

# MARICOPA ASSOCIATION OF GOVERNMENTS



## REGIONAL OFF-STREET SYSTEM PLAN

Creating Non-Motorized Paths/Trails in Existing Corridors

February 28, 2001

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# MARICOPA ASSOCIATION OF GOVERNMENTS (MAG)

## REGIONAL OFF-STREET SYSTEM (ROSS) PLAN

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- William Beyer, Citizens Transportation Oversight Committee



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# DEFINITION OF TERMS AND ABBREVIATIONS

## **AASHTO**

The American Association of State Highway and Transportation Officials (AASHTO) has created design guidelines for bicycle travel ways. Projects which use federal transportation funds need to meet or exceed these development guidelines.

## **ADA**

The Americans with Disabilities Act (ADA) is a federal law passed in 1990 which furthers the goal of full and equal participation of Americans with disabilities. It guarantees equal opportunity for individuals with disabilities in employment, public facilities, transportation, state/local government services, and telecommunications; including requiring that public entities provide accessible accommodations for persons with disabilities.

## **ADOT**

Arizona Department of Transportation.

## **Bike Lane**

A portion of a roadway which has been designated by striping, signing and pavement markings for the preferential or exclusive use of bicyclists.

## **Bike Route**

A segment of a system of bikeways designated by the jurisdiction having authority with appropriate directional and informational markers, with or without a specific bicycle route number.

## **Canal**

A canal is a water conveyance feature which intersects roadways. Operations and maintenance (O & M) roads run parallel next to canals and provide an off-street non-motorized travel opportunity. The O & M roads are typically dirt or rock with a relatively flat grade. Many of these corridors are currently in use for off-street, non-motorized travel. Public access is allowed on canals managed by the Salt River Project, but currently prohibited along the Central Arizona Project Canal, canals managed by the Buckeye Irrigation District, and canals managed by the Roosevelt Irrigation District.



**Corridor**

A corridor is a narrow tract of land forming a passageway that connects two or more destinations. Corridors identified in the ROSS plan include canals, flood control structures and rights-of-way, utility easements, railway corridors, desert washes and waterways, and highway and freeway rights-of-way. The width of these corridors vary from five (5) feet to several hundred feet. They may be natural or constructed, curvilinear or straight.

**CPTED**

Crime Prevention Through Environmental Design (CPTED) is a relatively new design concept which posits that crime can be reduced by incorporating features, such as increased lighting or smaller scale vegetation, into the physical environment. More information on CPTED is provided in Appendix A.

**Desert Washes and Waterways**

The natural drainage of the desert consists of washes. These channels are typically shallow, rocky, and dry most of the year. Throughout the MAG region, most washes have been diverted, channelized, or eliminated; however, some have been preserved as natural resources. Many have rich vegetation along the banks where moisture is concentrated.

**Facilities**

A general term denoting improvements and provisions made by public agencies to accommodate or encourage bicycling and walking, or other non-motorized transportation, such as roller blading and horse riding.

**FHWA**

Federal Highway Administration.

**Flood Control District of Maricopa County (FCDMC) Structures and Rights-of-Way**

FCDMC structures and rights-of-way include interceptor channels and dam structures. They exist throughout the MAG region along rivers and range in length from several feet to 35 miles. Their landscape characteristics can be steep concrete channels, open vegetated swales, or earthen embankments. There are typically operations and maintenance roads on each side that may be suitable for a non-motorized travel way.

**Highway**

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



### **Highway and Freeway Rights-of-Way**

Highway and freeway rights-of-way include off-street corridors along drainage channels and sound walls. A path placed in these types of corridors would be screened and buffered from high-speed traffic while maintaining access to destinations also accessible by automobile.

### **Land Banking**

Land Banking is a process to reserve land for conservation purposes. Either public or private land can be land banked to help mitigate the negative impacts of development. For more information on land banking, please see Appendix B.

### **LRTP**

The MAG Long Range Transportation Plan (LRTP) addresses all modes of transportation for at least a 20-year time period: airports, bicycles, freeways, pedestrians, streets and transit. The plan also addresses special transportation needs and safety. To incorporate recent planning studies and demographic and economic projections, and to ensure consistency with the most recent air quality plans, the LRTP is updated annually if feasible.

### **MAG**

The Maricopa Association of Governments (MAG) was formed in 1967 to address regional planning needs. The member agencies of MAG include incorporated cities and towns within Maricopa County, the County, the Gila River Indian Community and the Salt River Pima-Maricopa Indian Community. In transportation, MAG has been designated by the Governor as the Metropolitan Planning Organization in accordance with Federal requirements. Also, MAG has been designated as the Lead Air Quality Planning Agency by the Governor.

The governing body of MAG is the Regional Council, which includes a representative of each member agency and two representatives from the Arizona State Transportation Board. In addition, the Chairman of the Citizens Transportation Oversight Committee (CTOC) serves as an ex-officio member on matters relating to the Regional Freeway System.

The MAG Management Committee and four MAG policy committees report directly to the Regional Council. In addition to the policy committees, MAG has 20 technical committees, many of which address transportation issues.



### **Nodes and Gathering Places**

A node or gathering place is any place where people collect and interact. A node might be an intersection where two paths/trails cross. A gathering place may be where people congregate before beginning their journey via a path or trail. The speed of travel will often slow, or even stop at these points; therefore, these locations require more attention to site circulation and human comfort. Paths/trails that provide these opportunities are typically more successful since people need places to stop, rest, get directions and socialize.

### **Non-Motorized Facilities**

A general term denoting improvement and provisions made to facilities including any path, lane, route, trail, special shoulder or other treatment to provide on-road or off-road transportation to pedestrians, bicyclists, in-line skaters and equestrians.

### **Path/Trail**

As used in the ROSS document, a path/trail refers to either a shared-use path or shared-use trail.

### **PWG**

The Pedestrian Working Group (PWG) is a MAG technical advisory committee providing joint oversight of the MAG ROSS. The Working Group consists of representatives of MAG member agencies and a representative of the Arizona Society of Landscape Architects. The Working Group annually reviews and updates the MAG *Pedestrian Plan 2000* and develops activities to educate the region about the benefits of walking.

### **Rail Corridor**

A rail corridor is any set of tracks in use, or once used, by commuter and/or freight trains to transport people and/or goods.

### **RBTF**

The Regional Bicycle Task Force (RBTF) is a MAG technical advisory committee providing joint oversight of the MAG ROSS. The Task Force is comprised of representatives from MAG member agencies, the Arizona Department of Transportation and Valley Metro. The Task Force has developed a Regional Bicycle Plan which primarily addresses on-street facilities, and also encourages the implementation of the Plan by recommending bicycle-related projects for funding from federal and other sources.

### **Regional Trails Forum**

A series of meetings organized to obtain input from citizens and other organizations on the ROSS Plan.



**Right-of Way**

A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to transportation purposes.

**Roadway**

The portion of the highway, including shoulders, for vehicle use.

**ROSS**

The Regional Off-Street System (ROSS) Plan serves to complement the existing MAG Regional Bicycle Plan by identifying existing off-street corridors which could be used for non-motorized transportation.

**SRP**

The Salt River Project (SRP) provides both water and power to Valley residents. SRP maintains authority over approximately 130 miles of canals in the urbanized portion of the MAG region.

**Shared Roadway**

Any roadway upon which a bicycle lane is not designated and which may be legally used by bicycles regardless of whether such facility is specifically designated as a bikeway.

**Shared -Use Path (Class I Facility)**

According to AASHTO, a facility which is on a completely separate right-of-way from the roadway and sidewalk and designated for the use of bicycles, pedestrians and/or other non-motorized travelers. Cross flows with motor vehicles should be minimized whenever possible.

**Shared-Use Trail**

A path of travel within a designated corridor that is not classified as a highway, road or street. Trails provide travel opportunities for bicyclists, pedestrians and other non-motorized travelers, such as equestrians.

**Sidewalk**

The portion of a highway designed for preferential or exclusive use by pedestrians.

**TEA-21**

The Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21) was signed into law on June 20, 1998 and has numerous provisions that relate to improving conditions for bicycling and walking. TEA-21 confirms and continues the principle established in the Intermodal Surface Transportation Efficiency Act (ISTEA): planning and giving “due consideration”



of non-motorized travel needs is to be given during the planning, developing, and construction of all Federal-aid transportation projects.

According to the FHWA Guidance on Bicycle and Pedestrian Provisions of Federal Transportation Legislation: “ ‘Due consideration’ of bicycle and pedestrian needs should include, at a minimum, a presumption that bicyclists and pedestrians will be accommodated in the design of new and improved transportation facilities. In the planning, design, and operation of transportation facilities, bicyclists and pedestrians should be included as a matter of routine, and the decision to not accommodate them should be the exception rather than the rule...Maintaining access to the transportation system for nonmotorized users is not an optional activity.”

**TIP**

The MAG Transportation Improvement Program (TIP) is prepared annually by MAG. The TIP lists federally funded projects for the MAG region. The TIP serves as a five-year regional guide for the preservation, management and expansion of public transportation services including highways, arterial streets, transit, demand management and alternative mode improvements in Maricopa County. MAG, in cooperation with the Arizona Department of Transportation (ADOT) and the Regional Public Transportation Authority (RPTA), is responsible for the development of the MAG TIP.

**Utility Easements Corridor**

Utility easements corridors include powerline corridors as well as gasline easements or rights-of-way.



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# SECTION I: EXECUTIVE SUMMARY

## INTRODUCTION

The Regional Off-Street System (ROSS) Plan, initiated by the Maricopa Association of Governments (MAG), reveals a region-wide system of off-street paths/trails for non-motorized transportation. Throughout the MAG region, numerous opportunities for off-street travel by people who walk and bicycle exist along areas such as canal banks, utility line easements and flood control channels. These types of rights-of-way and easements



Figure 1-1: Shared-Use Path Near the Roosevelt Irrigation Company Canal in Goodyear.

intersect numerous arterial streets where local daily destinations are typically located. The goal of the ROSS Plan is to help make bicycling and walking viable options for daily travel trips using off-street opportunities.

The possibility of developing and expanding travel options for people who bicycle and walk offers many benefits to residents in the MAG region. These benefits include reduced traffic congestion and air pollution from less local trips made by automobile, and improved health and well-being that comes from regular

exercise. While not all trips can be replaced by bicycling and walking, many can, such as walking to work or the bus stop, children riding bicycles to school, errands to the grocery or video store and after-school sporting activities.

The ROSS Plan provides guidance to MAG member agencies in creating an off-street non-motorized transportation system. The Plan focuses on potential corridors that form the backbone of a regional off-street system of routes. Other off-street segments will be necessary to provide additional connections between origins and destinations. The ROSS Plan identifies issues associated with paths/trails and non-motorized transportation, identifies corridors which could be used for paths/trails in the MAG region and provides design guidelines for paths/trails. Creating the plan also helps to provide support for federal transportation funding requests.



## METHODOLOGY

The MAG Regional Bicycle Plan was adopted by the Regional Council in February, 1992. The Regional Bicycle Plan has been incorporated into the region's Long Range Transportation Plan. A bicycle plan update was approved by the MAG Regional Council in March, 1999. The update revised goals and objectives, changed evaluation criteria for project selection, enhanced plan maps, updated the funding plan and documented future possible planning activities. Because the original 1992 plan emphasized on-street facilities, the update also gave limited attention to potential off-street facilities in providing access and mobility for bicyclists. Creating a regional off-street shared-use path/trail plan was identified as an important future planning activity during the plan update. The off-street network was envisioned to include paved paths and unpaved transportation trails. The fiscal year 2000 Unified Planning Work Program and Annual Budget adopted by the MAG Regional Council in May 1999 contains a bicycle component and specifically identifies developing the ROSS Plan.

RBF Consulting was hired to assist the Regional Bicycle Task Force (RBTF) and Pedestrian Working Group (PWG) to develop the ROSS Plan. In consultation with MAG, the consultant developed a scope of work to complete the ROSS Plan. Key planning tasks included: public and agency involvement; issues identification; developing a plan vision statement, goals and objectives; identifying and evaluating corridors; creating design guidelines; developing implementation strategies and identifying potential funding sources.

## ISSUES

While specific issues and needs will vary between individual communities and among different types of users, a clear understanding of issues helps to define problems that the planning process should address. Identifying a broad range of issues also helps to define goals and objectives and guides the way to solving issue-related problems. Section III of the ROSS Plan outlines existing regional trends which contribute

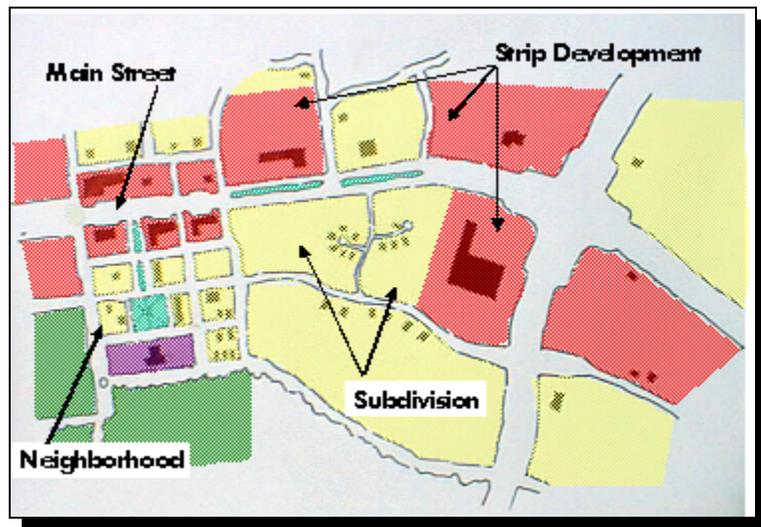


Figure 1-2: Traditional Urban Development Pattern Vs. Current Development Pattern.



to use of non-motorized transportation, general benefits of bicycling and walking, the importance of the on-road transportation system for bicyclists and pedestrians, and the need for an off-street non-motorized transportation system. The chapter concludes with issues identified through the planning process with the assistance of the RBTF, PWG and participants in the Regional Trails Forum meetings.

**VISION STATEMENT, GOALS AND OBJECTIVES**

The vision statement, goals and objectives were developed in consultation with the RBTF, PWG and participants in the Regional Trails Forum meetings. The vision statement paints a picture of the future once the Plan is implemented and helps define the future of the regional off-street non-motorized transportation system.

The five key issue areas defined in Section III provide the framework for the goals and objectives. The goals address the five issue areas of access, safety, connectivity, user-friendly and implementation, and provide guidance to MAG and its member agencies in making bicycling and walking viable options for daily travel trips. Replacing single-occupant motorized vehicle trips with bicycling and walking helps to improve air quality and relieve congestion. Each goal lists a number of objectives which are more specific measures to help achieve each of the goals. The vision statement, goals and objectives are provided on the following pages of this Executive Summary.



*Figure 1-3: Visions of a Non-Motorized Transportation System*



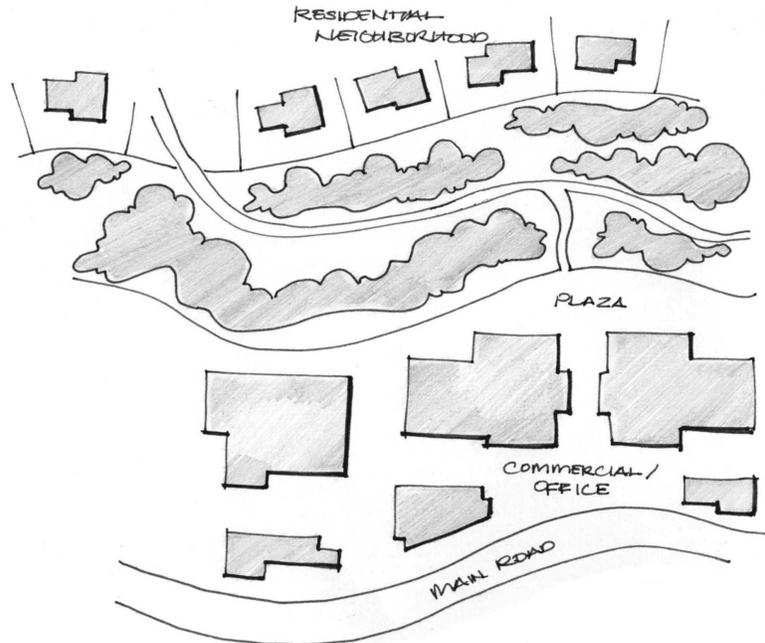
### Vision Statement

Residents of the MAG region have safe, convenient access to an attractive, shared-use, non-motorized transportation system that provides a viable alternative to driving for local trips, such as trips to work, school, shopping and leisure activities.

### Access Goal

Provide sufficient, convenient access to the non-motorized off-street transportation system which is highly visible to existing and potential users.

**Access Objectives.** Use design guidelines identified in the ROSS Plan, such as unique landscaping and special signs, to make path/trail access points more visible to existing and potential users.



Alleviate, or remove, barriers to non-motorized travel by implementing the design guidelines and recommendations included in the ROSS Plan. *Figure 1-4: Residential Area Linked to Commercial/Office Space Using an Off-Street Route.*

Design an off-street path/trail system that provides a sufficient number of access points to provide access to numerous users.

Whenever possible, ensure that design of off-street paths/trails meets or exceeds the Americans with Disabilities Act (ADA) Design Guidelines.

Encourage land use patterns which place origin and destination points within reasonable walking and bicycling distance of one another.



## Safety Goal

Develop an off-street system of paths/trails that is safe for a variety of users.

**Safety Objectives.** Design paths/trails within multi-purpose corridors to meet the needs of non-motorized travelers without infringing on the original purpose of the corridor.

Use Crime Prevention Through Environmental Design (CPTED) techniques to address personal safety concerns (see Appendix A).

Improve safety of users through design guidelines that regulate appropriate distance from and access to dangerous features, such as fast-moving water or sand-and-gravel pits.

Promote the adherence to nationally and regionally accepted design guidelines in the development of paths/trails, including the American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities*, the *Manual of Uniform Traffic Control Devices (MUTCD)*, the *MAG Pedestrian Plan 2000*, the *MAG Pedestrian Area Policies and Design Guidelines* and the ROSS Plan.

## Connectivity Goal

Connect origins and destinations with paths/trails, and link paths/trails to the existing on-street transportation system and other transportation modes.

**Connectivity Objectives.** Connect origins and destinations with continuous and direct off-street routes to encourage non-motorized travel.

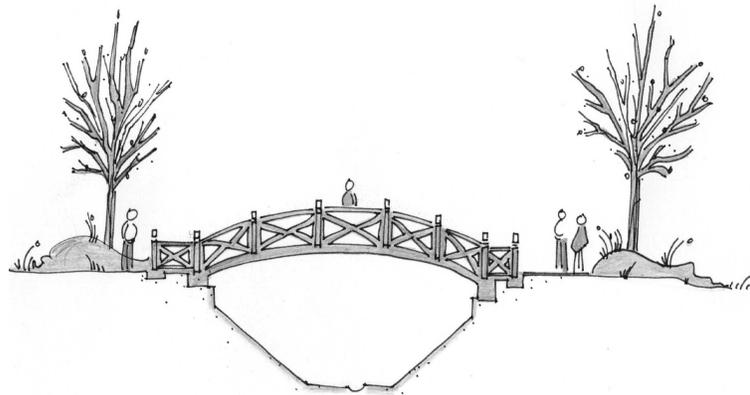


Figure 1-5: It May Be Necessary to Cross Barriers, Such as this Waterway, to Make Appropriate Connections for Non-Motorized Travelers.

Develop design guidelines in the ROSS Plan to minimize barriers to riding a bike or walking along paths/trails.

Provide grade separations to maintain connectivity of paths/trails over barriers such as freeways and high-speed, highly-traveled roadways.



When grade separated crossings are not feasible, use *Alternative Solutions to Pedestrian Mid-Block Crossings at Canals* to provide guidance for at-grade crossings, prepared for MAG in association with the City of Tempe in 1999 (see Appendix C).

Link the off-street non-motorized transportation system with the on-street system (such as bicycle lanes and wide outside lanes along arterial streets) and other modes of transportation (such as bus routes, light rail and park-and-ride lots) to optimize opportunities for travel by bicyclists and pedestrians.

Identify obvious gaps in the existing system of off-street paths/trails and develop methods to eliminate these gaps thereby encouraging bicycling and walking.

### User-Friendly Goal

Develop a system of paths/trails that considers the needs of users and potential users (user-friendly).

#### User-Friendly Objectives.

Design attractive and appropriate facilities based upon user needs, surrounding land uses and community character.

Provide an appropriate level of amenities to meet user needs, such as drinking fountains, rest areas, signage, lighting, shade and sufficient bicycle parking.

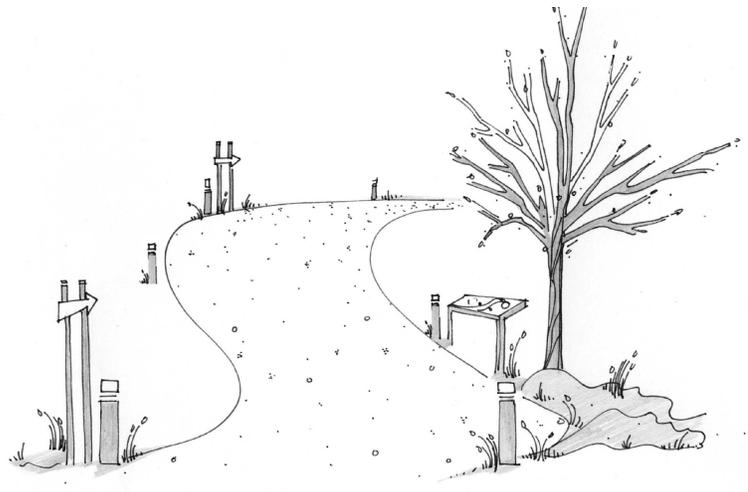


Figure 1-6: A User-Friendly Path/Trail.

Minimize conflicts between users by employing guidelines identified in the MAG ROSS Plan.

Maintain pathways to achieve a pleasant and safe travel experience.

### Implementation Goal

Achieve a truly regional system of off-street paths/trails by assisting MAG member agencies in developing portions of the off-street system under their jurisdiction.



**Implementation Objectives.** Create partnerships with private and public sector organizations to encourage the development of non-motorized transportation facilities that will meet the needs of the community without infringing on the original purpose of the right-of-way.

Encourage funding of projects which provide off-street travel opportunities in areas where expansion or retrofit of on-street facilities is cost prohibitive.

Identify potential solutions to resolve issues associated with developing paths/trails in corridors and rights-of-way, such as operations and maintenance, in the ROSS Plan.

Develop flexible design guidelines to address circumstances that may be encountered when developing in rights-of way with size or policy constraints.

Develop a model ordinance for MAG member agencies to incorporate into planning and review processes for developer provision of easements and development of critical pathway segments.

Consider and identify creative ways and approaches to implementing the system, such as shared use agreements, model ordinances and shared funding opportunities.

Promote the system as a viable alternative to driving.

## CORRIDOR IDENTIFICATION

Several types of corridors were identified for inclusion in the ROSS Plan. These corridors typically have a primary purpose other than non-motorized transportation and intersect arterial streets where many daily destinations, such as grocery stores and employers, are located. The MAG region is fortunate to have a variety of linear corridors and rights-of-way which can be utilized in an off-street transportation system by bicycles and pedestrians. These potential corridors form the backbone of a regional off-street system of routes. Other off-street segments may be needed to provide additional connections between origins and



Figure 1-7: The Creamery Branch, an Abandoned Rail Corridor in Tempe.



destinations. The goals and objectives identified in Section IV help provide guidance on developing other off-street segments. Of particular importance, public lands and existing parkland, such as mountain preserves, can provide vital links in the system. These and other opportunities and constraints should be examined more fully by jurisdictions as they implement the system. Identified corridors include canals, desert washes and waterways, flood control structures and rights-of-way, highway and freeway rights-of-way, railway corridors and utility easements. These corridors are shown in Figure 1-8, Potential Corridor Map.

## **REPRESENTATIVE PROJECTS**

To create design guidelines for the ROSS Plan, three representative projects were chosen for their potential to illustrate a variety of issues that might be encountered when developing path/trail systems in the various corridors. These issues include, among others, comfortably crossing busy roadways, creating a user-friendly system when right-of-way is limited and creating paths/trails which complement the primary use of the corridor, such as flood control. For each representative project, an analysis of opportunities and constraints led to schematic drawings illustrating how to appropriately address issues and work within the constraints. Representative projects were chosen to provide a broad range of examples of issues related to the different types of the corridors identified. These three projects included the Dysart Drain, the Creamery Branch rail spur, and the Roosevelt Water Conservation District Canal. Further information can be found in Section VI of the ROSS Plan.



Insert Figure 1-8, Potential Corridor Map.



Insert Back Side of Figure 1-8, Corridor Identification.



## DESIGN GUIDELINES

Section VII provides basic guidelines to assist MAG member agencies in developing the corridors identified in the ROSS Plan. These guidelines have been developed based upon the analysis of the representative projects and include standards from several sources, including: (1) MAG member agencies; (2) MAG *Pedestrian Area Policies and Design Guidelines*; (3) MAG *Pedestrian Plan 2000*; (4) American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities*; (5) *Trails for the 21<sup>st</sup> Century*; and (6) *Universal Trail Assessment by Beneficial Design*.

Section VII begins with a general discussion of factors affecting path and trail usage, and path/trail user needs. This information is important to consider when designing paths/trails since not all types of users will use all paths/trails. Design guidelines have been divided into two categories. The first category, general design guidelines, applies to all types of off-street corridors. General guidelines have been stratified into the general goal areas of access, safety, connectivity and user-friendly. The second category, specific design guidelines, has been developed to apply to the each of the specific corridor types, such as canal and utility line easements, identified in the ROSS Plan. Only general design guidelines are provided below. Please refer to the full text of Section VII of the ROSS Plan for specific design guidelines.

### General Design Guidelines

**General Design Guidelines To Ensure Access.** The following guidelines will encourage access to the path/trail, and access through and across the corridor. People need convenient access to a non-motorized transportation system to provide a viable alternative to driving. The more convenient the access, the more people will use alternatives to driving alone.

While certain corridor features, such as freeways, roadways, canals and ditches, are opportunities for off-street non-motorized travel, these features can also significantly harm the access to and continuity of an off-street transportation network. Other factors that threaten access are private property and gated communities. A path/trail that welcomes people and allows travel options beyond its own corridor will be well-used and create a pleasant user experience.



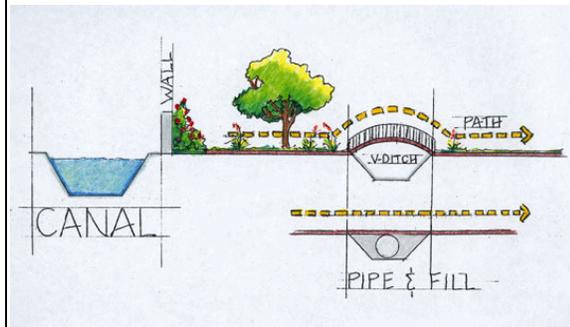


Figure 1-9: Potential Solutions to 'V' Ditches.

Remove, or resolve, obstacles that limit access such as 'v' ditches and fences. Possible options to 'v' ditches include using a prefabricated bridge to cross the ditch, or piping and filling the ditch (see Figure 1-9).

Whenever possible, utilize the entire corridor for non-motorized transportation by providing a path/trail along both sides of a corridor.

Obtain permission for access, or ownership, where a corridor crosses private property. If access is not possible, provide an alternative travel route.

Provide public access points no more than 1/2-mile apart. If distances are greater between access points, provide access to the path/trail as often as possible.

Encourage local access to paths/trails for nearby residents through cul-de-sac entrances and backyard gates (see Figure 1-10).



Figure 1-10: Neighborhood Path/Trail Access Through a Cul-de-Sac.

Provide regional access for short-term visitors that may not be local and include sufficient parking. Sufficient parking allows access to paths/trails for recreation and also allows longer trips to be partially made by bicycling or walking. Where feasible, parking should also accommodate equestrian users by having pull-through spaces for horse trailers.

Prioritize access to the shared-use path/trail system before land is developed. Consider non-motorized travel needs in neighborhood planning and reserve connections to existing and potential corridors prior to development (see Figure 1-11).



Figure 1-11: Construction of a Shared-Use Path Prior to Site Development.

**General Design Guidelines to Ensure Safety.**

These safety guidelines address both a sense of personal security (also related to user-



friendliness) and physical safety concerns from the natural and built environment. Safety is measured in terms of hazardous risks to the body or personal property. Injury can result from either purposeful or accidental events. Particular safety concerns in the potential corridors identified in the ROSS Plan include the possibility of falling electrical wires, drowning, tripping, collisions between cars and persons, and collisions between different user groups, such as bicyclists and equestrians. Some environmental safety issues to be addressed include flooding, lighting, fire and extreme heat. While not all risks can be eradicated, the guidelines provided below describe ways to minimize dangerous conditions for path/trail users.

Establish regular patrols by police or volunteers along paths/trails in corridors and on roadways adjacent to paths/trails. Patrols could be made by bicycle, motor vehicle or horseback. Rural and isolated areas will need particular attention to increase personal security. Criminal incidents are less likely in well-traveled areas with a visible police presence.

Incorporate the path/trail into the neighborhood watch system.

Post signs regarding yield priority, user liability, risks, hazards and upcoming intersections. Provide striping and other surface markings to safely guide users along the path/trail within the corridor and to prevent conflicts between users. Use the *Manual of Uniform Traffic Control Devices* as a reference for signing and striping guidelines.

Provide overhead lighting. The layout of lamps should be consistent, recognizable and unambiguous. Lamp placement should reinforce the direction of travel, reduce glare and minimize dense shadows. Vertical light distribution over paths/trails should cover or overlap at a height of 7-feet (see *Time-Saver Standards*, second edition, 1998, by Charles Harris and Nicholas Dines).

Plants should not be placed in a manner that creates hiding places. A clear zone of three feet should be maintained when measured from a height of three to eight feet. Therefore, shrubs shall be no greater than 3-feet tall and trees shall be limbed up eight feet, or higher. (Taken from the *April 2000, Council of Landscape Architectural Registration Boards, L.A.R.E. Reference Manual*).



Provide safe mid-block crossings by constructing an overpass, an underpass, a safe crossing with a refuge area, or a crosswalk and signal (see Figure 1-12). It may be necessary to direct path/trail users to an existing signalized street crossing. Refer to the MAG/City of Tempe *Alternative Solutions to Pedestrian Midblock Crossings at Canals* provided in Appendix C to help create safe and comfortable mid-block crossings.



Figure 1-12: A Mid-Block Crossing with Appropriate Signage. Mid-Block Crossing Should be Designed According to the Guidance Provided in Appendix C of the ROSS.

Provide emergency call boxes at approximately 1,000-foot intervals and at all nodes and gathering places. In rural areas, consider the use of solar powered boxes. Where possible, work with local law enforcement agencies and neighborhood watch groups to plan responses to calls. Each phone should identify its address for easy user identification.

Eradicate graffiti on a consistent basis.

Enforce existing local ordinances regarding trash pick-up and disposal of pet waste.

**General Design Guidelines to Ensure Connectivity.** Connectivity is defined by how the path/trail connects, or is planned to connect, to other corridor types, existing path/trail systems, other forms of transportation, and people to their destinations (see Figure 1-13). Creating a seamless non-motorized transportation system that links origins and destinations is a vital path/trail function. Connecting corridors of different types helps provide continuous off-street routes and provides variety for different users. This general design guideline category provides direction on how each path/trail should relate to its surroundings.



Figure 1-13: Bridges Across Washes, Such as This Bridge Across Cave Creek Wash, Helps Connect People to Destinations.



Connect paths/trails to local destinations such as shopping centers, offices and restaurants, and to regional destinations such as major parks, fairgrounds and employment centers.

To address the problem of terminating corridors, create trailheads where the path/trail has no obvious connections (see Figure 1-14). Alternatively, end the path/trail at a logical destination such as a park, school, employment center or shopping center, or create a path/trail loop which provides access to origins and destinations.



Figure 1-14: To Eliminate the Problem of Terminating Corridors, Change a Termination Point to a Beginning – A Trailhead or Node/Gathering Place.

Provide directional information at all path/trail intersections, nodes and gathering places, and at all logical points of access to the path/trail system.

Link corridor paths/trails to existing and proposed non-motorized transportation systems. Provide for future connections and continuations by land banking, zoning ordinance or other regulatory instrument.

Provide people with multiple opportunities to enter and exit the path/trail. Regional path/trail access points should connect to arterial streets to provide access to on-street travel systems, such as transit, bicycle lanes and sidewalks. The ability for people to easily connect with the off-street non-motorized transportation system will increase the amount of users and their enjoyment of the trail.

**General Design Guidelines to Ensure User-Friendliness.** This general design guideline category describes design elements that can be used to help people feel comfortable and relaxed. Sociological behaviors can be affected by design of the natural and built environment. While people direct design through placement and construction of various amenities, design can also direct people. Personal comfort is affected by various factors such as air temperature, size relationships, convenience, visual space, noise levels, air quality, security and ability to rest. Increasing personal comfort



Figure 1-15: A Rest Area with Appropriate Amenities for Path/Trail and Transit Users in Mesa. Appropriate Amenities Help Create a User-Friendly Non-Motorized Transportation System.



by creating user-friendly paths/trails results in pleasant user experiences, encouraging future travel choices via bicycling and walking rather than driving.

Plant shade trees to cover at least 50 percent of the path/trail surface for increased user comfort and to provide a human scale to the landscape. If equestrian travel may occur, or where passage height is a concern, this guideline can be adjusted to fit specific situations.

Place signs on shared-use paths/trails with specific yield instructions for users to encourage shared use and cooperation. To minimize user conflict, post information and signs regarding appropriate path/trail use at various places along paths/trails and at activity nodes.

Meet the needs of an aging population and special user groups by incorporating path/trail standards for barrier free access as specified in the Americans with Disabilities Act (ADA guidelines), when possible.

While width will depend on the user mix, shared-use paths/trails should be an average of 10- to 12-foot wide where possible to allow for multiple users with minimal conflict (see Figure 1-16). This width allows two-way bicycle traffic, passing for pedestrians and bicycles, plus a clear distance. A minimum width for two-way traffic, or shared-use, is 8-foot wide with adequate signing and a reduction of speed. This width will accommodate even heavily used paths/trails (20-30 pedestrians per hour, plus the same amount of bicycles). Trail widths may be as little as 4-feet on corridors for short distances, with low anticipated use rates and open visibility, with adequate signing and no adjacent dangers. For additional information on path/trail width, refer to Section VII of the ROSS Plan.



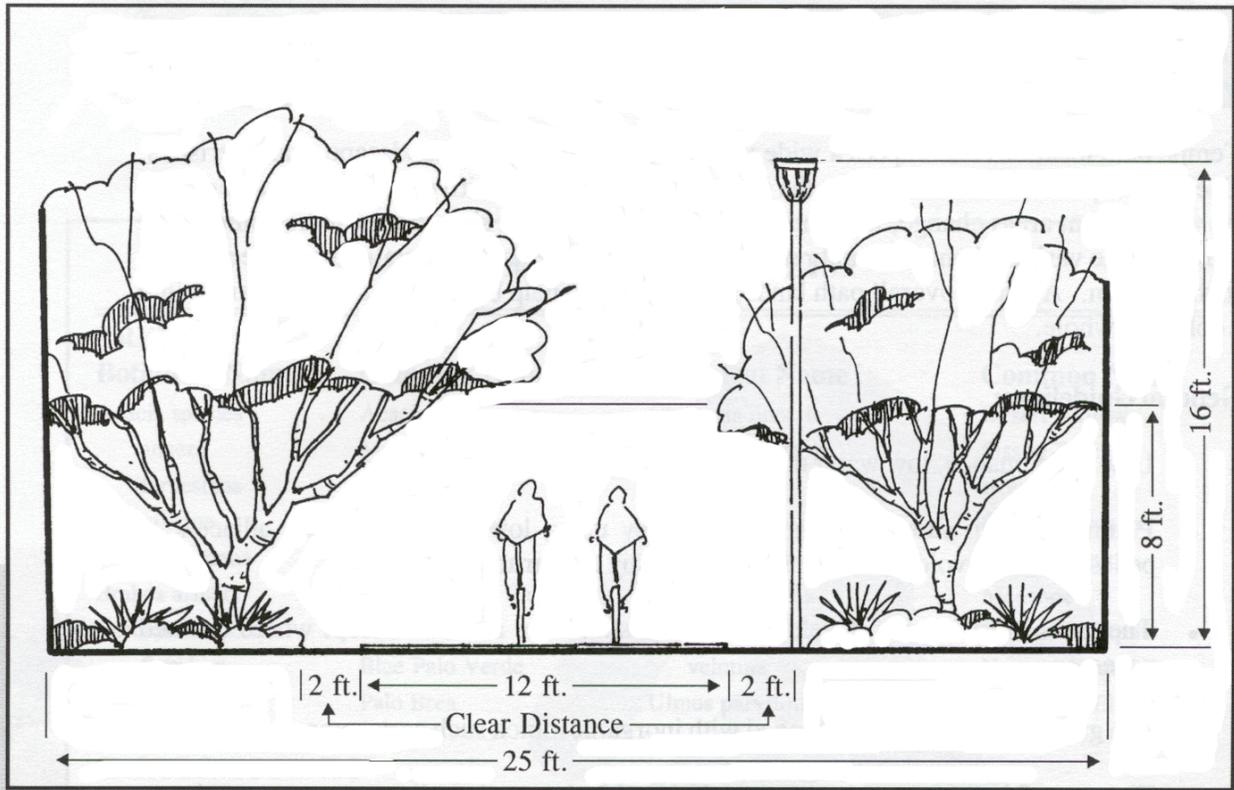


Figure 1-16: Recommended Path/Trail Section, Provided by the Tempe Multi-Use Path System Detailed Plan.

Surface treatment will depend on the user mix. All trail surfaces should be stable, smooth, slip-resistant and firm. The surface material should be free of irregularities and the surface edge should be uniform in width.

When possible, select surface treatments that appeal to a wide range of users, including special populations and equestrians as well as bicyclists and pedestrians. Where corridor width allows, provide both a hard and soft-surface path/trail surface to increase user satisfaction and safety.



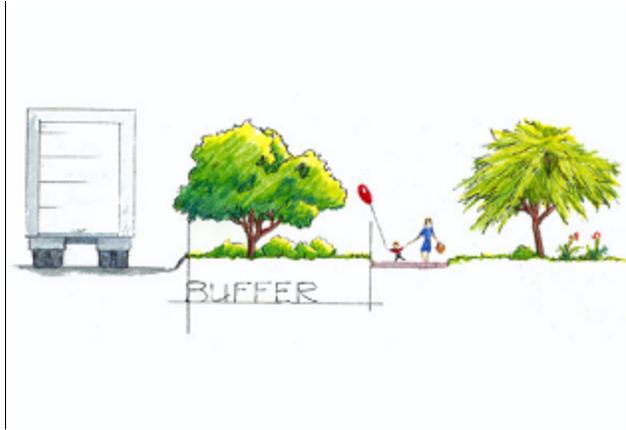


Figure 1-17: Add Separation Buffers Between Users and Unsafe Activities.

Separate incompatible uses physically by building a fence, wall, curb or planting island between the path/trail and dangerous activity such as fast-moving water, active rail lines or vehicular traffic (see Figure 1-17). If possible, restrict operations and maintenance vehicles to one side of corridor and leave the other side open to path/trail users (see Figure 1-18). Allow sufficient buffer/recovery space for the desired mix of users.



Figure 1-18: When Possible, Keep Operations and Maintenance Activities Separated From Bicyclists and Pedestrians.

Avoid frequent or drastic changes in grade. However, occasional fluctuations in path/trail grade are desirable to provide variation for path/trail uses and to allow proper drainage.

Clearly define the pathway through unique paving features or landscaping placement to create a human scaled environment (see Figure 1-19).



Figure 1-19: Clearly Defining the Pathway Creates a Human-Scaled Environment.

Establish seating along paths/trails at approximately 500-foot intervals and at all nodes and gathering places.

Accentuate regional views by removing vegetation and other debris that blocks views from the path/trail. Regional views in the MAG area include the adjacent mountains and skyline. Some routes, especially utility easements and canals, may include scenic views of cityscapes.

Screen unsightly views with plants or structures, such as drinking fountains or public art. Changing the orientation or direction of the path/trail may also be helpful in screening unsightly views.



Post signs that orient people to their surroundings. Identify street names and provide directional information to nearby destinations such as schools and shopping. Mileage markers are also very useful.

Provide bicycle parking at trailheads serving destinations such as shopping malls and retail shops, employment centers and schools. Bike lockers that secure the bike and protect it from the negative effects of weather should be provided at all park-and-ride and transit facilities.

Increase user comfort and help maintain a cleaner path/trail environment with additional site amenities such as drinking fountains, restrooms and trash bins. These amenities should be created especially at nodes and gathering places.

## IMPLEMENTATION AND RECOMMENDATIONS

Section VIII provides guidance to MAG member agencies implementing the off-street system. The overarching purpose of the MAG ROSS Plan is to define potential corridors for off-street travel and assist communities in implementing an off-street system of paths/trails for non-motorized travel. Since MAG has 24 member cities and towns, each community will have different community goals and values related to off-street non-motorized transportation. In addition, each community has different amounts of resources and opportunities to develop potential corridors as off-street travel ways. This section is a guide for implementing the system and identifies resources and processes helpful in developing a regional off-street non-motorized transportation system.

The section begins with a general process to develop an off-street non-motorized transportation system (Figure 1-20), including a model ordinance for adoption of the MAG ROSS Plan. This model ordinance is provided in Figure 1-21. Sample evaluation criteria are also included. Implementation issues, such as path/trail opposition, negotiating rights-of-way and easements, working with adjacent property owners, liability and maintenance, are identified and possible solutions are presented. Figure 1-22 identifies rights-of-way, contact information, key issues and potential solutions to consider when developing paths/trails in the corridors identified in the ROSS Plan. This section concludes with recommendations identified as either a “MAG Action” or a “MAG Support” in a manner similar to the *MAG Pedestrian Plan 2000*. These recommendations are listed on the following pages.



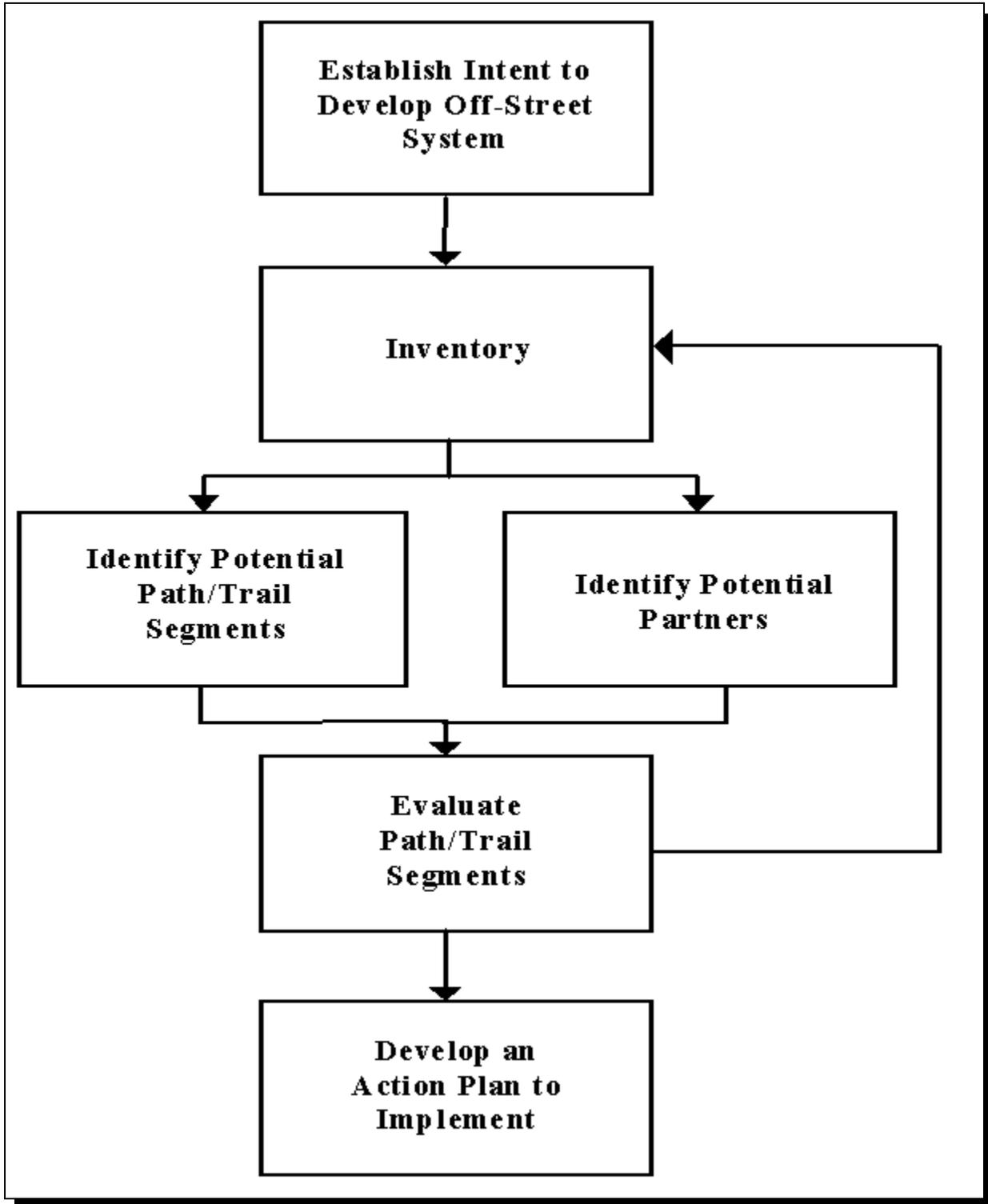


Figure 1-20: General Process to Develop an Off-Street Non-Motorized Transportation System.



CITY COUNCIL ORDINANCE \_\_\_\_ - \_\_\_\_

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF \_\_\_\_\_ ADOPTING THE SHARED-USE, NON-MOTORIZED TRANSPORTATION PATH/TRAIL SYSTEM WITHIN THE CITY, AS PREPARED BY THE MARICOPA ASSOCIATION OF GOVERNMENTS

WHEREAS, the City of \_\_\_\_\_ desires to improve regional shared-use, non-motorized path/trail transportation system in accordance with the City’s General Plan policies, Section \_\_\_\_ ; and

WHEREAS, the City of \_\_\_\_\_ desires to plan a shared-use, non-motorized transportation system that provides a viable alternative to driving for local trips, such as trips to work, school, shopping and leisure activities; and

WHEREAS, the City of \_\_\_\_\_ desires a shared-use, non-motorized transportation system that provides sufficient, convenient access which is highly visible; and

WHEREAS, the City of \_\_\_\_\_ desires to develop a shared-use, non-motorized path/trail transportation system that is safe for a variety of users; and

WHEREAS, the City of \_\_\_\_\_ desires to make appropriate connections that will link origins and destinations using the existing on-street system and other modes of transportation; and

WHEREAS, the City of \_\_\_\_\_ desires to develop a shared-use, non-motorized path/trail system comprised of paths/trails and amenities that considers the needs of users and potential users; and

WHEREAS, the Community Services Commission, Finance Commission, Transportation Commission and Planning Commission have reviewed this ordinance and upon consideration of the recommendation of the City of \_\_\_\_\_ staff, have recommended adoption of this ordinance to the City Council;

NOW, THEREFORE, the City Council of the City of \_\_\_\_\_ DOES HEREBY FIND as follows:

1. That the proposed ordinance will implement the General Plan Goals and Objectives, and result in an improved regional shared-use, non-motorized transportation path/trail system.
2. That the proposed shared-use, non-motorized transportation path/trail system within the City, and recommended guidelines is attached as Exhibit A, and incorporated by this reference.

Figure 1-21: Model Ordinance for Adoption of the ROSS Plan.



- 3. That the proposed ordinance will implement an improved regional shared-use, non-motorized transportation path/trail system so as continuous connections between major destinations and with adjoining jurisdictions are made within the network.
- 4. That the proposed ordinance will comply with path/trail design guidelines as identified in the Maricopa Association of Governments Regional Off-Street System Plan to ensure a consistent and cohesive regional shared-use, non-motorized transportation path/trail system throughout the Maricopa Association of Governments region.
- 5. That pursuant to Section \_\_\_ of the City of \_\_\_\_\_ Arizona Environmental Quality Act procedures and Article \_\_\_ of the State Environmental Guidelines, it has been determined that the proposed project will not have a significant effect on the Environment. Thus a negative declaration has been prepared, processed and considered according to the Arizona Environmental Quality Act.

NOW, THEREFORE, the City Council of the City of \_\_\_\_\_ DOES HEREBY ADOPT the Shared-use, Non-motorized Transportation Path/Trail System Ordinance.

PASSED AND ADOPTED by the City Council of the City of \_\_\_\_\_ at the meeting held on the \_\_\_th day of \_\_\_\_\_, 20\_\_\_\_.

MAYOR OF THE CITY OF \_\_\_\_\_

ATTEST:

CITY CLERK OF THE CITY OF \_\_\_\_\_

STATE OF ARIZONA            )  
COUNTY OF                 )     SS  
CITY OF                         )

I, \_\_\_\_\_, City Clerk of the City of \_\_\_\_\_, HEREBY DO CERTIFY that the foregoing Ordinance was duly adopted at the meeting of the City Council of the City of \_\_\_\_\_ on the \_\_\_th day of \_\_\_\_, 20\_\_, by the following roll call vote:

AYES:  
NOES:  
ABSENT:

CITY CLERK OF THE CITY OF \_\_\_\_\_

Figure 1-21: Model Ordinance for Adoption of the ROSS Plan, continued.



Right-of-Way	Contact Information	Major Issues	Solutions
<b>CANALS</b>			
Salt River Project (SRP)	Senior Engineer System Design and Construction	Lacks uniform path/trail development standards	Negotiate on a case-by-case basis
Central Arizona Project (CAP)	Deputy Manager (623) 869-2333	Lack uniform path/trail development standards, liability concern hinders path/trail development	Negotiate on a case-by-case basis, await results of on-going study by Maricopa County Dept. of Transportation
Buckeye Irrigation Company	(623) 386-2046	Liability concern hinders path/trail development	Negotiate on a case-by-case basis
Roosevelt Irrigation District	(623) 386-2046	Liability concern hinders path/trail development	Negotiate on a case-by-case basis
<b>FLOOD CONTROL DISTRICT OF MARICOPA COUNTY (FCDMC)</b>			
	Planning and Project Management Division of the FCDMC, Army Corps of Engineers contact may also be needed	Lack of uniform path/trail development standards, charter prevents construction and maintenance of paths/trails, permitting issues with Corps of Engineers	Aesthetic guidelines exist and are being updated through a master drainage planning process

Figure 1-22: Potential Corridors, Contact Information, Issues and Solutions.



Right-of-Way	Contact Information	Major Issues	Solutions
<b>POWER LINE EASEMENTS</b>			
	SRP or Arizona Public Service	Some rights-of-way are discontinuous due to existing development	Reserve corridors by policy in a general plan
<b>GAS LINE EASEMENTS</b>			
	Southwest Gas, El Paso Gas and/or Black Mountain Gas	Path/Trail may not be possible due to small easement	Construct pedestrian path/trail rather than shared-use
<b>RAILWAY CORRIDORS</b>			
	Burlington Northern Sante Fe, Rails to Trails Conservancy (505) 767-6845	Liability concern prevents path/trails anywhere near working lines	Negotiate on a case-by-case basis where the railway may have excess right-of-way or an abandoned line

Figure 1-22: Potential Corridors, Contact Information, Issues and Solutions, continued.



MAG ROLE*	RECOMMENDATION
<p><b>*MAG ROLE:</b>  <b>Action:</b> A “MAG Action” is a specific course of action designed to achieve an objective implemented by MAG staff or the Regional Bicycle Task Force. This is the “who” of the Goals and Objectives.  <b>Support:</b> A “MAG Support” is a specific course of action designed to achieve an objective that is implemented by MAG member agencies and which can be supported by MAG staff and/or the Regional Bicycle Task Force.</p>	
<p><b>ACCESS GOAL: Provide sufficient, convenient access to the non-motorized transportation system which is highly visible to existing and potential users.</b></p>	
Support	Encourage MAG members to plan for path/trail access by adopting the MAG ROSS Plan, and by expanding on the ROSS Plan by adding local paths/trails.
Support	Encourage land use patterns which place origin and destination points within reasonable walking and bicycling distance of one another by ensuring an appropriate diversity and mix of land uses in general plans.
Action	Develop a computerized presentation summarizing the key features of the MAG ROSS Plan to present to community groups and organizations interested in bicycle, pedestrian and open space issues.
Action	Develop information on the benefits of paths/trails specifically targeted for landowners and developers, and place this information on the MAG Web site.
Support	Encourage MAG members to plan for path/trail access by coordinating with developers and adjacent land owners during subdivision review processes.



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<p><b>SAFETY GOAL: Develop an off-street system of paths/trails that is safe for a variety of users.</b></p>	
Support	Encourage the implementation of the design guidelines included in the ROSS Plan to ensure the design of shared-use corridors which consider both the original purpose of the corridor and the safe mobility of non-motorized travelers.
Support	Support the expansion of path/trail etiquette resources to provide accurate, consistent and appropriate information to the diverse range of path/trail users.
Action	As appropriate, coordinate path/trail education materials and programs between MAG member agencies to provide consistent messages to non-motorized travelers.
Action	Identify path/trail needs for users not typically addressed in transportation plans, such as roller bladers and equestrians.
Action	Identify the potential feasibility of non-polluting motorized transportation, such as neighborhood electric vehicle (NEV) transportation, along off-street corridors.
Action	Develop Public Service Announcements on path/trail etiquette and the benefits of walking and bicycling.



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<p><b>CONNECTIVITY GOAL: Connect origins and destinations with paths/trails, and link paths/trails to the existing on-street transportation system and other transportation modes.</b></p>	
Action	Develop an annual budget for the publication and distribution of the ROSS Plan.
Support	Encourage jurisdictions to maintain connectivity between bicycle and pedestrian facilities, and other transportation modes and facilities such as transit and park-and-ride lots.
Support	Consider the needs of non-motorized travelers when evaluating subdivision plans.
Action	Create a comprehensive inventory of existing paths/trails to identify gaps in the non-motorized transportation system.
<p><b>USER-FRIENDLY GOAL: Develop a system of paths/trails that considers the needs of users and potential users (“user-friendly”).</b></p>	
Support	Encourage shared use and cooperation among path/trail users by implementing the design guidelines in the ROSS Plan.
Action	Ensure that all federally-funded non-motorized transportation facilities have amenities appropriate for the targeted user.
Action	Create a comprehensive map of transportation related paths/trails with additional information targeted specifically to user groups. This map may be done in conjunction with the Regional Bikeways Map, or may be a completely separate map.



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<p><b>IMPLEMENTATION GOAL: Achieve a truly regional system of off-street paths/trails by assisting MAG member agencies to develop portions of the off-street system that fall under their jurisdiction.</b></p>	
Action	Widely distribute relevant portions of the ROSS Plan, and specifically target Planning and Zoning departments and Commissions of member agencies.
Support	Encourage MAG members to use the model ordinances outlined in the ROSS Plan to implement a regional interconnected non-motorized transportation system.
Support	Support the interpretation and revision of state legislation and policies to allow use of state transportation funds for pedestrian and bicycle facilities.
Support	Provide coordination between member jurisdictions on open space and multi-modal transportation planning, through formats similar to the Regional Trails Forum meetings, as a way to meet regional path/trail needs, such as continuity along jurisdictional boundaries and path/trail linkage to regional destinations.
Action	Continue funding for a MAG planner to provide support to path/trail users as a vital component of a region-wide multi-modal transportation system.
Support	Promote the formation of regional partnerships between MAG members and private sector agencies to implement the ROSS Plan.
Action	Create an Advisory Membership category to the MAG Regional Bicycle Task Force to broaden representation to business groups, homebuilders, special interest groups and those with authority over the corridors identified in the ROSS Plan.



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Action	Continue MAG staff and Regional Bicycle Task Force participation in the Long Range Transportation Plan update process and in the development of the Transportation Improvement Program.

**FUNDING**

Funding for construction of paths/trails is a critical element of implementing a regional system of non-motorized off-street transportation. Several sources of funding are identified in Section IX of the ROSS Plan. There are many sources of public sector (government) funding available for paths/trails, pedestrian and bicycle transportation facilities, such as the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21) and Heritage Funds.

Another source of funding is the private sector. Sometimes commercial enterprises are interested in contributing to a path/trail project. These contributions might help increase business access and foot traffic, improve the visual appearance of the business or improve corporate image through a positive community contribution. Neighborhood associations may be interested in funding segments which improve neighborhood access, or they may be interested in creating safety patrols or providing maintenance through “adopt a trail” programs. In addition, developers may be able to construct portions of paths/trails if communities have established the intent to develop an off-street system.

If citizens support path/trails and public funding is lacking, additional new funding opportunities could be sought through community facility districts, general obligation bonds, revenue bonds and/or a transaction privilege/sales tax.

