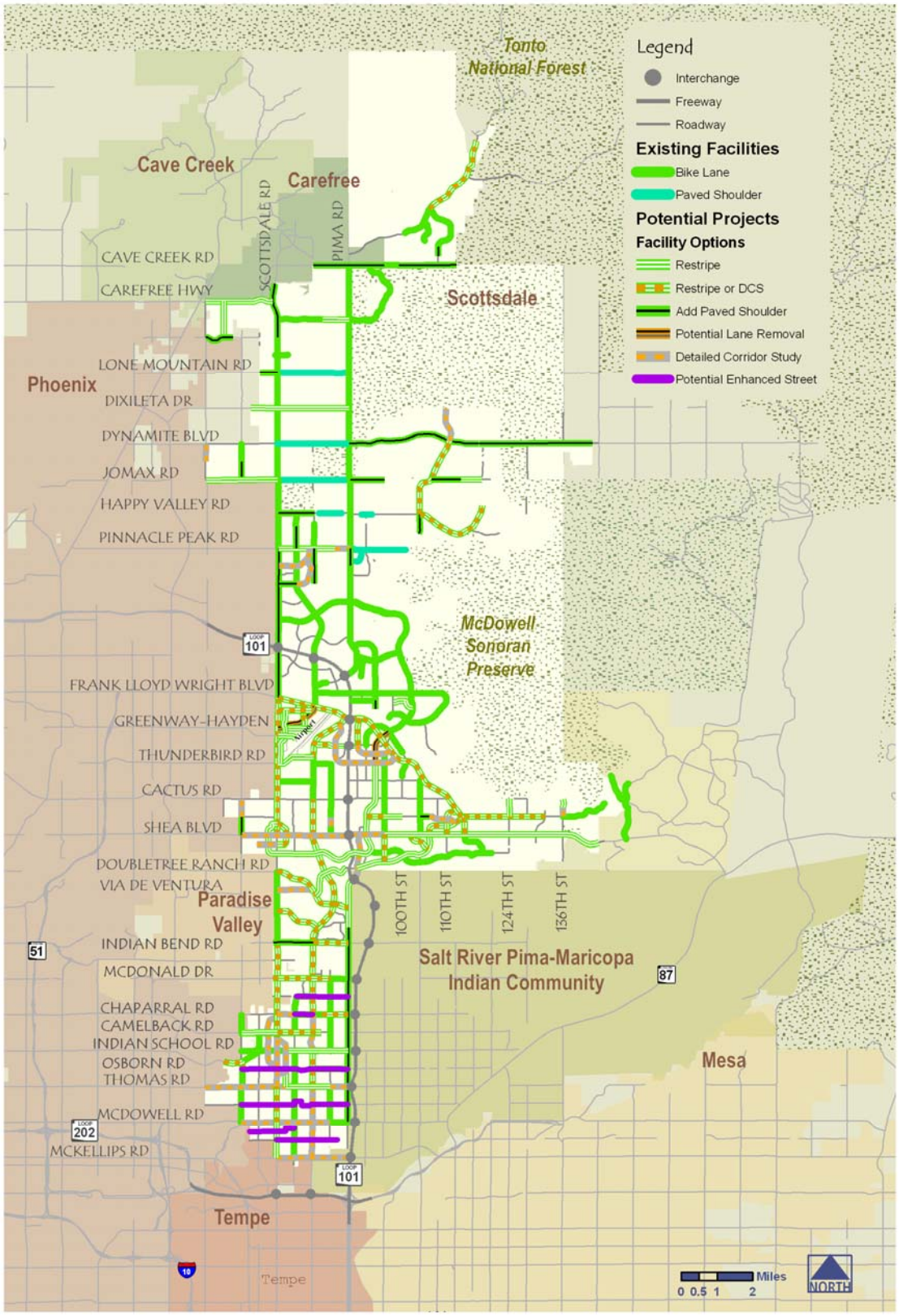
Based on the lane widths set forth in the restriping guidelines, many segments included in the evaluation have been deemed restripe candidates (*Figure 3*). Most of these are roadways where enough pavement width exists to reduce vehicle travel lane widths, thereby creating space for a new bike lane or a paved shoulder. Additional restripe candidates were identified wherein the general lane widths would be reduced to 10.5 or 10 feet. These candidate roadways, which should be examined further only in cases where truck volumes are very low, are shown with their secondary recommendation (described below) in *Figure 3*, in the event that restriping is ultimately deemed infeasible. Two additional segments (Greenway-Hayden Loop south of Frank Lloyd Wright Boulevard and 94th Street between Thunderbird Road and 100th Street) are restripe candidates if one general use lane in each direction could be removed and an acceptable motor vehicle LOS (based on forecast traffic volumes) will be maintained. These restriping candidates should undergo additional review and analysis. Restriping roadways, where feasible, is a relatively inexpensive solution for improving bicycling conditions and should be considered before any other solutions. Seventy-six miles of potential restripe roadways have been identified (see *Appendix C* for a list of these segments). For the remaining roadways where restriping is not a viable option, other alternatives have been explored; these alternatives are described in the sections below.

3.3.2 Paved Shoulders

There are many miles of roadway in Scottsdale that are not equipped with curbs and gutters. Some of these roadways presently have low traffic volumes and are therefore already well suited for bicycling, and others have been named as “restripe candidates” because there is available width in the existing cross section to re-position the edge stripe. There are many of these open-shoulder roads that have no more room to give from the travel lane to the shoulder. Bicycling conditions on these roads could be improved, however, by the relatively inexpensive widening of their paved shoulders. If shoulders are developed on these segments, they should extend to a minimum of five feet beyond the existing outside lane edge striping. There are approximately 25 miles of roadway for which adding to the shoulder is the recommended strategy.

As these open-shouldered roads usually lie along undeveloped parcels (either at the margin of present development patterns or in an infill situation), it is very important that the City pay close attention to these segments over time. Given the continued growth expected in Scottsdale in the coming decades, it is likely that many of these roadway segments will be widened and lined with curbs; when this occurs it will be important to include adequate space for bicyclists in the altered cross section as is currently required in the *DS&PM*. Improved bicycle accommodation through the relatively simple act of broadening roadway shoulders will give the residents of and visitors to Scottsdale and the East Valley the opportunity to reveal the demand for more “complete” streets in the future.

Figure 3: On-Street Bicycle Facility Guide



3.3.3 Detailed Corridor Study (DCS)

Many segments present minimal opportunity for improving bicycling conditions through either of the strategies mentioned above. Any tangible improvement to these segments will require extensive and detailed operational-level investigations of the constraints and opportunities along these corridors. Individual corridor studies will be needed to verify the extent of available rights-of-way as well as the design options which should be considered. There are approximately 26 miles of roadway that represent DCS segments.

3.3.4 Pedestrian / Bicycle Enhanced Street

There are no off-street corridors south of McDonald Drive that can easily be used for east-west pathway connections. Several streets provide conditions that may allow for a significant improvement to the pedestrian and bicycle facilities along them. These streets are primarily half-mile collectors between the major arterials. They include: Roosevelt, Belleview, Oak, Osborn, Chaparral, and Jackrabbit. No specific recommendations are being made at this time but improvements could include wide sidewalks, bike lanes, shared-use paths, additional shade, and traffic calming. A detailed plan for each street would be developed with significant input from residents and businesses along each of the corridors.

3.4 Prioritization Procedure

An objective prioritization procedure helps ensure that resources are allocated in a way that best serves the needs of the City's residents and visitors. One of the leading ways to prioritize candidate bicycle facility improvements is a neo-traditional Benefit-Cost Index. This is built upon standard benefit-cost ratios used in infrastructure investment planning and programming. It provides an indication of the relative value of improving a transportation facility with respect to other (candidate) transportation facilities. The results of a neo-traditional Benefit-Cost Index provide the City with an effective and easily defensible ranking list for improvements.

To evaluate potential bicycle facility improvements in Scottsdale, two measures of benefits have been incorporated into the analysis, the improvement to the roadway segment's bicycling conditions and the bicycling demand around the segment. For segments that have been identified as restripe candidates, the first benefit is measured by comparing the existing bicycle LOS score to the score resulting from the creation of a bike lane through the reallocation of existing pavement. The same approach is used to measure the improvement gained through the addition of paved shoulders. Measuring the potential improvement to bicycle conditions for segments identified as either DCS or Pedestrian/Bicycle Enhanced Streets is more challenging because the future outcome is less certain. In each case, an average assumed bicycle LOS was used. Specifically, a score of 2.0 ("B" on the assessment scale) was used for each segment. For detailed corridor study (DCS) segments, it is assumed that any detailed study would involve significant roadway reconfiguration, and would therefore likely include standard-width bike lanes in the future scenario, leading to a better bicycle LOS. Pedestrian/Bicycle Enhanced Street segments would require specific evaluation of facilities, opportunities, and substantial public involvement in the design of these streets, but it could be assumed that the facilities would be enhanced, also leading to a better bicycle LOS.

Bicycle LOS addresses the "supply side" of bicycling conditions by quantifying whether bicyclists are accommodated. It does not, however, measure whether there is any demand for bicycling in a particular area. To measure potential bicycle demand, the latent demand method was used. Latent demand identifies how many people would likely use non-motorized modes to travel, *if*

effective accommodation were universally provided, based on the proximity (and mix) of origins and destinations to study network segments (a more detailed explanation of the latent demand method is included in the Pedestrian Element of this *Transportation Master Plan*). By combining the improvement to bicycling conditions gained by making a facility improvement with the potential for bicycling in a given area, a complete picture of the likely benefits emerges.

In a situation where all bicycle facility improvement types have the same cost or when maintenance can implement improvements, those segments with the highest level of benefits (significantly improved bicycling conditions and high latent demand) would have the highest priority. However, the costs associated with the recommended improvements vary greatly. Specifically, roadway restriping is a very cost-effective way to better accommodate bicyclists, whereas constructing a sidepath or performing a detailed corridor study is much more costly. The assumed per-mile construction costs (2007) of the facility recommendations, which are based on costs estimated by communities throughout Arizona and the United States, are shown below:

- Roadway Restriping - $8,500/mile (less when completed with standard maintenance)
- Addition of Paved Shoulders - $200,000/mile
- Detailed Corridor Study and rebuilt street – up to $2,000,000/mile

The ranked prioritization list contained in *Appendix C* is designed to indicate where the City can get the most “bang for its buck.” The list is shown in descending order of benefit-cost, such that the highest projects on the list should receive the most immediate consideration when funding becomes available. Naturally, if funding for a particular project becomes available through private development, or State or Federal sources, or if the project is a key “missing link” in the system, or can be accomplished through standard maintenance, that project should be pursued regardless of its placement on the prioritization list.

To create a viable long-term on-street bicycle network in the City of Scottsdale, two approaches are needed: retrofitting existing roadways and ensuring accommodation on future roadways. The prioritized facility recommendations above will help enable the City to retrofit existing roadways to improve bicycling conditions. To ensure accommodation on future networks, policies that ensure the inclusion of bicycle facilities are critical. Fortunately, many of these policies are already in place. According to the standard cross sections contained in the *DS&PM*, bike lanes are included in the design of all roadways classified as minor collector and above. One revision to the major arterial cross-section would be to provide 6-foot bicycle lanes excluding curb and gutter on streets with speed limits of 50 mph or greater. A narrower bicycle lane would be allowed in retrofit situations. In addition, the Policy Element of this plan includes a Complete Streets Policy to further ensure that sufficient bicycle facilities will be provided.

4.0 OFF-STREET BICYCLE NETWORK

The Off-street Network consists of paved shared-use paths and unpaved shared-use trails. The unpaved trails were most recently addressed in the 2004 *Scottsdale Trails Master Plan: On the Right Trail*. All paved and unpaved facilities are open to all non-motorized users. Typically, equestrians avoid the paved paths, and roller bladers (in-line skaters) and cyclists on road bikes avoid the unpaved trails.

Shared-use paths[7] represent an important component of the overall bicycle network. They provide opportunities for riding among user groups who are not comfortable riding in the roadway (casual cyclists, children, families, and the elderly). There are two primary goals for the network of shared-use paths (or off-street facilities) in the City of Scottsdale: circulation and connectivity. The circulation goal is built on a vision of the network growing into a fully circulating (looped) network of shared-use paths that connect various priority trip origin points and destinations within the City, and also connect to major shared-use paths in neighboring communities. The connectivity goal is to build "spur" facilities that provide access from individual commercial districts or neighborhoods to the larger circulating system. The paths of this circulating and connected network will be designed to accommodate the mix of bicyclists, pedestrians, and other users who benefit from Scottsdale's existing shared-use path network. Circulation corridors and connectivity spurs have been selected based on their potential to connect certain priority origins and destinations to this system.

[7] Scottsdale's City Code currently refers to such facilities as "multiuse paths" (Chapter 17, Article IV, Division 3). However, the term "shared-use paths" has become the national standard, as evidenced by its use in the AASHTO *Guide for the Development of Bicycle Facilities*. For consistency, it is therefore recommended that the City adopt the use of "shared-use path."

4.1 Priority Connections

Priority Trip Origins to be connected to this system are derived from the character types outlined in the City's *General Plan Character and Design Element*, and will be refined through the Streets Element of this *Transportation Master Plan*. These origins are the areas from which a high number of residents and visitors could begin their travels on the system of shared-use paths. They have been selected because their land use designations provide the density of residents or concentration of visitors whose use of the network will provide an optimum return on the investment in the network. The priority origin areas to be connected by this network include:

- Urban Character Residential Areas;
- Suburban and Suburban Desert Character Residential Area; and
- Resort Corridor and Resort Village Character Areas.

Priority Trip Destinations to be connected to the system are similarly derived from the character areas of the City of Scottsdale *General Plan 2001*. These areas encompass Scottsdale's retail, entertainment, arts and cultural districts. The priority destination areas include:

- Employment and Regional Cores;
- Tourism and Recreation Corridors;
- Downtown Scottsdale;
- Urban Character Areas;
- *General Plan*-indicated "Activity Centers";
- Regional off-street bicycle facilities as they enter Scottsdale from neighboring jurisdictions; and,
- Preserve Trailheads

This system will consist of several fully circulating primary corridors, stretching the length and breadth of the City, with "spur routes" connecting the primary loops into neighborhoods and other districts. Development of future pathways on the circulation system can be evaluated based on various factors, including:

- calculating how much connected mileage they contribute to the system;
- connecting a new priority origin character area to the network;
- connecting a new priority destination character area to the network; and
- closing a circulating loop within the larger existing system.

Spur routes can similarly be prioritized to connect the circulating system to local destinations within individual neighborhoods or character areas. Such spur route priorities can include:

- improving access within a neighborhood to a school;
- improving access within a neighborhood to a park;
- connecting a school or park to the circulating system;
- extending a connection from the circulating network into a retail district;
- extending a connection from the circulating network into a Suburban or Suburban Desert Character Area;
- extending a connection from the circulating network into a Resort Corridor or Village; and
- extending a connection from the circulating network into an Urban Character Area, Downtown Scottsdale, or to a *General Plan*-indicated "Activity Center".

By concentrating the development of off-street bicycle facilities towards these parallel goals of circulation and connectivity, the City of Scottsdale can strengthen its position as one of the Southwest's great places to live, work and play.

4.2 Primary Path Corridors

4.2.1 Indian Bend Wash Path

The Indian Bend Wash Path is the most popular and well-known shared-use path in Arizona. It begins in Tempe at the Salt River and travels north in the Indian Bend Wash to Indian Bend Road. At this point it follows several street and drainage corridors to the northeast and reaches the CAP aqueduct at Horizon Park. Scottsdale's section of the Indian Bend Wash Path (north of McKellips Road) is roughly 14 miles. There is an unfinished gap between Shea Boulevard and Cactus Road that is currently under design. This path serves as the backbone of the City's off-street network. Nomenclature for the path is confusing north of Indian Bend Road. One segment is called the Camelback Walk Path and another is referred to as the 96th Street Path. This entire corridor should be assigned one name with the likely choices being the Indian Bend Wash Path or the Indian Bend Path.

4.2.2 Crosscut Canal Path / Arizona Canal Path

The Crosscut and Arizona canals are components of the Salt River Project canal system. The Crosscut Canal flows from the Arizona Canal at Indian School Road and 64th Street south to Canal Park at McKellips Road and College Avenue in Tempe. A paved path was constructed from Oak Street to Papago Park in the 1970s and featured the Valley's first grade-separated bicycle/pedestrian tunnel under McDowell Road. The reconstruction of this path and the tunnel approaches has just been completed and the next phase from Thomas Road to Indian School Road is currently in design.

The Arizona Canal runs over 38 miles from Granite Reef Dam on the Salt River to the New River in Peoria. Approximately six miles of the facility are located in Scottsdale. The Maricopa County Board of Supervisors designated it as a segment of the Sun Circle Trail in 1964. All the cities along the corridor have committed to maintain equestrian access along the route. The segment from Pima Road to the Indian Bend Wash has a completed paved path and other projects are in some phase of planning, design, or construction throughout the route within Scottsdale.

The City recently completed the Draft *Canal Corridor Study*[8] to provide guidance for developing the paved pathway along the Arizona and Crosscut canals. It identifies which bank the path should be located on, the locations for potential pedestrian bridges, and other issues related to the pathway and corridor development.

4.2.3 Central Arizona Project Aqueduct Path

The Central Arizona Project (CAP) Aqueduct system was constructed by the Bureau of Reclamation (Reclamation) and is operated by the Central Arizona Water Conservation District (CAWCD). The CAP is a 336-mile-long system of aqueducts, tunnels, pumping plants, and pipelines and is the largest single source of renewable water supplies in the state of Arizona. The CAP is designed to bring about 1.5 million acre-feet of Colorado River water per year to

[8] City of Scottsdale, Draft *Canal Corridor Study*, 2007

Pima, Pinal, and Maricopa counties. This water delivery system reaches from Lake Havasu to south of Tucson. As part of recreational planning for the CAP Aqueduct, Reclamation committed itself to maintain a 20-foot recreation corridor throughout the project.

In April 2004, the *Feasibility Study for a Multi-use Path along the Central Arizona Project Aqueduct System*[9] was completed through the participation of the State of Arizona, US Bureau of Reclamation, Maricopa County, and the cities of Mesa, Peoria, Phoenix, and Scottsdale. This study provides a detailed analysis of the pathway corridor from the Waddell turnout in Peoria to the southern boundary of Mesa.

The Scottsdale Segment comprises approximately 9.2 miles of the total 53-mile study corridor length and is primarily developed land along the existing adjoining properties to the Aqueduct right-of-way. In general, along the south side of the Aqueduct within the Scottsdale Segment, there is one CAP check control structure within the CAWCD security fence to go around, six existing major arterial roadway crossings (Scottsdale Road, Greenway-Hayden Loop, Thompson Peak Parkway, Cactus Road, Via Linda, Shea Boulevard, and 124th Street), one highway/freeway crossing (SR 101), and an existing 1.1-mile retaining wall along the existing CAWCD security fence line.

4.2.4 Power Line Path

The Power Line Path begins at WestWorld and follows the power line corridor northwest to Scottsdale Road just north of Deer Valley Road. The segment between Thompson Peak Parkway and Deer Valley Road already exists. Grade-separated crossings for the future path were provided during major roadway construction of Pima and Hayden roads.

4.2.5 Pima Path

The Pima Path is a unique combination of bike routes and paths that provides nearly nine miles of bicycle facilities along a north/south corridor south of Shea Boulevard. By providing short sections of pathways near the arterial intersections, Scottsdale was able to connect the residential access roads parallel to Pima Road for use by bicyclists and pedestrians. A major section of this corridor has just been rebuilt with a widened path and a new bridge over Via Linda. Sections of the Pima Path also exist north of the Loop 101.

4.3 Shared-Use Path Prioritization Criteria

Nearly 300 shared-use path segments have been identified as potential locations and prioritized for future construction. The segments include both circulation corridors and spur corridors, as defined in *Section 4.1*, as well as even shorter connections. Some of the proposed facilities would be sidepaths (located within the right of way of an adjacent roadway), while others would be independently aligned paths (located outside of any existing roadway right of way). Each of the identified corridors has been prioritized based on three criteria: the potential demand in the vicinity of the corridor, the existing bicycling conditions on parallel roadways, and the potential for connections to the City's existing bicycle network. These criteria are discussed in greater detail below.

> *While this plan recommends sidepaths in some locations, it is important to note that any sidepath project must be considered with a great deal of caution. While sidepaths*

[9] Initiated by the Governor's Arizona Bicycle Task Force in 1986. For copies contact Reed Kempton at the City of Scottsdale or any of the participating agencies.

are popular with some cyclists and appear to many as an appropriate bicycle facility alternative, crash statistics and operational challenges from across the United States and around the world provide ample warning that, in many settings, they are not. The AASHTO Guide for the Development of Bicycle Facilities *identifies potential problems associated sidepaths that should be considered when these facilities are being designed.*[10]

4.3.1 Potential Demand

Higher priority should be given to paths that will likely attract a significant number of users and that are located within urban, employment, and suburban *General Plan*-identified Character Areas. This criterion is measured by the latent demand[11] immediately surrounding the corridor. The latent demand analysis was originally performed for on-road segments that are part of the bicycle study network. In cases where a potential shared-use path corridor coincides with an on-road study network segment, the demand score is simply applied. In all other cases, potential demand for off-street corridors is estimated by interpolating the latent demand results of the bounding on-street segments. Among other factors, the latent demand method takes into account the proximity (hence connectivity) of a corridor to parks and schools. In addition, the latent demand results have been found to coincide closely with the priority character areas. As such, corridors with high levels of potential demand are also those that provide connections to identified priority destination areas.

4.3.2 Existing Bicycling Conditions

Where on-road bicycling conditions are poor, shared-use paths can frequently offer travelers a more comfortable way to reach their destinations. In these cases, a well-designed path (whether a sidepath or otherwise) has greater potential for increased use because of the lack of viable alternatives. The quality of existing conditions is measured by the bicycle level of service provided on the nearest parallel collector/arterial route (or a combination of multiple routes, if appropriate).[12] In this prioritization analysis, those corridors with the worst parallel on-road bicycling conditions receive the highest score for this criterion.

4.3.3 Connectivity to the Existing Network

Although certain components of a potential corridor's benefit to the transportation system's "connectivity" are covered by the latent demand criterion (*i.e.*, connectivity to parks, schools, and priority destinations), connectivity to the existing bicycle network is a separate issue. Accordingly, this component of the prioritization addresses whether and to what degree proposed path corridors would connect to existing bicycle facilities of various types. Specifically, each corridor segment has been evaluated to see whether it would intersect with other shared use paths (4 points, if yes), bike lanes and paved shoulders (3 points), existing bike routes (1.5 points), local streets (1.0 point), and future paths (0.5 points). Naturally, longer segments have a greater potential to intersect other existing facilities; however, this situation is appropriate because longer segments have a greater ability to provide long-distance connections and they frequently are part of the important circulating network of potential paths.

[10] AASHTO *Guide for the Development of Bicycle Facilities*, 1999, pp. 33-35.

[11] The theory and methodology of the latent demand analysis are explained in detail as part of the Pedestrian Element of this *Plan*.

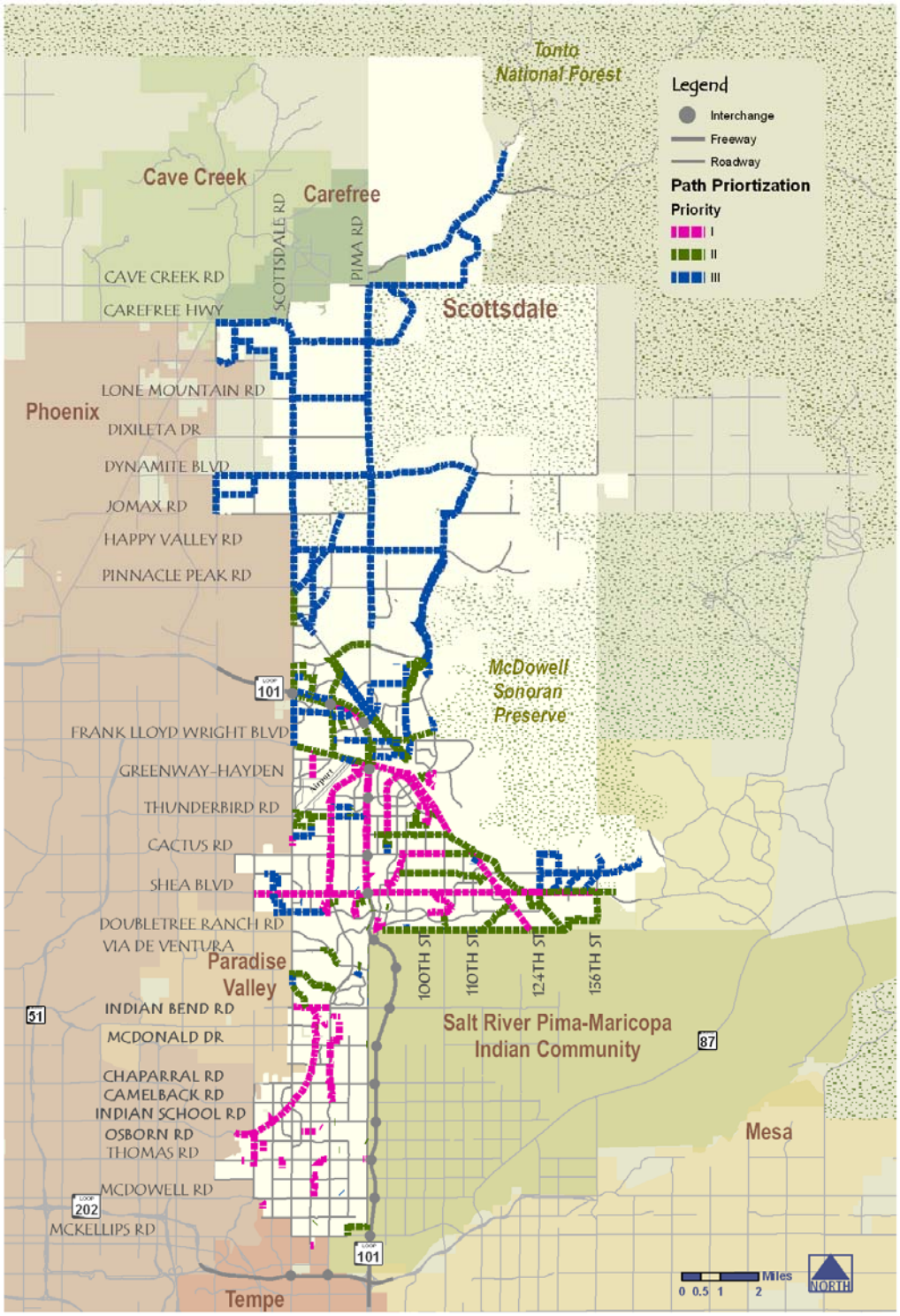
[12] While levels of service were not calculated for on-road segments with existing bike lanes, such roadways are assumed to have an ideal ("A") condition for this analysis.

4.3.4 Shared-Use Path Prioritization Procedure Results

All potential paths received a score between 10 (high) and 0 (low) for each of the designated criteria. The scores were then weighted based on the relative significance of the criteria (50% for potential demand, 30% for existing bicycling conditions, and 20% for connectivity to the existing network). The results were used to create three priority "tiers," with Tier I having a higher priority than Tier III. These are shown in tabular format in *Appendix D* (sorted by Path ID) and *Appendix E* (sorted by Tier). They are shown in graphical format in *Figure 4*. These tiers represent the relative benefit[13] of the paths and give the City an approximation of construction priorities, keeping in mind that opportunities to construct specific paths should always be taken when opportunity arises, regardless of the path's placement in this prioritization analysis.

[13] Unlike the on-road prioritization process, which incorporates a facility cost based on the various identified facility types, all paths are assumed to have the same unit construction cost.

Figure 4: Path Priority Tiers



4.4 Grade-separated crossings

A grade-separated crossing is an underpass, overpass, or bridge that allows motorized and nonmotorized traffic to avoid any interaction at street crossings or intersections. Grade-separated crossings are encouraged where paths and trails intersect major streets.

Grade-separated crossings should be required on new construction where major roadways cross a trail or path. When new drainage culverts are designed, the design should accommodate a path and trail and should consider the needs of bicyclists, pedestrians, and equestrians.

4.5 At-grade crossings

Where grade-separated crossings are not viable or necessary, at-grade crossings can be used.

4.5.1 Signalized at-grade crossings

In the absence of a grade-separated crossing, a signalized crossing should be considered if warranted. The *Manual on Uniform Traffic Control Devices* (*MUTCD*) provides warrants for the installation of traffic signals. Any of the warrants described in the *MUTCD* can be used for pathway / roadway intersections. When using vehicular warrants, however, only bicyclists should be considered as volume on the path. Alternatively, bicyclists can be counted as pedestrians for the application of the Pedestrian Volumes warrant.

4.5.2 Unsignalized at-grade crossings

In many locations and for many reasons, grade separation and/or signalization may not be feasible or warranted. There are several specific treatments that can be incorporated at designated crossings that will give path and trail users a greater sense of security, comfort, and convenience. These treatments are considerably less costly than grade-separated crossings. Two primary criteria are used to determine if a designated midblock pathway crossing may be appropriate at a given location:

- Roadway geometric characteristics:
    - sight distance
    - proximity to intersections
- Pathway user volumes converted to:
    - pedestrian delay represented by the additional distance the pathway user is required to travel to an intersection crossing.

If a designated midblock pathway or trail crossing is therefore determined to be the appropriate solution, specific intersection characteristics must be further evaluated to determine the appropriate crossing treatment(s). The intersection characteristics include:

- the number of lanes
- presence of a median
- motor vehicle travel speed
- traffic volume

Streets with many lanes, higher traffic speeds and higher traffic volumes would better accommodate bicyclists and pedestrians with the use of a greater number of design treatments such as:

- raised median
- pedestrian refuge
- ladder or continental style marked crosswalks
- staggered crosswalks or Danish offsets
- pedestrian crossing warning
- advanced pedestrian crossing warning signs
- yield to pedestrian signs
- advance yield lines
- appropriate pedestrian scale lighting
- experimental treatments and devices

4.6 Improving Existing Facilities

Scottsdale has a number of existing paths and bridges that were built prior to the Americans with Disabilities Act (ADA) and using a different set of guidelines than those in place today. These facilities should be evaluated for widths, slope, cross slope, access ramps, and other accommodation issues.

By 2009, the City shall complete an analysis regarding public restrooms in areas where commercial facilities are not available for use by business patrons. Items to examine include construction and maintenance costs as well as available alternatives.

5.0 EDUCATION, ENCOURAGEMENT, AND ENFORCEMENT

Education is an important element in increasing bicycling while improving safety. As discussed in *Section 2.2 Bicycle Crash Analysis*, educational and enforcement countermeasures can be effective in reducing the number and severity of bicycle/motorist crashes. Education goes hand-in hand with encouragement to increase cycling; together they improve skills and raise awareness. The greater the presence of bicyclists on the road, the more aware motorists will become.

5.1 City of Scottsdale "Bike Map"

Scottsdale's bike map provides guidelines for cyclists using on- and off-street bicycle facilities, along with information about existing bicycle facilities. The bike map is frequently updated providing a regular opportunity to update safety and educational information. The following information is on the current City of Scottsdale Bike Map (October 2006).

5.1.1 On-Street Bikeways – Share the Road

Ride defensively – prepare for the unexpected and plan alternative maneuvers to avoid conflict. Rules alone do not always protect bicyclists from injury. Be alert. Be visible. Be safe. Ride predictably.

- Obey traffic signals and signs – As a vehicle, bicycles must obey all the rules of the road. Cyclists have the same privileges and duties as other traffic.
- Use appropriate lane – Avoid being in a right turn-only lane if you plan to proceed straight through. Move into the through lane early.
- Beware of car doors – Be wary of parked cars. Motorists can unexpectedly open doors. Be sure your bike is a car door length away from parked cars.
- Use lights at night – Always use a strong white headlight, rear light and red reflector at night or when visibility is poor.
- Scan the road behind – Look over your shoulder to check behind you regularly and use a mirror to monitor traffic. Although bicycles have equal right to the road, be prepared to maneuver for safety.
- Ride on the right – Ride on the right with the flow of traffic. Never ride against traffic on the road, in a bike lane, or on a sidewalk.
- Turning left – two options – As a vehicle, signal your intentions in advance. Move to the left turn lane and complete the turn when safe. As a pedestrian, ride to the far crosswalk and walk your bike across.
- Use hand signals – Signal all turns and stops ahead of time. Check over your shoulder, then make your turn/stop when safe to do so.
- Make eye contact – Confirm that you are seen. Establish eye contact with motorists to ensure that they know you are on the road. Share the road in a polite and courteous manner.
- One person per bike – Riding double is only permitted when carrying a child in an approved carrier or when riding on a tandem bicycle.

5.1.2 Shared-use Paths

- Keep to the right on paths – all path users must keep to the right except when passing or turning left. Move off the path to the right when stopping.

- Signal to others – Cyclists, when approaching others, sound your bell or horn early, then pass safely on the left. Pedestrians, acknowledge with a wave when someone is overtaking.
- Right-of-way – Cyclists and in line skaters must yield to pedestrians. Pedestrians always have the right-of-way.
- Control your pet – Scottsdale ordinances require pets to be leashed while on the path and owners to clean up after their pets.
- Earphone dangers – Keep the volume sufficiently low to be able to hear other path users approaching.
- Merge correctly – Look both ways. Yield to through traffic at intersections.
- Respect nature – Do not disturb or feed wildlife. Keep to well established paths to protect habitats. Do not collect plant or animal material.
- Where to skate – Follow the same rules as cyclists. Ensure your stride does not cross the center of the path.
- Be visible – Outfit your bicycle with a headlight, rear light, and reflectors as you would for riding on the road.
- Flooded paths – Many of our paths are in flood channels. Do not enter when water is present.

5.1.3 Sharing the Trail

- Respect the land, stay on designated trails.
- Avoid wet or muddy trails. Save them for future trips when they are dry.
- When approaching horses, announce your presence, STOP, and ask if it is safe to pass, but don't make any sudden movement or noise that may cause a horse to spook.
- Don't cut switchbacks, take shortcuts, or create new trails.
- Keep to the right of the trail. Save the left for passing. Always announce your intentions when passing.
- Be aware of persons with disabilities and respectful of their needs. All users yield to persons with disabilities.
- Downhill traffic yields to uphill traffic. Listen for other trail users and stand off to the side of the trail to allow uphill users to pass.
- Slow down when sharing the trail. Adjust your pace when approaching other users. Travel at a speed appropriate for the conditions. Always travel at a speed that allows you to be in control.
- When in a group, travel single file and don't block the trail. Allow room for other users.
- Keep pets under control and/or on a leash when on a trail.

5.1.4 Theft Prevention

Most bicycle thefts are due to unlocked or improperly locked bikes. Following these tips will help prevent your bike from being stolen:

- Never leave your bike unlocked, not even for a few minutes.
- Always use a high quality U-lock, chain or cable.
- Always lock the frame and front wheel to either a rack or pole.
- For extra security, remove the front wheel and lock it with the frame and rear wheel.
- Register your bicycle with the Scottsdale police at www.ScottsdaleAZ.gov

5.2 Community Activities that Encourage/Promote Bicycling

Scottsdale has several programs and events in place to actively encourage or promote bicycling. Our B.I.K.E.S. program provides free bikes to City employees who agree to ride them to work. Handlebar Helpers is a community "earn a bike" and apprentice program that recycles bikes and trains young people in bike repair. Cycle the Arts and Bike to Work days promote and celebrate cycling in Scottsdale. The following are current cycling promotions and recommended additional methods to promote and encourage cycling.

5.2.1 Events

Cycle the Arts
Cycle the Arts is a uniquely Scottsdale annual family bike ride which tours part of Scottsdale's extensive public art collection with guides from the Scottsdale Cultural Council. The third annual Cycle the Arts event will be held in 2008.

Bike to Work Day
Bike to work is an annual event with employees riding approximately 4 miles to City Hall with elected Officials, Police Bike Unit members, and peers. Riders are eligible for prizes.

Safe Routes to School (Walk/Bike to School)
As an initial step towards a Safe Routes to School program, the City of Scottsdale encourages schools to participate in the annual Walk/Bike to School Day. At the 2006 and 2007 Walk/Bike to School Day events, coordinated with Grayhawk Elementary School, an estimated 75% of the students participated. The event is a partnership among City departments, school districts and parents, teachers, and school staff. The *Pedestrian Element and Policy Element of the Transportation Master Plan* encourage additional resources dedicated to this program to expand its scope and encourage more schools to participate Citywide.

Bike Rodeos
The City of Scottsdale Police bike unit, working with Scottsdale Unified School District, organizes several bike rodeos and safety presentations each year for school age children. An average of ten schools participate each year. Safety presentations and a bike obstacle course are provided for the students. Safety information brochures and booklets are distributed to all participants.

5.2.2 Educational/Promotional Opportunities

CityCable 11
There are several opportunities for educational and promotional announcements regarding cycling on the City of Scottsdale cable television station:

- Chief of Police weekly television show on the city's cable television show.
- Public service announcement on Arizona's three-foot passing law.
- Let's Get Moving Transportation program discusses transportation related topics including cycling.

Instruction
Local bike clubs, organizations and shops offer educational opportunities for adult cyclists with instruction by League of American Bicyclists members available.

Scottsdale Community College annually holds a course called Mountain Biking the Southwest which covers basic skills and techniques for mountain biking. The course includes bicycle maintenance techniques, trail etiquette, and safety considerations.

Through the Scottsdale Unified School District Parent/teacher handbook information on school guidelines for bicycle, roller blade, skateboard, and scooter use is provided to each student. The school district requires a signature from parents for each student affirming students received the handbook.

The City of Scottsdale webpage contains information on cycling, bicycling safety, bicycle registration, the City's Bike Map, and a Report a Problem feature which addresses routine bicycling issues.

Additional information about Scottsdale's current cycling activities and information are contained in the League of American Bicyclists application in *Appendix A*.

5.3 Enforcement

The Scottsdale Chief of Police has met personally with local bicycle advocates to discuss the concerns of cyclists in the community. Police officers get traffic law training in the Police Academy which includes bicycle laws. The City currently has nine officers and two sergeants assigned to the Scottsdale Police Bike Unit and Downtown squads.

Bicycle law enforcement can take any of several forms – citations, written warnings, verbal warnings, and positive reinforcement (to encourage and reward safe riding behavior). Enforcement plays an important role in enhancing overall traffic safety – this applies to all travel modes.

It is recommended that the City continue to coordinate an effective bicycle law enforcement program to enhance the safety of all users.

6.0 DETECTION OF BICYCLES AT TRAFFIC SIGNALS

This section addresses various issues related to detecting the presence of bicyclists at traffic signals and is augmented by information found in *Appendix I*. First, the general need for such detection is established by citing relevant portions of the *MUTCD*. Then this section discusses locations where detection strategies will need to be tailored to detect bicycles

6.1 Background

The detection of bicycles on the approaches of signalized intersections is an important provision in a bicycle transportation network for multiple reasons. First, the *MUTCD* requires traffic signals to be adjusted to consider the needs of bicycles.[14] Of equal importance is the fact that signals which cannot detect bicyclists impact both the safety of cyclists and the attitudes of motorists.

The *MUTCD* states:

> Standard:
> At installations where visibility-limited signal faces are used, signal faces shall be adjusted so bicyclists for whom the indications are intended can see the signal indications. If the visibility-limited signal faces cannot be aimed to serve the bicyclist, then separate signal faces shall be provided for the bicyclist.
>
> On bikeways, signal timing and actuation shall be reviewed and adjusted to consider the needs of bicyclists.

It is undoubtedly important for bicyclists riding on roadways to be able to see the traffic signals for their approaches. This discussion, however, focuses on the second part of the MUTCD standard, the requirement to review and adjust signal actuation in consideration of the needs of bicyclists.

Non-responsive signals, at which cyclists cannot get a green signal, can cause unsafe behaviors by cyclists. Bicyclists can be frustrated by traffic signals which will not detect their bicycles. Non-responsive signals can cause significant delays, and when delayed long enough bicyclists will typically ride through the red signal. While this is not an illegal behavior[15], it can contribute to cyclists choosing to disregard other signals which might actually be responsive to their presence. This conditioned disregard for signals can lead to crashes. Signals which do not respond to the presence of bicycles can also adversely affect motorists' attitudes toward bicyclists as followers of the rules of the road.

Traffic signals are usually installed because there are relatively high traffic volumes on both the main road and side street. This means that throughout most of the day, and most of the week, there is an adequate volume of motor vehicles on any particular approach to call the green signal. However, at some intersections, or during off-peak times (i.e., at night, in the early morning, on weekends) this may not be the case. In these situations, the signal detection

[14] *MUTCD*, Section 9D.02 Signal Operations for Bicycles, FHWA, Washington, D.C., 2003.

[15] **28-645. Traffic control signal legend. (ARS)** -- 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.

hardware should be configured so that bicyclists can be detected. The following identifies situations where the detection of bicyclists is an important consideration, how signal loops detect bicyclists, and how signalized intersections can be improved to consider the needs of bicyclists.

6.2 Important Locations for Bicyclist Detection

Just as detection of motor vehicles is not necessary for all movement approaches to signalized intersections, the same is true for the detection of bicycles. A discussion of which approaches may or may not need to be able to detect bicycles is provided below:

Through movements
Typically, signals along arterial roadways are programmed to “rest on green” for the arterial roadway. This means that if the signal hardware does not detect a vehicle on a side street approach, the signal facing the arterial roadway will remain green indefinitely. At other roadway intersections, however, signals are programmed for “automatic recall,” which gives each approach through movement a green signal every cycle, whether a vehicle is detected or not. On arterial roadways employing either of these two approaches to signal timing, it is frequently not necessary to be able to detect a bicycle (or any other vehicle) on some through movement approaches for the purposes of providing a green signal. Automatic recall is not the norm for travelers on non-arterial side streets. Consequently, if through-moving cyclists on a side street are not detected by the signal hardware, they will not receive a green light and will then likely treat the signal like a STOP sign type control. Therefore, on signalized intersections without automatic recall, the signal hardware should be adjusted to detect cyclists.

Right turn movements
In right turn lanes it may not be necessary to detect bicyclists; the ability to perform a right turn on red (RTOR) provides ample opportunity for bicyclists to turn. As was described earlier, during those time periods when traffic volumes on the cross street are so high as to prevent an RTOR, there is also likely to be detectable motor vehicle traffic on the approach the cyclist is using, sufficient to call the green light for that approach. If, however, there is a prohibition against RTOR, then the detection of bicyclists once again becomes an important consideration.

Left turn movements
On roadways with automatic recall, it may not be necessary for hardware to be able to detect bicyclists in left turn lanes that have a permitted or protected/permitted operation. This is for the same reasons as stated for the right turn lanes: under low volume conditions, the permitted left turn should provide adequate opportunities to turn and under higher volume conditions motor vehicles will likely be present to call the signal.

In those left turn lanes that provide for protected-only left turns the signal hardware should be able to detect bicycles; the same is true for left turn lanes on roadway approaches that are not set up for automatic recall.

Figures 5 and 6 below show those movements where the detection of bicycles is an important consideration.

Figure 5: Detection Considerations on Cross-Streets Without Marked Bike Lanes

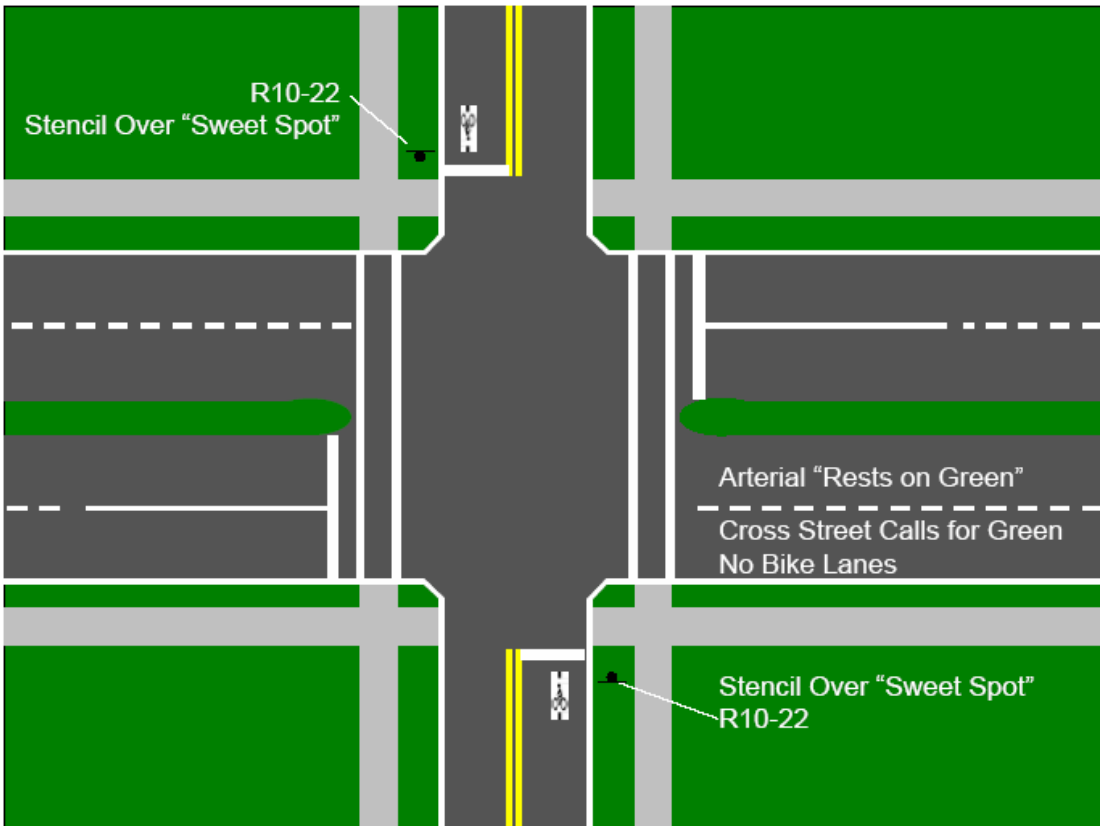
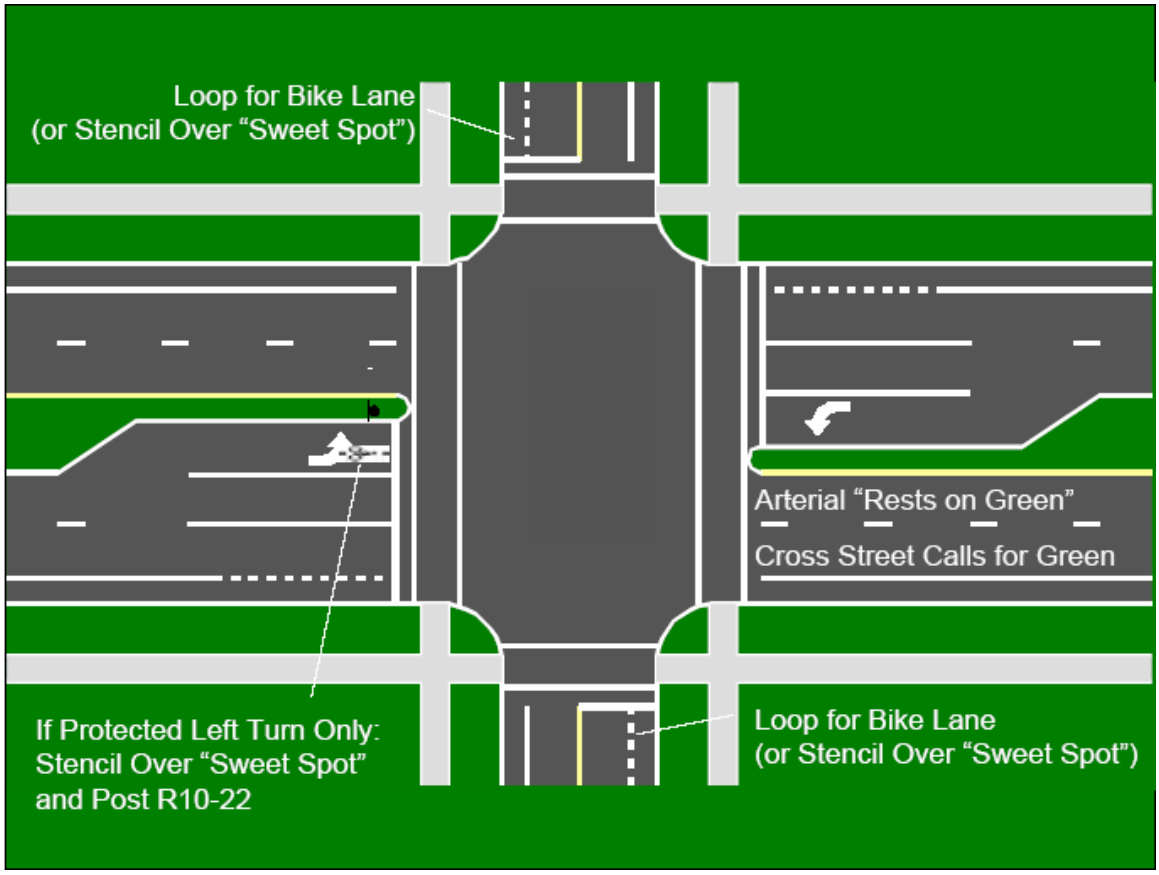


Figure 6: Detection Consideration on Cross-Streets With Marked Bike Lanes and Arterials With Protected Left-Turning Movements



Additional detailed information regarding bicycle detection is located in *Appendix I.*

7.0 BICYCLE TRAVEL DEMAND MANAGEMENT

Significant portions of this Bicycle Element advance the accommodation of bicycling in the transportation network's public right-of-way. However advanced this initiative, confined to the public rights-of-way, it is not enough for success in encouraging the use of the bicycle mode or enhancement of the City's aesthetic environment - it will fall short of its investment goals unless it is coupled with changes in Scottsdale's land use, "end of trip" provisions within the destinations of bicycling trips, and transportation choice programs. A quarter century of nationwide research, opinion and behavioral surveys, and Scottsdale's very own experience underscore this fact. Thus, bicycle mode encouragement, in the form of "end of trip" provisions, is outlined herein.

The two most common "end of trip" provisions cited in nationally prominent opinion surveys as influencing the choice to bicycle for transportation are bicycle parking and the workplace provision of locker/showers. In Scottsdale, the first is required in Scottsdale's Zoning Code, specifically **Article IX, Sec. 9.103. Parking requirements**, the second as an incentive in **Sec. 9.104. Programs and incentives to reduce parking requirements**. Observation of codes throughout the Phoenix vicinity, Arizona, and many metropolitan areas in the United States confirms that bicycle parking being required along with land development is increasingly prevalent. Minimal change is needed in Scottsdale's codes with respect to required amounts of bicycle parking (one U-shaped rack for every twenty auto spaces). However, workplace bicycle lockers, as well as change and/or shower facilities are not being constructed. It appears that the current incentives, which allow for up to a 5% reduction up to a maximum of 10 vehicular parking spaces, are insufficient. Thus there are two options: increase (or change) the incentives or mandate the facilities. It is recommended that by 2010 the City reassess the current incentives program and determine whether additional incentives, or more extensive mandates, should be developed.

8.0 WAYFINDING

The City of Scottsdale should develop a way-finding plan for bicycle and pedestrian networks. The existence of way-finding signage on paths and trails is an important amenity to users. Signage increases comfort, assists navigation, warns of approaching roadway crossings, and guides users through diverse environments. Its purpose is to direct people and provide information about destinations, directions, and/or distances. When applied on a regional level, way-finding can link communities and provide consistent visual indicators to direct bicyclists to their destinations along the route of their choice. Way-finding signage can achieve public objectives, such as promotion of community's attractions, education, mile marking, and directional guidance. A good way-finding system functions to achieve the following purposes:

- Help people find destinations from all travel modes.
- Establish clear pathways through the use of signs, maps, and other landmarks.
- Carry messages that are user-friendly and understandable.

People are the single most important component in developing a way-finding strategy. By identifying user patterns and destinations, way-finding users understand how the street or trail system operates and how to move through spaces and get directed to their destinations. In designing a wayfinding strategy or system, the following questions need to be considered:

- Where are the facility users going?
- What do the users or visitors want to see and hear?
- Is the goal navigation, directional information, orientation, location information, or interpretation?
- Who are the people who are going to use the way-finding system?
- Is a clear message being sent by the signage?

There are three general objectives in a way-finding signage system. When determining sign locations and messages, achieving these objectives should guide the way-finding plan.

1. **Get people to the paths or trails**
   Promote the trail system by linking people from the community to the neighborhoods. This promotes the trail system as both a destination to enjoy and a transportation route.

2. **Warn motorists that there may be pedestrians or bicycles on the roadway**
   Use cautionary and safety messages to increase motorists' awareness of pedestrians and bicyclists. Walking and bicycling are an important component of the transportation system and should be respected by other modes of transportation. However, since bicyclists are more vulnerable to injury in a collision with an automobile, motorists should pay particular attention to their presence and safety.

3. **Inform people how to get around the network**
   Guide bicyclists and pedestrians through the trail network, assisting their decision-making ability at intersections and decision points. Show a route or trail's role in larger network visually through maps. Utilizing a sign hierarchy can emphasize certain types of messages.

Information on the latest way-finding recommendations for bicycles from the National Committee on Uniform Traffic Control Devices (NCUTCD) can be found in *Appendix G*. Details on their recommendation for mile markers for paths and trails are in *Appendix H*. Both documents have been approved by the NCUTCD and are expected to appear in the next edition of the MUTCD. The most current versions should be used when they are available.

9.0 RECOMMENDATIONS

This section lists recommendations that will implement the goals and objectives of the Bicycle element of the Transportation Master Plan. Bicycle goals are found in *Section 1.0*.

9.1 Systematically Implement Bicycle Facility Projects

Identify projects for upcoming Capital Improvements Program (CIP) cycle using the priorities and Tier I, Tier II, and Tier III rankings of potential on and off street facilities. *Section 2.0 On-Street Bicycle Network* and *Section 3.0 Off-Street Bicycle Network* details the prioritization process and recommended projects can be found in *Appendices C, D and E*.

- Fund and implement a continuous north/south path from the Salt River to the Tonto National Forest.
- Fund and implement a continuous east/west path using the CAP Canal corridor.
- Pursue lane re-striping for on-street facilities.
- Implement enhanced bicycle/pedestrian corridors for identified streets in Scottsdale (Section 3.34)

9.2 Revise Terminology to Reflect National Norms

Scottsdale's City Code currently refers to off street paved facilities as "multiuse paths" (Chapter 17, Article IV, Division 3). However, the term "shared-use paths" has become the national standard, as evidenced by its use in the AASHTO *Guide for the Development of Bicycle Facilities*. For consistency, it is recommended that the City adopt the use of the term "shared-use path".

9.3 Develop a Bicycle Facility Way-finding Program

9.4 Create and Maintain an Inventory of Bike Racks at City-owned facilities

The latest design guidelines for bike racks should be used. The City should inventory and replace noncompliant racks at City owned facilities with inverted "U" style racks.

9.5 Develop a Bicycle Signal Recognition Implementation Program

9.6 Evaluate the Existing Path Network for ADA Universal Design and Issues

9.7 Improve Plan Review and Site Development Processes to Incorporate Bicycle Facilities and Accommodate the Needs of Bicyclists

9.8 Continue to Improve Scottsdale's Bicycle System Using the Following Measures

- Currently, 33% of City of Scottsdale streets with speed limits greater than or equal to 30 mph have on-street bike lanes. By 2015, this percentage should be increased to 50%; by 2030 90% of Scottsdale's streets with speed limits greater than or equal to 30 mph should have on-street bike lanes.

- Currently, there are no traffic signals on designated bicycle facilities with bicycle actuation in Scottsdale. By 2015, this percentage should be increased to 50%, and by 2030 all traffic signals should include some form of bicycle actuation.
- Sixty percent of Scottsdale GIS addresses are within ½ mile of a shared use path. By 2015, that percentage should increase to 75%, and by 2030 90% of Scottsdale GIS addresses should be within ½ mile of a shared use path.

9.9 Inventory Existing Trails and Trail Easements and Integrate Trails Information into the Shared use Path/trail System.

APPENDIX A: LEAGUE OF AMERICAN BICYCLISTS BICYCLE FRIENDLY COMMUNITY AWARD APPLICATION

City of Scottsdale

Recognized as a

Bicycle Friendly Community

by the

League of American Bicyclists

The League of American Bicyclists
Bicycle Friendly Communities Campaign
APPLICATION PART I

Name of Community:

City of Scottsdale

Mayor or top elected official in municipality:

Mary Manross, Mayor

Contact First Name:

Reed

Contact Last Name:

Kempton

Position:

Transportation Planner

Employer:

City of Scottsdale

Address:

7447 E. Indian School Rd., Suite 205

City:

Scottsdale

State:

AZ

Zip:

85251

Phone:

480-312-7630

Fax:

480-312-4000

Email:

rkempton@ScottsdaleAZ.gov

Website:

www.ScottsdaleAZ.gov

Population:

232,929

Square mileage of municipality, Total Area:

184.2 square miles

Square mileage of municipality, Water Area:

0.3 square miles

Square mileage of municipality, Land Area:

183.9 square miles

Population Density:

1266/mi

Average temperature for January:

53.7 °F

Average temperature for April:

68.9 °F

Average temperature for July:

91.00

Average temperature for October:

73.7 °F

Average precipitation for January:

1.10 inches

Average precipitation for April:

0.30 inches

Average precipitation for July:

1.00 inches

Average precipitation for October:

0.90 inches

Median Income:

$68,053

Age distribution, % under 20:

22.50 %

Age distribution, % 20 - 64:

60.90 %

Age distribution, % 65 - 84:

14.90 %

Age distribution, % 85+:

1.70 %

Race, % Hispanic or Latino :

13.00 %

Race, % Not Hispanic or Latino:

87.00 %

Race, % One race:

98.30 %

Race, % White:

91.40 %

Race, % Black or African American:

1.40 %

Race, % American Indian and Alaska Native: 0.70 %

Race, % Asian:

2.60 %

Race, % Native Hawaiian and Other Pacific Islander:

0.10 %

Race, % Some other race:

2.10 %

Race, % Two or more races:

1.80 %

If you have Journey-to-Work census data on bicycling to work, what percentage of people in your community bike to work?

1.74 %

How many households are within 1/4 mile of a retail or business area?

Most

How many neighborhoods have significant grass, flowers, and trees?

All neighborhoods in Scottsdale contain landscaping. The City prides itself on the quality of its landscape design, especially with the use of drought tolerant and native plant species. Grass and flowers are used sparingly due to water demand.

How many neighborhoods have significant amenities such as parks, water fountains, benches, and public art?

Most

How many neighborhoods in your community would you consider a good place to raise children?

All

Do you have a Bicycle Master Plan?

Yes

Do you have a written bicycle accommodation policy?

Yes

What was your community's most significant investment for bicycling in the past year?

Even though we completed several major on- and off-street bicycle/pedestrian projects, started a Safe Routes to School Program, and held our first community bike ride, our most significant investment in the past year was in our Capital Improvement Plan. We have programmed $48.2 million for bicycle and pedestrian projects for Fiscal Years 2008-2012. This is 19.2 percent of the $251 million funded by the Transportation Department.

List current community activities that encourage/promote bicycling.

Our B.I.K.E.S. program provides free bikes to City employees who agree to ride them to work. Handlebar Helpers, a community “Earn a Bike” and apprentice program recycles bikes and trains young people in bike repair. Cycle the Arts, an annual family bike ride with guides from the Public Art Program tours part of the City’s extensive public art collection. Several large, annual bike rides bring thousands of cyclists to our community. Programs promoting cycling appear on the City’s cable TV channel. Free bike maps are available at all libraries, community centers, and local bike shops. The City’s web site has a bikeways page with local information and a link to request a bike map by mail. The bike map can also be viewed on-line. Residents can register their bicycles with a special program operated by the Police Department. The City sponsors booths at local arts fairs, environmental festivals, and other events to distribute bicycle safety and promotional information. The City routinely holds “Bring Government to the People” events where staff goes door-to-door to

talk with residents about their neighborhoods, find out what their concerns are, and raise awareness of City services. Volunteers from the Transportation Department are always at these events with bike maps and flyers promoting upcoming activities. There is an annual Bike to Work event. Schools are getting involved with the Safe Routes to Schools program. Bicycling is promoted at all public meetings sponsored by the Transportation Department. Bicycle Friendly Community signs have been installed along bicycle facilities throughout the City.

List your official bicycle/pedestrian coordinator or bicycle issues contact person on government staff.

Reed Kempton

What department is the bicycle coordinator located in?

Transportation

How many hours are spent per year in this capacity?

2000

List all other government staff or contractors whose primary duties are devoted to bicycling issues.

Scott Hamilton - Trails

Do you have a Bicycle Advisory Committee, Ped/Bike Council or other venue for citizen input?

Yes

List the name of the Chair and their contact information.

Transportation Commission: Brian Davis, Chair - Staff contact is Rose Arballo 480-312-7650.

The League of American Bicyclists

Bicycle Friendly Communities Campaign

APPLICATION PART II

ENGINEERING

Do you have a policy that requires the accommodation of cyclists in all new road construction and reconstruction and resurfacing? Please include a copy of this legislation or policy.

Yes.

The 1994 *City of Scottsdale Bicycle/Pedestrian Transportation Plan* established policies that integrated bicycle accommodations with road construction and reconstruction projects. The plan was submitted with our 2005 Bicycle Friendly Community (BFC) application.

The *City of Scottsdale Design Standards and Policies Manual* (DSPM) specifically includes bikeways as a component of all public and private project proposals. The DSPM, updated annually, identifies bike lanes as a standard in roadway cross-sections and includes a bikeways chapter that provides details on bicycle facilities. The relevant pages are in the process of being updated. The most recent versions were submitted with our 2005 BFC application.

The *City of Scottsdale Streets Master Plan*, adopted by City Council in October 2003, recognizes that streets are important for pedestrians, bicyclists, equestrians, and transit riders (Goal C). Bicycle lanes are a standard element in all street classifications larger than a local street when new streets are built or existing streets are improved. The document includes design standards and cross sections that provide for bicycle lanes. A copy of the document was submitted with our 2005 BFC Application.

Currently, staff evaluates the potential for including bike lanes on all slurry and restriping projects. The City is in the process of developing a comprehensive Transportation Master Plan that will include a bicycle element that will provide an update to the 1994 bike plan. This element features bicycle latent demand analysis, bicycle level of service calculations, facility gap identification, collision studies, pavement restriping guidelines, and a methodology for ranking projects.

2. Have you provided training for your engineers and planners on how to accommodate cyclists? Please describe.

Yes.

Many of the engineers and planners have extensive bicycle accommodation experience. Three members of the transportation planning staff, including the general manager, worked for other agencies as bicycle coordinators. They attend and are frequently presenters at a variety of national and local conferences and training courses. Informal training takes place on a routine basis as a component of the project design and review process. Relevant journal articles, surveys, opinion pieces, and other documents are circulated throughout the department. Cost effective training opportunities are explored as they become available. Staff is routinely given the opportunity to attend live web conferences such as those presented by the American Society of Civil Engineers (ASCE) and the Institute of Transportation Engineers (ITE). Many participated in a recent national web seminar on complete streets held by the American Planning Association.

Is there a mechanism to provide training on an on-going basis?

Yes.

3. How many bridges are in your community?

63.

How many are closed or inaccessible to cyclists?

None.

Of those accessible by bike, how many have shoulders, bike lanes, wide curb lanes, or sidewalks/walkways?

All.

4. Do you have a bike parking ordinance? If yes, please include a copy of your ordinance.

Yes. A copy of the document was submitted with our 2005 BFC Application.

5. Are there bike racks or storage units at:

Schools:	All
Libraries:	All
Transit stations:	All
Recreation centers:	All
Government buildings:	All
Office buildings:	Most
Retail centers:	Most
Public spaces and parks:	All

6. If your community has transit service:

a. Are buses equipped with bike racks?

Yes. All are equipped with bike racks.

b. Can bikes be brought inside transit vehicles?

Yes, at the discretion of the bus driver.

7. How many miles of bike lanes do you have?

95 miles.

How many miles of bike lanes are in your bicycle master plan?

The 1994 City of Scottsdale Bicycle/Pedestrian Transportation Plan identifies 244 miles of on-street bicycle facilities. The plan does not specify the type. The Bicycle Element of the Transportation Master Plan will be more specific.

What is the mileage of your total road network?

900 miles

8. What percent of arterial streets have bike lanes or paved shoulders?

29 percent

9. How many miles of designated bike routes do you have?

50 miles

How many miles of signed bike routes are in your bicycle master plan?

The 1994 City of Scottsdale Bicycle/Pedestrian Transportation Plan identifies 244 miles of on-street bicycle facilities. The plan does not specify the type. The Bicycle Element of the Transportation Master Plan will be more specific.

10. Please describe any maintenance programs or policies that ensure bike lanes and shoulders remain usable.

a. Routine maintenance

All major streets are swept weekly. Downtown streets are swept three-times weekly. The street resurfacing schedule is posted on the City web site. The City web site also features a comprehensive “Report a Problem” page with links to 11 major areas that include “Streets and alleys, Streetlight and Traffic Signal Maintenance” and “Traffic Engineering, Sight Obstructions and Parking Issues.” The City also sponsors an EYES On-line Program (Employees Yielding Effective Savings) encouraging City employees to report any problems they see. All participants are entered in monthly prize drawings.

b. Capital improvements

The pavement condition of all streets is monitored through the use of a GIS-based pavement management system. Streets are maintained in excellent condition and rebuilt when necessary. Details for all capital improvement projects are available on the City web site.

11. Please describe initiatives your community has taken to ensure or improve bicycle access, safety and convenience at intersections, including bicycle detection, signing and marking.

Whenever possible, grade-separated bicycle/pedestrian facilities are constructed to help people cross major streets. Our system provides 72 crossings under streets, 5 crossings over streets, and one crossing over a freeway. There are eight bike/ped crossings over canals. The City has installed 11 pedestrian refuges and two raised pedestrian crossings on collector streets and have more in design. All signing and marking is done in compliance with the Manual on Uniform Traffic Control Devices (MUTCD). Four new grade-separated crossings are included in our current Capital Improvement Plan. Bicycle detection is being addressed in the Bicycle Element of the Transportation Master Plan.

12. How many miles of paved or hard surface trails (e.g. asphalt, concrete, crushed rock) do you have?

61 miles of paved paths

How many miles of paved or hard surface trails are in your bicycle master plan?

91 miles

13. How many miles of natural surface (singletrack) do you have?

238 miles

What is the total mileage of natural surface trails that are open to mountain bikes?

236 miles. One section of trail features a very steep climb to the top of a peak. Bike racks are available at the base of the ascent.

14. What is the estimated acreage of open space and public lands within the community (city, county, state, and federal public lands)?

Scottsdale City parks = 999 acres
Scottsdale City preserve = 34,324 acres
Immediately adjacent to Scottsdale's borders are:
- Phoenix Papago Park = 1200 acres
- Phoenix Reach 11 Recreation Area = 1,500 acres
- Tempe Canal Park = 40 acres
- Tempe Papago Park = 296 acres
- Tempe Indian Bend Park = 8 acres
- Maricopa County McDowell Mountain Park = 21,099 acres
- Tonto National Forest = 3 million acres

Are these areas open to cyclists?

Yes.

15. Please describe maintenance programs or policies for your Multi-use Paths.

a. Routine maintenance

The City has one full-time employee who inspects and sweeps the paved path system. Paths are inspected weekly and swept monthly with a path-sized sweeper. A second full-time position and an additional sweeper have been approved for the next fiscal year. Path users can notify the City of problem areas through the City web site.

b. Capital improvements

Bicycle and pedestrian projects account for 19 percent of the Transportation Department's Five-year Capital Improvement Plan (CIP), a $48.2 million investment in these modes for Fiscal Years 2008-2012. This includes 16 miles of new/improved path construction and four new grade-separated

structures. In addition, the City has identified a total of $7.5 million for trailhead and connecting trail improvements associated with the McDowell Sonoran Preserve.

Recently completed projects include a 1.5 mile segment of the Pima Path that was widened from 8 to 10 feet with a new bridge over Via de Ventura. This closed the final gap in a 9-mile corridor. 3.5 miles of new paths were constructed in Northsight, CAP Basin, and Indian School Parks. A new bike/pedestrian bridge was built over the Arizona Canal at the 82nd St. alignment. A new path and bike lanes were included with the 96th St. reconstruction. Several large box culverts were installed with roadway projects to provide future grade-separated crossings when the path system is extended into those areas. The Lost Dog Wash Access Area with 100 passenger vehicle spaces, 20 horse trailer spaces, bike racks, restrooms, ramadas, hitching rails, and water troughs was recently finished. Other Preserve improvements include the Windgate Pass, Bell Pass, Paradise, Prospector, Windmill, and Gateway loop trails.

Another recent project is along 96th St. from Shea Blvd to Sweetwater Rd. 96th St. One-third of this corridor was a typical street with four travel lanes and a center two-way left turn lane. One-third was three lanes and one-third was two lanes. Traffic volumes were much less than designed capacity. Two miles of the street were fully reconstructed with two travel lanes, bike lanes, landscaped medians, and center lane street print where left turns are permitted. The edges feature sidewalks or a paved shared-use path on one side and an unpaved, stabilized decomposed granite trail on the other. Two modern roundabouts accommodating bicycle facilities were installed at collector street intersections.

Transportation projects completed in the past two years include:

- 96th Street: Shea to Sweetwater – bike lanes, multi-use path and trail (2 miles)
- 82nd Street and Arizona Canal – bicycle/pedestrian bridge over Arizona Canal
- Hayden Road: Cactus to Redfield – bike lanes (1 mile)
- Hayden Road: Pima Freeway to Thompson Peak Pkwy – bike lanes, grade-separated crossing (1.25 miles)
- Hayden/Miller Road: Deer Valley to Pinnacle Peak – bike lanes (1 mile)
- Hayden and McDonald intersection grade-separated crossing
- Pima Path at Via Linda – bicycle/pedestrian bridge and new path (1.5 miles and completed final gap in 9-mile corridor)
- Scottsdale Road: Indian Bend to Gold Dust – bike lanes (2.75 miles)

16. Does your community have an ordinance or local code requirement for employers to provide bicycle parking, shower facilities, etc.? If yes, please describe or include a copy.

Yes. The City of Scottsdale enforces a bicycle parking ordinance, adopted in March 1995, that encourages the use of bicycles (Sec. 9.101.4). The code states that every land use where 40 or more auto parking spaces are required must provide bicycle parking at the rate of one space for every ten auto spaces. Outside the downtown area, a minimum of four bicycle parking spaces are required regardless of the number of auto spaces required. Inside the downtown area, the City may provide bicycle parking in the public rights-of-way (Sec. 9.103.B). The number of required auto parking spaces may be reduced by providing additional bicycle parking, high security bicycle parking spaces, lockers, showers, and changing facilities (Sec. 9.104.C.) Standards for locating the bicycle parking are also provided (Sec. 9.106.A.2 and Sec. 9.106.B.2). A copy of the document was submitted with our 2005 BFC Application.

17. Please describe recreational facilities for cyclists such as low traffic rural roads and signed touring routes.

Pima Path/Route Corridor

The Pima Path is a unique combination of bike routes and paths that provides nearly nine miles of bicycle facilities along a north/south corridor. About eight miles of Pima Road lies on the border between the City of Scottsdale and the Salt River Pima-Maricopa Indian Community. Scottsdale developed in this corridor as primarily residential with only arterial street access to Pima Road. Tribal land along Pima Road is currently being developed as primarily commercial. By providing short sections of pathways near the arterial intersections, Scottsdale was able to connect the residential access roads parallel with Pima Road for use by bicyclists and pedestrians. This facility crosses and connects with the Indian Bend Wash Path and the Sun Circle Trail. A major section of this corridor has just been rebuilt with a widened path and a new bridge over Via Linda.

Hidden Hills

Hidden Hills is a gated community with a public trails easement over the primary street to provide bicycle/pedestrian access between Scottsdale and the Town of Fountain Hills. The gates on both ends of the street are offset to allow bicycles to move through them without dismounting.

18. Are there other facilities that have been created to promote bicycling in your community? If yes, please describe.

Yes.

Indian Bend Wash

Scottsdale's Indian Bend Wash is much more than just a few miles of path. This greenbelt is one of the nation's most well-known flood-control projects. Seven and a half miles of parkland provide lakes, golf courses, many recreational facilities, and an extensive multi-use path system for skating, biking, walking, and jogging. The wash was once an eroded eyesore running through the center of the community. The details of how this project was developed can be found on-line at http://www.ci.scottsdale.az.us/Parks/_docs/IndianBendWashBook.pdf

Residential properties, attractive shopping centers, resorts, and schools now line the slopes of the wash. Scottsdale has made the Indian Bend Wash greenbelt an integral part of its outdoor lifestyle. Due to the City's linear shape, about 80 percent of Scottsdale's citizens are within walking distance of the Wash. Estimates are that one million people make use of the greenbelt annually. The Wash has attracted residential and commercial activity that thrive on the traffic generated around and through the area.

Thomas Road Bike Stop

There are many places to stop and rest along the City's pathway system. The Thomas Bike Stop, however, is large enough to be classified as one of Scottsdale's city parks. Located on Thomas Road at the northern end of Eldorado Park along the Indian Bend Wash Multi-use Path, this one-acre "rest stop" has picnic areas, one large ramada, two small ramadas, and a restroom.

Portals and Loops

A nonprofit organization with membership from the cities of Scottsdale, Phoenix, and Tempe, the Papago Salado Association promotes and facilitates the implementation of paths and facilities along the "Papago Salado Trail." This series of facilities passes through the cities of Scottsdale, Tempe, and Phoenix along the Salt River Project (SRP) canals. The Papago Salado Association acknowledges and preserves the unique and vital presence of SRP's infrastructure of canals and paths within the fabric of the three cities. SRP has provided three interpretive sites, one in each city, along their canal banks. In 2004, the mayors of Scottsdale, Tempe, and Phoenix, council members of each community, the president of SRP, and members of SRP's Board of Directors, dedicated the first of the three interpretive sites. The City of Scottsdale has two major projects in this corridor. Work has just begun to rebuild and upgrade a tunnel under McDowell Road and widen a one-mile section of path from 8 to 10 feet. A design project has begun that will continue the path along the Crosscut Canal north to connect with the Arizona Canal.

EDUCATION

1. How do you educate motorists to share the road with cyclists? Please describe.

Community motorists are reached through a variety of educational formats. Bike Lane, Bike Route, Share the Road, and Bicycle Friendly Community signs are used throughout Scottsdale to remind motorists to expect bicyclists on our streets.

Bicycling is a regular topic on the Chief of Police's weekly television show on the city's cable television channel. Members of the Coalition of Arizona Bicyclists (CAzB) have been Chief Rodbell's guests and officers from the Scottsdale Bike Unit have appeared to demonstrate bicycle safety.

In cooperation with the City of Scottsdale, CAzB developed a Public Service Announcement on Arizona's three-foot passing law. The PSA gets regular airing on Scottsdale's Channel 11 and was distributed to other agencies around Arizona for their use. CAzB representatives have also appeared on the Transportation Department's Let's Get Moving program to talk about bicycle safety and new legislation.

The Transportation Department holds many public meetings each year on a wide range of transportation related projects and programs. An Arizona version of "Street Smarts" and the Scottsdale Bike map are made available at these meetings.

How many community motorists do you reach with these efforts?

Most

2. Are there other bicycle education opportunities for adults? Please describe.

Local bicycle clubs, organizations, and shops offer educational opportunities for adults. CAzB arranges for facilities and provides instruction by LAB certified instructors on a regular basis.

Scottsdale Community College offers a course titled Mountain Biking the Southwest. The course covers basic skills and techniques for mountain biking and the application of these to mountain biking as a recreational and lifetime activity in the southwest. The course includes bicycle maintenance techniques, trail etiquette and safety considerations.

Do you have a bicycle safety program for children in schools?

Most.

How many schools participate?

10 of 27 each year

Bike Rodeos

The City of Scottsdale Police Bike Unit, working with the Scottsdale Unified School District, organizes several bike rodeos and safety presentations each year for school age children. An average of ten schools participate each year. The rodeos include a safety presentation and a bike obstacle course for the students. CycloCat's Guide to Bike Safety is given to all participants. A copy of the guide was included with our original application.

Parent/Student Handbook

Each Scottsdale Unified School District school provides a Parent/Student handbook that requires a signature from the parents for each student. The handbooks contain the following information on bicycles:

BICYCLES/ROLLER BLADES/SKATEBOARDS/SCOOTERS

1. In the interest of safety, children must be in fourth grade in order to ride the above mentioned items to school. Children in K-3 grades will not be permitted to bring these items on campus. Parents who wish to take exception to this rule need to contact the school office and set up an appointment to discuss this with the administration. It is strongly recommended that helmets be worn as students ride to and from school.

2. Bicycles must be parked in designated areas. A bicycle may only utilize one space in the bike rack. The bike racks will be locked while school is in session.

3. Bikes are to remain in the bike area during the school day. Bikes are not allowed in the main section of the campus for any reason.

4. Students must lock their bicycles while they are in the designated areas. Neither the district nor its employees are responsible for damage to or theft of any bicycles.

5. Students must observe the following safe riding habits:

One rider per bicycle.
Use bike lanes coming to and from school.
Ride on the right side of the street.
Use crosswalks when crossing the street and walk all items listed above while in crosswalks.
Obey crossing guards.
Students must walk all items listed above while on campus.

6. District policy states that bicycles, roller blades, scooters, and skateboards are not to be ridden on campus at anytime. This includes the parking lot as well.

4. What other types of bicycle safety and education opportunities are available for children? Please describe. How many children participate?

CycloCat's Guide to Bike Safety

This children's guide to bike safety is given out at bike rodeos, safety presentations, Public Safety Day events, and other community functions.

Bicycle Safety Education Campaign

Valley Metro developed a strategic marketing, community outreach, education and communications plan for a bicycle safety education campaign for Maricopa County. This included advertising elements, public relations strategies, community outreach programs, and education initiatives. The primary objectives of this plan are to motivate people to wear safety helmets and ride on the right side of the road, communicate the risks involved when people do not wear helmets, and reduce the number of bicycle-related injuries. A Bicycle Safety Education Stakeholders Group was organized to bring MAG agencies, health care professionals, and bicycle safety experts together to implement the plan.

The plan includes:

Bicycle Safety Education Curriculum for School Outreach
Activity materials for use in presentations for school children
"Put a Lid on your Kid" guide for parents
Presentation tools such as "brains" that show the potential injury to the head and brain
Giveaway items
Train-the-trainer workshops (Agencies can get free bike helmets for participating in the workshops. Scottsdale is giving away 100 children's helmets from this program at the next Cycle the Arts bike ride.)
Event booths
Marketing programs

Helmet Contest

Maricopa County area public and private schools, along with Phoenix Children's Hospital and the SAFE KIDS Coalition of Maricopa County, have developed a partnership with the professional baseball team in Phoenix, the Arizona Diamondbacks, to promote helmet use through a school-based contest. The program takes place every spring. In March, more than 1,800 packets are mailed to school principals and art teachers in the county who receive a letter on Arizona Diamondbacks letterhead announcing the contest. They are asked to distribute the materials including a blank drawing of a helmet to the students in 4th-6th grades. Students are instructed to create a helmet design using the official Diamondbacks colors. A panel of judges selects the five finalists and then during a home game, the fans at a Diamondbacks game pick their favorite helmet design to select the winner. More than 3,400 students entered the contest in 2000 and each year the number increases. The winner and his/her classmates are given free tickets to a Diamondbacks game, and during an on-field ceremony prior to the game, one of the Diamondback ballplayers presents the winning student with the Helmet Coloring Contest trophy.

"Helmet Your Brain - Avoid the Pain"

This is a free educational kit designed for teachers, youth leaders, health professionals, and parents to teach children, especially those between 8 - 12 years old, the importance of wearing a helmet. The "Helmet Your Brain Avoid the Pain" program is sponsored by the Maricopa County SAFE KIDS Coalition. Barrow Neurological Institute® of St. Joseph's Hospital and Medical Center, a partner member of the SAFE KIDS Coalition, helped develop the kit in conjunction with the Coalition.

The "Helmet Your Brain Avoid the Pain" kit includes:

Easy-to-follow lesson plans with interactive activities
Models of the skull and brain
Brain JELLO mold

Video tapes from SAFE KIDS and Bill Nye "The Science Guy"
Reproducible parent and student handouts

5. Do you make bicycle safety materials available to the public? Please describe.

Yes. The City of Scottsdale Bike Map and the regional bike map from the metropolitan planning agency, Maricopa Association of Governments (MAG), include safety information. Both are distributed free of charge and are regularly updated and reprinted.

Bicycle safety information is available on the Scottsdale web site and links are provided to the ADOT Bicycle/Pedestrian program and other related sites. Also available from ADOT and distributed free through a variety of sources in Scottsdale are Arizona Bicycle Street Smarts and Share the Road: A Guide for Bicyclists and Motorists. Copies were included with our original application. The local newspaper publishes a monthly bike safety article furnished by CAzB. The CycloCat activity booklets are handed out at rodeos and presentations.

Time to Recreate, a show on the City's cable network, recently presented a segment featuring the City's shared-use path system and how to use it safely.

6. Do you have a bicycle ambassador program that educates community members on local opportunities for bicycling and answers their questions?

The City works closely with the Coalition of Arizona Bicyclists (CAzB) to promote bicycling in our community. CAzB members attend public meetings to discuss bicycle issues with residents, teach LAB cycling courses, and encourage our political leaders to support bicycling programs.

7. Do you have League Cycling Instructors in your area? Please list active instructors.

Donald Randolph, LCI #: 191, Scottsdale, AZ
Richard Lorance, LCI #: 687 C K, Tempe, AZ
Douglas Hawley, LCI #: 361 K C, Mesa, AZ
Gene Holmerud, LCI #: 1193, Phoenix, AZ
Radar Matt, LCI #: 633, Phoenix, AZ
Sharon Newman-Matt, LCI #: 1427, Phoenix, AZ
Kathryn L. Mills, LCI #: 1194, Phoenix, AZ
Richard Moeur, LCI #: 266 C, Phoenix, AZ
Brian H. Nelson, LCI #: 1195, Phoenix, AZ
Michael Sanders, LCI #: 1428, Phoenix, AZ
Gerald Stanley, LCI #: 1525, Phoenix, AZ
Jay Stewart, LCI #: 1196, Phoenix, AZ
Robert Ward, LCI #: 1430, Phoenix, AZ
Heather Fowler, LCI #: 812 K C, New River, AZ
Edwin Cure, LCI #: 1192, Glendale, AZ

8. Is bicycle safety education included in routine local activities (e.g. tax renewal, drivers licensing and testing, or inserts with utility bills each month)? If so, please describe.

The Scottsdale Police Department bicycle registration program is advertised in utility bills and on the City's web site.

The following information is included in the Arizona Drivers License manual, available in print and on-line versions.

Sharing the Road With a Bike

Bicyclists must obey the same traffic laws as drivers of motor vehicles, and they have the right-of-way under the same conditions as motorists.

Motorists should be alert for bicyclists along the roadway, because cyclists are often difficult to see. Extra caution is necessary. Motorists are required to allow a minimum safe distance of 3 feet when passing a bicycle traveling in the same direction.

At night, you should dim your headlights for bicyclists.

Drivers should be prepared for a bicyclist swerving.

Although bicyclists must ride with the flow of traffic and stay near the right side of the road, they can legally move left for several reasons, such as:

Turning left
Avoiding hazards
Passing pedestrians or vehicles
If the lane in which the person is operating a bicycle is too narrow for bicycle and motor vehicle to travel safely side by side

Important rules for bicyclists:

Do not carry more persons than the design of the bicycle permits

Do not ride more than two side-by-side

Ride as near to the right side of the road as possible

Use proper hand signals (See Signaling on Page 34)

Do not bicycle under the influence of drugs or alcohol — it is illegal

When riding at night, have a white headlamp visible from 500 feet, and a rear reflector

ENCOURAGEMENT

How do you promote National Bike Month in May (or another month)? Please describe.

Every month is Bicycle Month in Scottsdale! With no snow, 7.74 inches of rainfall, and 314 days of sunshine each year, bicycling is an activity enjoyed regardless of the season. Even summer days provide cool, comfortable temperatures for that morning ride.

In April each year, Scottsdale participates with Valley Metro, the regional Clean Air Campaign, and other Valley communities to promote Valley Bike Month and Week. In 2004, 73,200 commuters in the region chose to ride their bicycles to work one day a week or more instead of drive. Every year, thousands of riders participate in region-wide bicycle events during April and May. A major partner in the Bike Month program is the Arizona Diamondback baseball team. Each year they arrange for a player to participate in a safety campaign that features helmets, bike safety, riding on the right, or something similar. A special ride, *The Great Bike Chase*, to a major league ballgame at Chase Field, will have nearly 2000 riders.

In 2006, the City of Scottsdale sponsored the first annual Cycle the Arts ride, a family-fun bike ride demonstrating public art in our community. About 50 riders joined neighbors, city staff, and local art experts for a short, 8-mile bicycle ride and an up close look at local public art installations. The event began at the Paiute Neighborhood Center and included downtown Scottsdale, the Civic Center, and the Indian Bend Wash. Before and after the ride there were fun activities for kids of all ages that combined bicycles and art. In addition, cyclists brought non-perishable food items for donation for the Vista del Camino food bank. The 2007 event will take place May 6 and free bike helmets will be given to the first 75 children to sign up.

How many people do you reach with events and activities during this celebration?

Valley-wide, thousands of people will participate in regional and local events promoting the fun, healthy benefits of cycling. Estimations are that more than 100,000 people will be directly exposed to some form of print media and millions will be exposed to an assortment of television, radio, newspaper, and web based promotional items.

3. Do you actively promote Bike to Work Day or other bicycle commuting incentive programs? Please describe.

Yes. We actively promote Bike to Work Day and other bicycle commuting incentive programs. Through the regional marketing efforts of Valley Metro, the Maricopa County mandatory employee trip reduction program, and other promotional opportunities, nearly all of the community's workforce gets information about bicycling as a viable alternative for trips to work.

The City sponsors a Bike to Work Day ride to City Hall. Each year, participants ride 4.5 miles with elected officials, Police Bike Unit members, and other City staff. Riders are provided incentives and are eligible for prizes.

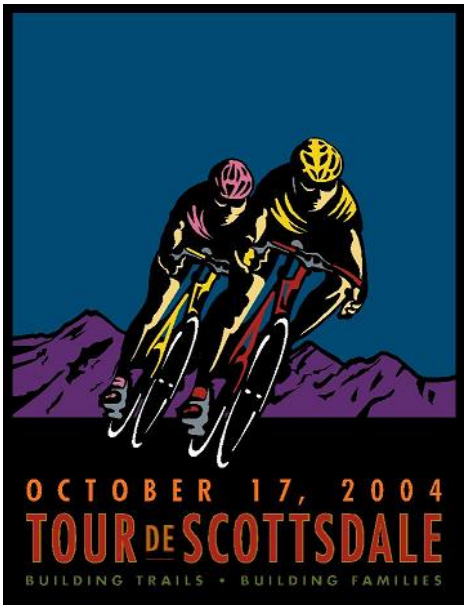
The City of Scottsdale has its own incentive program where employees can earn bicycles just by riding them to work. B.I.K.E.S. (Bicycle Incentive and Keen Efforts for Scottsdale) uses bicycles from the Handlebar Helper program. Employees enter into an agreement with the City to use, at no cost, a reconditioned bicycle for commuting to and from work. The participant agrees to ride at least 20 days in six months, wear a helmet, and ride safely.

What portion of the community workforce do you reach?

Most

4. Is there an annual bike tour or ride promoted to the general public in your community? Please describe.

The following events are annually promoted and take place in Scottsdale:



Cycle the Arts: Guided Tour of Public Art installations. Free.

Scottsdale Police Bike Unit Ride: Tour; Admission is a can of food for the Vista del Camino Community Center. Route utilizes the Indian Bend Wash Path.

Tour de Scottsdale: Timed Event; DCB Adventures; Begins and ends in Scottsdale. Proceeds benefit the City's trail program. Distance of 67 miles.

El Tour de Phoenix: Timed Event; Perimeter Bicycling Association of America; Begins and ends in Mesa. Route includes Scottsdale, Maricopa County, Fountain Hills, and Tonto National Forest. Despite the name, the ride does not pass through Phoenix. Distance options of 70 and 25 miles.

Answer to the Challenge: Tour; GABA; Begins and ends in Scottsdale. Three-day event covering 325 miles with 22,000 feet of vertical climbing.

Memorial Ride for Safety: Tour; Coalition of Arizona Bicyclists; Begins and ends in Scottsdale. Route goes through Carefree and the Tonto National Forest. Distance options of 60 and 35 miles.

Tandem "Rally in the Valley": Tour; Arizona Bicycle Club; Various routes traveling through Scottsdale, Paradise Valley, and Phoenix. Distance options vary.

Sun Festival Southwest: Tour; Sun Festival and Arizona Bicycle Club. Sun and fun filled educational weekend celebrates, generates, and demonstrates renewable energy and healthy living for the entire community. Distance options vary.

McDowell Century: Tour; Arizona Bicycle Club; Begins and ends in Scottsdale. Distance options of 100, 65, and 30 miles.

The following events are annually promoted in Scottsdale but may take place in neighboring communities:

MS150 Best Dam Bike Ride: MS Society.
Tortilla Flats Ride: Arizona Bicycle Club
Casa Grande Century: GABA Phoenix
Laveen Country Challenge: Laveen Lions Foundation
Arizona Senior Olympics
Le Grande Tour: Arizona Parks and Recreation Association
Gila Valley Tour: ABC
Around the White Tanks: GABA West Valley
Tour de Cure: American Diabetes Association
Desert Classic: ABC
Palo Verde Nuclear Century: GABA West Valley
Tour de Farm: H304 Charities
The Great Bike Chase: Valley Metro

This year Scottsdale will again host the Arizona State Criterium Championships during April. This is a USCF event featuring Arizona's best bicycle racers.

In March 2007, NORBA will host a national mountain bike race in Maricopa County McDowell Mountain Park adjacent to Scottsdale.

5. Are there community road or mountain bike clubs, bicycle advocacy organizations or racing clubs? Please describe.

Many bicycle organizations are located in Scottsdale or frequently stage rides in the City. They include:

Coalition of Arizona Bicyclists, advocate organization
ABC – Arizona Bicycle Club
Pinnacle Peak Chapter
Scottsdale – Frank Lloyd Wright Chapter
Scottsdale – Via Linda Chapter
Bull Shifters Bicycling Club
GABA – Greater Arizona Bicycling Association
Phoenix Metro Bicycle Club
MBAA – Mountain Bike Association of Arizona
BRAG – Bent Riders of Arizona Group
Arizona Bicycle Bunch
RideAZ – Arizona Mountain Bike Riders
Red Mountain Cycling Club
Arizona Outdoor Travel Club

Racing clubs located in Scottsdale include:

Bicycle Ranch
Camelback Cycling Club
Notre Dame Preparatory HS Cycling
Racelab U-23 Cycling Team
San Tan Racing
Strada Racing Club
Team One Racing

Racing clubs training in Scottsdale include:

Team Ace Asphalt/Corsa Bicycle
White Mountain Road Club
Nova Youth Cycling League
HLHAP

Sonoran Cycling
Tribe Racing
Patent It! Cycling Club
Swiss American Bicycle Club
Azphalt Cycling
Construction Zone, The
ECFA/Honeywell
G.S. Tifosi
Mountain Velo Cycling Team
Phoenix Consumers Cycling Club
Team Vitesse
Arizona State University

6. How many specialty bicycle retailers (i.e. bike shops, not big box retailers like K-Mart or Wal Mart) are there in your community?

There are 20 bicycle shops located in Scottsdale.

7. Are there other bicycling areas or facilities such as BMX tracks, velodromes or mountain biking centers in your community?

There are BMX tracks located nearby in Phoenix, Chandler, and Queen Creek. Competitive mountain bike singletrack courses are located in several of Maricopa County's regional parks. McDowell Mountain Regional Park, adjacent to Scottsdale, annually hosts a national NORBA event.

8. Does your trails system have a unit of the National Mountain Bike Patrol? Patrollers inform, assist and educates mountain bikers and other trail users.

The Preserve has a local mountain bike patrol unit that is not currently affiliated with the National Mountain Bike Patrol.

9. Are there opportunities to rent bicycles in your community or other recreational opportunities involving bicycling? Please describe.

Yes. There are 11 locations advertising bicycle rentals. In addition, many of the local resorts make bicycles available to their guests.

10. Do you have Safe Routes to School program that includes bicycling?

Yes.

Scottsdale's school transportation safety program involves proactive school site transportation audits to identify potential transportation improvements that would help provide safe access to and from schools in Scottsdale. In October 2006, the community held its first formal Safe Walk/Bike/ Bus to school event. The City is finalizing a comprehensive Safe Routes to School Program that will be housed in the Transportation Department. Several schools are expected to participate in future events.

School Safety Audits
In September 2005, the city of Scottsdale's Transportation Department initiated proactive school site transportation audits to identify potential transportation improvements that would help provide safe access to and from schools in Scottsdale. An initial goal was set to audit every public school in the city by the end of the school year, May 2006. The intention of the transportation audit was to identify major issues at many schools and to focus on areas adjacent to school and existing school crossings for safety improvements. Since that time, Transportation Department staff have performed on-site visits of Scottsdale schools during morning drop-off and afternoon pick-up hours. Following each site visit, a report was prepared which indicated general observations by staff from Traffic Engineering and Transportation Planning who attended the review. Each report also lists recommended changes and other issues that could be addressed as part of a longer-range program. In doing the safety audits, the city has taken a critical step in identifying engineering solutions necessary to ensure school safety. By focusing on low cost, easy to implement solutions, such as signage, paint/striping and curb ramps, it was hoped that support for other elements of a

comprehensive program such as more thorough engineering treatments, enforcement, education and encouragement would be generated.

Safe Walk/Bike/Bus to School

In October of 2006, Grayhawk Elementary School became the first Scottsdale school to hold a formal Safe Walk/Bike/Bus to school event. The event was preceded by other activities initiated by the Parent Teacher Organization Health, Safety and Environment Committee at Grayhawk Elementary with the full support of school administration and staff, and the City of Scottsdale. The October 20 event was held to celebrate International Walk To School Month. The 773 students were encouraged to walk with parents, teachers, city staff and others. Because more than 200 of these students do not live in the community but are open enrolled at the school, they were encouraged to join the event by parking at a nearby supermarket that offered the commuting families parking space in their lot. It is estimated that between 650 and 700 children participated in the event far exceeding expectations of parents, teachers, staff and the City of Scottsdale.

How many schools are involved?

All public schools are involved in the Safety Audits. Several are involved with the Safe Routes to School Program.

11. Does your community have youth recreation and intervention programs that are centered around bicycling?

Yes

Handlebar Helpers

Handlebar Helpers is a community "earn-a-bike program" staffed by the City of Scottsdale. This volunteer-supported program began in Scottsdale in the fall of 1994 through a group effort of citizen volunteers and City of Scottsdale staff. The initial purpose of the program was to provide a way for kids who could not otherwise afford bicycles to earn them, through volunteering time in their community. In response to community need, the program has grown to include adults, and the purpose has been expanded to promote bicycle safety, increase individual responsibility and self-esteem, encourage bicycle riding for individual health and environmental benefit, and demonstrate additional environmental responsibility through reuse and recycling. In addition, the apprentice program teaches bicycle repair and other job and life skills. The program is offered to Scottsdale residents only.

The City of Scottsdale provides facilities for the program in the Paiute Neighborhood Center, administrative support, and two part-time bicycle maintenance and repair experts. All other operating expenses and materials are funded by the city budget as well. The program receives donated bikes. Bike technicians establish a “price” that the program participant must pay in hours of volunteer work to own the bike. Once the participant has completed approximately half of the volunteer hours, an appropriate bike is selected with the help of a volunteer bike tech who then either reconditions or supervises the reconditioning of the selection. When the participant has satisfied the volunteer commitment, the bike, a helmet, and a lock are awarded at a special ceremony. Each recipient receives a folder that contains a written description and picture of their bike, and a safety brochure, available in English and Spanish. The Scottsdale Police Department Bike Patrol supports the program and participates in this presentation. They emphasize the safety information and are good role models, as they always wear helmets and ride safely. Kids receiving bicycles are encouraged to bring their parents. Another neighborhood supporting feature is that the program coordinator awards movie tickets to those “caught” wearing their helmets while riding their bicycles.

12. Do you publish a bike map and keep it up to date?

Yes. We publish a 4-color, 24x36 folding street map that shows bike lanes, bike routes, shared-use paths, unpaved trails, bus stops, parks, and other useful information. We print 15,000 at a time and update before each reprinting. They are available free of charge at all libraries, community centers, and local bike shops. There is also an on-line version. Also available on-line is a request form to receive a Scottsdale Bike Map by mail. Since October 2005, 1,230 maps have been requested from the web site. A regional bike map, updated about every two years, is published by MAG and distributed upon request.

13. Do you publish a map of mountain bike trails?

Yes. The Scottsdale Bike map also shows the unpaved trails. More detailed maps have been developed that show specific areas around popular trail heads. They are available on-line at http://www.scottsdaleaz.gov/preserve/pdf/TrailMaps.pdf.

14. Please describe any other efforts in your community to encourage cycling.

Scottsdale Waterfront/Downtown

The Scottsdale Waterfront is situated alongside 1,800 linear feet of the Arizona Canal. Twelve and a half acres of ground have already been broken on this 600,000-sq.ft. project. The Scottsdale Waterfront will feature pedestrian-friendly waterfront walkways, a shared-use path, outdoor plazas, and water-themed paseos. Key project considerations were to activate the Arizona Canal, connect downtown districts through land use and pedestrian retail experiences, and enhance mobility by supporting alternate modes of transportation. The Scottsdale Economic Vitality staff estimates that total investment in the downtown and other southern parts of the City since 2003 now totals nearly $3.13 billion. People are already starting to move into downtown and are walking and riding their bikes to work.

Public Art

Scottsdale has a history of commitment to the arts. Some of the City's first settlers were artists, craftsmen, architects, art collectors, educators, and others who believed that art should be part of the fabric of the community. The municipal art collection was formally established in 1967 and now includes more than 1,950 total objects (704 municipal and 1250 museum pieces). As a defining characteristic of our community, public art enhances Scottsdale's unique character, image and identity. The City has a Percent for Art component in its Capital Improvement Program (CIP) budget as well as an Art in Private Development ordinance. Our parks and paths have benefited tremendously from this effort. Transportation projects regularly include artists as members of design teams, most recently on the Crosscut Canal path project from McDowell to Thomas roads. Each year, the Public Art Program teams with City staff to host a bicycle tour of public art installations. This Cycle the Arts event is truly unique to Scottsdale.

Spinning Our Wheels by artist Aris Georgiades was a temporary installation presented by the Scottsdale Public Art Program, which ran during the course of the Scottsdale Arts Festival (March 11th-13th, 2005). Through participation on a component bike sculpture, the work becomes an interactive piece that explores the frustration of going in circles in our daily lives. The artist was available to assist people at the festival to get on the sculpture and to work as a team to gain momentum. Humor and deeper meaning become evident through the process of participation. After the festival, the City Transportation Department purchased the piece for use at upcoming bicycle events.

Rippling Waters Bridge, by Carolyn Law, located over the Crosscut Canal on the west side of Tonalea Elementary School, dramatizes a sense of flow through the neighborhood. The canal crossing is an important access point for school children and for recreational users along the path. Law's prismatic pickets create an optical effect of shimmering water and shift color as one walks across, causing a sensory connection to the contents of the channel. Like most water infrastructure in Arizona, canals are slowly outgrowing their identity as unnoticed fixtures in our built environment. Law's bridge promotes these waterways as community assets that string together all corners of the Valley.

Artist Erik Gonzales conceived of *Visual Puzzles* as a series of artworks on the Osborn pedestrian/bicycle bridge that recognize the significance of the Crosscut Canal to Scottsdale and illuminate an artist's perspective on the canal's history. The antiqued images within the art panels are comprised of several layers of shapes, textures and earthen-tone colors and are a combination of historic aerial photographs of the location and original abstract forms. In the black-and-white imagery of the artworks, large rectangular and round shapes are from aerial views of the Crosscut Hydro Plant. The blueprints are reproductions that were used by engineers and contractors during construction of the canal.

Parada del Sol Parade

The Scottsdale Jaycees Parada del Sol is a month-long celebration culminating in nearly a week of professional rodeo performances and a magnificent parade. The Parada del Sol Parade is one of the community highlights each year in Scottsdale. Over 150 entries and nearly 1,000 horses travel north two miles up Scottsdale Road, making the event the "World's Largest Horse Drawn Parade." It is followed by an all day Trails End Party in Scottsdale's Old Town. To promote their love of cycling and their laid-back life style, one of the local clubs, Bent Riders of Arizona Group (BRAG) regularly joins the horses and glides up the street on their unique recumbent bicycles.

Bicycle Delivered Coffee Bar

A coffee bar in the main City office building is provided by a popular restaurant located nearby on the Scottsdale Civic Center Mall. All products are delivered by bicycle and their logo is a bike. Lunch orders are taken in the morning and delivered promptly at noon by bicycle.

ENFORCEMENT

1. Is your local police department addressing the concerns of cyclists in your community? Is there a liaison that communicates with the bicycling community?

Yes. Chief of Police Alan Rodbell has personally met with local bicycle advocates to discuss their concerns. Members of the Coalition of Arizona Bicyclists have been guests on his weekly cable television show, *Behind the Badge*, to discuss bicycle safety. Chief Rodbell is available to the bicycling community without the need for a designated liaison.

2. Do you offer specific training to police officers regarding traffic law as it applies to bicyclists?

Police Officers get traffic law training in the Police Academy and bicycle laws are covered at that time. The City has three certified bike instructors through the International Police Mountain Bike Association (IPMBA) and they have certified several officers throughout the state to become police cyclists. The IPMBA outline specifically includes traffic laws pertaining to cyclists.

The Scottsdale Police Bike Unit hosted the 2005 IPMBA conference in Scottsdale during our annual Bike Week. This event provided officers from around the country with skill enhancing training and certification courses; essential, dynamic, and innovative on-bike sessions; insightful and information-filled in-class workshops; and the nation's largest and best bicycle patrol product exhibition.

The Coalition of Arizona Bicyclists developed a training program with the Scottsdale Police Department based on the Bicycle Enforcement Program offered by Massbike and the National Highway Safety Administration. It includes an overview of vehicular cycling theory (Road One Class), crash statistics, Arizona bicycle laws, Arizona vehicle laws as they apply to cyclists, and the reasons for enforcing bicycle and vehicle laws.

3. Do you use targeted enforcement to encourage cyclists and motorists to share the road safely?

No. To date, the City has not used any type of targeted enforcement to encourage cyclists and motorists to share the road safely.

4. Do you have public safety employees on bikes? Indicate the number of employees on bike as well as the size of the entire staff.

Yes. We currently have nine officers and two sergeants assigned to the Scottsdale Police Bike Unit and the downtown squads. There are 14 School Resource Officers and two sergeants that are certified bike officers. There are approximately 64 other officers that have been certified as bike officers in Scottsdale Police Department on a reserve list. An impressive 21% of Scottsdale's 371 officers are ready to serve as bicycle officers.

5. Do you have a mandatory helmet law? To what ages does it apply?

No. Neither the City of Scottsdale, Maricopa County, nor the State of Arizona have mandatory bicycle helmet laws. There are no communities in the region with mandatory bicycle helmet laws. The State of Arizona also does not have a mandatory helmet law for adults on motorcycles. Children under 18 are required to wear helmets when riding or operating a motorcycle.

6. Do you have mandatory sidepath laws? If so, what is the status of these laws? Are they enforced?

No.

EVALUATION AND PLANNING

1. Do you have any information on the number of trips by bike in your community including census data? Please describe.

Surveys from the Maricopa County Trip Reduction Program (TRP) show that Scottsdale's bicycle mode percentage for commute to work trips has increased to 1.74 percent in 2006 from 1.15 percent in 2001. The trend continues to show that as we add facilities and close the gaps in existing corridors, more people are bicycling to work. The bicycle mode percentage for the County as a whole is 1.0 percent. All businesses in Maricopa County with 50 or more employees at a site are required to participate in the TRP. Each employee fills out a survey once each year documenting their commute to work choices. The average adult bicycle commute in the County is 6.5 miles.

The 2000 Census data journey to work table indicates that the bicycle mode for Scottsdale provides 0.8 percent of work commute trips. These numbers underestimate actual bicycle trips. Scottsdale is undergoing major changes in housing density downtown that will have significant impact as the area becomes a vibrant residential/work area.

2. How many cyclist/motor vehicle fatalities have occurred in your community in the past five years?

Three.

3. How many cyclist/motor vehicle crashes have occurred in your community in the past five years?

232. Reported bicycle/vehicle collisions from 1994 through 2004 have been divided into total collisions, injury collisions, and fatal collisions. The lowest number of bicycle/vehicle collisions occurred in 2003 with 40 total collisions, 35 of which resulted in injury and one resulted in a fatality. The highest number of bicycle-vehicle collisions occurred in 1995 with a total of 88 crashes, 77 of which resulted in injury and one resulted in a fatality. The majority of bicycle-vehicle collisions resulted in injury. An additional 84 bicycle crashes were reported during January 2005 – October 2006. Scottsdale's bicycle crash rate in 2005 (23.89 crashes per 100,000 population) and bicyclist fatality rate (0.44 fatalities per 100,000 population) are considerably lower than Maricopa County as a whole (38.23 crashes per 100,000 population and 0.64 fatalities per 100,000)

4. Do you have a specific plan or program to reduce these numbers?

Yes. The Bicycle Element of the Transportation Master Plan will include specific engineering, educational, and enforcement countermeasures to address collision rates. After determining that the shared-use path crossing at Hayden and Chaparral roads had one of the highest number of bicycle/ vehicle collisions, a CIP project was started that will grade-separate the crossing of Chaparral and eliminate the need for through pathway users to cross Hayden twice. This project is in final environmental review and is expected to go to construction next year.

5. Do you have a system in place that allows bicyclists to submit ideas and concerns to public officials? Please describe.

Yes. In Scottsdale, bicyclists serve on the City Council, the Transportation Commission, and populate the staff. For those cyclists not quite so plugged in, the City's web site allows for several methods of submitting ideas and concerns. The *Report a Problem* page provides a form that addresses many routine issues as well as space to describe any other problem. Staff in each department are identified and their phone numbers and e-mail addresses are provided. Citizens can send e-mails directly to Council Members. Cyclists routinely contact the staff in person at public meetings, in their offices, and on the telephone. Citizens may also address the Transportation Commission meetings, generally held on the 3rd Thursday of each month at 6 p.m.

6. Do you have a comprehensive bicycle plan? Please include a copy.

Yes. A copy was included with our original application.

When was it passed or updated?

The City of Scottsdale Bicycle/Pedestrian Transportation Plan was adopted in January 1995. It is currently being updated as an element of the City's first overall comprehensive Transportation Master Plan.

Is it funded?

Funding is provided through the Transportation Capital Improvement Plan (CIP). Approved funding for bicycle and pedestrian projects from 2008-2012 is $37.65 million, 15 percent of the total. An additional $10.5 million is included for bike lanes and sidewalks in roadway improvement projects bringing the total expenditure on bicycle and pedestrian facilities to $48.2 million, 19 percent of the CIP. Funding comes from a dedicated transportation sales tax, transportation bond elections, and Federal grants.

What percentage has been implemented?

About 85% has been implemented. The plan is guided by four action level options. Nearly all recommended actions in Levels I, II, and III have been implemented. Several action items in Level IV have been implemented or are in the planning stage of development.

When the 1994 bike plan was adopted, Scottsdale had eight miles of bike lanes, 37 miles of paved multi-use paths, and 35 miles of unpaved multi-use trails. Today Scottsdale has 95 miles of bike lanes, 61 miles of paved multi-use paths, and 238 miles of unpaved multi-use trails.

7. Do you have a trails master plan that addresses mountain bike access, and are there ongoing relations between the mountain biking community and the community recreation and planning staff?

Yes.

The Scottsdale Trails Master Plan: On the Right Trail, approved in February 2004, identifies nearly 300 miles of trails. The plan provides guidance for the future, defines trail classifications, trail standards, provides an action plan, and explains funding processes.

The Trails Program is currently located within the City's Preservation Department with two full-time staff. In 2000, Scottsdale voters approved a $2.5 million capital improvement program specifically for trail development and improvements and additional general fund monies have been allocated.

A total of $7.5 million has been identified for trailhead and connecting trail improvements associated with the McDowell Sonoran Preserve. Scottsdale citizens have voted seven times to support the preservation of mountain and desert lands in the City. Sales tax collections dedicated to the preservation program total over $215 million as March 2007. Approximately $300 million in bonds have been issued for land acquisition. The City owns 11,660 acres in the Preserve boundary. Another 1,713 are privately preserved.

The Scottsdale Transportation Department has played a significant role in the implementation of the City's trails infrastructure. Trails have been built or improved in conjunction with a variety of street improvement projects. Trails have been constructed within rights-of-way along arterial streets and trails have been included within grade-separated crossings, usually associated with drainage improvements, across major arterials. Other transportation related improvements include trail-crossing signs, fence installation between trails and roadways, improved crosswalks, and the installation of pedestrian/equestrian/bicyclist-activated signals at certain intersections.

Maricopa County Regional Trail System

Scottsdale is situated adjacent to several other municipalities with trails, as well as large areas of open space, such as Maricopa County's 21,099-acre McDowell Mountain Regional Park to the east, and the Tonto National Forest to the north/northeast. Because of this connectivity, several regionally significant trails cross through the City of Scottsdale. Most of these trails run along canal and power line corridors. The Sun Circle Trail is a 110-mile regional trail that was established in the 1960s by Maricopa County in partnership with the Salt River Project (SRP). It runs along the Arizona Canal and connects with Phoenix to the west, and the Salt River Pima-Maricopa Indian Community to the

east. The Central Arizona Project (CAP) canal, controlled by the Bureau of Reclamation (BOR), runs through central Scottsdale and also acts as a regionally significant trail corridor. The 242-mile Maricopa Trail, identified by the Maricopa County Board of Supervisors in August 2004, crosses Scottsdale using the CAP, the McDowell Sonoran Preserve, and several trails at the northern edge of Scottsdale. In 2006, the Lost Dog Wash Trailhead opened for public use providing access to ten miles of new trails that connect to other trails in and out of the Preserve. Trail connections to McDowell Mountain Regional Park and the regional trail system were completed with the construction of Windmill and Prospector Trails.

8. Is your bicycle network part of broader development plans, land use plans and ongoing development projects?

Yes. Staff from Transportation, Fire, Preservation, and Municipal Services meet with Planning and Development Services to review projects. Each project is reviewed for impacts to transportation and other City facilities and services. New facilities and access to existing facilities are frequently stipulated as requirements for permit approval.

With development taking place along the Arizona Canal in downtown Scottsdale, the Transportation Department moved forward with the Arizona/Crosscut Canal Study that provides an overall design and concept report to facilitate the completion of the path system along the SRP canal banks. This study identifies which side of the canals the paved path should be on, where bicycle/pedestrian bridges should be built over the canals, and where parks, public art, and other amenities should be located. Combined with projects already under construction in Tempe, this project will ultimately complete a 17-mile loop that passes through downtown Scottsdale, Papago Park in Phoenix, downtown Tempe, the Tempe Town Lake, and the Indian Bend Wash.

How many trails, bike lanes, paved shoulders, and bike routes connect with each other to provide seamless transportation options?

Most.

9. Have you evaluated your transportation network and prioritized bicycle improvements based on hazards and needs?

Yes. The Transportation Master Plan will include a comprehensive evaluation of our entire transportation network. The Bicycle Element includes a bicycle/pedestrian latent demand analysis that shows where the greatest potential is for people to ride and walk. A Bicycle Level of Service evaluation has been completed for our street system. All arterial and collector streets without bike lanes have been evaluated for potential bike lane striping and restriping policy guidelines are being proposed. Bicycle/vehicle collisions have been mapped and analyzed. A gap analysis has been performed to identify missing connections. All the processes described above are in GIS format to allow us to evaluate the needs, hazards, and potential usage as priorities are set and projects are ranked for funding.

Using GIS data, we determined that 59 percent of all address locations (office, residential, retail, etc.) are located within 0.5 miles of one of our shared-use paths. Thirty-five (35) percent are located within 0.25 miles of a path. We will be using this information to help set goals for future service. For example, one goal might be to have 75 percent of all address locations within 0.5 miles of a path by 2012.

10. What specific improvements do you have planned for bicycling in the following year?

We have 26 projects with bicycle facilities in various stages of progress. It is anticipated that projects planned or currently in design and construction phases will add in the next five years:

23 miles of bike lanes

16 miles of new or improved paved multi-use path

4 grade-separated crossings

37 miles of new/improved sidewalks

9 miles of streetscape enhancements, which generally include wider sidewalks, bicycle lanes, landscaping, and amenities

Current projects include:

Arizona Canal Path: Chaparral to McDonald – new path (1 mile)
Bell Road: 94th St. to 98th St. – improved sidewalks (0.5 miles)
Cactus Road: Pima Freeway to Frank Lloyd Wright – bike lanes, new path (2.8 miles)
Camelback Road: 64th St. to 68th St. – improved sidewalks (0.5 miles)
Crosscut Canal: McDowell to Thomas – pathway improvements (1.1 miles)
Crosscut Canal: Thomas to Indian School – new path (0.7 miles)
Indian Bend Road: Scottsdale to Hayden – bike lanes and new path (1 mile)
Indian Bend Wash: Chaparral to Jackrabbit – new path (0.5 miles)
Indian Bend Wash: Path widening and renovation (2.5 miles)
Indian School Road: Drinkwater to Pima – bike lanes and path connections (1.75 miles)
McDonald Road: Scottsdale to 78th St. – bike lanes (0.75 miles)
McKellips Service Center – new path connecting Miller with Rio Salado path (0.2 miles)
North Frontage Road: Hayden to Pima – bike lanes (1.2 miles)
Pima Road: Deer Valley to Pinnacle Peak – bike lanes, improved sidewalks (1 mile)
Pinnacle Peak Road: Scottsdale to Pima – bike lanes (2 miles)
Scottsdale Road: Frank Lloyd Wright to Thompson Peak Pkwy – bike lanes (2.2 miles)
Scottsdale Road: Thompson Peak Pkwy to Pinnacle Peak – bike lanes (2 miles)
Scottsdale Road Ped & Bike improvements Phase 1 – bike lanes, improved sidewalks (1.8 miles)
Scottsdale Road Ped & Bike improvements Phase 2 – bike lanes, improved sidewalks (1.8 miles)
South Frontage Road: Hayden to Pima – bike lanes (1 mile)
Stacked 40: Center to Hayden – bike lanes (0.75 miles)
Stacked 40: North Frontage (74th to Hayden) – bike lanes (0.5 miles)
Thomas Road: 64th St to Granite Reef – bike lanes, improved sidewalks (2 miles)
Thompson Peak Bridge @ Reata Pass Wash – bike lanes
Thunderbird/Redfield: Scottsdale to Hayden – bike lanes (1.1 miles)
Upper Camelback Wash Multi-use Path: 92nd to Cactus (1.1 miles)

11. What are the three primary reasons your city deserves to be designated as a Bicycle Friendly Community?

Everyone comes to Scottsdale to bicycle. With year-around cycling weather and high quality facilities that connect origins and destinations, Scottsdale is a great cycling community. The Indian Bend Wash Path is the most popular and well-known bicycling facility in Arizona. Our trail system is extensive. We have our own Preserve and direct connections to McDowell Mountain Regional Park and the Tonto National Forest.

Lance Armstrong and company in Scottsdale with local Bicycle Ranch riders. January 2002

We are aggressively expanding and improving our bicycle network. In the past two years, we have increased our annual investment in new facilities from $3 million to nearly $10 million. Our 5-year CIP features $48.2 million in bicycle and pedestrian projects. All projects, whether public or private, are evaluated with the intention of including bicycle and pedestrian amenities. We have a planner dedicated to bicycle issues and a dedicated trails coordinator.

Active bicyclists are involved at all levels of government. We are on the City Council, the Transportation Commission, and the staff. We really do bicycle here. Bicycling is one of the environmental values demonstrated and supported in the community, which include nationally recognized Green Building and Desert Preservation programs.

"*As we address our transportation needs, we are not just talking about roadways and public transit, either. We haven't forgotten our non-motorized travelers in Scottsdale, and there are more every year. Energy saving and environmentally friendly means of getting around need to be highlighted and encouraged. We are expanding our extensive network of more than 95 miles of bike lanes and 65 miles of paved pathways. New bicycle, pedestrian and equestrian path improvements are under way, with more on the drawing board. Our commitment to creating healthy and environmentally responsible options for transportation is just one way we demonstrate our awareness of the importance of protecting our land, water and air.*"

Mayor Mary Manross, State of the City Address, March 1, 2007

12. What are the three aspects of your community most in need of improvement in order to accommodate bicyclists?

We still have some gaps in both the street and path networks. Projects completed in the past two years have closed some of those gaps and several more connections will be completed within the next two years.

We still need to demonstrate to more people that bicycling to work is easy, safe, and fun. Many weekend cyclists have never commuted on their bicycle because they believe it is too far, too dangerous, too hot, too cold, too… Scottsdale's primary focus continues to be on improving all types of facilities and providing connections to them. As the community matures, we are developing programs that will devote resources towards education and encouragement.

We need to improve driver behavior around cyclists. Scottsdale has been very aggressive about citing red light runners and has permanent photo enforcement sites at certain major intersections as well as the first fixed photo enforcement demonstration program on a freeway in the US. The City has one mid-block photo enforcement installation and several photo enforcement vans that set up at random locations. Getting more people on bikes will also help modify motorists' behavior. Drivers tend to show people they know more respect. If every driver had a family member or a friend who bicycled, every bicyclist would get a little more consideration, and sharing the road would become more than just a roadway sign.

APPENDIX B: BICYCLE COLLISION DATA

Bicycle Element - Appendix B: Bicycle Crash Data

Historic Crash Data

The City of Scottsdale provided complete crash data files in electronic format for this analysis. These files contained data on report number, date and time of the crash, crash location (street names and distance and direction from intersection), injury severity, date of birth, physical condition, violations, action, travel direction, and manner of collision (head-on, rear-end, bicycle, etc.). Bicycle crashes were extracted from the overall database for review.

Figure 1 illustrates the number of reported bicycle-vehicle collisions from 1994 through 2004 divided into total collisions, injury collisions, and fatal collisions. The lowest number of bicycle-vehicle collisions occurred in 2003 with 40 total collisions, 35 of which resulted in injury and one resulted in a fatality. The highest number of bicycle-vehicle collisions occurred in 1995 with a total of 88 crashes, 77 of which resulted in injury and one resulted in a fatality. The majority of bicycle-vehicle collisions resulted in injury.

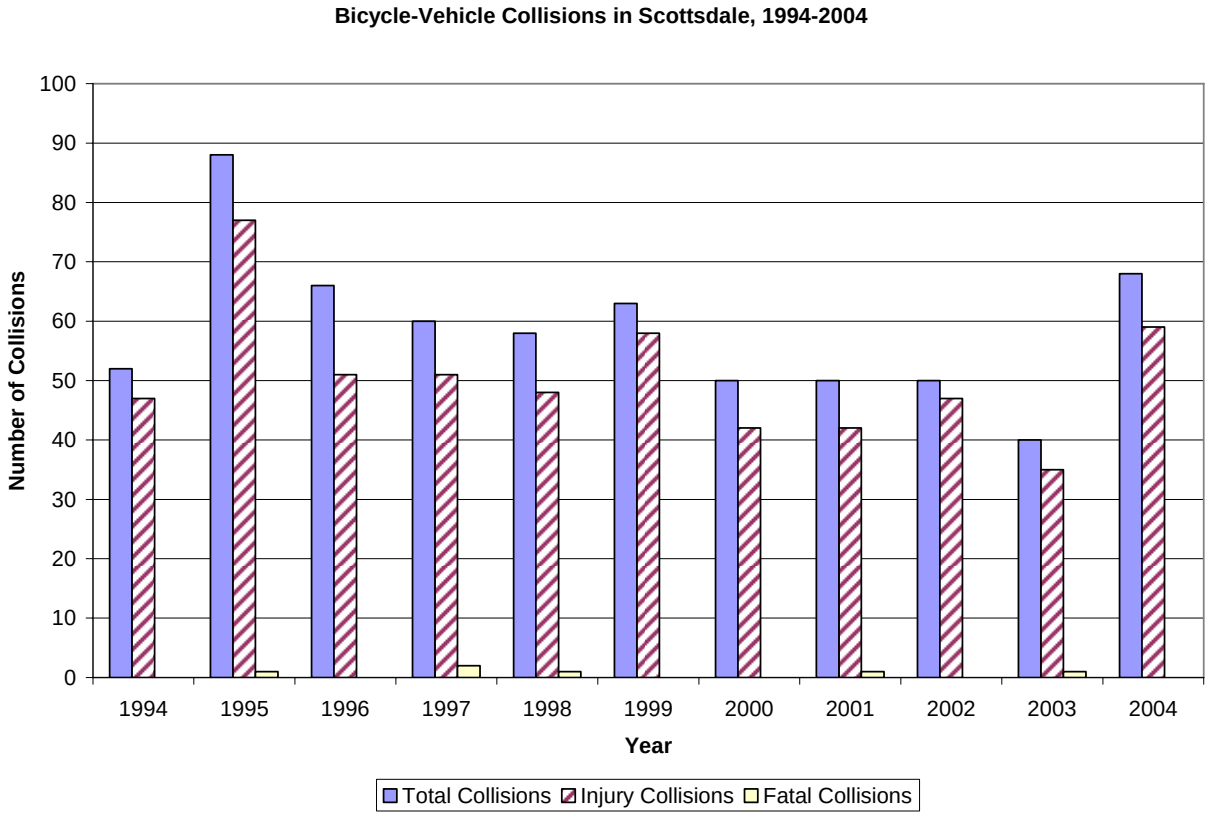


Figure 1 Bicycle-vehicle collisions in Scottsdale, 1994-2004

An additional 84 bicycle crashes were reported during January 2005 – October 2006. The geographical distribution of these crashes is depicted in Figure 2. Many of the crashes occurred in southern Scottsdale, where bicyclist exposure levels are likely higher than in the rest of the City. Few crashes occurred north of Frank Lloyd Wright Boulevard, probably reflecting the less dense nature of development in that part of the City, and therefore lower numbers of bicyclists.

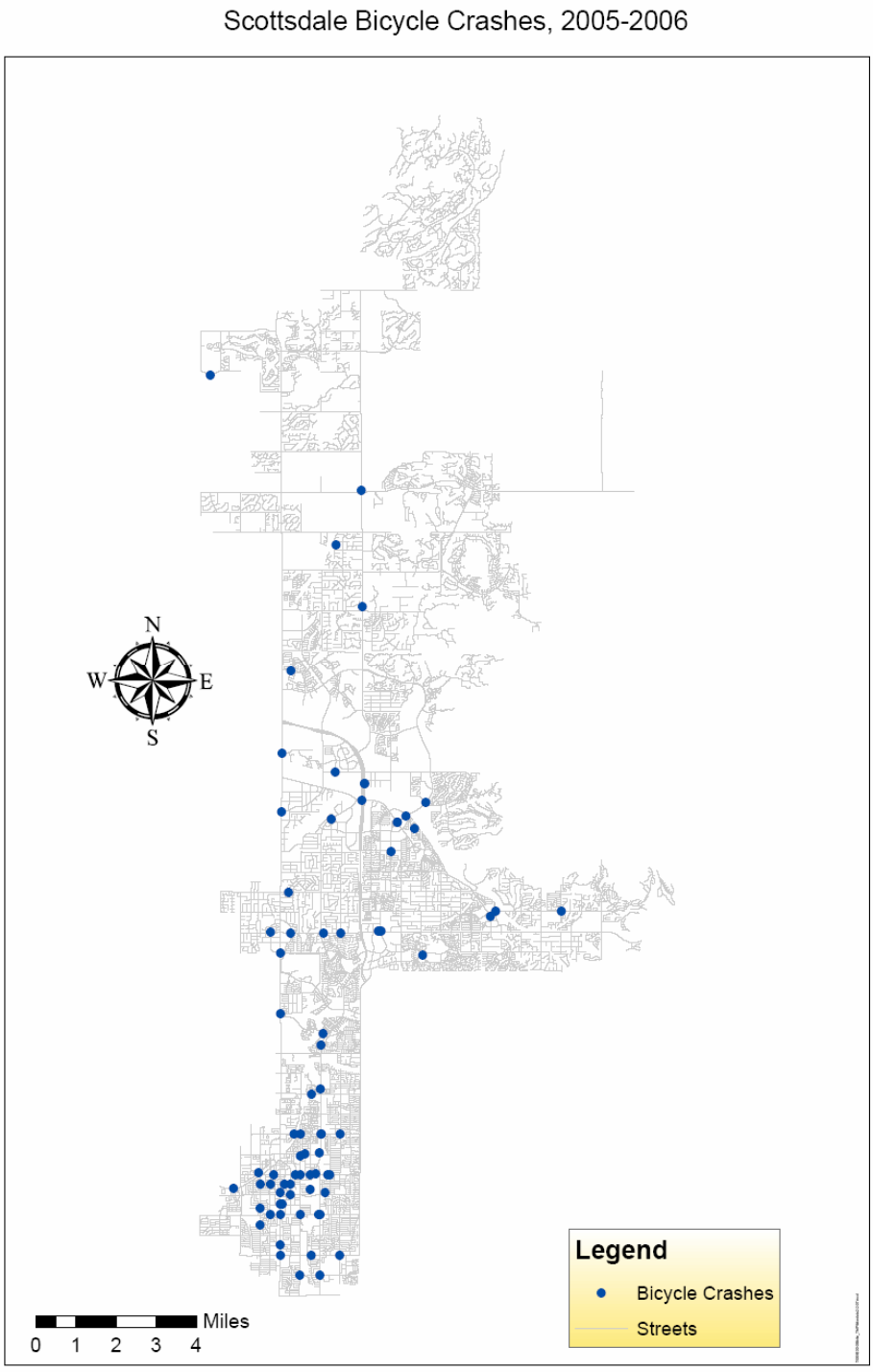


Figure 2 Geographical distribution of bicycle crashes in Scottsdale, January 2005-October 2006

The 84 bicycle crashes were analyzed to gain an understanding of crash characteristics. Most crashes resulted in an injury to the bicyclist (Figure 3). Only three crashes did not result in an injury. There was one bicyclist fatality.

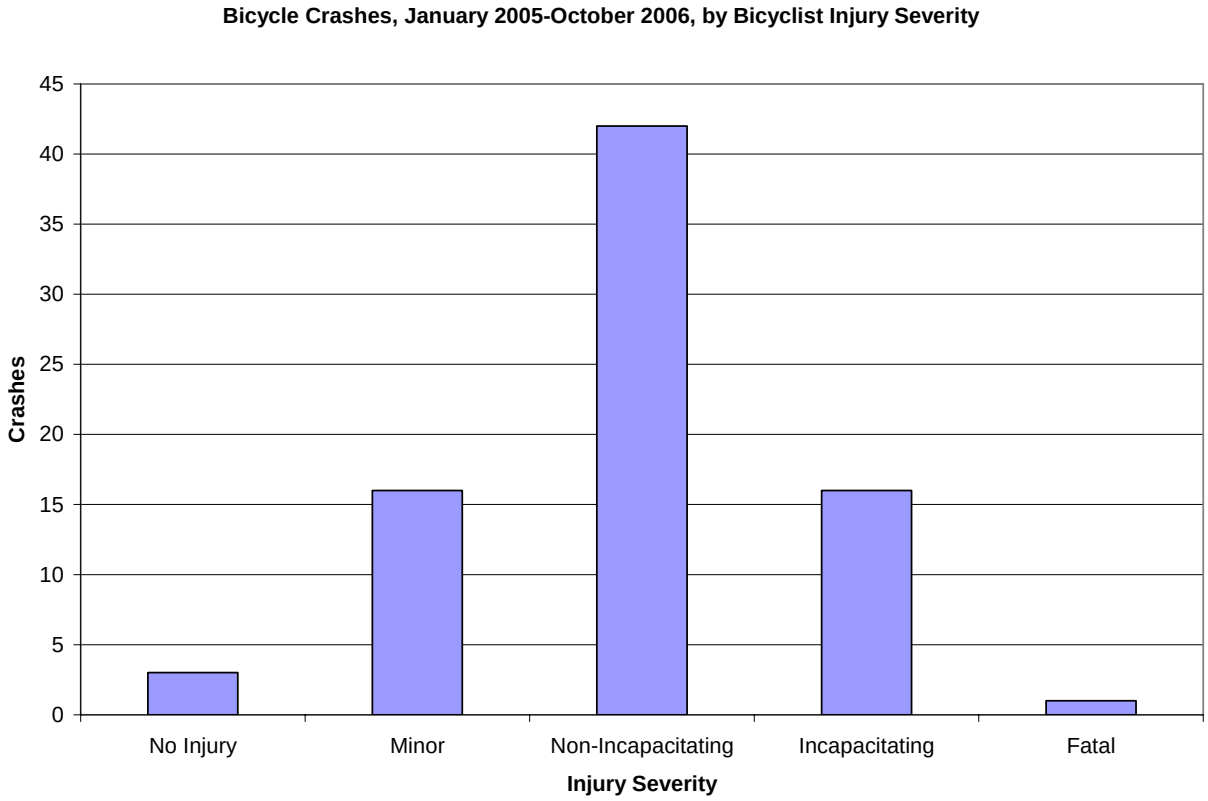


Figure 3 Injury severity

By time of day, 68 bicycle crashes occurred between 6:00 AM and 5:59 PM (Figure 4). Another 15 crashes occurred during the evening hours of 6:00 PM to 11:59 PM. Only one crash occurred during the overnight hours of 12:00 AM to 5:59 AM.

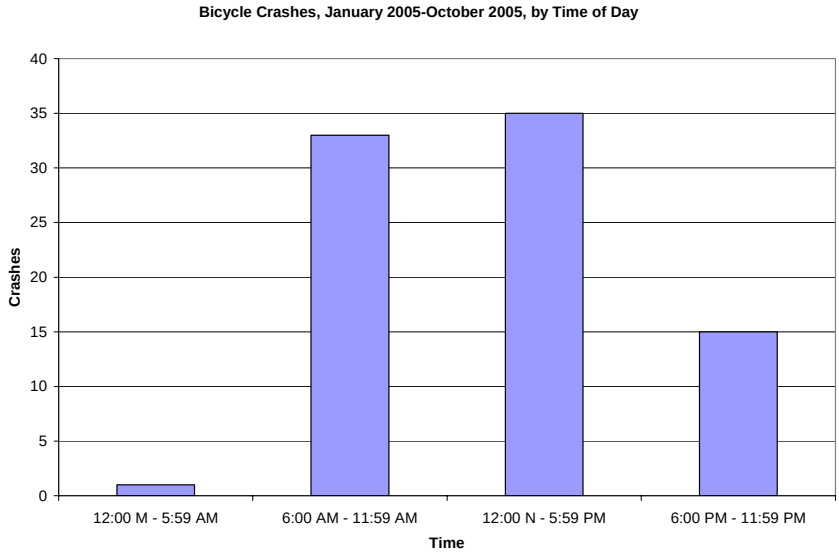


Figure 4 Time of day

Excluding crashes occurring on private property (for example, parking lots), bicycle crashes were nearly evenly distributed between intersection and midblock locations (Figure 5).

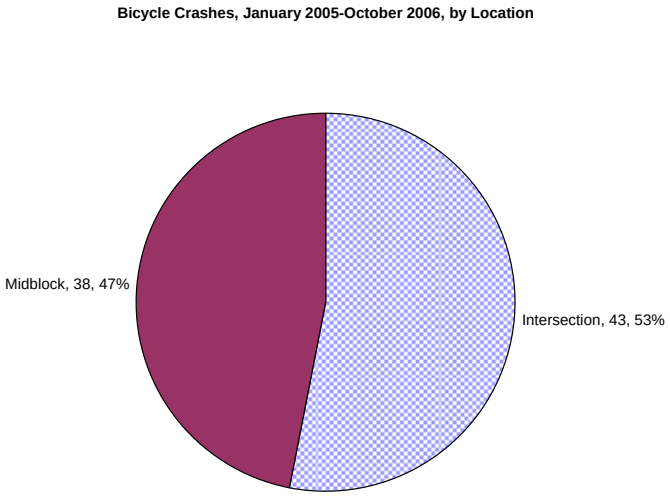


Figure 5 Intersection and midblock bicycle crashes

Bicyclists were most commonly between 18 and 44 years of age (Figure 6).

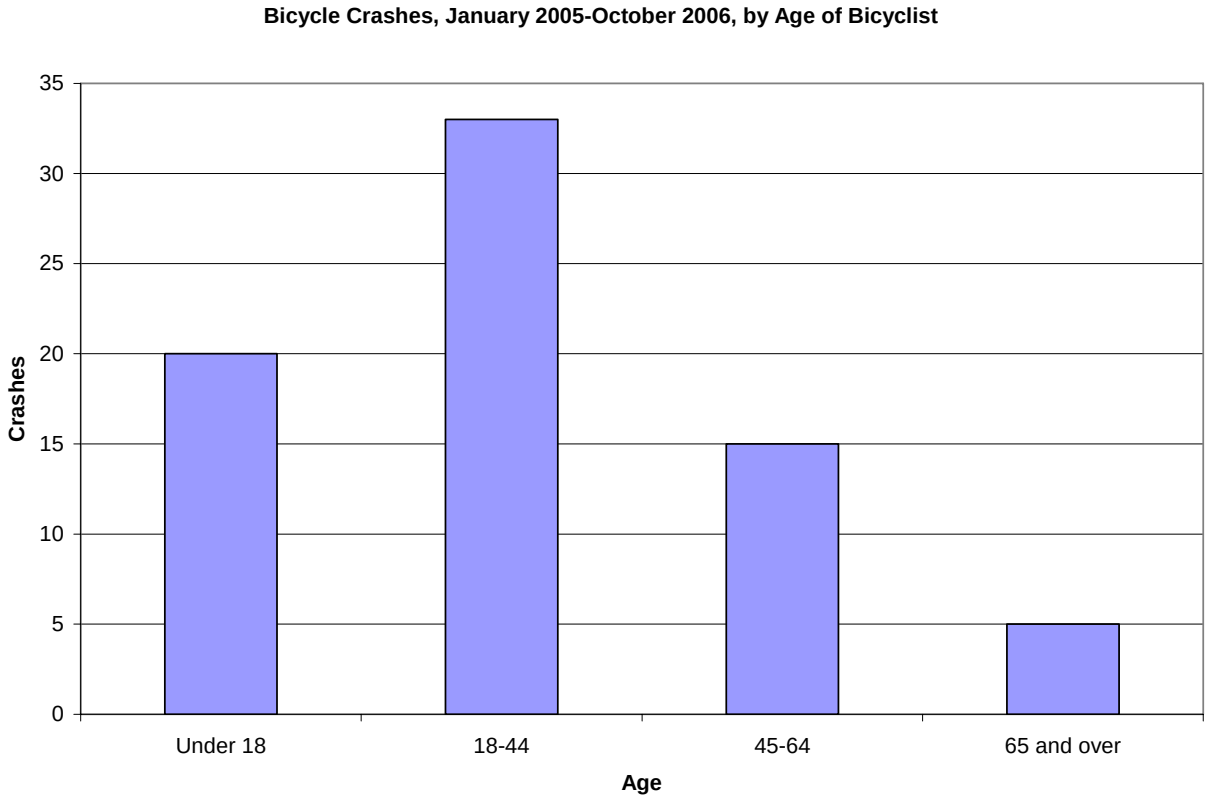


Figure 6 Age

The majority of bicyclists had no apparent defects in their physical condition (Figure 7).

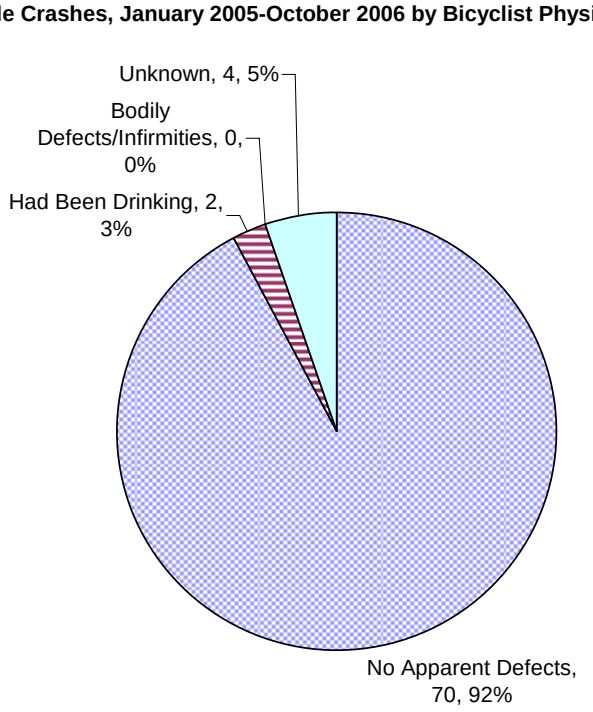


Figure 7 Physical condition

Compared to Maricopa County as a whole, Scottsdale's bicycle crash rate in 2005 (crashes per 100,000 population) and bicyclist fatality rate (fatalities per 100,000 population) are considerably lower (Figure 8).1

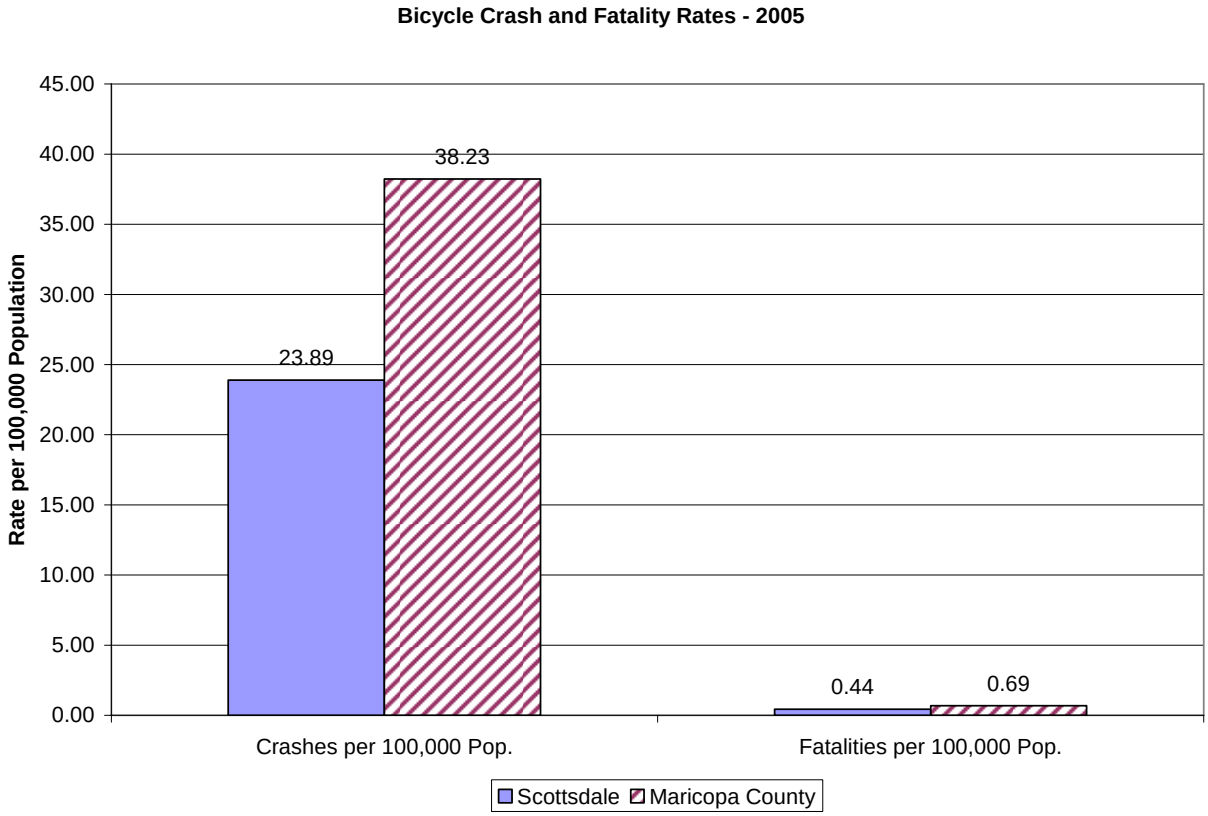


Figure 8 Bicycle crash and fatality rates in Scottsdale and Maricopa County

Discussion of the General Crash Data Analysis

First, while the general analysis by time of day (Figure 4) provides a temporal context, it is recommended that an analysis of crashes by light condition (daylight, dawn, dusk, dark with street lights, dark without streetlights) be performed. The results could suggest engineering countermeasures (such as installing streetlights), educational countermeasures (such as conveying the importance of being seen at night to bicyclists), and enforcement countermeasures.

Second, crashes were nearly evenly distributed between intersections and midblock locations (Figure 5). A more thorough analysis of bicyclist and motorist behaviors could indicate, for example, the need for educating bicyclists on the importance of riding with traffic, the need for educating motorists on the importance of scanning for bicyclists before making a turn, or the need for installing bicyclist-activated traffic signals.

Third, many bicyclists involved in crashes were under age 18 (Figure 6). A more detailed examination of the crash circumstances is recommended. Based on the results, bicyclist safety

[1] Maricopa County pedestrian crash data are available online at http://www.mag.maricopa.gov/archive/safetywebcrashdata/bikecrashtrend99_05.htm

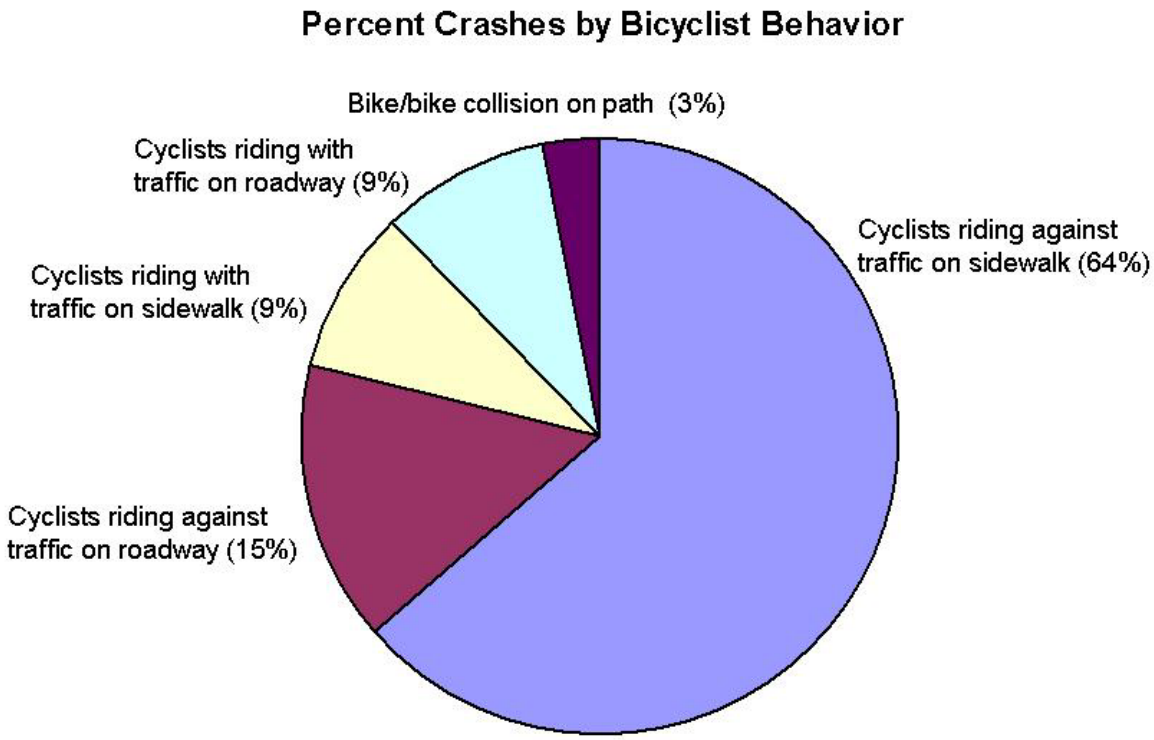
education in schools or more aggressive enforcement of motor vehicle traffic laws around schools might be in order.

Hard Copy Crash Report Reviews

In addition to the review of the computerized crash dataset, thirty-three hard copy crash reports were reviewed. These crashes were selected because they occurred on the following streets that City staff identified as being of interest: Indian School Road, Thomas Road, McDowell Road, and Scottsdale Road between Indian School Road and Thomas. All of the crash reports were read to determine root causes for the crashes, similar characteristics among the crashes, and potential countermeasures to prevent like crashes in the future. The findings of these reviews are discussed below.

The review of the crashes yielded a clear trend in the bicycle crashes occurring within the study area (Figure 9). Sixty-four percent of the crashes (21 of 33) involved motorists colliding with bicyclists riding against traffic on the sidewalk. An additional 15 percent (5 of 33) involved motorists colliding with cyclists riding against traffic on the roadway. In these crashes, motorists were most often exiting a side street or driveway onto the main road and failed to scan to the left for any approaching bicyclists or pedestrians coming from that direction. In one of these crashes, the cyclist crossed a side street against a don't walk signal. This preponderance of "cyclists riding against traffic" crashes illustrates the potential hazards associated with riding where motorists are not scanning for conflicting traffic.

Figure 9 Crashes by bicyclist behavior



The potential for crashes resulting from incomplete/insufficient scanning on the part of motorists is further illustrated by the next most frequent crash type – cyclists riding with traffic on the sidewalk. In these crashes the motorists failed to yield to bicyclists approaching on the sidewalk or in the crosswalk. One of these crashes involved a permitted left turn at a signalized intersection. Another occurred when a motorist turned left into a driveway. The third was a cyclist-only crash; however, it involved a cyclist who fell when he hit a curb while avoiding a car pulled across the crosswalk.

Three crashes involved cyclists riding on the roadway, with traffic. In one crash, the cyclist swerved off a sidewalk, out from behind a parked car and into the path of an overtaking motor vehicle. In another, the cyclist swerved off the sidewalk directly into the path of an overtaking motor vehicle. Both of these crash reports mentioned witnesses who confirmed the actions of the cyclists. The final crash involving a cyclist who was riding in the roadway with traffic was a hit-and-run crash. It occurred at 1:30 in the morning and involved an intoxicated left-turning motorist hitting a cyclist. The roadway (Thomas Road) is reported to be lit with functioning street lamps; the crash report does not note whether or not the bicycle was fitted with a headlamp.

The final crash involved two cyclists riding on a pathway. The crash occurred on a pathway when one cyclist moved left of center and had a head on collision with an oncoming cyclist.

Five of the crashes (15%) occurred under “dark with street lights” conditions. In none of these crashes do the police officers note defective lighting for the bicyclists on the crash report. This could be taken to mean that all the bicyclists were using headlamps when involved in their respective crashes. This, however, is unlikely, because it is rare for a crash report to indicate

whether or not a cyclist was using a light unless the cyclist is using a light. Consequently, it is believed that the lack of headlamps on the bicycles may have contributed to the crashes.

Recommended Countermeasures

Countermeasures are more effective if they are implemented citywide, rather than only on specific streets or at specific intersections. The following two sections describe educational and enforcement countermeasures that target bicyclist behaviors such as riding against traffic and riding at night without lights.

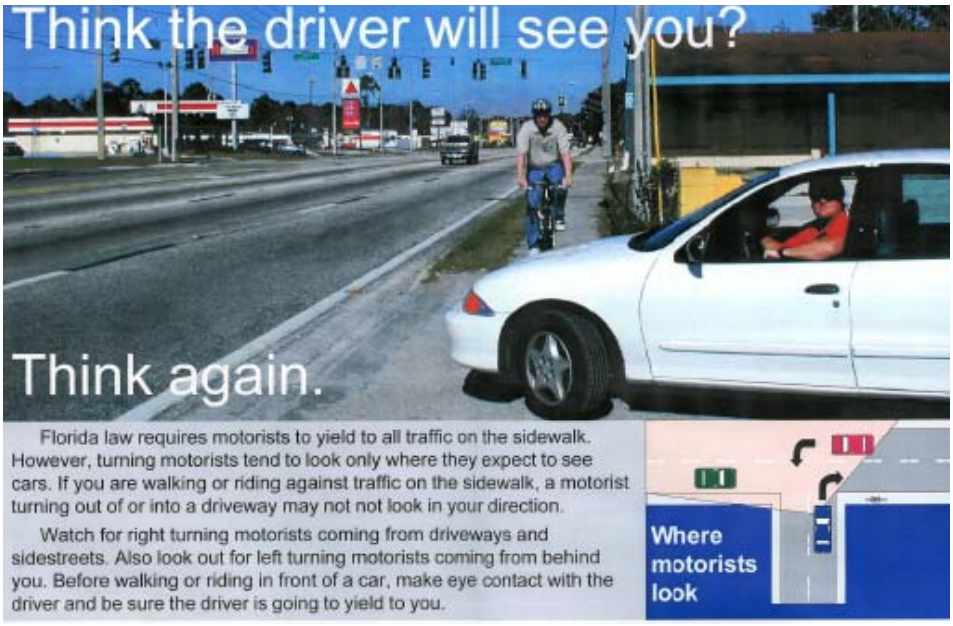


Figure 10 The dangers of riding on the sidewalk

Educational Countermeasures
Educational countermeasures will have a greater effect if they are implemented across the city. Consequently, we recommend a broad application of these campaigns with greater saturation within the high crash areas.

The Dangers of Riding against Traffic & Motorist Yield to Sidewalk Traffic

Riding against traffic, either on the sidewalk or on the roadway is fairly common practice in Scottsdale. Despite the dangers of riding on the sidewalk (Figure 10), especially against traffic, it is recognized that sidewalk riding will continue because many people simply are not comfortable riding bikes on the roadway with motor vehicles. Additionally, cyclists cannot be expected to cross a multi-lane roadway to get to a sidewalk so they can ride in the same direction as cars in the adjacent travel lane. Thus, it is imperative that cyclists who chose to ride on the sidewalk be aware of the hazards associated with this practice. Driver- and cyclist-targeted campaigns with graphics representing Scottsdale are recommended; this representation would include location, demographics, and language. It is also important to target motorists with these campaigns to make the drivers aware that they need to scan for traffic on the sidewalk. To maximize the potential for reducing crashes, these campaigns must be run concurrently.

Riding at Night without Lights

Bicyclists operating at night without lights are nearly invisible to motorists – until it is too late. Even if a bicycle is properly fitted with reflectors, motorists coming from a side street will not see the cyclists until it is too late for the driver to react. Yet some bicyclists will choose to ride at night without lights, and they must be made aware of the dangers they face in the dark. Reviews of as yet unpublished research papers show that a minimal (time) amount of exposure to conspicuity issues results in a much increased appreciation of how well motorists can see bicyclists at night. Applying this potential increase in awareness to the Scottsdale bicycle crash problem is recommended. Informational posters (Figure 11) showing sight distances for various colors of clothing and illustrating the limitations of reflectors may provide cyclists (and pedestrians) the information they need to make better choices when choosing gaps to cross the road or when anticipating driver behaviors at driveways and intersections.

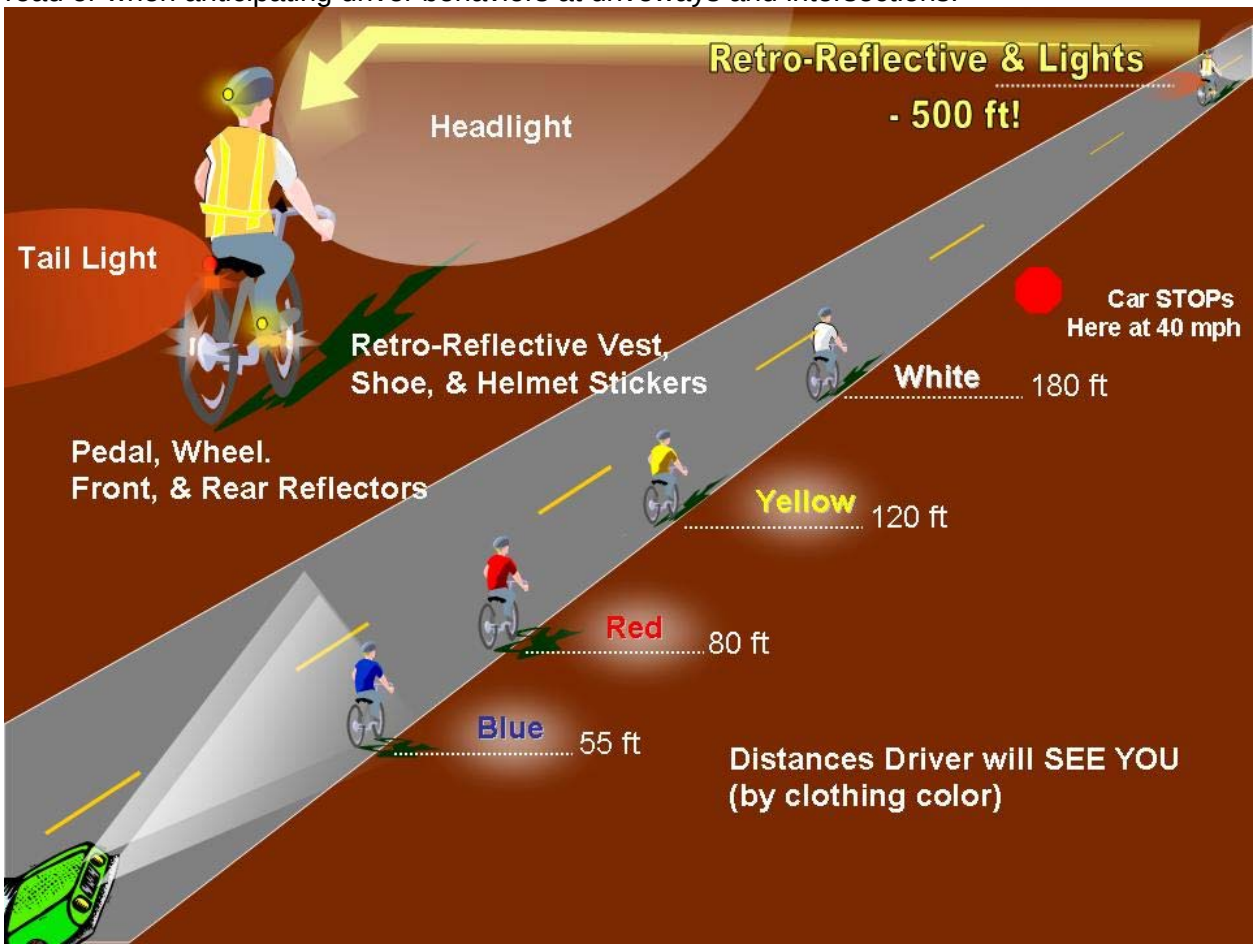


Figure 11 Informational poster illustrating bicyclist visibility at night

Enforcement Countermeasures

The effort to enforce the traffic laws as they relate to bicycle safety should be addressed in an overall, coordinated, countywide bicycle enforcement campaign. Sporadic enforcement will not result in significant improvements to cyclist behavior and will likely result in resentment of law enforcement personnel. Those behaviors to be targeted should be determined at the outset of the law enforcement campaign.

The following behaviors should be targeted:

- riding against traffic on the roadway,
- failure to yield to pedestrians and cyclists riding on the sidewalk,
- riding at night without lights, and
- violating traffic signals.

These four behaviors were chosen for two reasons. First, they represent particularly hazardous behaviors which result in many crashes. Secondly, and very importantly, the enforcement of these behaviors is easy to justify to the public. When coupled with (and in fact preceded by) a large scale education campaign, the public will understand the importance of the campaign and consequently will accept the enforcement activity.

APPENDIX C: BICYCLE ON-STREET FACILITY - LEVEL OF SERVICE AND FACILITY PRIORITIZATION RESULTS

Appendix C: City of Scottsdale Bicycle LOS and Prioritization Results

Seg ID	Road Name	From	To	Length (mi)	Dir.	Lanes (L)		YR 2004 Roadway ADT	Tks. (HV) (%)	Post. Spd. (SP_p) mph	Width Of Pavement		Occ. Park. (OSPA) (%)	Pavecon		Cross Sec. (C/S)	Bicycle LOS		Latent Demand	Improved LOS	Delta LOS	100% Delta LOS	Recommended Facility Improvement	Improvement Cost (per mile)	Benefit-Cost Index
						Th #	Con				W_t (ft)	W_l (ft)		PC_t (1..5)	PC_l (1..5)		Score (0..7)	Grade (A..F)							
5	Hayden	Chaparral	McDonald	1.0	N	6	D	33,450	4	45	10.0	0.0	0	4.5	0.0	C	**4.89**	**E**	100	3.86	1.03	29	Restripe	$8,500	1520
33	Scottsdale	Drinkwater	Chaparral	0.6	N	6	D	39,200	4	40	11.0	0.0	0	3.5	0.0	C	**5.02**	**E**	100	4.10	0.92	26	Restripe	$8,500	1483
57	94th / Thompson	Thunderbird	100th	1.0	S	6	D	15,850	4	40	12.0	0.0	0	4.0	0.0	C	**4.29**	**D**	100	3.39	0.90	25	Restripe	$8,500	1476
39	Camelback	64th	Scottsdale	1.0	E	6	D	27,600	4	35	14.0	0.0	0	3.5	0.0	C	**4.34**	**D**	100	3.51	0.83	24	Restripe	$8,500	1453
20	Thomas	Civic Center Plaza	84th	1.2	E	4	S	32,700	4	40	15.0	0.0	0	4.0	0.0	C	**4.46**	**D**	100	3.78	0.68	19	Restripe	$8,500	1403
29	Scottsdale	McKellips	McDowell	1.0	N	6	D	38,750	4	40	15.0	0.0	0	3.5	0.0	C	**4.50**	**D**	100	3.82	0.68	19	Restripe	$8,500	1403
3	Hayden	Thomas	Indian School	1.0	S	6	D	34,950	4	45	11.0	0.0	0	4.0	0.0	C	**4.91**	**E**	100	4.23	0.68	19	Restripe	$8,500	1403
22	64th	Osborn	Indian School	0.2	N	4	S	7,700	2	35	11.0	0.0	0	4.5	0.0	C	**3.60**	**D**	100	2.93	0.67	19	Restripe	$8,500	1400
30	Scottsdale	McDowell	Thomas	1.0	N	6	S	42,300	5	40	11.0	0.0	0	3.5	0.0	C	**5.31**	**E**	100	4.64	0.67	19	Restripe	$8,500	1400
41	Chaparral	82nd	Pima	0.7	W	4	S	25,850	4	40	11.0	0.0	0	4.5	0.0	C	**4.76**	**E**	100	4.09	0.67	19	Restripe	$8,500	1400
23	Indian School	60th	64th	0.5	E	4	S	21,200	4	40	12.0	0.0	0	4.5	0.0	C	**4.54**	**E**	100	3.98	0.56	16	Restripe	$8,500	1363
40	Camelback	Scottsdale	82nd	1.2	E	4	D	14,650	3	35	13.0	0.0	0	4.0	0.0	C	**3.98**	**D**	100	3.47	0.51	14	Restripe	$8,500	1346
24	Indian School	Drinkwater	Pima	1.7	W	4	S	35,750	4	40	15.0	0.0	0	3.0	0.0	C	**4.83**	**E**	100	4.34	0.49	14	Restripe	$8,500	1340
6	Hayden	McDonald	Indian Bend	1.0	N	6	D	30,900	4	45	10.0	0.0	0	4.5	0.0	C	**4.85**	**E**	80	3.82	1.03	29	Restripe	$8,500	1284
43	McDonald	W of Scottsdale	Granite Reef	1.6	E	4	S	20,900	4	40	12.0	0.0	0	4.0	0.0	C	**4.64**	**E**	90	4.00	0.64	18	Restripe	$8,500	1272
34	Scottsdale	McDonald	Indian Bend	2.0	N	6	D	54,400	5	45	9.0	0.0	0	4.0	0.0	C	**5.60**	**F**	70	4.38	1.22	35	Restripe	$8,500	1230
56	92nd / 94th	Shea	Thunderbird	2.1	N	4	D	14,025	4	40	12.5	0.0	0	4.0	0.0	C	**4.37**	**D**	80	3.71	0.66	19	Restripe	$8,500	1161
11	Pima	McDowell	Thomas	1.0	S	2	U	4,600	3	45	12.0	0.0	0	4.5	0.0	C	**3.97**	**D**	80	3.33	0.64	18	Restripe	$8,500	1154
79	FLW	Thunderbirird	Via Linda	2.6	NW	4	D	27,400	4	45	12.5	0.0	0	3.5	0.0	C	**4.97**	**E**	80	4.47	0.50	14	Restripe	$8,500	1108
7	Hayden	Indian Bend	Shea	3.3	N	6	D	35,820	4	45	12.0	0.0	0	4.5	0.0	C	**4.71**	**E**	70	3.90	0.81	23	Restripe	$8,500	1093
70	96th	Via Linda	Shea	0.7	S	4	D	7,950	3	45	11.5	0.0	0	4.5	0.0	C	**3.94**	**D**	70	3.15	0.79	22	Restripe	$8,500	1087
52	Via Linda	90th	Shea	2.5	E	4	D	22,300	4	40	11.5	0.0	0	4.5	0.0	C	**4.63**	**E**	70	3.85	0.78	22	Restripe	$8,500	1083
82	Thunderbird/ Redfield	Scottsdale	Hayden	1.1	E	2	S	19,800	3	35	16.5	0.0	0	3.5	0.0	C	**4.13**	**D**	60	3.18	0.95	27	Restripe	$8,500	1022
35	Scottsdale	Shea	FLW	3.9	S	6	D	43,900	5	45	11.0	0.0	0	3.0	0.0	C	**5.62**	**F**	60	4.69	0.93	26	Restripe	$8,500	1016
48	Via de Ventura	Hayden	Pima	0.4	W	4	D	25,100	4	40	12.0	0.0	0	4.5	0.0	C	**4.63**	**E**	70	4.07	0.56	16	Restripe	$8,500	1010
66	Shea	96th	City Limit	6.1	W	6	D	39,600	4	45	11.0	0.0	0	4.0	0.0	S	**4.97**	**E**	60	4.13	0.84	24	Restripe	$8,500	986
100	Dixileta	66th	Scottsdale	0.8	W	2	U	1,800	3	45	14.0	2.0	0	4.0	4.0	S	**2.60**	**C**	10	0.00	2.60	74	Restripe	$8,500	984
69	124th	Via Linda	Columbine	0.5	S	4	D	5,700	2	30	14.0	0.0	0	4.0	0.0	C	**2.41**	**B**	50	1.27	1.14	32	Restripe	$8,500	968
72	Cholla	92nd	96th	0.5	W	2	S	2,000	2	30	13.0	0.0	0	4.0	0.0	C	**2.99**	**C**	70	2.56	0.43	12	Restripe	$8,500	967
10	Hayden	Redfield	FLW	1.5	N	4	D	26,000	4	45	12.5	0.0	0	4.0	0.0	C	**4.79**	**E**	60	4.04	0.75	21	Restripe	$8,500	956
73	Cholla	96th	100th	0.5	W	2	S	600	2	30	23.5	0.0	0	4.5	0.0	S	**0.38**	**A**	70	0.00	0.38	11	Restripe	$8,500	950
55	Mountain View / 92nd	Scottsdale	Shea	3.3	E	4	D	13,450	4	40	12.0	0.0	0	4.0	0.0	C	**4.42**	**D**	60	3.69	0.73	21	Restripe	$8,500	949
16	Pima	Via de Ventura	101	0.8	S	4	U	11,400	4	45	12.0	0.0	0	4.0	0.0	C	**4.43**	**D**	60	3.71	0.72	20	Restripe	$8,500	946
81	Raintree	78th	Redfield	1.3	W	4	D	21,150	4	40	12.5	0.0	0	3.5	0.0	C	**4.73**	**E**	60	4.07	0.66	19	Restripe	$8,500	926
45	Indian Bend	Hayden	Pima	1.0	E	4	D	21,800	4	45	12.0	0.0	0	4.5	0.0	C	**4.66**	**E**	60	4.02	0.64	18	Restripe	$8,500	919
53	Via Linda	Shea	132nd	3.5	E	4	D	12,425	4	40	12.0	0.0	0	4.0	0.0	C	**4.38**	**D**	60	3.74	0.64	18	Restripe	$8,500	919
68	136th	Coyote	Cactus	0.2	N	2	S	5,400	2	30	16.0	0.0	0	4.0	0.0	S	**3.06**	**C**	50	2.14	0.92	26	Restripe	$8,500	895
15	Pima	Inner Circle	Via de Ventura	0.6	N	3	U	11,400	4	45	14.0	2.0	0	4.0	4.0	C	**4.17**	**D**	60	3.71	0.46	13	Restripe	$8,500	859

Appendix C: City of Scottsdale Bicycle LOS and Prioritization Results

Seg ID	Road Name	From	To	Length (mi)	Dir.	Lanes (L)		YR 2004 Roadway ADT	Tks. (HV) (%)	Post. Spd. (SP_p) mph	Width Of Pavement		Occ. Park. (OSPA) (%)	Pavecon		Cross Sec. (C/S)	Bicycle LOS		Latent Demand	Improved LOS	Delta LOS	100% Delta LOS	Recommended Facility Improvement	Improvement Cost (per mile)	Benefit-Cost Index
						Th #	Con				W_t (ft)	W_l (ft)		PC_t (1..5)	PC_l (1..5)		Score (0..7)	Grade (A..F)							
46	McCormick	Scottsdale	Hayden	1.3	E	4	D	6,300	3	40	11.0	0.0	0	5.0	0.0	C	**3.48**	**C**	50	2.73	0.75	21	Restripe	$8,500	838
78	FLW	Scottsdale	Thunderbird	3.9	NW	6	D	32,700	4	45	11.0	0.0	0	3.5	0.0	C	**5.03**	**E**	50	4.35	0.68	19	Restripe	$8,500	815
80	FLW	Via Linda	Shea	0.5	NW	4	D	22,700	4	40	12.0	0.0	0	3.5	0.0	C	**4.83**	**E**	50	4.19	0.64	18	Restripe	$8,500	802
49	Doubletree Ranch	Scottsdale	Hayden	2.0	W	4	D	18,450	4	40	12.0	0.0	0	4.5	0.0	C	**4.48**	**D**	50	3.92	0.56	16	Restripe	$8,500	775
121	Pinnacle Peak	Scottsdale	Country Club	1.6	W	2	S	16,250	4	45	13.0	2.0	0	4.0	4.0	S	**4.84**	**E**	30	3.88	0.96	27	Restripe	$8,500	673
108	Jomax	56th	Scottsdale	2.0	E	2	U	1,500	2	35	12.5	2.5	0	4.0	4.0	S	**1.57**	**B**	10	0.48	1.09	31	Restripe	$8,500	481
96	Carefree	56th	Scottsdale	1.9	E	2	U	14,600	4	45	15.0	2.5	0	4.5	4.5	S	**4.00**	**D**	30	3.72	0.28	8	Restripe	$8,500	446
88	Cave Creek	Desert Hills	Deer Trail	2.5	W	4	D	5,600	6	40	12.0	0.0	0	4.5	0.0	C	**3.90**	**D**	10	3.12	0.78	22	Restripe	$8,500	378
101	Dixileta	Scottsdale	Pima	2.0	W	2	U	1,800	3	40	13.0	0.0	0	4.5	0.0	S	**2.10**	**B**	10	1.36	0.74	21	Restripe	$8,500	364
112	Alma School	Happy Valley	Rio Verde	2.4	N	4	D	5,900	3	40	11.5	0.0	0	4.5	0.0	C	**3.33**	**C**	10	2.65	0.68	19	Restripe	$8,500	344
33A	Scottsdale	Chaparral	McDonald	1.0	N	6	D	45,500	5	40	15.0	0.0	0	4.0	0.0	C	**4.67**	**E**	10	3.99	0.68	19	Restripe	$8,500	344
12	Pima	Thomas	Chaparral	2.0	S	2	U	8,600	3	45	12.0	0.0	0	4.0	0.0	C	**4.39**	**D**	90	3.11	1.28	36	Add PS	$200,000	63
74	Cholla	104th	106th	0.3	W	2	U	600	2	30	9.5	0.0	0	4.0	0.0	C/S	**1.69**	**B**	70	0.00	1.69	48	Add PS	$200,000	59
13	Pima	Chaparral	Indian Bend	2.0	S	2	U	11,850	4	45	12.0	0.0	0	3.5	0.0	C	**4.96**	**E**	80	3.68	1.28	36	Add PS	$200,000	58
14	Pima	Indian Bend	Inner Circle	0.4	N	2	U	11,400	4	45	12.0	0.0	0	4.0	0.0	S	**4.78**	**E**	60	3.50	1.28	36	Add PS	$200,000	48
63	64th	Shea	Cholla	0.5	S	2	U	8,700	2	35	12.0	0.0	0	3.5	0.0	C/S	**4.15**	**D**	60	2.87	1.28	36	Add PS	$200,000	48
36	Scottsdale	FLW	Pinnacle Peak	4.2	W	4	S	46,520	4	50	11.5	0.0	0	3.5	0.0	S	**5.43**	**E**	40	4.19	1.24	35	Add PS	$200,000	38
44	Indian Bend	W of Scottsdale	Hayden	1.1	E	2	U	19,600	4	40	13.0	1.0	0	3.5	0.0	S	**4.98**	**E**	60	4.55	0.43	12	Add PS	$200,000	36
92	Stagecoach Pass	82nd	Pima	1.0	E	2	U	1,700	3	35	11.0	0.0	0	4.5	0.0	S	**2.49**	**B**	10	0.78	1.71	48	Add PS	$200,000	29
94	Stagecoach Pass	E of 97th	dead end	1.6	E	2	U	1,700	3	30	11.0	0.0	0	5.0	0.0	C/S	**2.27**	**B**	10	0.57	1.70	48	Add PS	$200,000	29
93	Stagecoach Pass	Pima	W of 97th	1.0	E	2	U	1,700	3	30	11.0	1.0	0	4.5	4.5	S	**2.58**	**C**	10	1.00	1.58	45	Add PS	$200,000	27
117	Happy Valley	Scottsdale	Hayden	1.0	W	2	U	2,600	3	40	11.0	0.0	0	4.0	0.0	S	**3.31**	**C**	10	1.80	1.51	43	Add PS	$200,000	26
21	Thomas	84th	Pima	0.5	E	4	S	28,550	4	40	11.0	0.0	0	4.0	0.0	C	**4.91**	**E**	100	2.00	2.91	82	DCS	FALSE	#DIV/0!
37	Scottsdale	Dove Valley	Carefree Hwy	1.0	N	4	D	21,500	5	50	13.0	0.0	0	4.5	0.0	S	**4.89**	**E**	10	3.53	1.36	39	Add PS	$200,000	24
4	Hayden	Indian School	Chaparral	1.0	S	6	D	36,000	4	45	11.0	0.0	0	4.5	0.0	C	**4.82**	**E**	100	2.00	2.82	80	DCS	FALSE	#DIV/0!
89	Lone Mountain	68th	Scottsdale	0.5	W	2	U	4,300	3	45	12.0	0.0	0	4.0	0.0	S	**4.04**	**D**	10	2.76	1.28	36	Add PS	$200,000	23
103	Rio Verde	Pima	W. of 118th	3.7	E	4	D	12,600	10	50	12.0	0.0	0	4.0	0.0	S	**6.54**	**F**	10	5.26	1.28	36	Add PS	$200,000	23
65	Shea	64th	96th	4.0	W	6	D	51,500	6	50	13.0	0.0	0	4.0	0.0	C	**5.53**	**F**	60	2.00	3.53	100	DCS	FALSE	#DIV/0!
8	Hayden	Shea	Cactus	1.0	N	4	S	22,500	4	45	11.5	0.0	0	4.0	0.0	C	**4.84**	**E**	70	2.00	2.84	80	DCS	FALSE	#DIV/0!
125	Pima	Country Club	Pinnacle Peak	0.5	S	4	D/U	36,000	5	50	14.0	2.0	0	4.0	4.0	S	**5.12**	**E**	10	4.10	1.02	29	Add PS	$200,000	19
104	Rio Verde	W. of 118th	E of 136th	3.2	E	2	U	9,100	7	50	14.0	2.5	0	4.0	4.0	S	**5.01**	**E**	10	4.17	0.84	24	Add PS	$200,000	17
64	64th	Cholla	Cactus	0.5	S	2	S	8,000	2	35	12.0	0.0	0	4.0	0.0	C	**3.95**	**D**	60	2.00	1.95	55	DCS	FALSE	#DIV/0!
83	Northsight / Thunderbird	Hayden	FLW	2.8	E	4	S	6,400	2	35	11.5	0.0	0	3.0	0.0	C	**3.88**	**D**	60	2.00	1.88	53	DCS	FALSE	#DIV/0!
38	Scottsdale	Carefree Hwy	Boulder Pass	0.5	N	4	D	21,500	4	35	11.5	0.0	0	4.5	0.0	C/S	**4.48**	**D**	10	3.86	0.62	18	Add PS	$200,000	14
122	Pinnacle Peak	Country Club	Pima	0.4	W	4	D	16,800	4	45	11.0	0.0	0	4.5	0.0	C	**4.65**	**E**	20	2.00	2.65	75	DCS	FALSE	#DIV/0!
67	136th	Via Linda	Coyote	0.2	S	4	D	5,400	2	30	11.0	0.0	0	4.0	0.0	C	**2.93**	**C**	50	2.00	0.93	26	DCS	FALSE	#DIV/0!
31	Scottsdale	Thomas	Goldwater	0.5	N	6	D/S	40,400	5	35	10.0	0.0	0	3.5	0.0	C	**5.24**	**E**	100	2.00	3.24	92	DCS	FALSE	#DIV/0!
28	Goldwater	Fashion Square	Scottsdale	1.3	S	3	OW	22,500	4	35	10.0	0.0	0	4.5	0.0	C	**4.75**	**E**	100	2.00	2.75	78	DCS	FALSE	#DIV/0!

Appendix C: City of Scottsdale Bicycle LOS and Prioritization Results

Seg ID	Road Name	From	To	Length (mi)	Dir.	Lanes (L)		YR 2004 Roadway ADT	Tks. (HV) (%)	Post. Spd. (SP_p) mph	Width Of Pavement		Occ. Park. (OSPA) (%)	Pavecon		Cross Sec. (C/S)	Bicycle LOS		Latent Demand	Improved LOS	Delta LOS	100% Delta LOS	Recommended Facility Improvement	Improvement Cost (per mile)	Benefit-Cost Index
						Th #	Con				W_t (ft)	W_l (ft)		PC_t (1..5)	PC_l (1..5)		Score (0..7)	Grade (A..F)							
19	Thomas	56	Civic Center Plaza	2.3	E	5	S	29,250	4	40	11.0	0.0	0	4.0	0.0	C	**4.72**	**E**	100	2.00	2.72	77	DCS	FALSE	#DIV/0!
2	Hayden	McKellips	Thomas	2.0	S	6	D	30,150	4	45	11.0	0.0	0	4.0	0.0	C	**4.83**	**E**	90	2.00	2.83	80	DCS	FALSE	#DIV/0!
27	Goldwater	Scottsdale	Fashion Square	0.4	S	5	D	22,500	4	35	10.0	0.0	0	4.5	0.0	C	**4.46**	**D**	100	2.00	2.46	70	DCS	FALSE	#DIV/0!
42	Chaparral	Scottsdale	Miller	0.5	W	4	S	19,200	3	35	11.0	0.0	0	4.0	0.0	C	**4.36**	**D**	100	2.00	2.36	67	DCS	FALSE	#DIV/0!
1	McKellips	Scottsdale	Pima Fwy	2.0	E	4	D/S	14,000	4	40	11.0	0.0	0	3.5	0.0	C	**4.70**	**E**	90	2.00	2.70	76	DCS	FALSE	#DIV/0!
32	Scottsdale	Goldwater	Drinkwater	0.8	N	4	U	27,650	4	25	12.0	0.0	0	3.5	0.0	C	**4.31**	**D**	100	2.00	2.31	65	DCS	FALSE	#DIV/0!
26	Drinkwater	Scottsdale	Scottsdale	1.4	N	5	D	14,000	3	35	10.0	0.0	0	4.5	0.0	C	**4.00**	**D**	100	2.00	2.00	57	DCS	FALSE	#DIV/0!
18	McDowell	64	84	2.5	W	6	D	34,800	4	45	11.0	0.0	0	4.0	0.0	C	**4.90**	**E**	70	2.00	2.90	82	DCS	FALSE	#DIV/0!
17	90th	101	Shea	1.3	N	4	S	22,150	4	40	10.0	0.0	0	4.0	0.0	C	**4.89**	**E**	70	2.00	2.89	82	DCS	FALSE	#DIV/0!
75	Cholla	106th	Via Linda	0.8	W	2	S	800	2	30	12.5	0.0	0	4.5	0.0	C	**2.52**	**C**	70	2.00	0.52	15	DCS	FALSE	#DIV/0!
25	Civic Center Plaza	Thomas	Civic Center Blvd	0.4	N	2	S	ND	ND	35	25.0	0.0	75	4.0	0.0	C	**N/A**	**N/A**	100	N/A	N/A	N/A	Restripe	$8,500	N/A
50	Via Linda	Hayden	87th	1.4	W	2	U	ND	5	25	18.0	0.0	0	4.5	0.0	C	**N/A**	**N/A**	70	N/A	N/A	N/A	Restripe	$8,500	N/A
51	Via Linda	87th	90th	0.3	W	2	S	ND	ND	25	14.5	1.5	0	4.5	0.0	C	**N/A**	**N/A**	70	N/A	N/A	N/A	Restripe	$8,500	N/A
58	Lakeview	Via Linda	Shea	0.7	N	2	S	ND	ND	35	13.5	0.0	0	3.5	0.0	C	**N/A**	**N/A**	70	N/A	N/A	N/A	Restripe	$8,500	N/A
59	Mescal / 74th	Scottsdale	Scottsdale	0.9	S/E	4	D	ND	ND	35	13.5	0.0	0	3.5	0.0	C	**N/A**	**N/A**	60	N/A	N/A	N/A	Restripe	$8,500	N/A
60	70th / Mescal	Scottsdale	Scottsdale	1.2	N/E	2	U	ND	ND	25	18.5	0.0	0	4.0	0.0	C	**N/A**	**N/A**	60	N/A	N/A	N/A	Restripe	$8,500	N/A
71	110th / Altadena	Shea	FLW	0.9	S	2	S	ND	ND	30	13.0	0.0	0	4.0	0.0	C	**N/A**	**N/A**	60	N/A	N/A	N/A	Restripe	$8,500	N/A
84	Greenway/ Hayden Loop	Scottsdale	FLW	1.3	SW	4	D	ND	ND	40	12.0	0.0	0	4.5	0.0	C	**N/A**	**N/A**	60	N/A	N/A	N/A	Restripe	$8,500	N/A
85	90th	Raintree	FLW	0.8	S	4	S	ND	ND	35	12.5	0.0	0	3.5	0.0	C	**N/A**	**N/A**	60	N/A	N/A	N/A	Restripe	$8,500	N/A
95	Westland	83rd	Pima	0.7	E	2	U	ND	ND	35	14.0	0.0	0	4.5	0.0	C	**N/A**	**N/A**	10	N/A	N/A	N/A	Restripe	$8,500	N/A
97	60th	Dove Valley	Carefree Hwy	1.0	N	4	U	ND	ND	35	12.0	0.0	0	4.5	0.0	C/S	**N/A**	**N/A**	20	N/A	N/A	N/A	Restripe	$8,500	N/A
115	Jomax	113th	116th	0.4	E	4	D	ND	ND	40	12.0	0.0	0	5.0	0.0	C	**N/A**	**N/A**	10	N/A	N/A	N/A	Restripe	$8,500	N/A
116	Jomax	116th	118th	0.2	E	2	U	ND	ND	30	11.0	0.0	0	4.5	0.0	S	**N/A**	**N/A**	10	N/A	N/A	N/A	Restripe	$8,500	N/A
120	Happy Valley	Alma School	118th	2.4	W	4	D	ND	ND	40	11.5	0.0	0	4.5	0.0	C	**N/A**	**N/A**	10	N/A	N/A	N/A	Restripe	$8,500	N/A
130	Paradise	98th	E of 100th	0.3	W	2	U	ND	ND	35	14.0	0.0	0	5.0	0.0	C	**N/A**	**N/A**	90	N/A	N/A	N/A	Restripe	$8,500	N/A
131	Paradise	E of 100th	Thompson Peak	0.4	W	2	S	ND	ND	30	16.5	0.0	0	4.5	0.0	C	**N/A**	**N/A**	90	N/A	N/A	N/A	Restripe	$8,500	N/A
132	78th	Greenway	FLW	0.7	S	2	S	ND	ND	30	13.5	0.0	0	4.0	0.0	C	**N/A**	**N/A**	60	N/A	N/A	N/A	Restripe	$8,500	N/A
133	Paradise	Scottsdale	Greenway Hayden Loop	1.0	E	2	S	3,500	ND	30	13.5	0.0	0	4.0	0.0	C	**N/A**	**N/A**	60	N/A	N/A	N/A	Restripe	$8,500	N/A
134	Greenway Road	73rd	79th	0.7	W	2	U	ND	ND	30	20.0	0.0	25	3.5	0.0	C	**N/A**	**N/A**	60	N/A	N/A	N/A	Restripe	$8,500	N/A
135	73rd / Dial	Paradise	Redfield	1.6	S	2	U	ND	ND	30	19.0	0.0	0	3.5	0.0	C	**N/A**	**N/A**	60	N/A	N/A	N/A	Restripe	$8,500	N/A
136	Butherus	Scottsdale	Airport	0.5	E	4	D	ND	ND	30	13.5	0.0	0	4.0	0.0	C	**N/A**	**N/A**	60	N/A	N/A	N/A	Restripe	$8,500	N/A
91	Lone Mountain	Via Cortana	Standing Stones	0.3	N	2	U	ND	ND	35	10.5	0.0	0	4.5	0.0	C/S	**N/A**	**N/A**	10	N/A	N/A	N/A	Add PS	$200,000	N/A
98	Dove Valley	56th	60th	0.5	E	2	S	ND	ND	30	12.0	0.0	0	4.0	0.0	S	**N/A**	**N/A**	20	N/A	N/A	N/A	Add PS	$200,000	N/A
99	Dove Valley	60th	62nd	0.3	E	2	U	ND	ND	30	11.5	2.0	0	4.5	0.0	C/S	**N/A**	**N/A**	20	N/A	N/A	N/A	Add PS	$200,000	N/A
107	64th	Jomax	Pinnacle Vista	0.5	S	2	U	ND	ND	25	11.5	0.0	0	4.0	0.0	S	**N/A**	**N/A**	10	N/A	N/A	N/A	Add PS	$200,000	N/A
110	Jomax	Pima	dead end	1.0	E	2	U	ND	ND	25	9.0	0.0	0	3.0	0.0	S	**N/A**	**N/A**	10	N/A	N/A	N/A	Add PS	$200,000	N/A
111	Alma School	dead end	Happy Valley	0.5	S	2	U	ND	ND	25	11.5	0.0	0	4.0	0.0	S	**N/A**	**N/A**	10	N/A	N/A	N/A	Add PS	$200,000	N/A
114	Jomax	Alma School	113th	0.8	W	2	U	ND	ND	40	12.0	0.0	0	4.5	0.0	S	**N/A**	**N/A**	10	N/A	N/A	N/A	Add PS	$200,000	N/A

Appendix C: City of Scottsdale Bicycle LOS and Prioritization Results

Seg ID	Road Name	From	To	Length (mi)	Dir.	Lanes (L)		YR 2004 Roadway ADT	Tks. (HV) (%)	Post. Spd. (SP_p) mph	Width Of Pavement		Occ. Park. (OSPA) (%)	Pavecon		Cross Sec. (C/S)	Bicycle LOS		Latent Demand	Improved LOS	Delta LOS	100% Delta LOS	Recommended Facility Improvement	Improvement Cost (per mile)	Benefit-Cost Index
						Th #	Con				W_t (ft)	W_l (ft)		PC_t (1..5)	PC_l (1..5)		Score (0..7)	Grade (A..F)							
123	Hayden	Deer Valley	Happy Valley	1.0	N	2	U	ND	ND	30	10.5	0.0	0	4.0	0.0	S	**N/A**	**N/A**	20	N/A	N/A	N/A	Add PS	$200,000	N/A
124	Miller	Pinnacle Peak	Parkview	0.6	S	2	U	ND	ND	25	10.5	0.0	0	3.0	0.0	S	**N/A**	**N/A**	10	N/A	N/A	N/A	Add PS	$200,000	N/A
126	Deer Valley	Scottsdale	Miller	0.5	E	2	U	ND	ND	30	10.0	0.0	0	4.0	0.0	C/S	**N/A**	**N/A**	30	N/A	N/A	N/A	Add PS	$200,000	N/A
129	94th	dead end	Bahia	0.3	S	2	S	ND	ND	25	12.0	0.0	0	4.0	0.0	C	**N/A**	**N/A**	70	N/A	N/A	N/A	Add PS	$200,000	N/A
47	Eastwood	Scottsdale	Doubletree Ranch	1.0	W	2	U	ND	ND	35	12.0	0.0	0	4.5	0.0	C	**N/A**	**N/A**	50	N/A	N/A	N/A	DCS	FALSE	N/A
76	84th	Desert Cove	Cholla	0.3	N	2	U	ND	ND	25	10.0	0.0	0	4.5	0.0	S	**N/A**	**N/A**	60	N/A	N/A	N/A	DCS	FALSE	N/A
105	56th	Pinnacle Vista	Dynamite	0.5	N	2	U	ND	ND	35	10.0	0.0	0	4.0	0.0	C	**N/A**	**N/A**	10	N/A	N/A	N/A	DCS	FALSE	N/A
128	Williams	Scottsdale	Pinnacle Peak	1.2	E/N	2	S	ND	ND	30	11.5	0.0	0	4.5	0.0	C	**N/A**	**N/A**	40	N/A	N/A	N/A	DCS	FALSE	N/A
86	Redfield	Raintree	FLW	1.1	E	4	S	ND	ND	30	10.5	0.0	0	3.5	0.0	C	**N/A**	**N/A**	60	N/A	N/A	N/A	DCS	FALSE	N/A
113	Alma School	Rio Verde	dead end	1.0	N	2	S	ND	ND	35	12.0	0.0	0	4.0	0.0	C	**N/A**	**N/A**	10	N/A	N/A	N/A	DCS	FALSE	N/A
127	79th	Miller	Williams	1.0	N	2	U	ND	ND	30	12.0	0.0	0	4.5	0.0	C	**N/A**	**N/A**	40	N/A	N/A	N/A	DCS	FALSE	N/A

Notes:

W_t = width of outside general tarvel lane plus any bike lane or paved shoulder

W_l = width of paving between the outside lane stripe and the edge of pavement, if any

OSPA = percentage of segment with occupied on-street parking

PCt = FHWA's five point pavement surface condition rating of the travel lane ("5" is new, "1" is poor)

PCl = FHWA's five point pavement surface condition rating of the shoulder ("5" is new, "1" is poor)

Cross Section: C=curbed, S=open shoulder

APPENDIX D: PATH PRIORITIZATION CALCULATIONS (LISTED BY PATH IDENTIFICATION NUMBER)

Appendix D: City of Scottsdale Path Prioritization Calculations by Path ID

Path ID	Name	From	To	Length (ft)	Length (mi)	Latent Demand	LOS	Connection SUPs	Connection Bike Lanes or Paved Shoulders	Connection Bike Routes	Connection Streets	Connection Future Paths	Connection Total	Connection Score (max 10)	Prioritization Score	Tier
1	South Corp Yard Path	Miller Rd	Indian Bend Wash	671	0.1	8	8	1	1	0	0	0	7.0	7.0	7.8	I
2	Granite Reef Path	McKellips Rd	Granite Reef Rd	1531	0.3	6	8	0	0	0	2	1	2.5	2.5	5.9	II
3	Papago Path	Granite Reef Rd	Pima Path	2732	0.5	6	8	1	0	0	0	1	4.5	4.5	6.3	II
4	Yavapai Path	Yavapai Elementary School	Indian Bend Wash	316	0.1	7	8	1	0	0	0	0	4.0	4.0	6.7	II
5	Crosscut Connection	Belleview St	Crosscut Canal	798	0.2	8	8	1	0	0	1	0	5.0	5.0	7.4	I
6	Indian Bend Path	McDowell Rd	Eldorado Aquatic Center	2726	0.5	9	8	1	1	0	0	1	7.5	7.5	8.4	I
7	Indian Bend Path	Eldorado Aquatic Center	Indian Bend Wash	851	0.2	9	8	2	1	1	1	1	14.0	10.0	8.9	I
8	Elm Dr Connector	Elm Dr	Granite Reef Senior Center	146	0.0	5	8	0	0	0	1	0	1.0	1.0	5.1	III
9	70th St Connection	Virginia Ave	Thomas Rd	1450	0.3	10	8	0	0	0	3	0	3.0	3.0	8.0	I
10	Thomas Rd Path	61st St	62nd St	342	0.1	9	8	0	0	0	2	0	2.0	2.0	7.3	I
11	Crosscut Connector	64th St	Crosscut Canal	426	0.1	10	8	1	1	0	1	0	8.0	8.0	9.0	I
12	Thomas Bike Stop	Thomas Rd	Indian Bend Wash	832	0.2	10	6	1	0	0	1	0	5.0	5.0	7.8	I
13	Thomas Rd Gap	Indian Bend Wash	Thomas Rd	304	0.1	10	6	1	0	0	1	0	5.0	5.0	7.8	I
14	Thomas Rd Path	Pima Park	Pima Path	623	0.1	10	8	1	0	0	0	0	4.0	4.0	8.2	I
15	Paiute Path	Avalon Dr	Osborn Rd	1423	0.3	9	8	0	0	1	1	0	2.5	2.5	7.4	I
16	Earll Path	81st Pl	82nd Pl	111	0.0	9	6	0	0	0	2	0	2.0	2.0	6.7	II
17	Osborn Path	Osborn Rd	Pima Rd	131	0.0	9	6	0	0	1	1	0	2.5	2.5	6.8	II
18	Columbus Path	Columbus Ave	Granite Reef Rd	48	0.0	9	8	0	0	0	2	0	2.0	2.0	7.3	I
19	Civic Center Path	Drinkwater Bl	75th St	666	0.1	9	6	0	0	1	2	0	3.5	3.5	7.0	I
20	2nd St Path	75th St	Indian Bend Wash	1392	0.3	10	6	1	1	0	1	1	8.5	8.5	8.5	I
21	Main Street Path	78th St	Indian Bend Wash	246	0.0	9	8	1	0	0	1	0	5.0	5.0	7.9	I
22	Indian School Path	Bashas Market	81st St	135	0.0	10	2	0	1	0	1	0	4.0	4.0	6.4	II
23	Crosscut Path	Catalina Dr	Thomas Rd	508	0.1	10	8	1	1	0	1	1	8.5	8.5	9.1	I
24	Crosscut Canal Path	Thomas Rd	Indian School Rd	3683	0.7	10	8	0	2	0	0	3	7.5	7.5	8.9	I
25	Arizona Canal Path	60th St	64th St	2765	0.5	10	8	0	1	0	1	3	5.5	5.5	8.5	I
26	Arizona Canal Path	64th St	Goldwater Bl	4694	0.9	10	8	0	0	1	0	4	3.5	3.5	8.1	I
27	68th Street Bridge	Lafayette Bl	Indian School Rd	367	0.1	9	8	0	2	1	0	1	8.0	8.0	8.5	I
28	Arizona Canal Path	Goldwater Bl	Scottsdale Rd	2078	0.4	10	8	0	0	0	4	2	5.0	5.0	8.4	I
29	Arizona Canal Path	Scottsdale Rd	Chaparral Rd	3400	0.6	10	8	0	0	0	3	2	4.0	4.0	8.2	I
30	Arizona Canal Path	Chaparral Rd	McDonald Dr	5444	1.0	10	8	0	1	0	2	5	7.5	7.5	8.9	I
31	Miller Connection	Arizona Canal	Miller Rd	68	0.0	9	8	0	1	0	0	1	3.5	3.5	7.6	I
32	Jackrabbit Path	Arizona Canal	Miller Rd	170	0.0	9	8	0	1	0	0	1	3.5	3.5	7.6	I
33	Jackrabbit Bridge	Arizona Canal at Jackrabbit Rd		181	0.0	9	8	1	1	1	0	2	9.5	9.5	8.8	I
34	San Miguel Path	Arizona Canal	76th Pl	132	0.0	9	8	0	0	0	1	1	1.5	1.5	7.2	I
35	Arizona Canal Path	McDonald Rd	Indian Bend Wash	4148	0.8	8	8	2	0	0	0	3	9.5	9.5	8.3	I
36	Lincoln Path	Arizona Canal	78th St	501	0.1	6	8	1	0	1	0	1	6.0	6.0	6.6	II
37	Lincoln Path	Indian Bend Wash	79th St	822	0.2	7	8	2	0	0	1	0	9.0	9.0	7.7	I
38	Indian Bend Path	Silverado Golf Course	Indian Bend Rd	1661	0.3	6	8	2	0	0	1	1	9.5	9.5	7.3	I
39	Hayden Tunnel 2	Hayden Rd at Coolidge		141	0.0	10	8	1	0	0	0	1	4.5	4.5	8.3	I
40	Hayden Tunnel	Hayden Rd at Chaparral		174	0.0	10	8	1	0	0	0	1	4.5	4.5	8.3	I
41	Indian Bend Path	Chaparral Rd	Jackrabbit Rd	2932	0.6	10	8	2	2	0	0	0	14.0	10.0	9.4	I
42	Vista Path	Chaparral Park	Vista Dr	52	0.0	9	8	1	0	0	1	0	5.0	5.0	7.9	I
43	Jackrabbit Path	Indian Bend Path	Jackrabbit Rd	113	0.0	9	8	0	0	1	1	0	2.5	2.5	7.4	I
44	Chaparral Path	Chaparral Park Path	McDonald	2224	0.4	10	8	1	0	0	1	1	5.5	5.5	8.5	I
45	Chaparral Path	McDonald Dr	Valley Vista Dr	632	0.1	8	8	0	0	0	2	2	3.0	3.0	7.0	I
46	Valley Vista Path	Hayden Rd	82nd St	1223	0.2	8	8	0	0	0	3	2	4.0	4.0	7.2	I
47	82nd St Path	Valley Vista Dr	Redwing Rd	2544	0.5	8	8	1	0	1	4	1	10.0	10.0	8.4	I
48	Agua Linda Path	Agua Linda Park	Pima Path	217	0.0	7	8	1	0	0	0	0	4.0	4.0	6.7	II
49	La Luna Connector	Via de La Luna	Pima Path	29	0.0	6	6	1	0	0	1	0	5.0	5.0	5.8	II
50	Joshua Tree Cnctr	Joshua Tree Ln	Pima Path	21	0.0	6	8	1	0	0	1	0	5.0	5.0	6.4	II
51	Sereno Connector	Via de Sereno	Pima Path	26	0.0	6	4	1	0	0	1	0	5.0	5.0	5.2	III
52	Dorado Connector	Via de Dorado	Pima Path	49	0.0	6	8	1	0	0	1	0	5.0	5.0	6.4	II
53	Inner Circle Cnctr	Inner Circle	Pima Path	12	0.0	6	6	1	0	0	0	0	4.0	4.0	5.6	III
54	Del Arbor Connector	Via del Arbor	Pima Path	54	0.0	6	6	1	0	0	1	0	5.0	5.0	5.8	II

Appendix D: City of Scottsdale Path Prioritization Calculations by Path ID

Path ID	Name	From	To	Length (ft)	Length (mi)	Latent Demand	LOS	Connection SUPs	Connection Bike Lanes or Paved Shoulders	Connection Bike Routes	Connection Streets	Connection Future Paths	Connection Total	Connection Score (max 10)	Prioritization Score	Tier
55	Taz Norte Connector	Via Taz Norte	Pima Path	14	0.0	6	4	1	0	0	1	0	5.0	5.0	5.2	III
56	McCormick Connector	Via de McCormick	Pima Path	19	0.0	6	6	1	0	0	1	0	5.0	5.0	5.8	II
57	Commercio Connector	Ranch Office	Pima Path	30	0.0	6	6	1	0	0	1	0	5.0	5.0	5.8	II
58	Ranch Connector	Ranch Office Park	Pima Path	34	0.0	6	6	1	0	0	0	0	4.0	4.0	5.6	III
59	Ranch Connector	Ranch Office Park	Pima Path	45	0.0	6	6	1	0	0	1	0	5.0	5.0	5.8	II
60	Ranch Connector	Ranch Office Park	Pima Path	19	0.0	6	6	1	0	0	1	0	5.0	5.0	5.8	II
61	Villa Vallarta Path	Villa de Vallarta	Pima Path	37	0.0	6	4	1	0	0	0	0	4.0	4.0	5.0	III
62	Villa Royale Path	Villa Royale	Pima Path	32	0.0	6	4	1	0	0	0	0	4.0	4.0	5.0	III
63	San Esteban Path	San Esteban Dr	Pima Path	78	0.0	6	6	1	0	0	1	0	5.0	5.0	5.8	II
64	87th Wy Connector	87th Wy	Pima Path	219	0.0	6	8	1	0	0	1	0	5.0	5.0	6.4	II
65	San Rafael Connector	San Rafael Dr	Pima Path	23	0.0	6	8	1	0	0	1	0	5.0	5.0	6.4	II
66	Rancho Antiqua Path2	Rancho Antigua	Pima Path	27	0.0	6	8	1	0	0	0	0	4.0	4.0	6.2	II
67	Rancho Antigua Path	Rancho Antigua	Pima Path	57	0.0	6	8	1	0	0	0	0	4.0	4.0	6.2	II
68	Pima Path	Mountain View Rd Crossing		84	0.0	6	6	2	0	0	0	0	8.0	8.0	6.4	II
69	Sun Canyon Connector	Sun Canyon	Pima Path	43	0.0	6	8	1	0	0	1	0	5.0	5.0	6.4	II
70	Casabella Connector	Casabella Condominiums	Pima Path	47	0.0	6	8	1	0	0	0	0	4.0	4.0	6.2	II
71	Mustang Connector	Mustang Tr	Pima Path	49	0.0	6	8	1	0	0	1	0	5.0	5.0	6.4	II
72	Arizona Canal Path	Hayden Rd	82nd St	1282	0.2	7	8	1	0	0	1	0	5.0	5.0	6.9	I
73	Arizona Canal Path	Hayden Rest Stop	Arizona Canal Path	70	0.0	7	8	1	0	0	0	0	4.0	4.0	6.7	II
74	Indian Bend Rd Path	Scottsdale Rd	Hayden Rd	5107	1.0	6	8	1	0	0	2	3	7.5	7.5	6.9	I
75	IBW West Path	Indian Bend Rd	Scottsdale Rd	3752	0.7	5	8	0	1	0	1	2	5.0	5.0	5.9	II
76	Scottsdale Rd Path	Indian Bend Wash	McCormick Py	1692	0.3	4	2	1	1	0	3	3	11.5	10.0	4.6	III
78	Indian Bend Path	Hayden Rd	Indian Bend Path	1178	0.2	5	4	2	0	0	2	1	10.5	10.0	5.7	II
79	McCormick Py Path	Scottsdale Rd	Indian Bend Path	6023	1.1	5	4	1	1	0	3	4	12.0	10.0	5.7	II
81	McCormick Path	Via Bonita	Doubletree Ranch Rd	922	0.2	5	6	1	0	0	4	0	8.0	8.0	5.9	II
82	Via de Ventura Path	Indian Bend Path	Doubletree Ranch Rd	2387	0.5	5	6	2	0	0	1	0	9.0	9.0	6.1	II
83	Paseo Path	Via Paseo Del Norte	Scottsdale McCormick Office Park	349	0.1	5	8	0	0	0	1	1	1.5	1.5	5.2	III
84	Paseo Path	Paseo Path	Via de Negocio	483	0.1	5	8	0	0	0	1	1	1.5	1.5	5.2	III
85	Ventura Path B	85th Wy	86th Pl	329	0.1	6	8	0	0	0	2	0	2.0	2.0	5.8	II
86	Ventura Path	85th Wy	86th Pl	423	0.1	6	8	0	0	0	2	0	2.0	2.0	5.8	II
87	Mountain View Path	68th Pl	Scottsdale Rd	2521	0.5	5	6	0	0	0	2	1	2.5	2.5	4.8	III
88	Mountain View Path	Scottsdale Rd	78th St	4148	0.8	5	6	0	0	1	3	1	5.0	5.0	5.3	III
89	Gainey Ranch Path	Mountain View Rd	Gold Dust Rd	2527	0.5	7	6	2	0	0	2	1	10.5	10.0	7.3	I
90	Gainey Ranch Path2	Mountain View Rd	Gold Dust Rd	2330	0.4	7	8	1	0	0	2	2	7.0	7.0	7.3	I
91	Gold Dust Path	West of Hayden Rd	Arabian Tr	1147	0.2	7	6	1	0	1	1	1	7.0	7.0	6.7	II
92	70th St Path	Mountain View Rd	Gold Dust Ave	1318	0.2	5	6	0	0	0	1	1	1.5	1.5	4.6	III
93	Gold Dust Path	68th Wy	70th St	1253	0.2	5	4	0	0	0	2	2	3.0	3.0	4.3	III
94	68th Pl Path	Gold Dust Ave	Shea Bl	1452	0.3	5	2	0	0	0	4	2	5.0	5.0	4.1	III
95	68th Pl Path	Shea Bl	Cholla St	2875	0.5	6	2	0	0	1	4	4	7.5	7.5	5.1	III
96	Mescal Path	68th Pl	68th Pl	1577	0.3	6	1	0	0	0	2	2	3.0	3.0	3.9	III
97	Cholla Path	66th St	68th Pl	1560	0.3	6	4	0	0	1	3	1	5.0	5.0	5.2	III
98	Gold Dust Gap	Gold Dust Ave	Gold Dust Ave	201	0.0	5	4	0	0	0	2	0	2.0	2.0	4.1	III
99	Mountain View Path	Mountain View Rd	Arabian Tr	2925	0.6	7	8	2	0	1	1	1	11.0	10.0	7.9	I
100	Irish Hunter Path	Mountain View Path	Arabian Tr	1371	0.3	6	6	1	0	1	3	1	9.0	9.0	6.6	II
101	Arabian Path	Irish Hunter Path	Arabian Tr	710	0.1	6	8	0	0	1	0	2	2.5	2.5	5.9	II
102	Arabian Path	Arabian Tr	Shea Bl	519	0.1	7	8	1	0	1	1	1	7.0	7.0	7.3	I
103	90th St Path	Bella Vista Path	Indian Bend Path	2707	0.5	7	8	1	0	0	3	1	7.5	7.5	7.4	I
104	Bella Vista Path	90th St	104th St	8690	1.6	7	8	0	0	0	0	4	2.0	2.0	6.3	II
105	100 Pl Connector	Bella Vista Path	100th Pl	52	0.0	5	4	0	0	0	1	1	1.5	1.5	4.0	III
106	Bella Vista Path	104th St	112th St	5309	1.0	6	8	0	0	0	0	4	2.0	2.0	5.8	II
107	Bella Vista Path	112th St	122nd St	6447	1.2	6	8	0	0	0	0	3	1.5	1.5	5.7	II
108	Bella Vista Path	122nd St	CAP Aqueduct	4625	0.9	6	8	0	0	0	0	3	1.5	1.5	5.7	II
109	Bella Vista Path	CAP Aqueduct	Shea Bl	10230	1.9	5	8	1	0	1	2	2	8.5	8.5	6.6	II
110	96th St Path	Bella Vista Path	Mission Ln	777	0.1	5	6	0	0	0	1	1	1.5	1.5	4.6	III

Appendix D: City of Scottsdale Path Prioritization Calculations by Path ID

Path ID	Name	From	To	Length (ft)	Length (mi)	Latent Demand	LOS	Connection SUPs	Connection Bike Lanes or Paved Shoulders	Connection Bike Routes	Connection Streets	Connection Future Paths	Connection Total	Connection Score (max 10)	Prioritization Score	Tier
111	104th St Path	Bella Vista Path	Mission Ln	581	0.1	5	8	0	0	0	1	2	2.0	2.0	5.3	III
112	104th St Path	Mission Ln	Via Linda	1748	0.3	6	8	0	1	0	2	2	6.0	6.0	6.6	II
113	104th St Path	Via Linda	Scottsdale Ranch Park	180	0.0	6	8	0	0	0	1	2	2.0	2.0	5.8	II
114	Sctsdl Ranch Path	104th St Path	Scottsdale Ranch Path	79	0.0	6	8	1	0	0	0	1	4.5	4.5	6.3	II
115	Via Linda Path	Mountain View Rd	Lakeview Dr	3920	0.7	7	8	1	1	0	2	2	10.0	10.0	7.9	I
116	ScRanchPk 2	Tennis Courts	Path	237	0.0	6	8	2	0	0	0	0	8.0	8.0	7.0	I
117	ScRanchPk 1	Path	Lakeview Dr	349	0.1	5	8	1	0	0	1	0	5.0	5.0	5.9	II
118	Lakeview Path	Via Linda	Laguna Elementary School	1734	0.3	7	8	1	0	0	1	3	6.5	6.5	7.2	I
119	Lakeview Path	Laguna Elementary School	Shea Bl	1709	0.3	6	8	1	0	0	4	1	8.5	8.5	7.1	I
120	Bella Vista Cnctr	Bella Vista Path	Bella Vista	435	0.1	5	8	0	0	0	1	1	1.5	1.5	5.2	III
121	Palomino Path	Bella Vista Path	117th Wy	5521	1.0	5	8	0	2	0	2	2	9.0	9.0	6.7	II
122	Doubletree Path	Power Line Path	Doubletree Ranch Rd	130	0.0	5	8	0	0	0	1	1	1.5	1.5	5.2	III
123	Power Line Path	Bella Vista Path	Shea Bl	6336	1.2	6	8	0	1	0	4	3	8.5	8.5	7.1	I
124	Powerline Path	Shea Bl	Cactus Rd	7064	1.3	5	8	1	0	0	11	3	16.5	10.0	6.9	I
125	CAP Path	Bella Vista Path	Shea	7953	1.5	6	8	0	0	1	3	4	6.5	6.5	6.7	II
126	CAP Path	Shea Bl	Via Linda	4327	0.8	6	8	1	0	0	2	2	7.0	7.0	6.8	II
127	CAP Path	Via Linda	Sweetwater Ave	9245	1.8	6	8	0	0	1	2	3	5.0	5.0	6.4	II
128	CAP Path	Sweetwater Ave	Thompson Peak Py	8784	1.7	8	8	0	1	1	1	3	7.0	7.0	7.8	I
129	CAP Path	Thompson Peak Py	Loop 101	7011	1.3	9	8	1	1	0	1	3	9.5	9.5	8.8	I
130	CAP Path	Loop 101	Hayden Rd	5177	1.0	5	8	0	2	0	0	2	7.0	7.0	6.3	II
131	CAP Path	Hayden Rd	Scottsdale Rd	5417	1.0	5	8	0	2	0	0	2	7.0	7.0	6.3	II
132	124th St Path	CAP Aqueduct	Cochise Dr	1681	0.3	6	8	0	0	1	2	2	4.5	4.5	6.3	II
133	124th St Path	Cochise Dr	Lost Dog Trailhead	6616	1.3	6	2	0	0	1	10	3	13.0	10.0	5.6	III
134	Mt View Connector	Camelback Walk	Mountain View Rd	401	0.1	6	6	1	0	0	1	0	5.0	5.0	5.8	II
135	Shea Path	64th St	Scottsdale Rd	5293	1.0	6	10	0	0	0	8	1	8.5	8.5	7.7	I
136	Shea Path	Scottsdale Rd	Hayden Rd	5263	1.0	5	10	1	0	0	5	2	10.0	10.0	7.5	I
137	Shea Path	Hayden Rd	Loop 101	4155	0.8	6	10	1	1	0	3	3	11.5	10.0	8.0	I
138	Shea Path	Loop 101	96th St	5356	1.0	6	10	2	1	1	4	0	16.5	10.0	8.0	I
139	Shea Path	96th St	104th St	5313	1.0	7	8	1	2	1	1	2	13.5	10.0	7.9	I
140	Shea Path	104th St	Frank Lloyd Wright Blvd	6569	1.2	6	8	0	2	1	3	2	11.5	10.0	7.4	I
141	Shea Path	Frank Lloyd Wright Bl	124th St	6614	1.3	6	8	1	1	1	3	3	13.0	10.0	7.4	I
142	Shea Path	124th St	136th St	8533	1.6	6	8	1	0	3	0	3	10.0	10.0	7.4	I
143	Arabian_Shea Path	Arabian Tr	Shea Bl	522	0.1	6	10	1	0	1	1	1	7.0	7.0	7.4	I
144	Shea Path	120th St	124th St	2634	0.5	6	8	1	0	1	2	2	8.5	8.5	7.1	I
145	Shea Path	124th St	132nd St	3623	0.7	6	8	0	0	1	2	3	5.0	5.0	6.4	II
146	Shea Path	132nd St	140th St	6590	1.2	6	8	0	0	1	2	2	4.5	4.5	6.3	II
147	Hayden Path	Shea Bl	Cactus Rd	5719	1.1	7	8	0	1	0	4	2	8.0	8.0	7.5	I
148	Hayden Path	Cactus Rd	Thunderbird Rd	5324	1.0	7	8	0	2	1	3	2	11.5	10.0	7.9	I
149	Hayden Path	Thunderbird Rd	Frank Lloyd Wright Bl	9941	1.9	5	8	0	1	0	9	4	14.0	10.0	6.9	I
150	Professional Gap	85th Pl	Scottsdale Professional	82	0.0	6	4	0	0	0	1	0	1.0	1.0	4.4	III
151	Pima Path	Shea Bl	Cactus Rd	5462	1.0	7	8	1	0	0	7	2	12.0	10.0	7.9	I
152	Pima Path	Cactus Rd	Thunderbird Rd	5614	1.1	7	6	1	1	1	2	2	11.5	10.0	7.3	I
153	Pima Path	Thunderbird Rd	Frank Lloyd Wright Bl	6728	1.3	7	6	0	1	0	4	3	8.5	8.5	7.0	I
154	Pima Path	Frank Lloyd Wright Bl	Bell Rd	6053	1.1	6	8	0	1	0	0	4	5.0	5.0	6.4	II
155	Pima Path	Loop 101	Power Line Path	3796	0.7	4	4	0	1	0	1	3	5.5	5.5	4.3	III
156	Pima Path	Overlook Dr	Los Gatos Dr	1649	0.3	3	2	1	0	0	1	2	6.0	6.0	3.3	III
157	Pima Path	Los Gatos Dr	Happy Valley Rd	9027	1.7	1	8	0	2	0	2	2	9.0	9.0	4.7	III
158	Pima Path	Happy Valley Rd	Jomax Rd	5190	1.0	1	6	0	1	0	0	2	4.0	4.0	3.1	III
159	Pima Path	Jomax Rd	Dynamite Bl	5192	1.0	1	6	0	2	0	0	2	7.0	7.0	3.7	III
160	Pima Path	Dynamite Bl	Dixileta Dr	5354	1.0	1	6	0	1	0	0	2	4.0	4.0	3.1	III
161	Pima Path	Dixileta Dr	Lone Mountain Rd	5433	1.0	1	4	0	1	0	1	2	5.0	5.0	2.7	III
162	Pima Path	Lone Mountain Rd	Westland Rd	8400	1.6	1	4	0	1	0	1	2	5.0	5.0	2.7	III
163	Pima Path	Westland Rd	Stagecoach Rd	7880	1.5	1	4	0	2	0	0	2	7.0	7.0	3.1	III
164	Indian Bend Path	92nd St	Cactus Rd	6329	1.2	7	6	2	1	1	4	1	17.0	10.0	7.3	I

Appendix D: City of Scottsdale Path Prioritization Calculations by Path ID

Path ID	Name	From	To	Length (ft)	Length (mi)	Latent Demand	LOS	Connection SUPs	Connection Bike Lanes or Paved Shoulders	Connection Bike Routes	Connection Streets	Connection Future Paths	Connection Total	Connection Score (max 10)	Prioritization Score	Tier
165	Cholla Path	94th St	108th St	9034	1.7	7	2	1	2	1	5	2	17.5	10.0	6.1	II
166	Cholla Path	108th St	Cholla Park	3396	0.6	5	6	2	0	1	3	0	12.5	10.0	6.3	II
167	Cactus Path	96th St	104th St	5304	1.0	7	6	1	2	1	3	2	15.5	10.0	7.3	I
168	Cactus Path	104th St	Frank Lloyd Wright Bl	4019	0.8	5	6	0	1	1	2	2	7.5	7.5	5.8	II
169	Bent Tree Path	110th St	Frank Lloyd Wright Bl	1036	0.2	5	6	1	0	0	1	1	5.5	5.5	5.4	III
170	132nd St Path	Shea Bl	Via Linda	3054	0.6	6	2	1	0	1	4	2	10.5	10.0	5.6	III
171	Mayo Path	Shea Bl	Cactus Rd	6224	1.2	6	2	0	1	0	5	2	9.0	9.0	5.4	III
172	Via Linda Path	124th St	136th St	7896	1.5	5	4	0	0	2	4	2	8.0	8.0	5.3	III
173	Via Linda Path	Hidden Hills		6884	1.3	5	4	0	0	1	0	1	2.0	2.0	4.1	III
174	128th St Path	Shea Bl	Cactus Rd	5618	1.1	6	2	0	0	0	5	3	6.5	6.5	4.9	III
175	Cactus Path	124th St	128th St	2542	0.5	6	2	0	0	0	3	2	4.0	4.0	4.4	III
176	Scottsdale Rd Path	Cactus Park	Sweetwater Ave	1478	0.3	8	10	1	0	0	1	0	5.0	5.0	8.0	I
177	Sweetwater Path	Scottsdale Rd	76th St	2568	0.5	8	2	0	0	0	3	2	4.0	4.0	5.4	III
178	76th St Path	Sweetwater Ave	Cotton Dr	1376	0.3	8	1	0	1	0	1	3	5.5	5.5	5.4	III
179	76th St Path	Sutton Dr	Thunderbird Rd	3906	0.7	7	6	0	0	0	4	2	5.0	5.0	6.3	II
180	73rd St Path	Sutton Dr	Thunderbird Rd	1449	0.3	7	8	0	0	0	2	2	3.0	3.0	6.5	II
181	Thunderbird Path	Thunderbird Rd	Redfield Rd	556	0.1	7	6	0	0	0	1	3	2.5	2.5	5.8	II
182	Thunderbird Path	Redfield Rd	Thunderbird Rd	1466	0.3	7	6	0	0	0	2	2	3.0	3.0	5.9	II
183	73rd St Path	Thunderbird Rd	Redfield Rd	1253	0.2	6	8	0	0	0	3	1	3.5	3.5	6.1	II
184	Thunderbird Path	76th St	Hayden Rd	2703	0.5	7	6	0	1	0	0	3	4.5	4.5	6.2	II
185	Thunderbird Path	Hayden Rd	Loop 101	4987	0.9	6	2	0	3	1	2	3	14.0	10.0	5.6	III
186	Northsight Path	Thunderbird Rd	Northsight Path	559	0.1	6	6	1	2	1	0	1	12.0	10.0	6.8	II
187	Redfield Path	Hayden Rd	Northsight Park	2602	0.5	5	6	0	0	0	1	2	2.0	2.0	4.7	III
188	82nd St Connector	82nd St	Redfield Path	309	0.1	5	6	0	0	0	1	1	1.5	1.5	4.6	III
189	Redfield Path	Northsight Park	Gelding Dr	590	0.1	6	6	0	0	0	2	2	3.0	3.0	5.4	III
190	Northsight Path	Northsight Path	Redfield Path	241	0.0	6	6	1	0	0	0	1	4.5	4.5	5.7	II
191	76th St Path	Greenway Rd	CAP Aqueduct	3916	0.7	7	10	0	0	0	6	1	6.5	6.5	7.8	I
192	Northsight Path	Hayden Rd	CAP Aqueduct	2206	0.4	10	8	0	0	0	2	3	3.5	3.5	8.1	I
193	FLW Path	82nd St	Northsight Path	1971	0.4	5	8	0	0	0	2	1	2.5	2.5	5.4	III
194	92nd St Path	Cactus Rd	Larkspur Dr	1311	0.2	7	6	0	0	0	1	1	1.5	1.5	5.6	III
195	Larkspur Path	Larkspur Dr	93rd St	986	0.2	7	6	0	0	0	2	1	2.5	2.5	5.8	II
196	92nd St Path	Larkspur Dr	Sweetwater Ave	1270	0.2	7	6	0	0	1	2	3	5.0	5.0	6.3	II
197	92nd St Path	Sweetwater Ave	Raintree Dr	5251	1.0	9	8	0	1	2	6	2	13.0	10.0	8.9	I
198	92nd St Path	Raintree Dr	Frank Lloyd Wright Bl	3149	0.6	9	8	0	1	1	3	2	8.5	8.5	8.6	I
199	100th St Path	Frank Lloyd Wright Bl	Thompson Peak Py	2499	0.5	9	8	1	2	0	0	0	10.0	10.0	8.9	I
200	FLW Path	Thunderbird Rd	Redfield Path	485	0.1	9	8	0	0	0	1	2	2.0	2.0	7.3	I
201	Sweetwater Path	89th St	96th St	4514	0.9	7	4	2	1	1	6	2	19.5	10.0	6.7	II
202	Sweetwater Path	96th St	Frank Lloyd Wright	5944	1.1	7	4	1	2	1	6	2	18.5	10.0	6.7	II
203	Presidio Path	96th St	97th St Path	1053	0.2	6	6	1	1	0	0	1	7.5	7.5	6.3	II
204	97th St Path	Sutton Dr	Presidio Rd	435	0.1	7	6	0	0	0	2	2	3.0	3.0	5.9	II
205	Presidio Path	Sutton Dr	100th St	2018	0.4	7	6	0	1	0	2	2	6.0	6.0	6.5	II
206	100th St Path	Aztec Elementary School	Frank Lloyd Wright	1559	0.3	7	8	0	1	0	1	2	5.0	5.0	6.9	I
207	100th St Path	Thompson Peak Py	Frank Lloyd Wright Bl	5097	1.0	8	8	0	3	0	0	3	10.5	10.0	8.4	I
208	97th St Path	Presidio Path	Thunderbird Rd	1711	0.3	7	6	0	0	0	1	2	2.0	2.0	5.7	II
209	Thunderbird Path	97th St Path	Frank Lloyd Wright Bl	510	0.1	8	6	0	0	0	2	2	3.0	3.0	6.4	II
210	Redfield Path	Frank Lloyd Wright Bl	100th St	1328	0.3	8	8	0	1	0	2	2	6.0	6.0	7.6	I
211	FLW Path	100th St	CAP Aqueduct	1520	0.3	7	8	0	1	0	0	2	4.0	4.0	6.7	II
212	Desert Canyon Path	WestWorld	Desert Canyon Path	1578	0.3	9	2	1	1	0	0	1	7.5	7.5	6.6	II
213	Desert Canyon Path	Thompson Peak Py	Desert Canyon Middle School	689	0.1	9	4	0	1	1	0	3	6.0	6.0	6.9	I
214	Desert Canyon Path	Desert Canyon Path	102nd St	762	0.1	9	4	1	0	1	0	1	6.0	6.0	6.9	I
215	Ranch Park Path	102nd St	Desert Canyon Path	2060	0.4	9	4	1	0	1	0	1	6.0	6.0	6.9	I
216	Scottsdale Rd Path	CAP Aqueduct	Loop 101	7627	1.4	4	8	0	0	0	4	4	6.0	6.0	5.6	III
217	Scottsdale Rd Path	Loop 101	Thompson Peak Py	3801	0.7	4	8	1	1	0	1	2	9.0	9.0	6.2	II
218	Scottsdale Rd Path	Deer Valley Rd	Pinnacle Peak Rd	5364	1.0	3	8	0	2	0	4	2	11.0	10.0	5.9	II

Appendix D: City of Scottsdale Path Prioritization Calculations by Path ID

Path ID	Name	From	To	Length (ft)	Length (mi)	Latent Demand	LOS	Connection SUPs	Connection Bike Lanes or Paved Shoulders	Connection Bike Routes	Connection Streets	Connection Future Paths	Connection Total	Connection Score (max 10)	Prioritization Score	Tier
219	Scottsdale Rd Path	Pinnacle Peak Rd	Happy Valley Rd	5257	1.0	2	8	0	0	0	4	2	5.0	5.0	4.4	III
220	Scottsdale Rd Path	Happy Valley Rd	Jomax Rd	4939	0.9	1	8	0	2	0	0	2	7.0	7.0	4.3	III
221	Scottsdale Rd Path	Jomax Rd	Dynamite Bl	5283	1.0	1	8	0	2	0	2	3	9.5	9.5	4.8	III
222	Scottsdale Rd Path	Dynamite BL	Dixileta Rd	5271	1.0	1	8	0	0	0	5	2	6.0	6.0	4.1	III
223	Scottsdale Rd Path	Dixileta Rd	Lone Mountain Rd	5205	1.0	1	8	0	0	0	1	2	2.0	2.0	3.3	III
224	Scottsdale Rd Path	Lone Mountain Rd	Carefree Hwy	10692	2.0	1	8	0	3	0	1	2	11.0	10.0	4.9	III
225	Hayden Path	CAP Aqueduct	Copper Basin Park	4008	0.8	5	4	2	2	0	1	3	16.5	10.0	5.7	II
226	Hayden Path	Copper Basin Park	Power Line Path	7693	1.5	5	4	1	1	0	3	4	12.0	10.0	5.7	II
227	Bell Path	Hayden Rd	Copper Basin Park	602	0.1	5	4	1	1	0	0	1	7.5	7.5	5.2	III
228	Bell Path	Copper Basin Park	Loop 101	3479	0.7	5	4	1	0	0	3	1	7.5	7.5	5.2	III
229	Bell Path	Loop 101	Power Line Path	2724	0.5	5	6	0	0	0	4	2	5.0	5.0	5.3	III
230	Bell Path	Power Line Path	Thompson Peak Py	6203	1.2	5	6	0	2	0	0	3	7.5	7.5	5.8	II
231	82nd St Path	Princess Dr	Union Hills Dr	1885	0.4	5	4	2	1	0	4	1	15.5	10.0	5.7	II
232	82nd St Path	Union Hills Dr	Loop 101	1371	0.3	5	4	0	0	0	2	3	3.5	3.5	4.4	III
233	Union Hills Path	Scottsdale Rd	Hayden Rd	5356	1.0	4	4	0	1	0	1	2	5.0	5.0	4.2	III
234	Union Hills Path	Hayden Rd	Loop 101	2855	0.5	5	4	0	1	0	2	4	7.0	7.0	5.1	III
235	Union Hills Tunnel	Loop 101		595	0.1	4	4	0	0	0	2	2	3.0	3.0	3.8	III
236	Union Hills Path	Loop 101	Power Line Path	1387	0.3	4	4	0	0	0	1	2	2.0	2.0	3.6	III
237	Loop 101 Path	Hayden Rd	Bell Rd	5399	1.0	5	8	0	3	0	1	4	12.0	10.0	6.9	I
238	Loop 101 Path	Scottsdale Rd	Hayden Rd	5374	1.0	5	8	0	1	0	1	1	4.5	4.5	5.8	II
239	Loop 101 Path	Hayden Rd	Princess Dr	5798	1.1	5	8	0	2	0	0	3	7.5	7.5	6.4	II
240	Loop 101 Path	Scottsdale Rd	Hayden Rd	5503	1.0	4	8	0	1	0	0	4	5.0	5.0	5.4	III
241	Pima Path	CAP Aqueduct	Bell Rd	3272	0.6	5	8	0	2	0	2	3	9.5	9.5	6.8	II
242	WestWorld Path	Loop 101	Power Line Path	4811	0.9	5	6	0	0	0	3	2	4.0	4.0	5.1	III
243	Power Line Path	WestWorld	Pima Rd	7881	1.5	5	4	1	3	0	0	6	16.0	10.0	5.7	II
244	Power Line Path	Pima Rd	Hayden Rd	7804	1.5	5	4	0	2	0	0	3	7.5	7.5	5.2	III
245	Power Line Path	Hayden Rd	Thompson Peak Py	3018	0.6	5	4	1	2	0	0	0	10.0	10.0	5.7	II
246	Powerline Path	74th St	Scottsdale Rd	4077	0.8	4	4	1	1	1	3	2	12.5	10.0	5.2	III
247	Thompson Peak Path	Hayden Rd	Pima Rd	5893	1.1	5	4	2	2	0	1	1	15.5	10.0	5.7	II
248	76th St Path	Loop 101	Thompson Peak Py	6247	1.2	4	6	1	1	1	1	2	10.5	10.0	5.8	II
249	Center Path	Scottsdale Rd	76th St Path	1192	0.2	4	6	0	0	0	1	2	2.0	2.0	4.2	III
250	94th St Path	Power Line Path	Bell Rd	854	0.2	5	6	0	1	0	0	2	4.0	4.0	5.1	III
251	Thompson Peak Path	Bell Path	Desert Activity Center	1586	0.3	5	4	0	0	0	1	1	1.5	1.5	4.0	III
252	Old Pima Path	Power Line Path	Hualapai Dr	4005	0.8	4	4	1	1	0	0	1	7.5	7.5	4.7	III
253	Horizon Crossing	Indian Bend Path	Horizon Park	193	0.0	9	8	1	1	0	0	0	7.0	7.0	8.3	I
254	Reata Path	Power Line Path	Union Hills Dr	7924	1.5	4	6	0	2	0	0	3	7.5	7.5	5.3	III
255	Reata Path	Union Hills Dr	Thompson Peak Py	7292	1.4	5	6	1	1	0	0	3	8.5	8.5	6.0	II
256	Reata Path	Thompson Peak Py	Adobe Dr	5360	1.0	4	6	0	1	0	0	2	4.0	4.0	4.6	III
257	Reata Path	Adobe Dr	Pinnacle Peak Rd	5257	1.0	3	6	0	1	0	0	2	4.0	4.0	4.1	III
258	Reata Path	Pinnacle Peak Rd	Happy Valley Rd	5909	1.1	1	6	0	1	0	2	2	6.0	6.0	3.5	III
259	Reata Path	Happy Valley Rd	Jomax Rd	6116	1.2	1	6	0	0	0	4	2	5.0	5.0	3.3	III
260	Reata Path	Jomax Rd	Rio Verde Dr	6279	1.2	1	6	0	1	0	2	2	6.0	6.0	3.5	III
261	Hualapai Path	Ironwood Path	Pima Acres Path	2487	0.5	3	1	1	0	0	0	1	4.5	4.5	2.7	III
262	Pima Acres Path	S of Hualapai Dr	Diamond Rim Dr	1810	0.3	4	4	0	0	0	1	1	1.5	1.5	3.5	III
263	Pima Acres Path	Diamond Rim Dr	Desert Camp Dr	1597	0.3	5	6	0	0	0	2	2	3.0	3.0	4.9	III
264	Desert Camp Path	Pima Acres Path	Thompson Peak Py	2195	0.4	5	6	2	1	0	1	1	12.5	10.0	6.3	II
265	94th St Connector	Sierra Pinta Dr	Desert Camp Dr	107	0.0	4	4	0	0	0	2	0	2.0	2.0	3.6	III
266	DC Ranch Path	Alma School Path	Copper Ridge Middle School	377	0.1	4	4	1	0	0	0	1	4.5	4.5	4.1	III
267	DC Ranch Path	DC Ranch Path	Thompson Peak Py	768	0.1	5	4	2	0	0	0	0	8.0	8.0	5.3	III
268	Thompson Peak Path	Thompson Peak Path	Wash Crossing	2772	0.5	5	4	1	1	0	0	1	7.5	7.5	5.2	III
269	Deer Valley Path	Existing sidewalk	Miller Rd	1069	0.2	3	4	2	2	0	0	1	14.5	10.0	4.7	III
270	Milller Path	Deer Valley Rd	Pinnacle Peak Rd	6322	1.2	3	2	2	1	0	5	1	16.5	10.0	4.1	III
271	Miller Path	Williams Dr	Pinnacle Peak Rd	2731	0.5	3	4	0	0	0	2	3	3.5	3.5	3.4	III
272	Miller Path	Pinnacle Peak Rd	Happy Valley Rd	5209	1.0	1	4	0	0	0	2	3	3.5	3.5	2.4	III

Appendix D: City of Scottsdale Path Prioritization Calculations by Path ID

Path ID	Name	From	To	Length (ft)	Length (mi)	Latent Demand	LOS	Connection SUPs	Connection Bike Lanes or Paved Shoulders	Connection Bike Routes	Connection Streets	Connection Future Paths	Connection Total	Connection Score (max 10)	Prioritization Score	Tier
273	Rawhide Path	Scottsdale Rd	Happy Valley Rd	7539	1.4	2	6	0	0	0	4	3	5.5	5.5	3.9	III
274	Happy Valley Path	Scottsdale Rd	Alma School Rd	20704	3.9	1	6	0	3	0	5	6	17.0	10.0	4.3	III
275	Rawhide Path	Happy Valley Rd	Jomax Rd	5222	1.0	1	2	0	1	0	1	1	4.5	4.5	2.0	III
276	Jomax Path	Jomax Rd	Alma School Rd	1421	0.3	1	2	0	0	0	2	2	3.0	3.0	1.7	III
277	Jomax Path	Pinnacle Peak Py	Alma School Rd	1317	0.2	1	2	0	1	0	1	2	5.0	5.0	2.1	III
278	56th St Path	Jomax Rd	Dynamite Bl	5320	1.0	1	1	0	0	0	4	2	5.0	5.0	1.8	III
279	Pinnacle Vista Path	56th St	64th St	5254	1.0	1	1	0	1	0	2	2	6.0	6.0	2.0	III
280	64th St Path	Pinnacle Vista Dr	Dynamite Bl	2580	0.5	1	4	0	0	0	2	2	3.0	3.0	2.3	III
281	Dynamite Path	56th St	Scottsdale Rd	10647	2.0	1	6	0	2	0	4	1	10.5	10.0	4.3	III
282	Dynamite Path	Scottsdale Rd	80th St	5172	1.0	1	2	0	1	0	1	3	5.5	5.5	2.2	III
283	Dynamite Path	80th St	Pima Rd	5389	1.0	1	2	0	1	0	1	3	5.5	5.5	2.2	III
284	Dynamite Path	Pima Rd	97th Pl	6190	1.2	1	10	0	2	0	2	2	9.0	9.0	5.3	III
285	Dynamite Path	97th Pl	Alma School Py	8978	1.7	1	10	0	0	0	4	2	5.0	5.0	4.5	III
286	Lone Mountain Path	Scottsdale Rd	Pima Rd	10360	2.0	1	4	0	2	0	1	2	8.0	8.0	3.3	III
287	Dove Valley Path	56th St	60th St	2798	0.5	3	6	0	0	0	2	2	3.0	3.0	3.9	III
288	60th St Path	Dove Valley Rd	Carefree Hwy	5178	1.0	3	6	0	0	0	6	3	7.5	7.5	4.8	III
289	Border Path	60th St	Scottsdale Rd	12678	2.4	1	8	0	1	0	2	2	6.0	6.0	4.1	III
290	Carefree Path	56th St	Scottsdale Rd	10068	1.9	3	8	0	0	0	4	2	5.0	5.0	4.9	III
291	Westland Path	Scottsdale Rd	Hayden Rd	5378	1.0	1	2	0	1	0	3	2	7.0	7.0	2.5	III
292	Westland Path	Hayden Rd	Pima Rd	5317	1.0	1	2	0	2	0	4	2	11.0	10.0	3.1	III
293	Westland Path	Pima Rd	92nd Pl	4830	0.9	1	2	0	2	0	2	3	9.5	9.5	3.0	III
294	Westland Path	92nd Pl	Stagecoach Rd	9050	1.7	1	2	0	1	0	6	1	9.5	9.5	3.0	III
295	Stagecoach Path	Pima Rd	Lone Mountain Py	13116	2.5	1	4	0	1	0	7	3	11.5	10.0	3.7	III
296	Lone Mountain Path	Stagecoach Rd	Cave Creek Rd	11089	2.1	1	4	0	1	0	6	2	10.0	10.0	3.7	III
297	Cave Creek Path	City Limits	Lone Mountain Py	8631	1.6	1	4	0	3	0	2	2	12.0	10.0	3.7	III
298	Cave Creek Path	Lone Mountain Py	112th Pl	7015	1.3	1	6	0	1	0	3	2	7.0	7.0	3.7	III
299	Cave Creek Path	112th Pl	City Limits	6172	1.2	1	6	0	0	0	1	1	1.5	1.5	2.6	III
300	Camelback Path	Camelback Rd	Chaparral Rd	2651	0.5	10	8	2	0	0	2	0	10.0	10.0	9.4	I
301	Shea Path	142nd St	City Limits	1342	0.3	6	8	1	0	0	1	0	5.0	5.0	6.4	II
302	IBW Osborn Bridge			213	0.0	10	6	2	0	0	1	0	9.0	9.0	8.6	I

APPENDIX E: PATH PRIORITIZATION CALCULATIONS (LISTED BY TIER)

Appendix E: City of Scottsdale Path Prioritization Calculations by Tier

Path ID	Name	From	To	Length (ft)	Length (mi)	Latent Demand	LOS	Connection SUPs	Connection Bike Lanes or Paved Shoulders	Connection Bike Routes	Connection Streets	Connection Future Paths	Connection Total	Connection Score (max 10)	Prioritization Score	Tier
41	Indian Bend Path	Chaparral Rd	Jackrabbit Rd	2932	0.6	10	8	2	2	0	0	0	14.0	10.0	9.4	I
300	Camelback Path	Camelback Rd	Chaparral Rd	2651	0.5	10	8	2	0	0	2	0	10.0	10.0	9.4	I
23	Crosscut Path	Catalina Dr	Thomas Rd	508	0.1	10	8	1	1	0	1	1	8.5	8.5	9.1	I
11	Crosscut Connector	64th St	Crosscut Canal	426	0.1	10	8	1	1	0	1	0	8.0	8.0	9.0	I
7	Indian Bend Path	Eldorado Aquatic Center	Indian Bend Wash	851	0.2	9	8	2	1	1	1	1	14.0	10.0	8.9	I
24	Crosscut Canal Path	Thomas Rd	Indian School Rd	3683	0.7	10	8	0	2	0	0	3	7.5	7.5	8.9	I
30	Arizona Canal Path	Chaparral Rd	McDonald Dr	5444	1.0	10	8	0	1	0	2	5	7.5	7.5	8.9	I
197	92nd St Path	Sweetwater Ave	Raintree Dr	5251	1.0	9	8	0	1	2	6	2	13.0	10.0	8.9	I
199	100th St Path	Frank Lloyd Wright Bl	Thompson Peak Py	2499	0.5	9	8	1	2	0	0	0	10.0	10.0	8.9	I
33	Jackrabbit Bridge	Arizona Canal at Jackrabbit Rd		181	0.0	9	8	1	1	1	0	2	9.5	9.5	8.8	I
129	CAP Path	Thompson Peak Py	Loop 101	7011	1.3	9	8	1	1	0	1	3	9.5	9.5	8.8	I
198	92nd St Path	Raintree Dr	Frank Lloyd Wright Bl	3149	0.6	9	8	0	1	1	3	2	8.5	8.5	8.6	I
302	IBW Osborn Bridge			213	0.0	10	6	2	0	0	1	0	9.0	9.0	8.6	I
20	2nd St Path	75th St	Indian Bend Wash	1392	0.3	10	6	1	1	0	1	1	8.5	8.5	8.5	I
25	Arizona Canal Path	60th St	64th St	2765	0.5	10	8	0	1	0	1	3	5.5	5.5	8.5	I
27	68th Street Bridge	Lafayette Bl	Indian School Rd	367	0.1	9	8	0	2	1	0	1	8.0	8.0	8.5	I
44	Chaparral Path	Chaparral Park Path	McDonald	2224	0.4	10	8	1	0	0	1	1	5.5	5.5	8.5	I
6	Indian Bend Path	McDowell Rd	Eldorado Aquatic Center	2726	0.5	9	8	1	1	0	0	1	7.5	7.5	8.4	I
28	Arizona Canal Path	Goldwater Bl	Scottsdale Rd	2078	0.4	10	8	0	0	0	4	2	5.0	5.0	8.4	I
47	82nd St Path	Valley Vista Dr	Redwing Rd	2544	0.5	8	8	1	0	1	4	1	10.0	10.0	8.4	I
207	100th St Path	Thompson Peak Py	Frank Lloyd Wright Bl	5097	1.0	8	8	0	3	0	0	3	10.5	10.0	8.4	I
35	Arizona Canal Path	McDonald Rd	Indian Bend Wash	4148	0.8	8	8	2	0	0	0	3	9.5	9.5	8.3	I
39	Hayden Tunnel 2	Hayden Rd at Coolidge		141	0.0	10	8	1	0	0	0	1	4.5	4.5	8.3	I
40	Hayden Tunnel	Hayden Rd at Chaparral		174	0.0	10	8	1	0	0	0	1	4.5	4.5	8.3	I
253	Horizon Crossing	Indian Bend Path	Horizon Park	193	0.0	9	8	1	1	0	0	0	7.0	7.0	8.3	I
14	Thomas Rd Path	Pima Park	Pima Path	623	0.1	10	8	1	0	0	0	0	4.0	4.0	8.2	I
29	Arizona Canal Path	Scottsdale Rd	Chaparral Rd	3400	0.6	10	8	0	0	0	3	2	4.0	4.0	8.2	I
26	Arizona Canal Path	64th St	Goldwater Bl	4694	0.9	10	8	0	0	1	0	4	3.5	3.5	8.1	I
192	Northsight Path	Hayden Rd	CAP Aqueduct	2206	0.4	10	8	0	0	0	2	3	3.5	3.5	8.1	I
9	70th St Connection	Virginia Ave	Thomas Rd	1450	0.3	10	8	0	0	0	3	0	3.0	3.0	8.0	I
137	Shea Path	Hayden Rd	Loop 101	4155	0.8	6	10	1	1	0	3	3	11.5	10.0	8.0	I
138	Shea Path	Loop 101	96th St	5356	1.0	6	10	2	1	1	4	0	16.5	10.0	8.0	I
176	Scottsdale Rd Path	Cactus Park	Sweetwater Ave	1478	0.3	8	10	1	0	0	1	0	5.0	5.0	8.0	I
21	Main Street Path	78th St	Indian Bend Wash	246	0.0	9	8	1	0	0	1	0	5.0	5.0	7.9	I
42	Vista Path	Chaparral Park	Vista Dr	52	0.0	9	8	1	0	0	1	0	5.0	5.0	7.9	I
99	Mountain View Path	Mountain View Rd	Arabian Tr	2925	0.6	7	8	2	0	1	1	1	11.0	10.0	7.9	I
115	Via Linda Path	Mountain View Rd	Lakeview Dr	3920	0.7	7	8	1	1	0	2	2	10.0	10.0	7.9	I
139	Shea Path	96th St	104th St	5313	1.0	7	8	1	2	1	1	2	13.5	10.0	7.9	I
148	Hayden Path	Cactus Rd	Thunderbird Rd	5324	1.0	7	8	0	2	1	3	2	11.5	10.0	7.9	I
151	Pima Path	Shea Bl	Cactus Rd	5462	1.0	7	8	1	0	0	7	2	12.0	10.0	7.9	I
1	South Corp Yard Path	Miller Rd	Indian Bend Wash	671	0.1	8	8	1	1	0	0	0	7.0	7.0	7.8	I
12	Thomas Bike Stop	Thomas Rd	Indian Bend Wash	832	0.2	10	6	1	0	0	1	0	5.0	5.0	7.8	I
13	Thomas Rd Gap	Indian Bend Wash	Thomas Rd	304	0.1	10	6	1	0	0	1	0	5.0	5.0	7.8	I
128	CAP Path	Sweetwater Ave	Thompson Peak Py	8784	1.7	8	8	0	1	1	1	3	7.0	7.0	7.8	I
191	76th St Path	Greenway Rd	CAP Aqueduct	3916	0.7	7	10	0	0	0	6	1	6.5	6.5	7.8	I
37	Lincoln Path	Indian Bend Wash	79th St	822	0.2	7	8	2	0	0	1	0	9.0	9.0	7.7	I
135	Shea Path	64th St	Scottsdale Rd	5293	1.0	6	10	0	0	0	8	1	8.5	8.5	7.7	I
31	Miller Connection	Arizona Canal	Miller Rd	68	0.0	9	8	0	1	0	0	1	3.5	3.5	7.6	I
32	Jackrabbit Path	Arizona Canal	Miller Rd	170	0.0	9	8	0	1	0	0	1	3.5	3.5	7.6	I
210	Redfield Path	Frank Lloyd Wright Bl	100th St	1328	0.3	8	8	0	1	0	2	2	6.0	6.0	7.6	I
136	Shea Path	Scottsdale Rd	Hayden Rd	5263	1.0	5	10	1	0	0	5	2	10.0	10.0	7.5	I
147	Hayden Path	Shea Bl	Cactus Rd	5719	1.1	7	8	0	1	0	4	2	8.0	8.0	7.5	I
5	Crosscut Connection	Belleview St	Crosscut Canal	798	0.2	8	8	1	0	0	1	0	5.0	5.0	7.4	I
15	Paiute Path	Avalon Dr	Osborn Rd	1423	0.3	9	8	0	0	1	1	0	2.5	2.5	7.4	I

Appendix E: City of Scottsdale Path Prioritization Calculations by Tier

Path ID	Name	From	To	Length (ft)	Length (mi)	Latent Demand	LOS	Connection SUPs	Connection Bike Lanes or Paved Shoulders	Connection Bike Routes	Connection Streets	Connection Future Paths	Connection Total	Connection Score (max 10)	Prioritization Score	Tier
43	Jackrabbit Path	Indian Bend Path	Jackrabbit Rd	113	0.0	9	8	0	0	1	1	0	2.5	2.5	7.4	I
103	90th St Path	Bella Vista Path	Indian Bend Path	2707	0.5	7	8	1	0	0	3	1	7.5	7.5	7.4	I
140	Shea Path	104th St	Frank Lloyd Wright Blvd	6569	1.2	6	8	0	2	1	3	2	11.5	10.0	7.4	I
141	Shea Path	Frank Lloyd Wright Bl	124th St	6614	1.3	6	8	1	1	1	3	3	13.0	10.0	7.4	I
142	Shea Path	124th St	136th St	8533	1.6	6	8	1	0	3	0	3	10.0	10.0	7.4	I
143	Arabian_Shea Path	Arabian Tr	Shea Bl	522	0.1	6	10	1	0	1	1	1	7.0	7.0	7.4	I
10	Thomas Rd Path	61st St	62nd St	342	0.1	9	8	0	0	0	2	0	2.0	2.0	7.3	I
18	Columbus Path	Columbus Ave	Granite Reef Rd	48	0.0	9	8	0	0	0	2	0	2.0	2.0	7.3	I
38	Indian Bend Path	Silverado Golf Course	Indian Bend Rd	1661	0.3	6	8	2	0	0	1	1	9.5	9.5	7.3	I
89	Gainey Ranch Path	Mountain View Rd	Gold Dust Rd	2527	0.5	7	6	2	0	0	2	1	10.5	10.0	7.3	I
90	Gainey Ranch Path2	Mountain View Rd	Gold Dust Rd	2330	0.4	7	8	1	0	0	2	2	7.0	7.0	7.3	I
102	Arabian Path	Arabian Tr	Shea Bl	519	0.1	7	8	1	0	1	1	1	7.0	7.0	7.3	I
152	Pima Path	Cactus Rd	Thunderbird Rd	5614	1.1	7	6	1	1	1	2	2	11.5	10.0	7.3	I
164	Indian Bend Path	92nd St	Cactus Rd	6329	1.2	7	6	2	1	1	4	1	17.0	10.0	7.3	I
167	Cactus Path	96th St	104th St	5304	1.0	7	6	1	2	1	3	2	15.5	10.0	7.3	I
200	FLW Path	Thunderbird Rd	Redfield Path	485	0.1	9	8	0	0	0	1	2	2.0	2.0	7.3	I
34	San Miguel Path	Arizona Canal	76th Pl	132	0.0	9	8	0	0	0	1	1	1.5	1.5	7.2	I
46	Valley Vista Path	Hayden Rd	82nd St	1223	0.2	8	8	0	0	0	3	2	4.0	4.0	7.2	I
118	Lakeview Path	Via Linda	Laguna Elementary School	1734	0.3	7	8	1	0	0	1	3	6.5	6.5	7.2	I
119	Lakeview Path	Laguna Elementary School	Shea Bl	1709	0.3	6	8	1	0	0	4	1	8.5	8.5	7.1	I
123	Power Line Path	Bella Vista Path	Shea Bl	6336	1.2	6	8	0	1	0	4	3	8.5	8.5	7.1	I
144	Shea Path	120th St	124th St	2634	0.5	6	8	1	0	1	2	2	8.5	8.5	7.1	I
19	Civic Center Path	Drinkwater Bl	75th St	666	0.1	9	6	0	0	1	2	0	3.5	3.5	7.0	I
45	Chaparral Path	McDonald Dr	Valley Vista Dr	632	0.1	8	8	0	0	0	2	2	3.0	3.0	7.0	I
116	ScRanchPk 2	Tennis Courts	Path	237	0.0	6	8	2	0	0	0	0	8.0	8.0	7.0	I
153	Pima Path	Thunderbird Rd	Frank Lloyd Wright Bl	6728	1.3	7	6	0	1	0	4	3	8.5	8.5	7.0	I
72	Arizona Canal Path	Hayden Rd	82nd St	1282	0.2	7	8	1	0	0	1	0	5.0	5.0	6.9	I
74	Indian Bend Rd Path	Scottsdale Rd	Hayden Rd	5107	1.0	6	8	1	0	0	2	3	7.5	7.5	6.9	I
124	Powerline Path	Shea Bl	Cactus Rd	7064	1.3	5	8	1	0	0	11	3	16.5	10.0	6.9	I
149	Hayden Path	Thunderbird Rd	Frank Lloyd Wright Bl	9941	1.9	5	8	0	1	0	9	4	14.0	10.0	6.9	I
206	100th St Path	Aztec Elementary School	Frank Lloyd Wright	1559	0.3	7	8	0	1	0	1	2	5.0	5.0	6.9	I
213	Desert Canyon Path	Thompson Peak Py	Desert Canyon Middle School	689	0.1	9	4	0	1	1	0	3	6.0	6.0	6.9	I
214	Desert Canyon Path	Desert Canyon Path	102nd St	762	0.1	9	4	1	0	1	0	1	6.0	6.0	6.9	I
215	Ranch Park Path	102nd St	Desert Canyon Path	2060	0.4	9	4	1	0	1	0	1	6.0	6.0	6.9	I
237	Loop 101 Path	Hayden Rd	Bell Rd	5399	1.0	5	8	0	3	0	1	4	12.0	10.0	6.9	I
17	Osborn Path	Osborn Rd	Pima Rd	131	0.0	9	6	0	0	1	1	0	2.5	2.5	6.8	II
126	CAP Path	Shea Bl	Via Linda	4327	0.8	6	8	1	0	0	2	2	7.0	7.0	6.8	II
186	Northsight Path	Thunderbird Rd	Northsight Path	559	0.1	6	6	1	2	1	0	1	12.0	10.0	6.8	II
241	Pima Path	CAP Aqueduct	Bell Rd	3272	0.6	5	8	0	2	0	2	3	9.5	9.5	6.8	II
4	Yavapai Path	Yavapai Elementary School	Indian Bend Wash	316	0.1	7	8	1	0	0	0	0	4.0	4.0	6.7	II
16	Earll Path	81st Pl	82nd Pl	111	0.0	9	6	0	0	0	2	0	2.0	2.0	6.7	II
48	Agua Linda Path	Agua Linda Park	Pima Path	217	0.0	7	8	1	0	0	0	0	4.0	4.0	6.7	II
73	Arizona Canal Path	Hayden Rest Stop	Arizona Canal Path	70	0.0	7	8	1	0	0	0	0	4.0	4.0	6.7	II
91	Gold Dust Path	West of Hayden Rd	Arabian Tr	1147	0.2	7	6	1	0	1	1	1	7.0	7.0	6.7	II
121	Palomino Path	Bella Vista Path	117th Wy	5521	1.0	5	8	0	2	0	2	2	9.0	9.0	6.7	II
125	CAP Path	Bella Vista Path	Shea	7953	1.5	6	8	0	0	1	3	4	6.5	6.5	6.7	II
201	Sweetwater Path	89th St	96th St	4514	0.9	7	4	2	1	1	6	2	19.5	10.0	6.7	II
202	Sweetwater Path	96th St	Frank Lloyd Wright	5944	1.1	7	4	1	2	1	6	2	18.5	10.0	6.7	II
211	FLW Path	100th St	CAP Aqueduct	1520	0.3	7	8	0	1	0	0	2	4.0	4.0	6.7	II
36	Lincoln Path	Arizona Canal	78th St	501	0.1	6	8	1	0	1	0	1	6.0	6.0	6.6	II
100	Irish Hunter Path	Mountain View Path	Arabian Tr	1371	0.3	6	6	1	0	1	3	1	9.0	9.0	6.6	II
109	Bella Vista Path	CAP Aqueduct	Shea Bl	10230	1.9	5	8	1	0	1	2	2	8.5	8.5	6.6	II
112	104th St Path	Mission Ln	Via Linda	1748	0.3	6	8	0	1	0	2	2	6.0	6.0	6.6	II
212	Desert Canyon Path	WestWorld	Desert Canyon Path	1578	0.3	9	2	1	1	0	0	1	7.5	7.5	6.6	II

Appendix E: City of Scottsdale Path Prioritization Calculations by Tier

Path ID	Name	From	To	Length (ft)	Length (mi)	Latent Demand	LOS	Connection SUPs	Connection Bike Lanes or Paved Shoulders	Connection Bike Routes	Connection Streets	Connection Future Paths	Connection Total	Connection Score (max 10)	Prioritization Score	Tier
180	73rd St Path	Sutton Dr	Thunderbird Rd	1449	0.3	7	8	0	0	0	2	2	3.0	3.0	6.5	II
205	Presidio Path	Sutton Dr	100th St	2018	0.4	7	6	0	1	0	2	2	6.0	6.0	6.5	II
22	Indian School Path	Bashas Market	81st St	135	0.0	10	2	0	1	0	1	0	4.0	4.0	6.4	II
50	Joshua Tree Cnctr	Joshua Tree Ln	Pima Path	21	0.0	6	8	1	0	0	1	0	5.0	5.0	6.4	II
52	Dorado Connector	Via de Dorado	Pima Path	49	0.0	6	8	1	0	0	1	0	5.0	5.0	6.4	II
64	87th Wy Connector	87th Wy	Pima Path	219	0.0	6	8	1	0	0	1	0	5.0	5.0	6.4	II
65	San Rafael Connector	San Rafael Dr	Pima Path	23	0.0	6	8	1	0	0	1	0	5.0	5.0	6.4	II
68	Pima Path	Mountain View Rd Crossing		84	0.0	6	6	2	0	0	0	0	8.0	8.0	6.4	II
69	Sun Canyon Connector	Sun Canyon	Pima Path	43	0.0	6	8	1	0	0	1	0	5.0	5.0	6.4	II
71	Mustang Connector	Mustang Tr	Pima Path	49	0.0	6	8	1	0	0	1	0	5.0	5.0	6.4	II
127	CAP Path	Via Linda	Sweetwater Ave	9245	1.8	6	8	0	0	1	2	3	5.0	5.0	6.4	II
145	Shea Path	124th St	132nd St	3623	0.7	6	8	0	0	1	2	3	5.0	5.0	6.4	II
154	Pima Path	Frank Lloyd Wright Bl	Bell Rd	6053	1.1	6	8	0	1	0	0	4	5.0	5.0	6.4	II
209	Thunderbird Path	97th St Path	Frank Lloyd Wright Bl	510	0.1	8	6	0	0	0	2	2	3.0	3.0	6.4	II
239	Loop 101 Path	Hayden Rd	Princess Dr	5798	1.1	5	8	0	2	0	0	3	7.5	7.5	6.4	II
301	Shea Path	142nd St	City Limits	1342	0.3	6	8	1	0	0	1	0	5.0	5.0	6.4	II
3	Papago Path	Granite Reef Rd	Pima Path	2732	0.5	6	8	1	0	0	0	1	4.5	4.5	6.3	II
104	Bella Vista Path	90th St	104th St	8690	1.6	7	8	0	0	0	0	4	2.0	2.0	6.3	II
114	Sctsdl Ranch Path	104th St Path	Scottsdale Ranch Path	79	0.0	6	8	1	0	0	0	1	4.5	4.5	6.3	II
130	CAP Path	Loop 101	Hayden Rd	5177	1.0	5	8	0	2	0	0	2	7.0	7.0	6.3	II
131	CAP Path	Hayden Rd	Scottsdale Rd	5417	1.0	5	8	0	2	0	0	2	7.0	7.0	6.3	II
132	124th St Path	CAP Aqueduct	Cochise Dr	1681	0.3	6	8	0	0	1	2	2	4.5	4.5	6.3	II
146	Shea Path	132nd St	140th St	6590	1.2	6	8	0	0	1	2	2	4.5	4.5	6.3	II
166	Cholla Path	108th St	Cholla Park	3396	0.6	5	6	2	0	1	3	0	12.5	10.0	6.3	II
179	76th St Path	Sutton Dr	Thunderbird Rd	3906	0.7	7	6	0	0	0	4	2	5.0	5.0	6.3	II
196	92nd St Path	Larkspur Dr	Sweetwater Ave	1270	0.2	7	6	0	0	1	2	3	5.0	5.0	6.3	II
203	Presidio Path	96th St	97th St Path	1053	0.2	6	6	1	1	0	0	1	7.5	7.5	6.3	II
264	Desert Camp Path	Pima Acres Path	Thompson Peak Py	2195	0.4	5	6	2	1	0	1	1	12.5	10.0	6.3	II
66	Rancho Antiqua Path2	Rancho Antigua	Pima Path	27	0.0	6	8	1	0	0	0	0	4.0	4.0	6.2	II
67	Rancho Antigua Path	Rancho Antigua	Pima Path	57	0.0	6	8	1	0	0	0	0	4.0	4.0	6.2	II
70	Casabella Connector	Casabella Condominiums	Pima Path	47	0.0	6	8	1	0	0	0	0	4.0	4.0	6.2	II
184	Thunderbird Path	76th St	Hayden Rd	2703	0.5	7	6	0	1	0	0	3	4.5	4.5	6.2	II
217	Scottsdale Rd Path	Loop 101	Thompson Peak Py	3801	0.7	4	8	1	1	0	1	2	9.0	9.0	6.2	II
82	Via de Ventura Path	Indian Bend Path	Doubletree Ranch Rd	2387	0.5	5	6	2	0	0	1	0	9.0	9.0	6.1	II
165	Cholla Path	94th St	108th St	9034	1.7	7	2	1	2	1	5	2	17.5	10.0	6.1	II
183	73rd St Path	Thunderbird Rd	Redfield Rd	1253	0.2	6	8	0	0	0	3	1	3.5	3.5	6.1	II
255	Reata Path	Union Hills Dr	Thompson Peak Py	7292	1.4	5	6	1	1	0	0	3	8.5	8.5	6.0	II
2	Granite Reef Path	McKellips Rd	Granite Reef Rd	1531	0.3	6	8	0	0	0	2	1	2.5	2.5	5.9	II
75	IBW West Path	Indian Bend Rd	Scottsdale Rd	3752	0.7	5	8	0	1	0	1	2	5.0	5.0	5.9	II
81	McCormick Path	Via Bonita	Doubletree Ranch Rd	922	0.2	5	6	1	0	0	4	0	8.0	8.0	5.9	II
101	Arabian Path	Irish Hunter Path	Arabian Tr	710	0.1	6	8	0	0	1	0	2	2.5	2.5	5.9	II
117	ScRanchPk 1	Path	Lakeview Dr	349	0.1	5	8	1	0	0	1	0	5.0	5.0	5.9	II
182	Thunderbird Path	Redfield Rd	Thunderbird Rd	1466	0.3	7	6	0	0	0	2	2	3.0	3.0	5.9	II
204	97th St Path	Sutton Dr	Presidio Rd	435	0.1	7	6	0	0	0	2	2	3.0	3.0	5.9	II
218	Scottsdale Rd Path	Deer Valley Rd	Pinnacle Peak Rd	5364	1.0	3	8	0	2	0	4	2	11.0	10.0	5.9	II
49	La Luna Connector	Via de La Luna	Pima Path	29	0.0	6	6	1	0	0	1	0	5.0	5.0	5.8	II
54	Del Arbor Connector	Via del Arbor	Pima Path	54	0.0	6	6	1	0	0	1	0	5.0	5.0	5.8	II
56	McCormick Connector	Via de McCormick	Pima Path	19	0.0	6	6	1	0	0	1	0	5.0	5.0	5.8	II
57	Commercio Connector	Ranch Office	Pima Path	30	0.0	6	6	1	0	0	1	0	5.0	5.0	5.8	II
59	Ranch Connector	Ranch Office Park	Pima Path	45	0.0	6	6	1	0	0	1	0	5.0	5.0	5.8	II
60	Ranch Connector	Ranch Office Park	Pima Path	19	0.0	6	6	1	0	0	1	0	5.0	5.0	5.8	II
63	San Esteban Path	San Esteban Dr	Pima Path	78	0.0	6	6	1	0	0	1	0	5.0	5.0	5.8	II
85	Ventura Path B	85th Wy	86th Pl	329	0.1	6	8	0	0	0	2	0	2.0	2.0	5.8	II
86	Ventura Path	85th Wy	86th Pl	423	0.1	6	8	0	0	0	2	0	2.0	2.0	5.8	II

Appendix E: City of Scottsdale Path Prioritization Calculations by Tier

Path ID	Name	From	To	Length (ft)	Length (mi)	Latent Demand	LOS	Connection SUPs	Connection Bike Lanes or Paved Shoulders	Connection Bike Routes	Connection Streets	Connection Future Paths	Connection Total	Connection Score (max 10)	Prioritization Score	Tier
106	Bella Vista Path	104th St	112th St	5309	1.0	6	8	0	0	0	0	4	2.0	2.0	5.8	II
113	104th St Path	Via Linda	Scottsdale Ranch Park	180	0.0	6	8	0	0	0	1	2	2.0	2.0	5.8	II
134	Mt View Connector	Camelback Walk	Mountain View Rd	401	0.1	6	6	1	0	0	1	0	5.0	5.0	5.8	II
168	Cactus Path	104th St	Frank Lloyd Wright Bl	4019	0.8	5	6	0	1	1	2	2	7.5	7.5	5.8	II
181	Thunderbird Path	Thunderbird Rd	Redfield Rd	556	0.1	7	6	0	0	0	1	3	2.5	2.5	5.8	II
195	Larkspur Path	Larkspur Dr	93rd St	986	0.2	7	6	0	0	0	2	1	2.5	2.5	5.8	II
230	Bell Path	Power Line Path	Thompson Peak Py	6203	1.2	5	6	0	2	0	0	3	7.5	7.5	5.8	II
238	Loop 101 Path	Scottsdale Rd	Hayden Rd	5374	1.0	5	8	0	1	0	1	1	4.5	4.5	5.8	II
248	76th St Path	Loop 101	Thompson Peak Py	6247	1.2	4	6	1	1	1	1	2	10.5	10.0	5.8	II
78	Indian Bend Path	Hayden Rd	Indian Bend Path	1178	0.2	5	4	2	0	0	2	1	10.5	10.0	5.7	II
79	McCormick Py Path	Scottsdale Rd	Indian Bend Path	6023	1.1	5	4	1	1	0	3	4	12.0	10.0	5.7	II
107	Bella Vista Path	112th St	122nd St	6447	1.2	6	8	0	0	0	0	3	1.5	1.5	5.7	II
108	Bella Vista Path	122nd St	CAP Aqueduct	4625	0.9	6	8	0	0	0	0	3	1.5	1.5	5.7	II
190	Northsight Path	Northsight Path	Redfield Path	241	0.0	6	6	1	0	0	0	1	4.5	4.5	5.7	II
208	97th St Path	Presidio Path	Thunderbird Rd	1711	0.3	7	6	0	0	0	1	2	2.0	2.0	5.7	II
225	Hayden Path	CAP Aqueduct	Copper Basin Park	4008	0.8	5	4	2	2	0	1	3	16.5	10.0	5.7	II
226	Hayden Path	Copper Basin Park	Power Line Path	7693	1.5	5	4	1	1	0	3	4	12.0	10.0	5.7	II
231	82nd St Path	Princess Dr	Union Hills Dr	1885	0.4	5	4	2	1	0	4	1	15.5	10.0	5.7	II
243	Power Line Path	WestWorld	Pima Rd	7881	1.5	5	4	1	3	0	0	6	16.0	10.0	5.7	II
245	Power Line Path	Hayden Rd	Thompson Peak Py	3018	0.6	5	4	1	2	0	0	0	10.0	10.0	5.7	II
247	Thompson Peak Path	Hayden Rd	Pima Rd	5893	1.1	5	4	2	2	0	1	1	15.5	10.0	5.7	II
53	Inner Circle Cnctr	Inner Circle	Pima Path	12	0.0	6	6	1	0	0	0	0	4.0	4.0	5.6	III
58	Ranch Connector	Ranch Office Park	Pima Path	34	0.0	6	6	1	0	0	0	0	4.0	4.0	5.6	III
133	124th St Path	Cochise Dr	Lost Dog Trailhead	6616	1.3	6	2	0	0	1	10	3	13.0	10.0	5.6	III
170	132nd St Path	Shea Bl	Via Linda	3054	0.6	6	2	1	0	1	4	2	10.5	10.0	5.6	III
185	Thunderbird Path	Hayden Rd	Loop 101	4987	0.9	6	2	0	3	1	2	3	14.0	10.0	5.6	III
194	92nd St Path	Cactus Rd	Larkspur Dr	1311	0.2	7	6	0	0	0	1	1	1.5	1.5	5.6	III
216	Scottsdale Rd Path	CAP Aqueduct	Loop 101	7627	1.4	4	8	0	0	0	4	4	6.0	6.0	5.6	III
169	Bent Tree Path	110th St	Frank Lloyd Wright Bl	1036	0.2	5	6	1	0	0	1	1	5.5	5.5	5.4	III
171	Mayo Path	Shea Bl	Cactus Rd	6224	1.2	6	2	0	1	0	5	2	9.0	9.0	5.4	III
177	Sweetwater Path	Scottsdale Rd	76th St	2568	0.5	8	2	0	0	0	3	2	4.0	4.0	5.4	III
178	76th St Path	Sweetwater Ave	Cotton Dr	1376	0.3	8	1	0	1	0	1	3	5.5	5.5	5.4	III
189	Redfield Path	Northsight Park	Gelding Dr	590	0.1	6	6	0	0	0	2	2	3.0	3.0	5.4	III
193	FLW Path	82nd St	Northsight Path	1971	0.4	5	8	0	0	0	2	1	2.5	2.5	5.4	III
240	Loop 101 Path	Scottsdale Rd	Hayden Rd	5503	1.0	4	8	0	1	0	0	4	5.0	5.0	5.4	III
88	Mountain View Path	Scottsdale Rd	78th St	4148	0.8	5	6	0	0	1	3	1	5.0	5.0	5.3	III
111	104th St Path	Bella Vista Path	Mission Ln	581	0.1	5	8	0	0	0	1	2	2.0	2.0	5.3	III
172	Via Linda Path	124th St	136th St	7896	1.5	5	4	0	0	2	4	2	8.0	8.0	5.3	III
229	Bell Path	Loop 101	Power Line Path	2724	0.5	5	6	0	0	0	4	2	5.0	5.0	5.3	III
254	Reata Path	Power Line Path	Union Hills Dr	7924	1.5	4	6	0	2	0	0	3	7.5	7.5	5.3	III
267	DC Ranch Path	DC Ranch Path	Thompson Peak Py	768	0.1	5	4	2	0	0	0	0	8.0	8.0	5.3	III
284	Dynamite Path	Pima Rd	97th Pl	6190	1.2	1	10	0	2	0	2	2	9.0	9.0	5.3	III
51	Sereno Connector	Via de Sereno	Pima Path	26	0.0	6	4	1	0	0	1	0	5.0	5.0	5.2	III
55	Taz Norte Connector	Via Taz Norte	Pima Path	14	0.0	6	4	1	0	0	1	0	5.0	5.0	5.2	III
83	Paseo Path	Via Paseo Del Norte	Scottsdale McCormick Office Park	349	0.1	5	8	0	0	0	1	1	1.5	1.5	5.2	III
84	Paseo Path	Paseo Path	Via de Negocio	483	0.1	5	8	0	0	0	1	1	1.5	1.5	5.2	III
97	Cholla Path	66th St	68th Pl	1560	0.3	6	4	0	0	1	3	1	5.0	5.0	5.2	III
120	Bella Vista Cnctr	Bella Vista Path	Bella Vista	435	0.1	5	8	0	0	0	1	1	1.5	1.5	5.2	III
122	Doubletree Path	Power Line Path	Doubletree Ranch Rd	130	0.0	5	8	0	0	0	1	1	1.5	1.5	5.2	III
227	Bell Path	Hayden Rd	Copper Basin Park	602	0.1	5	4	1	1	0	0	1	7.5	7.5	5.2	III
228	Bell Path	Copper Basin Park	Loop 101	3479	0.7	5	4	1	0	0	3	1	7.5	7.5	5.2	III
244	Power Line Path	Pima Rd	Hayden Rd	7804	1.5	5	4	0	2	0	0	3	7.5	7.5	5.2	III
246	Powerline Path	74th St	Scottsdale Rd	4077	0.8	4	4	1	1	1	3	2	12.5	10.0	5.2	III
268	Thompson Peak Path	Thompson Peak Path	Wash Crossing	2772	0.5	5	4	1	1	0	0	1	7.5	7.5	5.2	III

Appendix E: City of Scottsdale Path Prioritization Calculations by Tier

Path ID	Name	From	To	Length (ft)	Length (mi)	Latent Demand	LOS	Connection SUPs	Connection Bike Lanes or Paved Shoulders	Connection Bike Routes	Connection Streets	Connection Future Paths	Connection Total	Connection Score (max 10)	Prioritization Score	Tier
8	Elm Dr Connector	Elm Dr	Granite Reef Senior Center	146	0.0	5	8	0	0	0	1	0	1.0	1.0	5.1	III
95	68th Pl Path	Shea Bl	Cholla St	2875	0.5	6	2	0	0	1	4	4	7.5	7.5	5.1	III
234	Union Hills Path	Hayden Rd	Loop 101	2855	0.5	5	4	0	1	0	2	4	7.0	7.0	5.1	III
242	WestWorld Path	Loop 101	Power Line Path	4811	0.9	5	6	0	0	0	3	2	4.0	4.0	5.1	III
250	94th St Path	Power Line Path	Bell Rd	854	0.2	5	6	0	1	0	0	2	4.0	4.0	5.1	III
61	Villa Vallarta Path	Villa de Vallarta	Pima Path	37	0.0	6	4	1	0	0	0	0	4.0	4.0	5.0	III
62	Villa Royale Path	Villa Royale	Pima Path	32	0.0	6	4	1	0	0	0	0	4.0	4.0	5.0	III
174	128th St Path	Shea Bl	Cactus Rd	5618	1.1	6	2	0	0	0	5	3	6.5	6.5	4.9	III
224	Scottsdale Rd Path	Lone Mountain Rd	Carefree Hwy	10692	2.0	1	8	0	3	0	1	2	11.0	10.0	4.9	III
263	Pima Acres Path	Diamond Rim Dr	Desert Camp Dr	1597	0.3	5	6	0	0	0	2	2	3.0	3.0	4.9	III
290	Carefree Path	56th St	Scottsdale Rd	10068	1.9	3	8	0	0	0	4	2	5.0	5.0	4.9	III
87	Mountain View Path	68th Pl	Scottsdale Rd	2521	0.5	5	6	0	0	0	2	1	2.5	2.5	4.8	III
221	Scottsdale Rd Path	Jomax Rd	Dynamite Bl	5283	1.0	1	8	0	2	0	2	3	9.5	9.5	4.8	III
288	60th St Path	Dove Valley Rd	Carefree Hwy	5178	1.0	3	6	0	0	0	6	3	7.5	7.5	4.8	III
157	Pima Path	Los Gatos Dr	Happy Valley Rd	9027	1.7	1	8	0	2	0	2	2	9.0	9.0	4.7	III
187	Redfield Path	Hayden Rd	Northsight Park	2602	0.5	5	6	0	0	0	1	2	2.0	2.0	4.7	III
252	Old Pima Path	Power Line Path	Hualapai Dr	4005	0.8	4	4	1	1	0	0	1	7.5	7.5	4.7	III
269	Deer Valley Path	Existing sidewalk	Miller Rd	1069	0.2	3	4	2	2	0	0	1	14.5	10.0	4.7	III
76	Scottsdale Rd Path	Indian Bend Wash	McCormick Py	1692	0.3	4	2	1	1	0	3	3	11.5	10.0	4.6	III
92	70th St Path	Mountain View Rd	Gold Dust Ave	1318	0.2	5	6	0	0	0	1	1	1.5	1.5	4.6	III
110	96th St Path	Bella Vista Path	Mission Ln	777	0.1	5	6	0	0	0	1	1	1.5	1.5	4.6	III
188	82nd St Connector	82nd St	Redfield Path	309	0.1	5	6	0	0	0	1	1	1.5	1.5	4.6	III
256	Reata Path	Thompson Peak Py	Adobe Dr	5360	1.0	4	6	0	1	0	0	2	4.0	4.0	4.6	III
285	Dynamite Path	97th Pl	Alma School Py	8978	1.7	1	10	0	0	0	4	2	5.0	5.0	4.5	III
150	Professional Gap	85th Pl	Scottsdale Professional	82	0.0	6	4	0	0	0	1	0	1.0	1.0	4.4	III
175	Cactus Path	124th St	128th St	2542	0.5	6	2	0	0	0	3	2	4.0	4.0	4.4	III
219	Scottsdale Rd Path	Pinnacle Peak Rd	Happy Valley Rd	5257	1.0	2	8	0	0	0	4	2	5.0	5.0	4.4	III
232	82nd St Path	Union Hills Dr	Loop 101	1371	0.3	5	4	0	0	0	2	3	3.5	3.5	4.4	III
93	Gold Dust Path	68th Wy	70th St	1253	0.2	5	4	0	0	0	2	2	3.0	3.0	4.3	III
155	Pima Path	Loop 101	Power Line Path	3796	0.7	4	4	0	1	0	1	3	5.5	5.5	4.3	III
220	Scottsdale Rd Path	Happy Valley Rd	Jomax Rd	4939	0.9	1	8	0	2	0	0	2	7.0	7.0	4.3	III
274	Happy Valley Path	Scottsdale Rd	Alma School Rd	20704	3.9	1	6	0	3	0	5	6	17.0	10.0	4.3	III
281	Dynamite Path	56th St	Scottsdale Rd	10647	2.0	1	6	0	2	0	4	1	10.5	10.0	4.3	III
233	Union Hills Path	Scottsdale Rd	Hayden Rd	5356	1.0	4	4	0	1	0	1	2	5.0	5.0	4.2	III
249	Center Path	Scottsdale Rd	76th St Path	1192	0.2	4	6	0	0	0	1	2	2.0	2.0	4.2	III
94	68th Pl Path	Gold Dust Ave	Shea Bl	1452	0.3	5	2	0	0	0	4	2	5.0	5.0	4.1	III
98	Gold Dust Gap	Gold Dust Ave	Gold Dust Ave	201	0.0	5	4	0	0	0	2	0	2.0	2.0	4.1	III
173	Via Linda Path	Hidden Hills		6884	1.3	5	4	0	0	1	0	1	2.0	2.0	4.1	III
222	Scottsdale Rd Path	Dynamite BL	Dixileta Rd	5271	1.0	1	8	0	0	0	5	2	6.0	6.0	4.1	III
257	Reata Path	Adobe Dr	Pinnacle Peak Rd	5257	1.0	3	6	0	1	0	0	2	4.0	4.0	4.1	III
266	DC Ranch Path	Alma School Path	Copper Ridge Middle School	377	0.1	4	4	1	0	0	0	1	4.5	4.5	4.1	III
270	Milller Path	Deer Valley Rd	Pinnacle Peak Rd	6322	1.2	3	2	2	1	0	5	1	16.5	10.0	4.1	III
289	Border Path	60th St	Scottsdale Rd	12678	2.4	1	8	0	1	0	2	2	6.0	6.0	4.1	III
105	100 Pl Connector	Bella Vista Path	100th Pl	52	0.0	5	4	0	0	0	1	1	1.5	1.5	4.0	III
251	Thompson Peak Path	Bell Path	Desert Activity Center	1586	0.3	5	4	0	0	0	1	1	1.5	1.5	4.0	III
96	Mescal Path	68th Pl	68th Pl	1577	0.3	6	1	0	0	0	2	2	3.0	3.0	3.9	III
273	Rawhide Path	Scottsdale Rd	Happy Valley Rd	7539	1.4	2	6	0	0	0	4	3	5.5	5.5	3.9	III
287	Dove Valley Path	56th St	60th St	2798	0.5	3	6	0	0	0	2	2	3.0	3.0	3.9	III
235	Union Hills Tunnel	Loop 101		595	0.1	4	4	0	0	0	2	2	3.0	3.0	3.8	III
159	Pima Path	Jomax Rd	Dynamite Bl	5192	1.0	1	6	0	2	0	0	2	7.0	7.0	3.7	III
295	Stagecoach Path	Pima Rd	Lone Mountain Py	13116	2.5	1	4	0	1	0	7	3	11.5	10.0	3.7	III
296	Lone Mountain Path	Stagecoach Rd	Cave Creek Rd	11089	2.1	1	4	0	1	0	6	2	10.0	10.0	3.7	III
297	Cave Creek Path	City Limits	Lone Mountain Py	8631	1.6	1	4	0	3	0	2	2	12.0	10.0	3.7	III
298	Cave Creek Path	Lone Mountain Py	112th Pl	7015	1.3	1	6	0	1	0	3	2	7.0	7.0	3.7	III

Appendix E: City of Scottsdale Path Prioritization Calculations by Tier

Path ID	Name	From	To	Length (ft)	Length (mi)	Latent Demand	LOS	Connection SUPs	Connection Bike Lanes or Paved Shoulders	Connection Bike Routes	Connection Streets	Connection Future Paths	Connection Total	Connection Score (max 10)	Prioritization Score	Tier
236	Union Hills Path	Loop 101	Power Line Path	1387	0.3	4	4	0	0	0	1	2	2.0	2.0	3.6	III
265	94th St Connector	Sierra Pinta Dr	Desert Camp Dr	107	0.0	4	4	0	0	0	2	0	2.0	2.0	3.6	III
258	Reata Path	Pinnacle Peak Rd	Happy Valley Rd	5909	1.1	1	6	0	1	0	2	2	6.0	6.0	3.5	III
260	Reata Path	Jomax Rd	Rio Verde Dr	6279	1.2	1	6	0	1	0	2	2	6.0	6.0	3.5	III
262	Pima Acres Path	S of Hualapai Dr	Diamond Rim Dr	1810	0.3	4	4	0	0	0	1	1	1.5	1.5	3.5	III
271	Miller Path	Williams Dr	Pinnacle Peak Rd	2731	0.5	3	4	0	0	0	2	3	3.5	3.5	3.4	III
156	Pima Path	Overlook Dr	Los Gatos Dr	1649	0.3	3	2	1	0	0	1	2	6.0	6.0	3.3	III
223	Scottsdale Rd Path	Dixileta Rd	Lone Mountain Rd	5205	1.0	1	8	0	0	0	1	2	2.0	2.0	3.3	III
259	Reata Path	Happy Valley Rd	Jomax Rd	6116	1.2	1	6	0	0	0	4	2	5.0	5.0	3.3	III
286	Lone Mountain Path	Scottsdale Rd	Pima Rd	10360	2.0	1	4	0	2	0	1	2	8.0	8.0	3.3	III
158	Pima Path	Happy Valley Rd	Jomax Rd	5190	1.0	1	6	0	1	0	0	2	4.0	4.0	3.1	III
160	Pima Path	Dynamite Bl	Dixileta Dr	5354	1.0	1	6	0	1	0	0	2	4.0	4.0	3.1	III
163	Pima Path	Westland Rd	Stagecoach Rd	7880	1.5	1	4	0	2	0	0	2	7.0	7.0	3.1	III
292	Westland Path	Hayden Rd	Pima Rd	5317	1.0	1	2	0	2	0	4	2	11.0	10.0	3.1	III
293	Westland Path	Pima Rd	92nd Pl	4830	0.9	1	2	0	2	0	2	3	9.5	9.5	3.0	III
294	Westland Path	92nd Pl	Stagecoach Rd	9050	1.7	1	2	0	1	0	6	1	9.5	9.5	3.0	III
161	Pima Path	Dixileta Dr	Lone Mountain Rd	5433	1.0	1	4	0	1	0	1	2	5.0	5.0	2.7	III
162	Pima Path	Lone Mountain Rd	Westland Rd	8400	1.6	1	4	0	1	0	1	2	5.0	5.0	2.7	III
261	Hualapai Path	Ironwood Path	Pima Acres Path	2487	0.5	3	1	1	0	0	0	1	4.5	4.5	2.7	III
299	Cave Creek Path	112th Pl	City Limits	6172	1.2	1	6	0	0	0	1	1	1.5	1.5	2.6	III
291	Westland Path	Scottsdale Rd	Hayden Rd	5378	1.0	1	2	0	1	0	3	2	7.0	7.0	2.5	III
272	Miller Path	Pinnacle Peak Rd	Happy Valley Rd	5209	1.0	1	4	0	0	0	2	3	3.5	3.5	2.4	III
280	64th St Path	Pinnacle Vista Dr	Dynamite Bl	2580	0.5	1	4	0	0	0	2	2	3.0	3.0	2.3	III
282	Dynamite Path	Scottsdale Rd	80th St	5172	1.0	1	2	0	1	0	1	3	5.5	5.5	2.2	III
283	Dynamite Path	80th St	Pima Rd	5389	1.0	1	2	0	1	0	1	3	5.5	5.5	2.2	III
277	Jomax Path	Pinnacle Peak Py	Alma School Rd	1317	0.2	1	2	0	1	0	1	2	5.0	5.0	2.1	III
275	Rawhide Path	Happy Valley Rd	Jomax Rd	5222	1.0	1	2	0	1	0	1	1	4.5	4.5	2.0	III
279	Pinnacle Vista Path	56th St	64th St	5254	1.0	1	1	0	1	0	2	2	6.0	6.0	2.0	III
278	56th St Path	Jomax Rd	Dynamite Bl	5320	1.0	1	1	0	0	0	4	2	5.0	5.0	1.8	III
276	Jomax Path	Jomax Rd	Alma School Rd	1421	0.3	1	2	0	0	0	2	2	3.0	3.0	1.7	III

APPENDIX F: SIGNAL TIMING ADJUSTMENTS

Signal Timing Adjustments

Minimum clearance interval
The clearance interval at a traffic signal (the yellow time plus the time when all approaches have a red signal) is intended to allow those drivers who cannot reasonably stop when the signal turns yellow to make it to and through the intersection prior to conflicting traffic receiving a green signal. The AASHTO *Bike Guide*[1] provides the following equation for calculating the minimum clearance interval[2]:

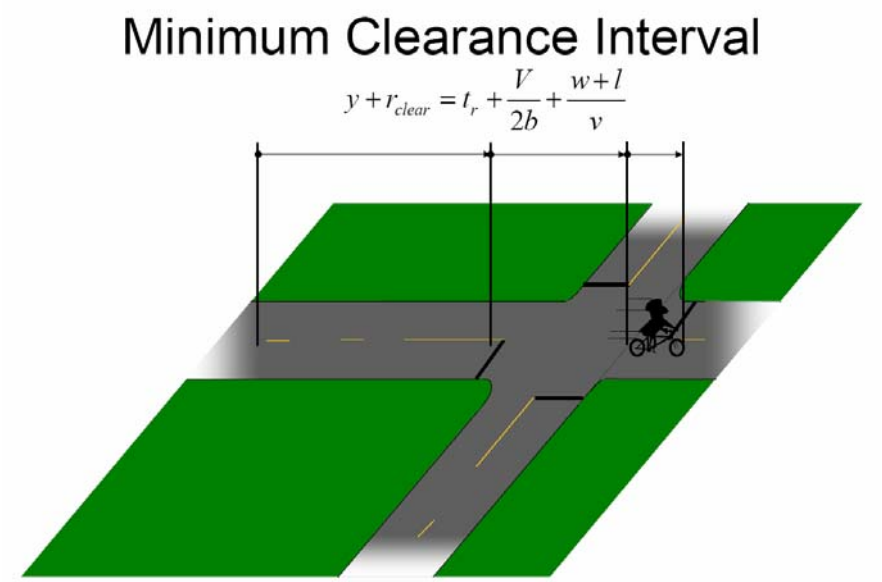
$$y + r_{clear} \geq t_r + \frac{v}{2b} + \frac{w + l}{v}$$

y = yellow interval(s)
r_{clear} = red clearance interval(s)
t_r = reaction time (1.0 s)
v = bicyclist speed ~~(mph)~~ (fps)
b = bicyclist braking deceleration (4 to 8 ft/s^2)
w = width of crossing (ft)
l = bicycle length (6 ft)

This equation essentially calculates the time it takes a bicycle to pass from the “point of no return” on the intersection approach to the far side of the intersection, taking into account the bicycle’s length and speed and the cyclist’s reaction time. This is shown graphically in *Figure 1 (next page)*.

[1] *Guide for the Development of Bicycle Facilities*, pg. 65, AASHTO, Washington, D.C., 1999.
[2] The AASHTO *Guide* erroneously shows the equation as measuring bicyclist speed in miles per hour, rather than in feet per second. The equation shown corrects this error.

Figure 1: Calculation of Minimum Clearance Interval



Direct application of this equation is problematic. If one assumes the deceleration rate of a bicyclist to be 4 feet per second per second (fpsps), then to cross a relatively small intersection of 72 feet (five 12-foot travel lanes, two 4-foot bike lanes and a 4-foot traffic separator) would require a clearance interval of 6.3 seconds. This is much longer than typical for a clearance interval, and it is not advisable to lengthen the clearance interval because long clearance intervals have been shown to increase crashes. If, however, one assumes a deceleration rate of 8 fpsps, then the clearance interval can be reduced to 5.5 seconds, a time that is not unreasonably long. The problem is that most bicyclists will not actually clear the intersection in 5.5 seconds.

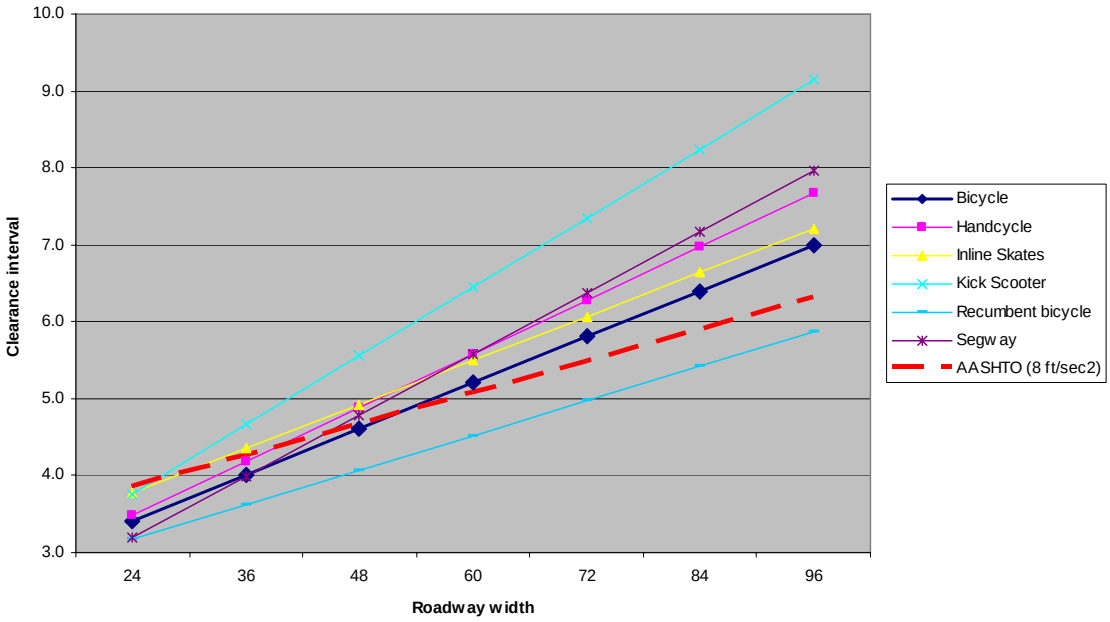
The 2004 report *Characteristics of Emerging Road and Trail Users and Their Safety*[3] revealed that the AASHTO assumptions of a 20 mph design speed results is an underestimation of the needed clearance interval for cyclists. *Figure 2* shows the needed clearance intervals for a variety of users based upon the crossing width of the intersecting roadway. The AASHTO clearance interval calculated using 8 fpsps is shown for reference. As can be seen, once a crossing width exceeds about 55 feet, the AASHTO equation underestimates the needed time for a bicyclist to clear the intersection.

One potential solution for clearing cyclists from an intersection without lengthening the clearance interval (yellow phase plus all-red phase) is through the use of loops in bike lanes on approaches to the intersection, placed in advance of the “point of no return.” These loops would detect bicyclists in the bike lanes who are too close to clear the

[3] *Characteristics of Emerging Road and Trail Users and Their Safety*, FHWA-HRT-04-103, Washington, D.C., 2004.

intersection during the normal clearance interval and, rather than lengthening the clearance interval, would cause the green time to be extended by a couple of seconds.

Figure 2: Clearance Intervals For Various User Types



Minimum Green Time

The minimum green time for a traffic signal is actually the minimum time provided by the green, yellow, and all-red for a vehicle to react, start moving, and clear an intersection. AASHTO[4] provides the following equation for the calculation of minimum green time for bicycles:

For English Units:

$$g + y + r_{clear} \geq t_{cross} = t_r + \frac{v}{2a} + \frac{w + l}{v}$$

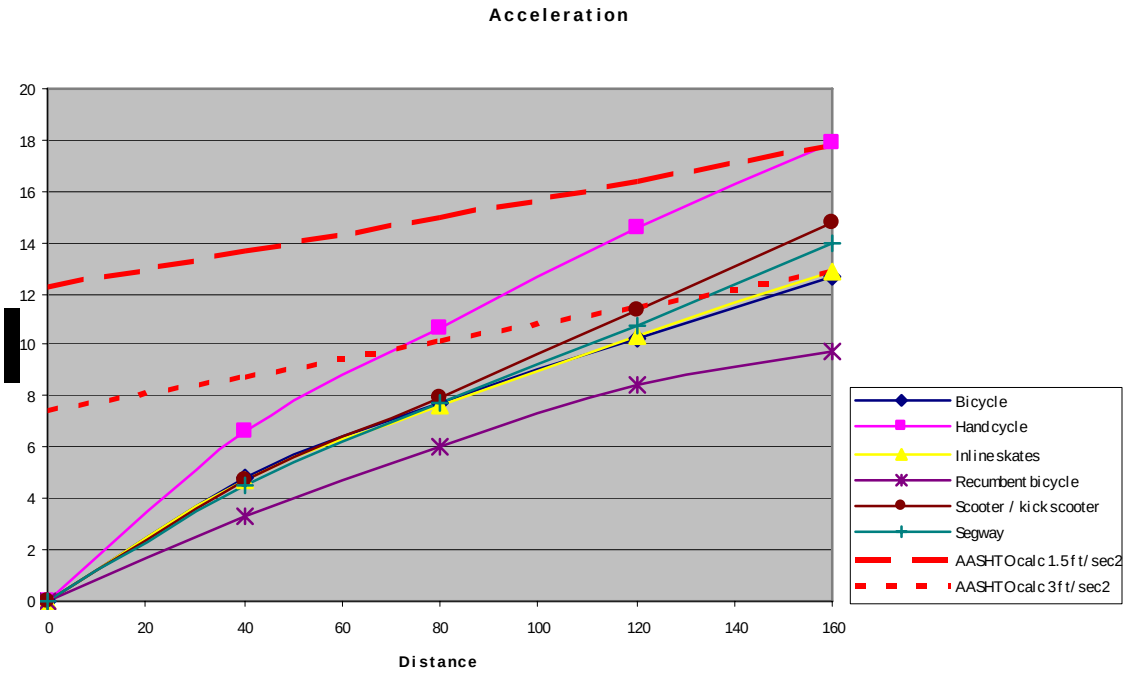
g	= minimum green
y, r_{clear}	= yellow and red clearance intervals actually used
t_{cross}	= Time to cross the intersection
t_r	= Reaction time (2.5 s)
v	= Bicycle speed (ft/s)
a	= Bicycle acceleration (1.5 - 3 ft/s^2)
w	= Width of crossing (ft)
l	= Bicycle length (6 ft)

This equation is very conservative; it actually provides time for cyclists to accelerate to speed before calculating the time to cross the intersection. The *Characteristics of Emerging Trail Users* report can be used to determine the actual required minimum crossing times (see *Figure 3*).

If the minumum green time provided at a signal does not normally meet the needs of cyclists, a signal loop within a bike lane can be used to call a longer minimum green when bicycles are present.

[4] *Guide for the Development of Bicycle Facilities*, pg. 65, AASHTO, Washington, D.C., 1999.

Figure 3: Crossing Times For Various User Types



APPENDIX G: SIGNAGE AND WAY-FINDING RECOMMENDATIONS FOR BICYCLES

BICYCLE NO. 2

TECHNICAL COMMITTEE RECOMMENDATION

TECHNICAL COMMITTEE: Bicycle Technical Committee

DATE OF ACTION: June 23rd, 2005 (*modified January 20th, 2006*)

TOPIC: Proposed D1 & D11 Series Bicycle Guide Signs
Part 9 of the MUTCD

ORIGIN OF REQUEST: NCUTCD Bicycle Technical Committee

DISCUSSION:

The system of bicycle route guide signs currently in the MUTCD works reasonably well in areas where only one bicycle route exists. Urban areas, however, frequently have locations where multiple routes intersect or overlap. In these locations, the signage system currently established in the MUTCD has limited flexibility in addressing these issues, and can result in sign clutter and higher costs.

To address this concern, the following changes to the MUTCD signage for bicyclist guidance are proposed:

1. Add new Bicycle Destination Signs (D1-1b, D1-1c, D1-2b, D1-2c, D1-3b, D1-3c) for specific use as guide and wayfinding signs for bicycle travel. These revised D1 series signs include a bicycle symbol added to the principal legend. The proposal allows the use of these new Destination Signs in place of the D11-1 / D1-1 / M7-1 sign assembly currently shown in the MUTCD. Using these new bicycle-specific signs will decrease costs and reduce sign clutter because all pertinent user information can be located on one panel. This allows travelers to quickly comprehend sign information with minimal distraction.

2. Add a new optional Bicycle Route Guide Sign (D11-1c). The new optional D11-1c sign substitutes additional route name, direction, or destination information in lieu of a generic "BIKE ROUTE" message to provide improved guidance and destination information to bicyclists. By replacing the "BIKE ROUTE" text with more specific information, the D11-1c can be used to replace D11-1 / D1-1 sign assemblies, reducing sign clutter and cost. It can also increase user comprehension of the sign by reducing the amount of text and incorporating all messages into one sign panel.

The proposed signs are modeled after successful bikeway sign systems that are in place in other countries that incorporate a bike symbol, destination, direction and distance (if appropriate) into a single panel. The design has been adjusted to be consistent with US and MUTCD guidelines for guide signing.

Example of bicycle-specific guide signing outside US (Netherlands)

The proposed Standard, Guidance, and Option statements are modeled after similar wording in Chapter 2D for directional signing for conventional roads.

These proposed changes were also reviewed and approved by the NCUTCD Guide and Motorist Information (G/MI) Technical Committee at their meeting in June 2005.

COMMITTEE ACTION:

The Bicycle Technical Committee recommends that the National Committee submit this proposal as developed by the NCUTCD BTC to sponsors for comment and approval.

Approved unanimously by NCUTCD Council January 20th, 2006.

Note: Deleted items are shown in ~~strikethrough red~~, and added text is shown in underline green.

Insert the following entries into existing Table 9B-1:

Destination	D1-1, D1-1a	Varies x 150 (Varies x 6)	Varies x 450 (Varies x 18)
Bicycle Destination	D1-1b, D1-1c, D1-2b, D1-2c, D1-3b, D1-3c	Varies x 150, 300, 450 (Varies x 6, 12, 18)	Varies x 150, 300, 450 (Varies x 6, 12, 18)
Street Name	D3	Varies x 150 (Varies x 6)	Varies x 450 (Varies x 18)
Bicycle Route Guide	D11-1, D11-1c	600 x 450 (24 x 18)	600 x 450 (24 x 18)

Revise Sections 9B.19 and 9B.21 :

Section 9B.19 Bicycle ~~Route~~ Guide Signs (D11-1, D11-1c, D1-1b, D1-1c, D1-2b, D1-2c, D1-3b, D1-3c)

~~Guidance:~~ Option:
~~If used,~~ Bicycle Route Guide (D11-1) signs (see Figure 9B-4) ~~should~~ may be provided ~~at decision points~~ along designated bicycle routes~~, including signs~~ to inform bicyclists of bicycle route direction changes and to confirm ~~confirmation signs for~~ route direction, distance, and destination.

If used, Bicycle Route Guide signs ~~should~~ may be repeated at regular intervals so that bicyclists entering from side streets will have an opportunity to know that they are on a bicycle route. Similar guide signing ~~should~~ may be used for shared roadways with intermediate signs placed for bicyclist guidance.

Alternative Bicycle Route Guide Signs (D11-1c) may be used to provide information on route direction, destination, and/or route name in place of the "BIKE ROUTE" wording on the D11-1 sign (see Figure 9B-4 and 9B-6).

Destination (D1-1, D1-1a) signs, Street Name (D3) signs or Bicycle Destination (D1-1b, D1-1c, D1-2b, D1-2c, D1-3b, D1-3c) signs (see Figure 9B-4) may be installed to provide direction, destination, and distance information as needed for bicycle travel. If several destinations are to be shown at a single location, they may be placed on a single panel with an arrow (and the distance, if desired) for each name. If more than one destination lies in the same direction, a single arrow may be used for the destinations.

Guidance:
Adequate separation should be made between any destination or group of destinations in one direction and those in other directions by suitable design of the arrow, spacing of lines of legend, heavy lines entirely across the panel, or separate panels.

Standard:
An arrow pointing to the right, if used, shall be at the extreme right of the sign. An arrow pointing left or up, if used, shall be at the extreme left. The distance figures, if used, shall be placed to the right of the destination names.

On Bicycle Destination signs, a bicycle symbol shall be placed next to each destination or group of destinations. If an arrow is at the extreme left, the bicycle symbol shall be placed to the right of the respective arrow.

Guidance:
Unless a sloping arrow will convey a clearer indication of the direction to be followed, the directional arrows should be horizontal or vertical.

The bicycle symbol should be to the left of the destination legend.

If several individual name panels are assembled into a group, all panels in the assembly should be of the same length.

Support:
Figure 9B-5 shows an example of the signing for the beginning and end of a designated bicycle route on a shared-use path. Figure 9B-6 shows an example of signing for an on-roadway bicycle route. Figure 9B-7 shows examples of signing and markings for shared-use paths.

Section 9B.21 ~~Destination~~ Arrow and Supplemental Plaque Signs for Bicycle Route Signs

Option:
~~Destination (D1-1b and D1-1c) signs (see Figure 9B-4) may be mounted below Bicycle Route Guide signs, Bicycle Route signs, or Interstate Bicycle Route signs to furnish additional information, such as directional changes in the route, or intermittent distance and destination information.~~

The M4-11 through M4-13 supplemental plaques (see Figure 9B-4) may be mounted above the appropriate Bicycle Route Guide signs, Bicycle Route signs, or Interstate Bicycle Route signs.

Guidance:
If used, the appropriate arrow (M7-1 through M7-7) sign (see Figure 9B-4) should be placed below the Bicycle Route Guide sign, Bicycle Route sign, or Interstate Bicycle Route sign.

Arrow signs and supplemental plaques should not be used in conjunction with Bicycle Destination Signs.

Standard:
The arrow signs and supplemental plaques used with the D11-1 or M1-8 signs shall have a white legend and border on a green background.

The arrow signs and supplemental plaques used with the M1-9 sign shall have a white legend and border on a black background.

Insert the following signs into existing Figure 9B-4:

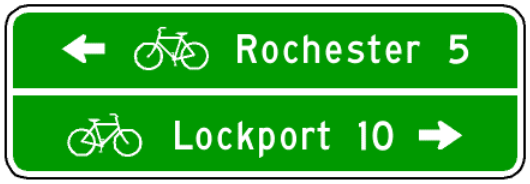
D1-1

D1-1a

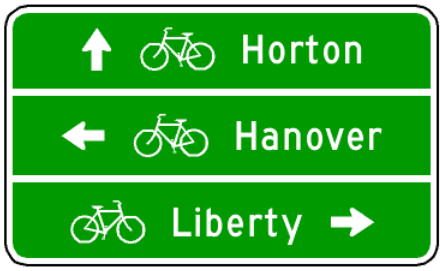
D1-1b

D1-1c

D1-2b



D1-2c



D1-3b

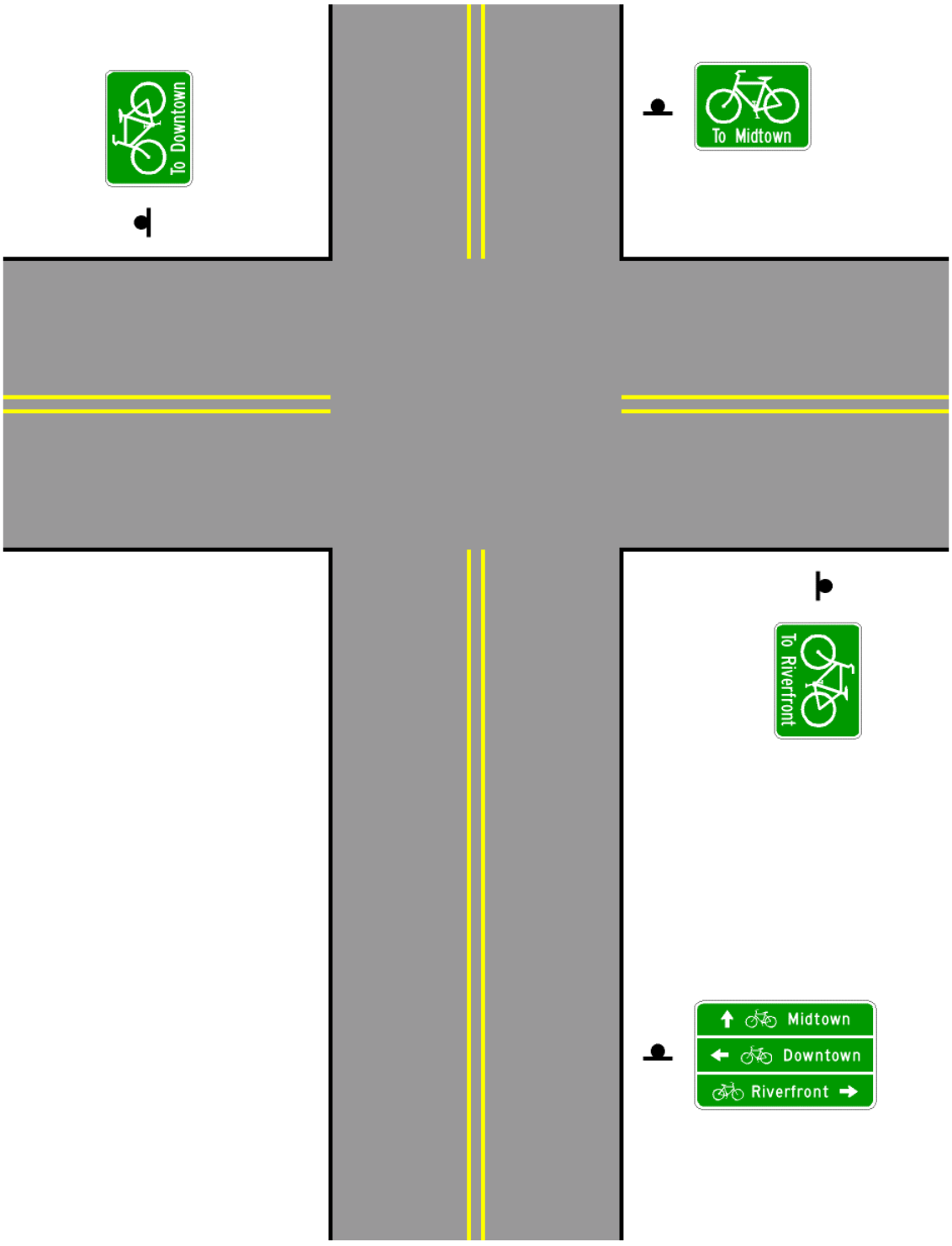
D1-3c

D3

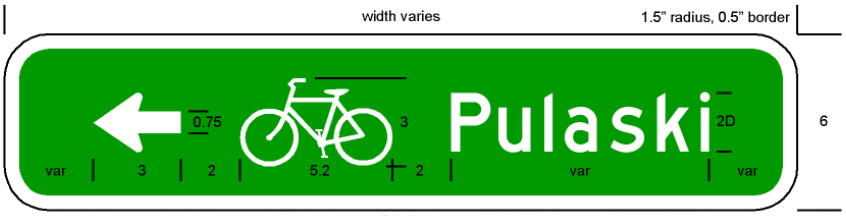
D11-1c

Replace existing Figure 9B-6 with the following:

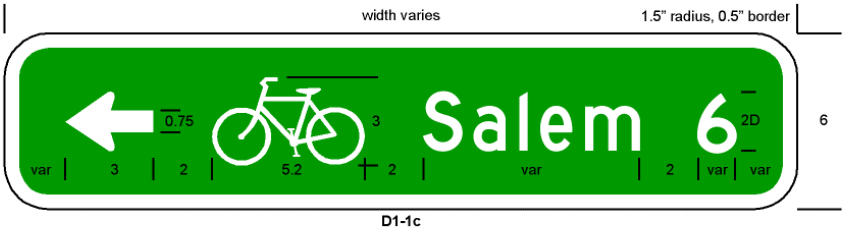
Figure 9B-6. Example of Bicycle Guide Signing



SHS figures

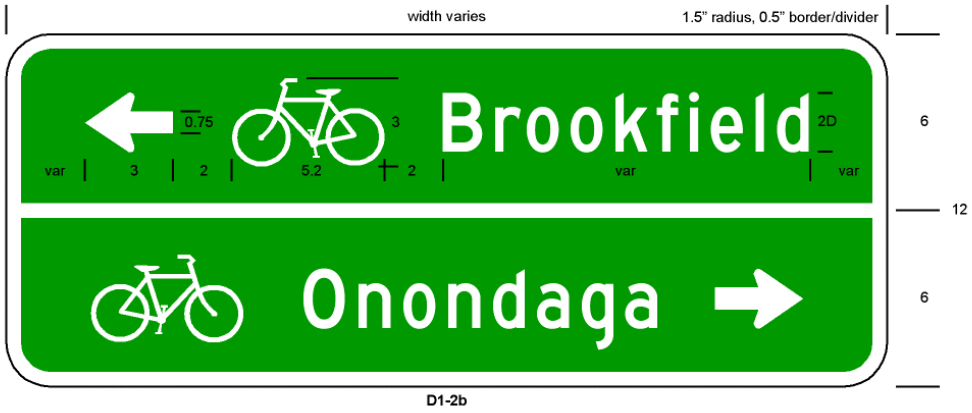


D1-1b

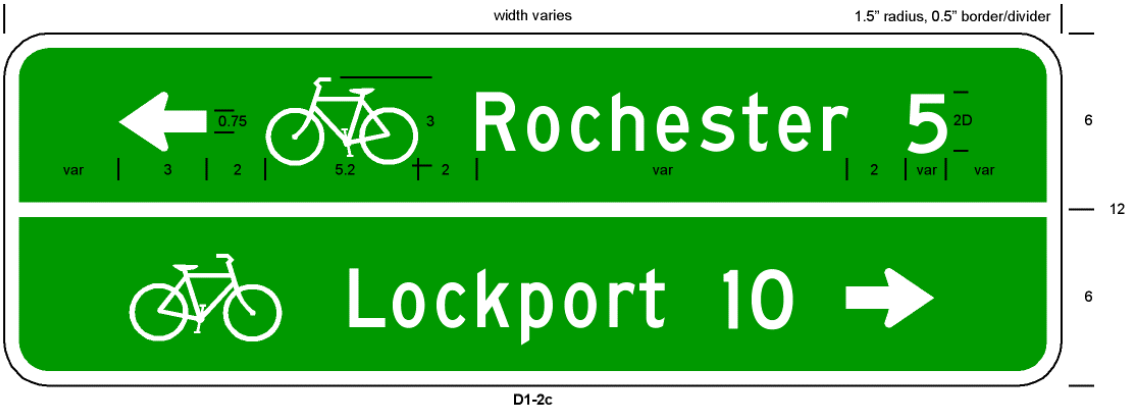


D1-1c

SHS figures

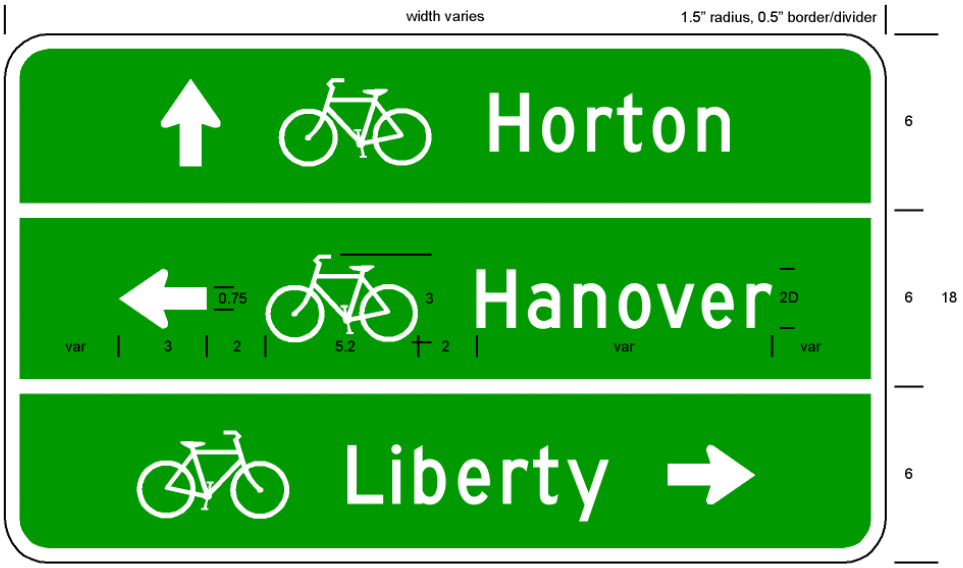


D1-2b

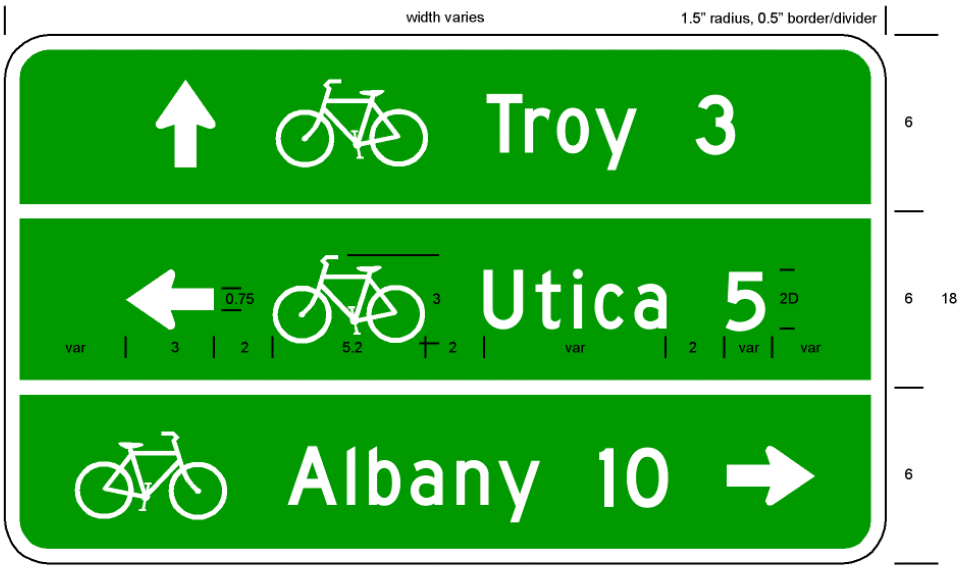


D1-2c

SHS figures



D1-3b



D1-3c

APPENDIX H: MILE MARKER RECOMMENDATIONS FOR PATHS AND TRAILS

BICYCLE No. 5

TECHNICAL COMMITTEE RECOMMENDATION

TECHNICAL COMMITTEE: Bicycle Technical Committee

DATE OF ACTION: June 23rd, 2005 (*modified January 18th, 2006*)

TOPIC: Proposed Reference Location Signs
Part 9 of the MUTCD

ORIGIN OF REQUEST: NCUTCD Bicycle Technical Committee

DISCUSSION:

Reference Location signs (mileposts) have been defined in Chapter 2D of the MUTCD since 1971, and have proven extraordinarily valuable for traveler information, maintenance and operations, emergency response, and numerous other applications.

The linear nature of many shared-use paths would seem to also naturally lend itself to the application of Reference Location signs. However, the use and design of such signs has not yet been explicitly addressed in Part 9 of the MUTCD. Defining a standard and uniform design could provide more uniform traveler guidance, reduce the proliferation of non-standard reference location signs, and encourage the use of these signs where desirable and appropriate.

The Bicycle Technical Committee proposes to add a section to Chapter 9B of the MUTCD defining the optional use of Reference Location signs for shared-use paths. The proposed signs would be proportionately sized for the lower operating speeds of shared-use paths, using a 6” wide panel with 3” numerals. The proposed text is adapted directly from Section 2D.46 defining the use of these signs for conventional roadways.

These proposed changes were also reviewed and approved by the NCUTCD Guide and Motorist Information (G/MI) Technical Committee at their meeting in June 2005.

COMMITTEE ACTION:

The Bicycle Technical Committee recommends that the National Committee submit this proposal as developed by the NCUTCD BTC to sponsors for comment and approval.

Approved unanimously by NCUTCD Council January 20th, 2006.

Add the following entries to Table 9B-1 of the MUTCD:

Sign	MUTCD Code	Minimum Sign Size – mm (in)	
		Shared-Use Path	Roadway
Reference Location	D10-1, D10-2, D10-3	150 x 300, 450, 600 (6 x 12, 18, 24)	250 x 600, 900, 1200 (10 x 24, 36, 48)
Intermediate Reference Location	D10-1a, D10-2a, D10-3a	150 x 450, 600, 750 (6 x 18, 24, 30)	250 x 675, 900, 1200 (10 x 27, 36, 48)

Add the following section to Chapter 9B of the MUTCD:

Section 9B.XX <u>Reference Location Signs (D10-1 through D10-3) and Intermediate Reference Location Signs (D10-1a through D10-3a)</u>

Support:

There are two types of reference location signs:

A. Reference Location signs (D10-1, 2, and 3) show an integer distance point along a shared-use path; and

B. Intermediate Reference Location signs (D10-1a, 2a, and 3a) also show a decimal between integer distance points along a shared-use path.

Option:

Reference Location (D10-1 to D10-3) signs (see Figure 9B-X) may be installed along any section of a shared-use path to assist users in estimating their progress, to provide a means for identifying the location of emergency incidents and crashes, and to aid in maintenance and servicing.

To augment the reference location sign system, Intermediate Reference Location (D10-1a to D10-3a) signs (see Figure 9B-X), which show the tenth of a kilometer (mile) with a decimal point, may be installed at one tenth of a kilometer (mile) intervals, or at some other regular spacing.

Standard:

When Intermediate Reference Location (D10-1a to D10-3a) signs are used to augment the reference location sign system, the reference location sign at the integer kilometer (mile) point shall display a decimal point and a zero numeral.

Reference location signs shall have a minimum mounting height of 600 mm (2 ft) to the bottom of the sign, and shall not be governed by the mounting height requirements prescribed in Section 9B.01.

Option:

Reference location signs may be installed on one side of the shared-use path only and may be installed back-to-back.

If a reference location sign cannot be installed in the correct location, it may be moved in either direction as much as 15 m (50 ft).

Guidance:

If a reference location sign cannot be placed within 15 m (50 ft) of the correct location, it should be omitted.

Support:

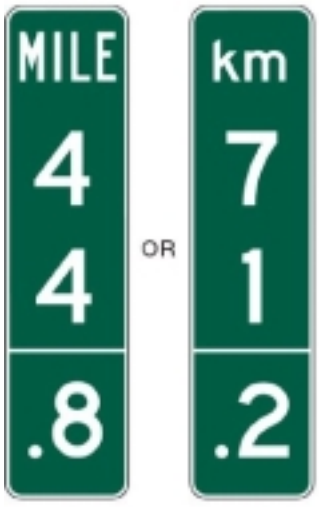
See Section 2D.46 for additional information on the application of reference location signs.

Add the following signs to Chapter 9B of the MUTCD (either as part of Figure 9B-4 or as a separate figure):

D10-1

D10-1a

D10-2

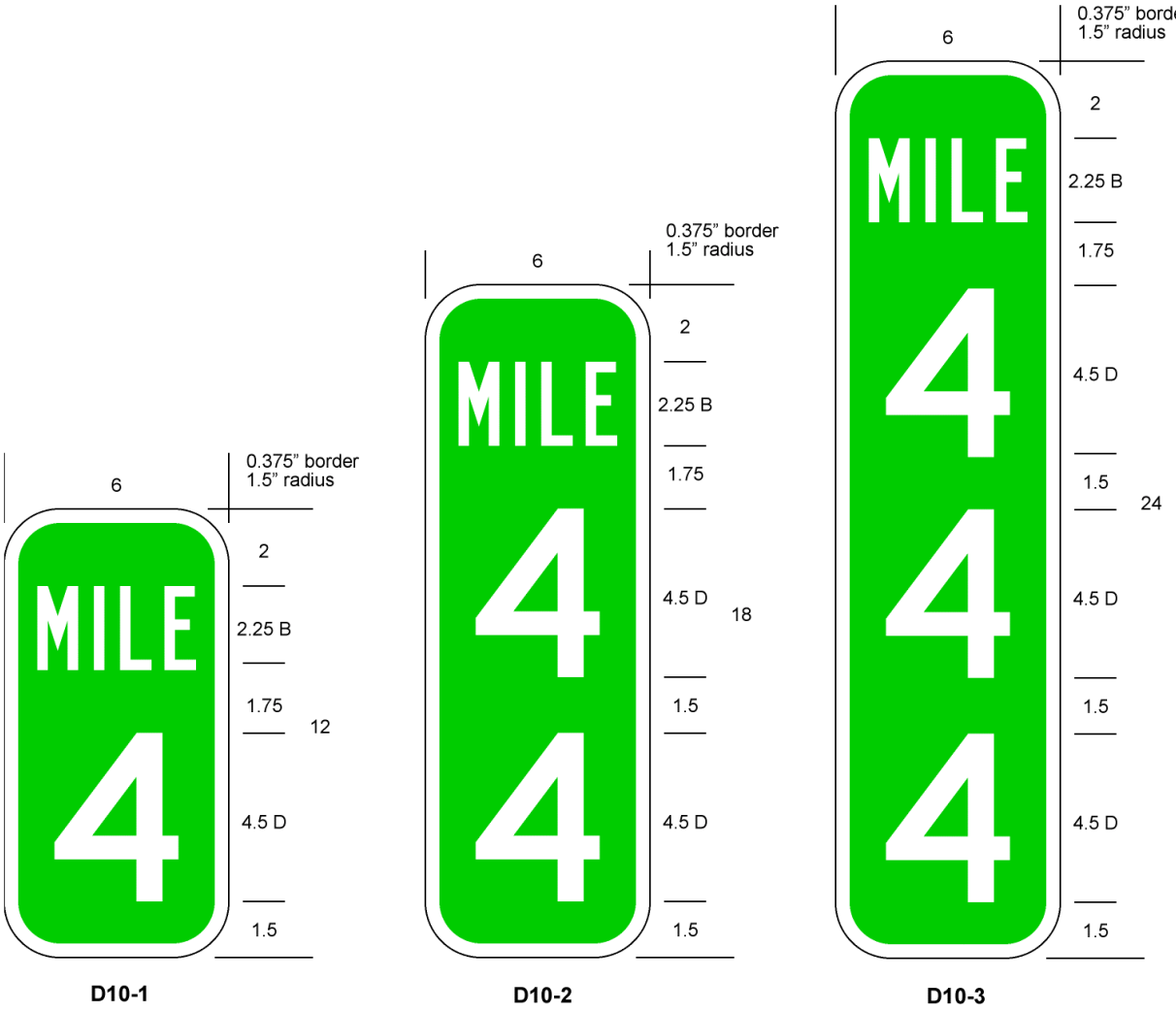


D10-2a

D10-3

D10-3a

SHS Figures



D10-1 **D10-2** **D10-3**

APPENDIX I: DETECTION OF BICYCLES

Detection of Bicycles

For traffic signals to operate efficiently they must be able to detect when vehicles are present on approaches to the intersection. In response to detecting the presence (and consequently the absence) of vehicles, traffic signal hardware can adjust signal phasing and timing plans to accommodate fluctuating traffic conditions throughout the day and week. Inefficient signal operations can arise when vehicle detection hardware is not operating optimally, such as when a loop fails. When this happens, the detector hardware will usually compensate by providing an automatic recall to the movement formerly monitored by the failed detector; this means that the lane over the failed loop will receive a green light during every cycle, whether a vehicle is there or not. Alternatively, there are some signal loop installations which may detect cars, but do not detect some trucks, motorcycles or bicycles. If they are not detected, these vehicles may not receive a green light.

This section describes common detector types and how their detection of bicycles can be optimized. This section also recommends an approach to bicycle detection that optimizes existing technology (i.e., inductive loop detectors) before pursuing new technologies for bicycle detection only.

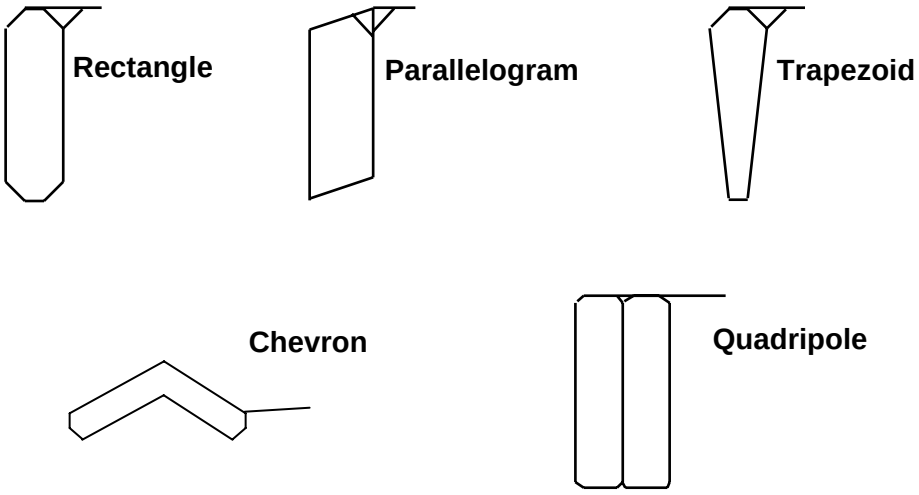
Inductive loops

The most common type of vehicle detection hardware is the inductive loop. The loop consists of a wire (or several wires) embedded into the roadway. A very low voltage current runs continuously through the loop; whenever a conductive object enters the electrical field around the loop, the loop's inductance is altered. The detector hardware senses this change in inductance and interprets it as a vehicle over the loop.[17]

Loop sensitivity is also an important aspect to consider with regard to bicycle detection. Sensitivity is affected by several factors, the three most important of which are: the amount of metal in the vehicle; the proportion of the loop covered by the vehicle; and the distance between the roadway surface and the metal in the vehicle. Ideally, a loop would be able to detect any vehicle placed over the loop but not detect vehicles in any adjacent lanes. Calibrating loops sensitively to do so is a principal challenge of signal hardware design, which has led to the development of numerous loop configuration solutions. Some of the more common configurations are shown in *Figure 1*. Each of these of these configurations is widely used across the country and each is capable of detecting bicycles in their fields.

[17] It is important to note that induction loops do not detect changes in the magnetic field and therefore a bicycle need not be made of steel to be detected. Because aluminum is a better conductor than steel, aluminum bikes are actually are more easily detected by inductive loops than steel bikes.

Figure 1: Common Configurations of Inductive Loop Detectors



There is a perception among many cyclists and roadway engineers that inductive loops do not detect the presence of bicycles; this perception is often based on cyclists not waiting in an optimal spot for detection. Research has shown that inductive loops are highly reliable at detecting steel and aluminum bicycles when bicycles are in the proper position.[18] There are two basic strategies to improve detection of bicycles: to direct bicyclists to the area of optimal loop sensitivity ("marking the sweet spot") or to place new loops in spots where cyclists are likely to be waiting, such as in the bike lane or at the right edge of the pavement. It is recommended that these strategies for optimizing loop detection of bicyclists be employed before investigating a substantial investment of new technology; the technology already in place around many Scottsdale intersections is likely quite capable of detecting bicyclists. The following sections describe these two strategies.

Marking the Sweet Spot. One of the simplest ways to facilitate the detection of bicyclists at traffic signals is to mark that spot on the roadway where a given loop will detect a bicycle. The *MUTCD* provides for a symbol that may be placed on the pavement to indicate the optimum position for a bicyclist to actuate the signal (*Figure 2*).[19] Used in conjunction with the BICYCLE SIGNAL ACTUATION sign (R10-22, *Figure 3*)[20], this symbol can eliminate the problem of bicycle detection for any intersection movement where the loops can detect bicyclists.

[18] See for example the FHWA report "Bicycle and Pedestrian Transportation," prepared by SRF consulting in 2003, available on line at http://ntl.bts.gov/lib/23000/23300/23330/BikePedDetFinalReport.pdf
[19] *MUTCD*, Section 9C.05 Bicycle Detector Symbol, FHWA, Washington, D.C., 2003.
[20] *MUTCD*, Section 9B.12, Bicycle Signal Actuation Sign, FHWA, Washington, D.C., 2003.

Figure 2: Signal Actuation Stencil

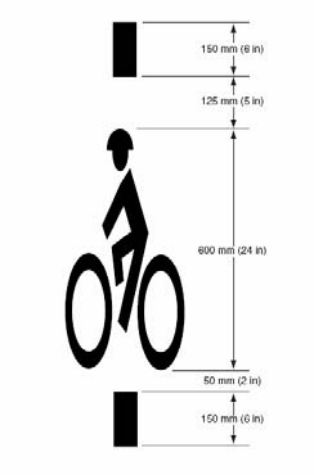


Figure 3: Signal Actuation Sign

This *sweet spot* can be located by two people in the field using the following process. First, have one person open the controller cabinet and note the light indicating detection for the lane of interest. Next, place a bicycle at the right edge of the lane with the front tire overhanging the stop line. Then move the bicycle slowly to the left in the lane until the controller indicates the bike is detected by the signal loop (see *Figure 4*). Continue moving the bike until the bicycle can no longer be detected. Finally, mark the pavement at middle of this range of detection. In many cases an entire bicycle is not needed to locate the *sweet spot*, just a bicycle wheel may do. However, until it can be determined if a single wheel will be detected by Scottsdale loops, an entire bike – and initially both a mountain bike and a road bike – may be appropriate for experimentation.

Figure 4: Finding the "Sweet Spot"

Loops for Bike Lanes. Placement of signal loops within bike lanes is not always necessary. As stated above, frequently bicycles only need to be detected in situations where no motor vehicle is present; in those situations, bicyclists could exit the bike lane and wait to be detected over the standard signal loop. Even so, changing lanes at an intersection to call for a signal change is not a normal vehicular behavior. Consequently, in the interest of providing consistent treatments and promoting consistent vehicular behavior, bike lane detection should still be considered at locations where signal change is unlikely without detection.

The most commonly recommended loop type for bike lanes is a quadripole loop of reduced size. These loops are highly sensitive to objects in the area immediately above them, but detection falls off rapidly outside of this sensitivity field; this means that cars in adjacent lanes will not be detected. Quadripole loops, when placed in a bike lane, typically detect within an area two feet wide by ten feet long.

Other Detection Technologies

In addition to inductive loops there are numerous other technologies being used to detect bicyclists at signalized intersections. These include video, microwave, infrared, and ultrasonic detectors. Of these methodologies, video detection is the most commonly used at this time. New technologies can be effective and should be explored for future use especially when a platform conversion is underway for general vehicle detection needs as well.

Wireless sensors. Wireless sensors can be used as a direct replacement for conventional inductive loops at intersections, but without pavement cuts or lead-in cabling. With new sensitivity modes for stop bar applications, the wireless vehicle detection systems can be tuned to accurately detect the presence of automobiles, motorcycles, scooters, and bicycles at intersections. Using pulse or presence modes and mapped as required to different detector groups and signal phases, the wireless vehicle detection system can be easily configured in the same way that inductive loops would interface to a traffic controller. Unlike loops, however, each wireless sensor can be installed in less than ten minutes, making their installation a much faster and less expensive option.

Video Detection. Video detection has been used very successfully to detect bicyclists. In this methodology, a specific field of interest is outlined on a video display and any change within the field area is detected by the video detection hardware and software. Video detection of bicyclists has several advantages over inductive loop detectors. Inductive loops can fail, and, since they are hard wired into the roadway, they can take a long time to replace – typically coincident with resurfacing of a roadway. Inductive loops also limit a traffic engineer's ability to shift roadway lanes, crosswalks, or stop bars. Video detection hardware does not include any in-pavement components, thus the area of detection can be easily adjusted.

Video detection is not perfect, however. Some users have reported that such factors as glare, rain, or dirty lenses significantly reduce the detection capability of the video hardware. Proper alignment of the cameras, lens hoods and maintenance may be able to minimize the impact of these limitations. Another limitation of the video system that has been identified is that it may not detect cyclists at night if the cyclists are not using lamps; increased street lighting can help avoid this problem.

Microwave Detection. Microwave detectors transmit electromagnetic radiation at a detection zone on the pavement or sidewalk and use the Doppler principle to determine if a person, bike

or car is present. Some types of microwave detectors cannot detect stationary objects, while others are able to detect both detect passage (moving objects) and presence (stationary objects). Microwave detectors can detect pedestrians and bicyclists. Currently, they are not typically used for bicycle detection but are used for pedestrian detection.

Ultrasonic or Acoustic Detectors. Ultrasonic (or acoustic) detection systems work much the same way as microwave detectors. However, bicyclists and pedestrians usually do not cause enough changes in the detected sound energy levels. These systems are also prone to false calls in noisy environments.

Infrared Detection. There are two basic types of infrared detection systems – passive and active. Passive infrared detection systems are not particularly efficient and are subject to adverse weather conditions. Active infrared systems are effective at detecting bicyclists and pedestrians.

Of the above listed alternatives to inductive loops, video is probably the most common in use today. When strategically deployed, however, loop detectors are a very effective means of detecting the presence bicycles at intersections. If they are placed within a marked bike lane, the loops should have no problem detecting bicycles that pass over them, provided that the bicycle is also within the marked lane. If there is not a bike lane, it is advisable to stencil the "sweet spot" on those roadways for which the signal will not cycle to green without being called. Wireless sensors are a new technology that may provide a cost effective and reliable alternative. Other technologies have been have been shown to be effective for bicycles as in ways described above, but it is only advised that video or other technologies be considered for bicycle detection at intersections where such alternatives are being employed for other detection needs as well. The advantages of having a uniform technological platform for all traffic detection outweigh any sensitivity benefits to be gained by any one technology.

Signal Timing Adjustments

Calling the green signal is the primary purpose of detecting bicycles. For this purpose, either detection using the existing loops or loops in the bike lane will suffice. However, because signal timing may also need to be adjusted, there is an additional incentive to place detection loops in bike lanes. The consideration of bicyclists when timing signals involves two calculations – the minimum clearance interval and the minimum green time. Details for how to set signal timing for bicyclists are included in *Appendix F*.