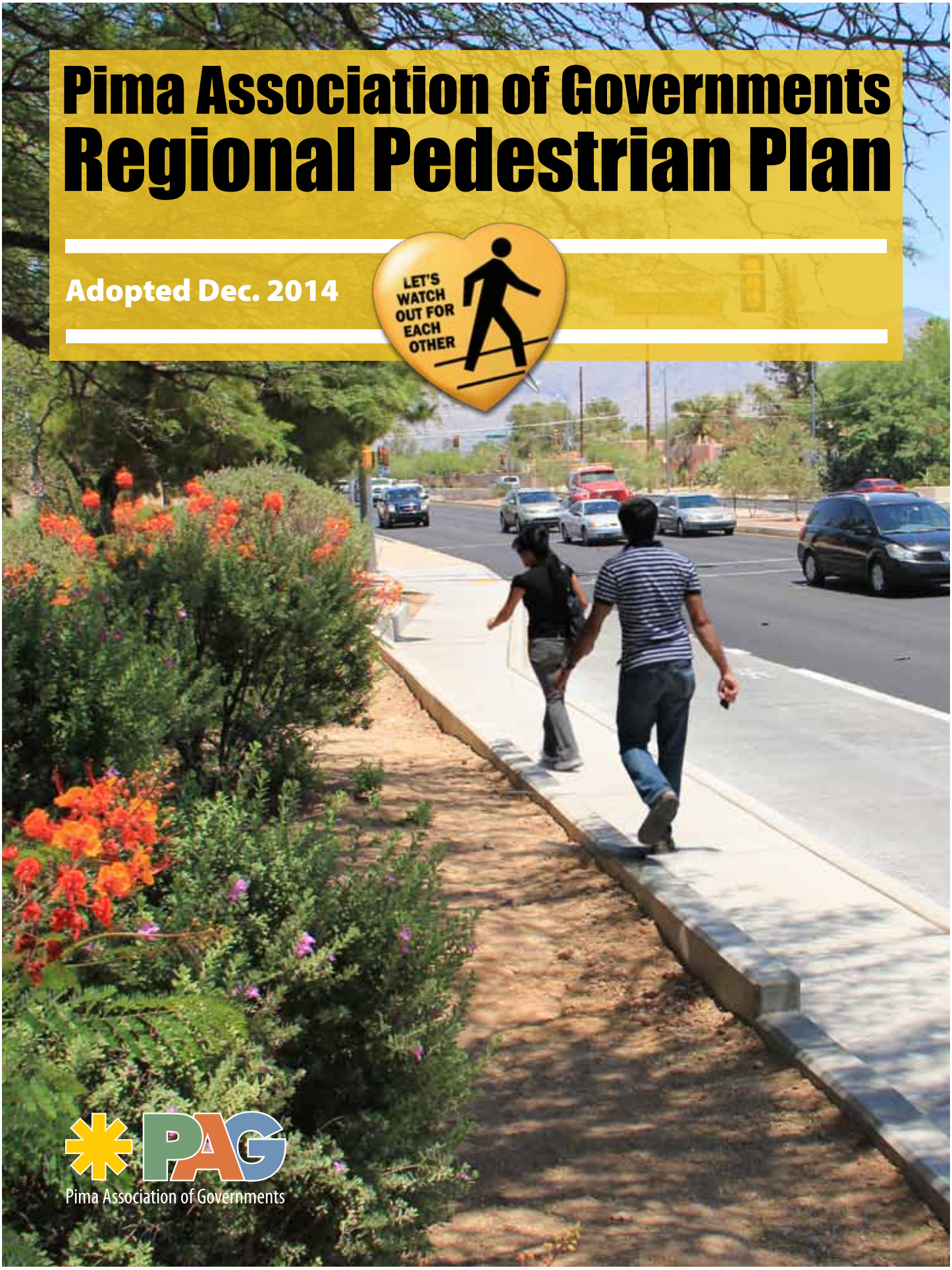
Pima Association of Governments
Regional Pedestrian Plan

Adopted Dec. 2014



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SECTION 1: Introduction

Walking is the most fundamental means of travel. Whether walking for recreation or exercise, going to the bus stop, parking lot or a favorite restaurant, everyone is a pedestrian, even if sometimes people do not identify themselves as such.

Perhaps because of this lack of a self-identified constituency, the shorter distances traveled by foot, and the fact that walking trips are frequently linked with other modes of transportation, pedestrian considerations have not traditionally received the attention relative to their importance as part of the transportation system.

However, attention to pedestrian travel has begun to change in significant ways over the last several years.

During that time, many factors have converged to make walkability, and the closely related and necessary issue of pedestrian improvements, an important consideration in decisions relating to the built environment. Some of these factors are:

Changing residential preferences: A number of studies and reports have been released recently showing that a significant portion of Americans would prefer to live in more walkable communities, where many daily needs can safely be met on foot. To cite one example, 60 percent of respondents, particularly younger respondents, to the 2013 Community Preferences Survey from the National Association of Realtors stated that they prefer to live in a neighborhood where businesses and other destinations are within walking distance. Evidence from reports by CEOs for Cities, the Brookings Institution, and others suggests that walkability is also correlated with higher residential and commercial property values. Within the Tucson region these same preferences have been expressed through regional visioning efforts and local planning.

Note:
The terms "walking" and "walk" are used throughout this document to indicate pedestrian travel, including where travel is done with the assistance of a mobility device, such as a wheelchair. This is done solely for ease of understanding.

Aging Population: The population is getting older. As the share of the population that is over 65 increases, more residents have mobility limitations and other disabilities that affect their transportation choices. To ensure that all residents are able to travel safely and comfortably, even without being able to drive, it is necessary to increase the accessibility of the region's transportation system, particularly pedestrian facilities.

Public Health: Obesity and related chronic diseases have become an area of national concern. A growing number of public health experts identify the built environment as a factor in an increasingly sedentary lifestyle that contributes to a growing obesity rate. For example, The Centers for Disease Controls and Prevention has launched the Healthy Communities Program to reduce community factors which contribute to poor health outcomes. Part of this program includes

"implementing environmental changes to make healthy living easier, such as improving means for safe active transportation for pedestrians, bicyclists and mass transit users."

This is one example of the work being done by a number of public health professionals, community advocates and city planners, which has placed active transportation, including pedestrian improvements, at the center of the discussion on the future of American health.

Public Safety: Closely related to public health are the safety concerns of walking. Pedestrian traffic crashes and fatalities have remained stubbornly high, even as total roadway fatalities have plummeted to historic lows. Pedestrian fatalities now represent around 18 percent of all roadway fatalities in the Tucson region. People who are injured on the region's roadways can suffer chronic health problems for many years after the initial incident. Pedestrian crashes and fatalities in the region have brought increased attention to the many deficiencies in the pedestrian network as media outlets frequently report on pedestrian accidents and deaths.

Environment: Over the last century, growing reliance on private automobiles for transportation has had harmful effects on local air quality and vehicle emissions have been a major contributor to greenhouse gas emissions. Alternative modes of transportation and fuel efficient and alternative fuel vehicles are now promoted as a means of reducing harmful emissions. An improved walking environment is an important part of the solution.

Economy: As noted on the previous page, high walkability correlates with higher real estate prices. Residences in more pedestrian friendly areas are in demand and retail, restaurants, and other "walk up" businesses thrive when they are in areas with heavy foot traffic. Young professionals in particular, and the companies that recruit them, are looking to locate in communities that provide more active transportation options as a preferred lifestyle choice. Additionally, with the increased costs of driving, many people are looking for non-automobile transportation options to reduce the financial burden of transportation.

These factors are shifting priorities in the greater Tucson region just as they are nationally. A revitalized downtown Tucson has increased the demand for housing options in the urban core and near historic neighborhoods. The towns of Sahuarita, Oro Valley and Marana have all taken steps to develop town centers, which will provide more walkable districts throughout the region. Shared-use paths are heavily used and have proven to be very desirable community amenities. At the same time, pedestrian injuries and fatalities remain high, and many areas are inaccessible to people with disabilities.

With the evidence suggesting a growing demand for more walkable neighborhoods and active transportation options, the challenge is ensuring that the region is safe, accessible and comfortable for people to walk.

Sidewalk gaps such as this are seen throughout the region.

This challenge can be addressed by:

1) Creating regional and jurisdictional policies and standards that go beyond simply accommodating pedestrians in road projects and new development.

For years in the Tucson region, pedestrian facilities were added as an afterthought, if they were added at all. Thankfully, this has changed more recently and now almost all transportation projects completed in the region successfully incorporate high-quality pedestrian

facilities. However, more can be done with regard to requiring or encouraging better pedestrian access to and through residential and commercial developments, adding more shade where possible, developing at a pedestrian scale where appropriate, and ensuring that the entire public right-of-way is designed for the most vulnerable users, including pedestrians and cyclists.

2) Filling gaps in the pedestrian network, and retrofitting pedestrian facilities in older areas, to bring them up to current standards

Perhaps the biggest challenge the region faces with regard to pedestrians is bringing those areas that were developed under the older practices up to current standards. Years of rapid development at a time when pedestrian conditions were not necessarily a high priority has left the greater Tucson region with a legacy of incomplete and missing sidewalks, narrow pedestrian rights-of-way, and some roadways and intersections that are dangerous, or otherwise discourage walking. Where roadway improvements are planned, pedestrian facilities are generally brought up to current standards as part of the overall improvement. The challenge is retrofitting the system and filling sidewalk gaps where no other improvements are currently planned. In these instances, standalone sidewalk projects are often costly and difficult owing to inheriting earlier practices.

3) Supporting pedestrian travel by improving connectivity in suburban development

Many areas of the greater Tucson region, especially those that have developed in more recent years, have grown in a largely suburban pattern. While pedestrian facilities in suburban areas tend to be complete, accessible and attractive, long distance and the typical suburban development patterns often prevent well-connected direct walking routes. Improving pedestrian connections through cul-de-sacs and walls would provide more direct walking routes (and shorter distances) to many commercial and recreational destinations.

Low street connectivity makes it inconvenient for residents to walk to commercial services.

Using the Regional Pedestrian Plan

SECTIONS OF THE PLAN

The PAG Regional Pedestrian Plan is organized into 8 sections. A brief description of each section is below.

SECTION 1: Introduction

This section provides a general overview of the purpose of the Regional Pedestrian Plan.

SECTION 2: Public Process and Relevant Studies and Plans

This section reviews opportunities for public input into the development of the plan and shows which other plans and studies informed the development of the Regional Pedestrian Plan.

SECTION 3: Current Jurisdictional Pedestrian Policies and Standards

This section focuses on current pedestrian standards, policies, funding mechanisms and projects within each of the PAG member jurisdictions.

SECTION 4: Existing Walking Conditions in Eastern Pima County

This section provides information on demographic trends, walking behaviors, existing development patterns, pedestrian network conditions, and a detailed safety report, including identifying areas with high pedestrian crash frequencies.

SECTION 5: Walkability and Pedestrian Safety Toolkit

This section shares best practices in pedestrian safety design. It is intended to inform transportation planners, engineers, project managers, and others about the different tools that are available for improving pedestrian safety and comfort. This section does not represent standards.

SECTION 6: Pedestrian Demand Model

This section explains the methodology for identifying high-demand pedestrian areas. It includes a list of pedestrian generators, concentrations of populations with higher rates of walking, and pedestrian network conditions. This section also contains maps showing areas of higher estimated pedestrian demand.

Vision for Community Walkability:

The PAG Regional Pedestrian Plan marks the first update to the region's pedestrian plan in over 14 years. It is PAG's intent to incorporate the state of the practice in pedestrian planning and respond to the region's evolving pedestrian needs and preferences. In so doing, this Plan creates a framework for achieving the region's vision of making this a safe and walkable region for everyone. This plan envisions:

A region where people of all ages and of all abilities have the opportunity to walk in an environment that is safe, accessible, comfortable and well-connected

Goals:

1) **A safe region for walking**
   Objective 1: Reduce the rate and number of pedestrian crashes, injuries and fatalities
2) **A region where people will choose to walk**
   Objective 1: Increase availability of accessible, complete and connected sidewalks and pedestrian walkways

   Objective 2: Improve pedestrian comfort by providing more high-quality and attractive walking options
3) **A well-funded pedestrian system**
   Objective 1: Increase and maintain funding for pedestrian programs and projects

SECTION 7: Vision, Goals and Objectives

This section identifies the vision, goals and objectives for the Regional Pedestrian Plan. The section also establishes performance measures and targets for monitoring progress in the region and includes a list of potential projects based on the pedestrian demand model.

SECTION 8: Funding the Plan

This section identifies current funding sources for implementing elements of the plan and explores other potential sources of revenue for improving the pedestrian environment.

A GUIDE FOR ALL

The intent of this plan is not to lay out a specific program of projects, but instead to provide guidance for the greater Tucson region's jurisdictions and community members on potential pedestrian investments. Guidance is driven by:

- Building on PAG and the City of Tucson's jointly developed ADA Sidewalk Inventory Study Report to identify pedestrian deficiencies on major roadways
- Identifying current walking rates and demographic trends in the greater Tucson region
- Using available pedestrian crash data to identify common crash characteristics, vulnerable populations, and locations with a high frequency of pedestrian crashes
- Sharing nationally supported best practices and approaches to improving pedestrian safety and comfort along roadways and at intersections
- Using known pedestrian trip generators and attractors, safety issues, and pedestrian deficiencies to identify needed improvements
- Creating a list of objectives, performance measures, and targets for tracking progress on pedestrian improvements

HOW JURISDICTIONS CAN USE THIS PLAN

On the most basic level, jurisdictions can use this plan's pedestrian needs identification to assist in prioritizing pedestrian investments to be included in their annual capital improvement programs (CIP) and for pursuing regional, state and federal funding for projects and programs. Going further, jurisdictions could use this plan to target areas with pedestrian safety issues, or high potential pedestrian demand, to develop specific programs to meet the needs of that community. In areas with a high-number of pedestrian crashes, jurisdictions may wish to convene a task force of community members, engineers, planners, public safety personnel, school officials and neighborhood leaders to look at local crash characteristics and create a mix of engineering, engagement, educational and enforcement strategies using some of the best practices listed in this plan's Walkability and Pedestrian Safety Toolkit section to address the issue. For example, if an area has a high number of pedestrian crashes at intersections involving right turning vehicles, it may be appropriate to institute leading pedestrian intervals, improve signage and raise awareness of drivers approaching the area. Or if there are a high number of night time crashes involving pedestrians crossing at mid-block locations or non-intersection crosswalks, it might be appropriate to improve lighting, add more signalized crossing opportunities, educate residents and drivers on safe practices, and organize police enforcement efforts for people violating traffic laws.

HOW COMMUNITY MEMBERS CAN USE THIS PLAN

Community members and organizations can use the information presented in the Regional Pedestrian Plan to engage their jurisdictional leadership to ensure that the needs of pedestrians are met throughout the region. The maps and existing conditions report can help to identify problem or opportunity areas, the Toolkit can identify potential tools for addressing identified issues, and the plan can provide an overall shared community framework for working with elected officials and jurisdictional staff on developing pedestrian programs.

Case Study:
Miami-Dade Pedestrian Safety Demonstration Project

Between 2002 and 2004, researchers in Miami-Dade, Fla. carried out a study in which they identified and targeted high pedestrian crash density locations for implementation of a comprehensive package of safety countermeasures. Using a mix of education, enforcement and engineering approaches focused primarily in high-crash locations, the researchers saw an 8.3% to 13% reduction in county wide pedestrian crashes when compared to control groups. Researchers identified prominent crash characteristics in each location and developed appropriate programs for each area. Examples include:

- Brochures, pamphlets and safety programs in Hatian Creole to reduce high crash rates among Hatian school-aged children
- Booklets and classes in Spanish targeting senior-involved crashes in Little Havana
- Engineering improvements, such as medians on wide roads and filling gaps in sidewalks, in high crash-density areas
- Targeted driver-yielding enforcement in high crash-density locations

For more information on this program, see "Evaluation of Miami–Dade Pedestrian Safety Demonstration Project" by Charles V. Zegeer et al.

SECTION 2: Public Process and Supporting Studies and Plans

Public Process

An important component of the regional pedestrian planning process was ensuring that residents of the region had adequate opportunity to participate in the development of the plan. This was accomplished in two phases. Phase 1 was a public survey and small-group discussions about pedestrian needs, Phase 2 consisted of posting draft a draft plan for comment.

Phase 1: Public Surveys

From April until May 2013, PAG offered an online survey to better understand regional pedestrian habits, perceptions and needs. The survey was posted online and sent to a variety of community groups and organizations. Over 650 people responded to the survey. PAG staff also conducted in-person interviews and small focus group discussions with selected groups and attended open houses where people could discuss their concerns about the pedestrian system. The keys themes that emerged from the surveys and discussions were a desire for a more complete and well-maintained network of sidewalks, better shading of the pedestrian environment, and improved awareness and safe practices on the part of drivers. More detailed survey results can be found in Section 4 of this document with full results included in the Appendix 1.

Phase 2: Public Comment

In the second phase of the public participation effort, the draft vision, goals and project list were posted online for public comment.

Pedestrian Plan Technical Advisory Committee

Everything included in this plan was developed with the active assistance of the Pedestrian Plan Technical Advisory Committee. The Committee consisted of representatives from PAG member jurisdictions, community advocacy groups, public health, persons with disabilities, community design and pedestrian safety. The Committee met several times during plan development to provide guidance and key insights into improving pedestrian conditions.

Literature Review

Review of Relevant Plans and Studies

The *2014 Regional Pedestrian Plan* seeks to complement and build on the other efforts and plans in the greater Tucson region with regard to improving pedestrian safety, accessibility and comfort. Many past and existing plans address issues relating to pedestrians, and the region's jurisdictions have a number of programs in place to educate residents about pedestrian safety and to encourage active transportation.

- **Pima Association of Governments – *Regional Pedestrian Plan (2000)***

  The *2000 Regional Pedestrian Plan* was the first pedestrian plan completed by PAG. It represented a commitment on the part of the region's jurisdictions to take seriously and plan for pedestrian improvements on a level with other modes of transportation. The 2000 plan included the following list of goals for the region.

  Goal 1: Educate officials and the public to be aware of pedestrian issues, and encourage walking.

  Goal 2: Promote the development and design of pedestrian facilities that are direct, safe, comfortable, interesting and provide continuity.

  Goal 3: Improve pedestrian visibility and safety.

  Goal 4: Promote the enhancement, improvement and maintenance of the regional pedestrian system.

  Goal 5: Identify and secure funding sources to implement pedestrian programs and projects.

  In the years since the 2000 plan's completion, progress has been made on each of the goals as pedestrian issues have continued to grow in importance. The current *2014 Regional Pedestrian Plan* seeks to update goals and priorities for the region's transportation system using more recent data and reflecting the region's evolving needs. However, the current plan will stay true to the overall concept and intent of the previous effort.

- **City of Tucson/Pima Association of Governments – *ADA Sidewalk Inventory Study Report (2012)***

  The *2012 ADA Sidewalk Inventory Report* was an update to the *2005 Sidewalk Inventory* and was written and produced through a cooperative effort between the City of Tucson and Pima Association of Governments. The report provides a sidewalk inventory for over 2,435 directional miles of roadsides on arterial and collector streets in Pima County. The report also identifies gaps, barriers and other deficiencies in the sidewalk network which may limit access for persons with disabilities.

  The *ADA Sidewalk Inventory Study Report* is the primary data source regarding the existing pedestrian network used in the development of this plan.

- **Pima County – Americans with Disabilities Act (ADA) Transition Plan (2012)**

  In 2010 and 2012, Pima County Department of Transportation conducted a two-phase process to update the County's *ADA Transition Plan* for pedestrian facilities in public rights-of-way and establish an on-going program to address ADA needs on Pima County roadways. The transition plan includes a prioritizations plan for how county facilities will be brought into compliance with the *Americans with Disabilities Act*:

  Priority 1: Citizen Requests – The first priority will be to improve public rights-of-way on an individual basis in response to citizen requests from persons with disabilities

  Priority 2: Planned Sidewalk/Shared Use Path Projects – Projects that are currently included in the 2012-2016 PAG Transportation Improvement Program or in other programs. These projects are included in an appendix to the Plan.

  Priority 3: Non-programmed/Planned Improvements – These are longer-term projects not currently in any programs but have been identified as needs through the *ADA Sidewalk Inventory Study Report* and elsewhere.

- **Imagine Greater Tucson – *Looking Forward: A Vision for a Greater Tucson Region (2012)***

  From 2010 to 2012, over 10,000 residents of the greater Tucson region undertook an effort to outline a vision for the future of the region. During that process, creating more transportation choices, particularly more walkable neighborhoods, emerged as a major theme. In the final vision, four of the nine principles for creating a better region related directly to improving pedestrian conditions. These are: Accessibility (including creating a walkable community), Environmental Integrity, Healthy Communities and Quality Neighborhoods.

- **Jurisdictional General Plans**

  The State of Arizona requires that cities, towns and counties review and update their general and comprehensive plans every 10 years. Those plans establish the long-term goals for each jurisdiction with regard to land use, growth, circulation, recreation, water conservation and other items. All of those plans address pedestrian issues in their circulation element. For example, in the two latest plans to be updated, the *Town of Marana 2010 General Plan* and *Plan Tucson (2013)* from the City of Tucson, both have policies that mention pedestrian improvements specifically. The Town of Marana's plan has a policy to "implement a total system with multi-modal improvements to reduce vehicle use and miles traveled," with several actions relating to pedestrians. The City of Tucson wishes to "create pedestrian and bicycle networks that are continuous and provide safe and convenient alternatives within neighborhoods and for getting to school, work, parks, shopping, services and other destinations on a regular basis," as well as laying out a number of other development policies that support an improved pedestrian environment.

- **Arizona Department of Transportation – Pedestrian Safety Action Plan (2009)**

  ADOT's *2009 Pedestrian Safety Action Plan* was the result of a coordinated initiative between ADOT, FHWA's Arizona Division Office, and the Arizona Governor's Office of Highway Safety. The plan recommends achievable strategies to improve pedestrian safety on the State Highway System. The plan includes:

  - Identification and prioritization of high-crash segment locations
  - Development of conceptual countermeasures and their estimated costs
  - Recommendations for new or revisions to existing policies for consideration by ADOT

  The Plan included a list of identified pedestrian safety emphasis areas for Arizona. Identified

emphasis areas are:

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

- **Arizona Department of Transportation – *ADOT Statewide Bicycle and Pedestrian Plan Update Final Report (2013)***

  The *2013 ADOT Statewide Bicycle and Pedestrian Plan Update Final Report* represents an update of the 2003 statewide bicycle and pedestrian statewide plan. The purpose of the 2013 plan is to "update the 2003 plan and address the most critical bicycle and pedestrian transportation planning needs on the State Highway System (SHS), responding to the significant growth in Arizona that has occurred over the last decade." The three goals of the state plan are:

  Goal 1: Increase Bicycle and Pedestrian Trips

  Goal 2: Improve Bicyclist and Pedestrian Safety

  Goal 3: Improve Pedestrian and Bicycle Infrastructure

  The plan also proposes indicators for tracking progress in meeting those goals.

- **Regional Transportation Authority – *RTA Plan Ballot Number 37 - Elderly & Pedestrian Safety Improvements and Number 41 - Greenways, Pathways, Bikeways & Sidewalks***

  In 2006, voters of Pima County approved the $2.1 billion, 20-year Regional Transportation Authority (RTA) plan. Two parts of the RTA plan (Nos. 37 and 41 from the 2006 ballot) are committed to fund infrastructure improvements to support non-motorized forms of transportation, such as biking and walking. This program commits $80 million over the life of the RTA to construct curb ramps, build sidewalks, fill gaps, remove barriers, add bikeways and shared-use paths, and erect pedestrian crossing signals. This is a much needed infusion of funds for a region where many existing roadways do not have complete or accessible pedestrian facilities.

  Together, these programs are expected to fund the construction of roughly 250 miles of sidewalks and 550 miles of bikeways.

- **Town of Oro Valley – *Town of Oro Valley Pedestrian and Bicycle Plan (1999)***

  The Town of Oro Valley Pedestrian and Bicycle Plan grew out of the Town's 1996 General Plan. The Pedestrian and Bike Plan "presents a vision for a safer, more enjoyable pedestrian and bicycle environment within the Town of Oro Valley, and describe the process to achieve it."

  The Plan was updated in 2010 with an outline of completed projects and programs. The Plan also includes the following goals for 2010-2012:

  Goal 1: Establish policies which promote walking and bicycling as healthy forms of transportation and recreation.

  Goal 2: Develop and maintain continuous and interconnected pedestrian and bikeway systems.

  Goal 3: Use pedestrian and bicycle friendly standards, procedures and ordinances for pedestrian/bicycle facilities and roadways, following Crime Prevention through Environmental Design (CPTED) principles where applicable.

  Goal 4: Develop and implement Town-supported programs to encourage pedestrian and bicycle usage and safety.

  Goal 5: Develop and maintain databases useful for pedestrian and bicycle planning and accident prevention. Goal 6: Encourage land uses which foster pedestrian and bicycle travel.

- **Living Streets Alliance – *2012-2013 Pedestrian Safety and Comfort Campaign***

  Living Streets Alliance (LSA) is Tucson nonprofit organization whose mission is to "promote healthy communities by empowering people to transform our streets into vibrant places for walking, bicycling, socializing and play." In 2012, Living Streets Alliance launched a two-year pedestrian safety

and comfort campaign to make the Tucson region a walk-friendly community. LSA has spearheaded a number of campaigns and efforts and worked with local governments, regional agencies and other organizations to "inspire urban improvements for walking, cycling, public transit, and healthy community and neighborhood life…" Some of the programs in which LSA has been instrumental in starting or promoting include:

- Cyclovia Tucson
- Tucson on 2
- Neighborhood Walking Assessments
- The City of Tucson's Pedestrian Advisory Committee

Federal Focus on Active Transportation

In addition to local efforts to promote safe and comfortable pedestrian travel, the federal government recognizes the importance of pedestrian facilities as an essential component of the national transportation system. The federal surface transportation bill, know as Moving Ahead for Progress in the 21st Century (MAP-21), was enacted into law in October 2012. The two-year bill contains a number of provisions for bicycle and pedestrian travel, including dedicating funding to active modes through the Transportation Alternatives (TA) Program. The TA Program, while affirming the federal government's commitment to bike and pedestrian travel, is actually a consolidation of the former Transportation Enhancements, Safe Routes to School, and Recreational Trails programs from the previous transportation bill, SAFTEA-LU, and represents a reduction in funding for active modes.

The United States Code requires that:

> *(1) In general. Bicyclists and pedestrians shall be given due consideration in the comprehensive transportation plans developed by each metropolitan planning organization and State in accordance with sections 134 and 135, respectively.*
>
> *Bicycle transportation facilities and pedestrian walkways shall be considered, where appropriate, in conjunction with all new construction and reconstruction of transportation facilities, except where bicycle and pedestrian use are not permitted.*
>
> *(2)Safety considerations. Transportation plans and projects shall provide due consideration for safety and contiguous routes for bicyclists and pedestrians. Safety considerations shall include the installation, where appropriate, and maintenance of audible traffic signals and audible signs at street crossings. (23 U.S.C § 217(g)(1)(2))*

U.S. Department of Transportation Policy Actions

The U.S. Department of Transportation (USDOT) also has taken administrative action with regard to bicycles and pedestrians through a policy statement it signed in March 2010. The "United States Department of Transportation Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations" reflects USDOT's support for the development of fully integrated active transportation networks. The policy statement is as follows:

"The DOT policy is to incorporate safe and convenient walking and bicycling facilities into transportation projects. Every transportation agency, including DOT, has the responsibility to improve conditions and opportunities for walking and bicycling and to integrate walking and bicycling into their transportation systems. Because of the numerous individual and community benefits that walking and bicycling provide — including health, safety, environmental, transportation, and quality of life — transportation agencies are encouraged to go beyond minimum standards to provide safe and convenient facilities for these modes."

Finally, in August 2013 the Federal Highway Administration (FHWA) released a memorandum titled, "Bicycle and Pedestrian Facility Design Flexibility," to express support for taking a flexible approach to bicycle and pedestrian facility design. In the memo, FHWA encourages the appropriate use of the Institute of Transportation Engineers (ITE) and Congress for New Urbanism's (CNU) cooperatively developed *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach* as a means of fulfilling the aims of the above mentioned policy statement. The ITE guide, the memo explains, is useful in gaining an understanding of the flexibility inherent in The American Association of State Highway and Transportation Officials' (AASHTO) *A Policy on Geometric Design of Highways and Streets* (the "Green Book"). *Designing Walkable Urban Thoroughfares* is intended to give guidance on roadway design in urban areas to be compatible with walkable communities.

SECTION 3: Current Jurisdictional Pedestrian Policies and Standards

Located in the Sonoran Desert and ringed by mountains on all sides, the greater Tucson region boasts a hot, dry climate, dramatic views and easy access to natural preserves and recreational areas. The physical beauty of the place, its moderate winter weather, and its casual informality have made the region a high-growth area for over a half century, as people from around the world have been drawn to the region for relief from colder climates and for cultural and economic opportunities.

Like many western metropolitan areas, the greater Tucson region experienced its most rapid growth after the dawning of the age of the automobile and has an urban form that suits the technology. While it may lack the numerous freeways and interchanges typical of larger metros like Los Angeles and Phoenix, the region still reflects the legacy of the car by having grown outward in a largely horizontal fashion in patterns determined by the arterial road network, constrained only by the mountain ranges on three sides. The valley floor itself is flat and relatively free of physical barriers, supporting long straight roads and providing abundant land for the lower-density development pattern common in the region.

The greater Tucson region is made up of five incorporated towns and cities, unincorporated Pima County, the Tohono O'odham Nation, and the Pascua Yaqui Tribe. The Cities of Tucson and South Tucson comprise the oldest and most densely populated part of the region, while the Towns of Oro Valley, Marana and Sahuarita have developed and grown more recently, taking on a largely suburban character. Unincorporated Pima County has areas that are older and more urban in nature, areas that have more suburban characteristics, as well as large expanses that are sparsely populated and rural. The Nation and Tribe are primarily rural.

More historic parts of the region, which include the areas in and around downtown and mid-town Tucson, and the City of South Tucson, were developed using a more traditional grid pattern. Commercial areas and other destinations are largely located in strip developments or shopping centers along major roadways and at intersections. Residential neighborhoods are tucked behind on smaller local streets, placing some commercial services and transit within walking distance for many residents.

More recently developing areas have tended to follow a pattern typical of suburban communities with housing located in subdivisions on curvilinear streets, many terminating in cul-de-sacs, and commercial development clustered in large shopping centers and office complexes. In both older parts of the region, and in newer suburban areas, different land uses are largely separated into commercial or residential zones (or other uses).

Regionally, there are relatively few mixed-use neighborhoods, though this has been changing rapidly in recent years.

The weather and flat terrain make the greater Tucson region ideal for (almost) year-round walking, but the legacy of older roadway building practices and more

auto-oriented development patterns have left the region with numerous challenges in regard to providing a safe and comfortable walking environment. Pedestrian-involved crashes present an ongoing public safety challenge, one that is expected to be exacerbated by a changing population, and in too many parts of the region, there is a lack of safe and connected sidewalks or walkways, making them inaccessible or difficult to walk on for many residents. These challenges will have to be addressed if the region is to provide real transportation options, improve public spaces, and make the roadways usable for all residents.

The following section provides an overview of current jurisdiction standards and policies as they relate to pedestrians. The jurisdictions of Pima County have made considerable progress in recent years in making the region safe and accessible for walking.

Busy four-lane arterial street in midtown Tucson. Multiple driveway cuts, sidewalk gaps and lack of shade make this a difficult walking environment. Pedestrian improvements are planned for this area.

High-quality sidewalk facilities in more recently developed areas are attractive and encourage walking for health and recreation, but distances make walking for transportation purposes inconvenient.

Selected Jurisdictional Standards and Policies

Arizona Department of Arizona, Town of Marana, Pima County, and City of Tucson provided this plan with an overview of their current pedestrian standards, policies, and other activities related to the pedestrian network.

Travel Lane Standards

Jurisdictions in the PAG region typically build roadways with a 12 foot standard travel lane. However, most also allow the flexibility to reduce travel lanes to 11 or even 10 feet in certain cases.

Sidewalk Standards

Jurisdictions require 4-6 foot wide sidewalks on most urban facilities depending on the street type. Some also allow for wider sidewalks in areas with high or anticipated pedestrian volumes. Curbways of 2 feet or more (Marana requires 6 feet for example) are required for new construction and jurisdictions try to accommodate as much curbway as is possible in retrofit situations with narrow rights-of -way. Rural routes should have 5-6 foot paved shoulders.

Sidewalks are typically included as part of roadway improvements, and jurisdictions require developers to install sidewalks along any part of their property that fronts the public right-of-way (as well internal pedestrian circulation accommodations) when building new structures.

More specific details on jurisdictional policies and standards can be found in the following tables.

Jurisdiction Name: Arizona Department of Transportation

How are sidewalks and ramps constructed?

"It is ADOT's policy to provide a transportation infrastructure that provides safe and convenient pedestrian access. The *AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2004* provides guidelines for the design of pedestrian facilities. Sidewalks are normally not constructed as part of a highway project. In urban areas, the highway cross section should provide space for sidewalks to be constructed by others in the future. Exceptions: a) ADOT will construct and pay for sidewalk to replace existing sidewalks along a State highway or a local street which were removed as a part of an ADOT project; b) ADOT may construct additional sidewalks, over and above paragraph a), along local streets or along an urban arterial highway at the request of the local government, provided there is an agreement with the local government to pay ADOT's additional costs for design, construction and right-of-way. Agreements with local governments for the maintenance of the sidewalks must be executed before advertising the project for bids. Maintenance agreements will normally be the responsibility of the District Engineer; early notification to and coordination with the district is essential; c) ADOT will construct and pay for sidewalks on local street grade separation structures where there is a clear indication of future pedestrian traffic along the street after construction of the highway. The *Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines, July 23, 2004,* published by the U.S. Access Board and as adopted by the U.S. Department of Justice and the U.S. Department of Transportation is the current ADA standard for design of new facilities. The U.S. Access Board also has developed the *Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way, July 26, 2011*, which may be used for additional design guidance."

Source: *ADOT Roadway Design Guidelines (RDG)* (http://www.azdot.gov/docs/business/roadway-design-guidelines.pdf, Pp 100 -13 & 14). Also, refer to Roadway Engineering, Construction Standard Drawings: https://www.azdot.gov/business/engineering-and-construction/roadway-engineering/roadway-design-standards-and-guidelines/construction-standard-drawings

How is sidewalk construction and maintenance funded? (See above.)

Typically, sidewalk construction had been funded with TEA when a local agency requested the ADOT Tucson District to be the sponsor

How are other pedestrian improvements funded?

HSIP, e.g. in Tucson District pedestrian countdown signal heads in FFY 2012 (TRACS #H8434)

Sidewalk Standards

Arterial

Generally, follow *Guide for the Planning, Design, and Operation of Pedestrian Facilities, AASHTO, 2004*. For example, "Normally, sidewalks are 5 feet wide unless local standards require a greater width. Preferably, sidewalks are set back from the roadway curb and gutter to the extent practical and at least 5 feet from back of curb to sidewalk. If right-of-way constraints do not permit a setback, the sidewalk will be adjacent to the curb and gutter except at driveways where the sidewalk is constructed at the back of the driveway slope with appropriate transitions to the normal sidewalk. The project plans should detail where aggregate base is to be placed under sidewalk and driveways when warranted by local soil conditions. Sidewalk ramps are to be provided where required to accommodate pedestrian changes in elevation, primarily at curb crossings or curb and gutter. Sidewalk ramps shall conform to the requirements of the Americans With Disabilities Act (ADA) of 1990 and current updates. Current ADA requirements provide for the inclusion of tactile detectable warnings on sidewalk ramps to alert the visually impaired as to the ramp terminus location" (RDG, p. 300-55).

And "there should be at least 5 feet between the sidewalk and the back of the roadway curb. It is rarely appropriate to acquire additional right-of-way solely for setting the sidewalk away from the roadway. When the right-of-way is limited and the desirable setback distance to the sidewalk cannot be achieved, the sidewalk should be placed adjacent to the roadway curb. The location of the sidewalk should be coordinated with the local government and with the Roadside Development Section when the highway project involves landscaping." (RDG, p. 300-46).

Travel Lane Standards

Arterial

The width of all traffic lanes including through lanes, auxiliary lanes between interchanges, HOV lanes, ramp and frontage road lanes, left-turn and right-turn lanes shall be 12 feet except at urban intersections where right-of-way restrictions and existing roadway conditions govern. At such intersections, through lane widths may be reduced to 11 feet and left-turn lanes may be as narrow as 10 feet if necessary. In curb and gutter sections on the right side of traffic, a 12-foot lane with a minimum 2-foot paved shoulder, exclusive of the curb and gutter, shall be provided. The pavement width shall provide for the number of traffic lanes required by the projected traffic volumes plus the appropriate minimum paved shoulder widths given in Table 302.4. Pavement widths shall be sufficient to accommodate bicycle traffic in accordance with the ADOT Bicycle Policy (Intermodal Transportation Division [ITD], MGT 02-1 Bicycle Policy: http://www.azbikeped.org/images/MGT01-2%20Bike%20Policy.pdf: "Consider, as a part of major new construction and major reconstruction in urban areas, wide curb lanes up to 15-feet in width (exclusive of gutter pan) and placement of a stripe at the vehicle lane edge where appropriate. This decision will be made on a project basis weighing such factors as location, vehicular traffic, grades, anticipated bicycle usage, and right of way availability.), RDG, p. 300-2.

Does your jurisdiction currently have any pedestrian friendly development/design standards or districts?

When left-turn lanes are placed in raised (curbed) medians, a minimum of 4 feet should remain at the nose for pedestrian refuge (RDG, p. 400-28).

Existing Pedestrian Programs

Sharing the Road with Pedestrians: A Guide for Pedestrians and Motorists booklet (http://www.azbikeped.org/images/adotpedguide308.pdf)

Summary of Pedestrian Projects

Most projects in ADOT rights-of-way would have been initiated by local agencies

Additional Information

June 2009 – *ADOT MPD Pedestrian Safety Action Plan*

http://wwwa.azdot.gov/ADOTLibrary/Multimodal_Planning_Division/Bicycle-Pedestrian/Pedestrian_Safety_Action_Plan-0906.pdf

June 2013 – *ADOT Statewide Bicycle and Pedestrian Plan Update Final Report*: http://wwwa.azdot.gov/ADOTLibrary/Multimodal_Planning_Division/Bicycle-Pedestrian/Bicycle_Pedestrian_Plan_Update-Final_Report-1306.pdf

ADOT, Motor Vehicle Division, Driver Services, Tests and Manuals: http://www.azdot.gov/mvd/driver-services/Tests_Manuals

ADOT, Civil Rights, Americans with Disabilities Act: FINAL Transition Plan for Public Rights-of-Way, December 2012: http://www.azdot.gov/docs/default-source/ada-library/ada_transition_plan-prow_final_1212.pdf

Federal Highway Administration, Manual on Uniform Traffic Control Devices, 2009 edition (With Arizona Supplement included): http://www.azdot.gov/business/engineering-and-construction/traffic/traffic-engineering-references

ITD, Traffic Engineering, Arizona Manual of Approved Signs: https://www.azdot.gov/business/engineering-and-construction/traffic/manual-of-approved-signs

ADOT Traffic Control Design Guidelines: http://www.azdot.gov/docs/business/adot-traffic-control-design-guidelines.pdf

ADOT Traffic Safety for School Area Guidelines: http://www.azdot.gov/docs/business/adot-traffic-safety-for-school-area-guidelines.pdf

Traffic Engineering Policies, Guidelines and Procedures (PGP) 700 Illumination: http://www.azdot.gov/docs/businesslibraries/700.pdf; PGP 910 Pedestrian Crosswalks: http://www.azdot.gov/docs/businesslibraries/910.pdf; and

PGP 920 School Crosswalks: http://www.azdot.gov/docs/businesslibraries/920.pdf

Traffic Engineering, Pedestrian Hybrid Beacon Evaluation Guidelines (DRAFT): http://www.azdot.gov/docs/default-source/traffic-library/draft-pedestrian-hybrid-beacon-phb-guide.pdf

Jurisdiction Name: Town of Marana

How are sidewalks and ramps constructed?

Typically constructed with roadway projects, particularly with the construction and improvement of collector and arterial streets. TOM requires construction of sidewalks with most new development with the exception of certain residential developments using street sections in which sidewalks may not be required.

How is sidewalk construction and maintenance funded?

Construction is largely funded through regional programs; however, developer-funded sidewalk construction is typical particularly within residential developments and often within commercial development.

Funding sources include: local funding through CIP; regional funds (ie. RTA); developer funded improvements.

Maintenance is funded largely through HURF funds. Private funding through HOAs for developments with private streets.

How are other pedestrian improvements funded?

Funding sources include: local funding through CIP; regional funds (ie. RTA); HURF; developer-funded improvements.

Sidewalk Standards

Arterial

Four (4) to Six (6) lane arterials require minimum 5-foot sidewalks on both sides of the street, separated from the curb by a 6-foot curbway, which may be landscaped subject to approval by the Town, and 7-foot multi-use lanes on both sides. ROW = 150 feet min.

Collector

Residential collectors requires minimum 4-foot sidewalks on both sides of the street separated from the curb by a 6-foot curbway, which may be landscaped subject to approval by the Town. If sidewalks less than 5 feet in width are used, a 5-foot turnaround must be provided every 200 feet. If driveways are present within the 200-foot length, they may serve as acceptable turnarounds if they have a grade/slope of less than 2 percent ROW = 62 feet min. Vertical curbs.

Two (2)-lane rural collector street does not require sidewalks; however, requires a 6-foot multi-use lane on both sides of the street. ROW = 90-foot min. No curb required.

Two (2)-lane urban collector requires minimum 5-foot sidewalks on both sides separated by a 6-foot curbway, which may be landscaped subject to approval by the Town, and a 7-foot multi-use lane on both sides of the street. ROW = 90-foot min. Vertical curb.

Four (4) lane collector requires 5-foot sidewalks on both sides of the street separated from the curb by a 6-foot curbway, which may be landscaped subject to approval by the Town, and a 7-foot multi-use lane on both sides of the street. ROW = 110 feet min.

Local Residential

Typical roadway local street: requires minimum 5-foot sidewalks on both sides of the street, attached to roll curb/gutter. ROW = 46-foot min.

Typical roadway local streets: requires minimum 4-foot sidewalks on both sides of the street, separated by 6-foot curbway, which may be landscaped subject to approval by the Town. If sidewalks less than 5 feet in width are used, a 5-foot turnaround must be provided every 200 feet. If driveways are present within the 200-foot length, they may serve as acceptable turnarounds if they have a grade/slope of less than 2 percent ROW = 56 feet min.

Paved local street - Mountainous Terrain Street section: used for very low density residential developments. No sidewalks required. Shoulders of 4 feet to 8 feet typically required with 4-foot wide walkable area to be kept clear of vegetation. ROW = 45 feet min.

Residential Subdivisions

In addition to the above:
Small Rural Subdivision Street: for subdivisions with 10 lots or less and minimum lot size of 36,000 S.F. No sidewalks required. Private streets. Common Area = 30 feet min.

Commercial Developments

Commercial and industrial street sections require minimum 4-foot sidewalks on both sides of the street, separated from curb by 6-foot curbway, which may be landscaped subject to approval from the Town. ROW = 60-foot min.

Sidewalk width of five (5) feet or greater may be required for special pedestrian generators.

Other Standards

Sidewalks may be approved in alternative locations providing the design is acceptable to the Town Engineer and Planning Director.

Sidewalks shall be constructed to PC/DOT Standard Specifications and Details for Public Improvements.

Additional width may be required for special pedestrian generators such as schools, recreation sites, and certain businesses.

Asphalt shared use paths may be approved in-lieu of sidewalks.

Landscaping may be allowed within a curbway. Cul-de-sac landscaping is allowed to a maximum radius of 18 feet.

Travel Lane Standards

Arterial

4-lane arterials: 7-foot multi-use/ 12 feet / 13 feet / median (24 feet). ROW = 150 feet minimum.

6-lane arterials: 7-foot multi-use/ 12 feet/12 feet /13 feet/median (24 feet). ROW = 150 feet minimum.

Collector

Residential collector: 18-foot travel lane. ROW = 62-foot min.

Two (2)-lane rural collector: 6-foot multi-use/12 feet. ROW = 90 feet min.

Two (2)-lane urban collector (median): 7-foot multi-use/13 feet/median (20 feet). ROW = 90 feet min.

Two (2)-lane urban collector (left-turn lane): 7-foot multi-use/12 feet/ LT lane (14 feet). ROW = 90 feet min.

Four (4)-lane collector: 7-foot multi-use/12 feet/13 feet/median (24 feet). ROW = 110 feet min.

Local Residential

Typical roadway local street: 16-foot travel lane with 2-foot roll curb. ROW = 46-foot min. / 56-foot min.

Paved local street - Mountainous Terrain Street section: 10-foot travel lane with 2-foot roll curb. ROW = 45 feet min.

Residential Subdivisions

In addition to the above:

Small Rural Subdivision Street: 10-foot travel lane with 1-foot wedge curb. Common Area = 30 feet min.

Commercial / Industrial

Commercial / Industrial: 17-foot travel lane with vertical curb.

Does your jurisdiction currently have any pedestrian friendly development/design standards or districts?

Additional sidewalk width may be required in regular street sections for special pedestrian generators such as schools, recreation sites and certain businesses.

The Residential Design Standards within the Marana Land Development Code require new residential development to provide pedestrian connectivity via sidewalks, paths, and trails to facilitate pedestrian circulation within neighborhoods as well as link neighborhoods to community facilities and to the regional pedestrian system.

The Commercial Design Standards within the Marana Land Development Code require the following:

1. Continuous network of pedestrian walkways to provide connectivity throughout a development as well as link to adjacent developments ('where practical and appropriate') and/or regional system.
2. Walkways shall be a minimum of 6 feet- 8 feet in width.
3. Walkways shall link to pedestrian amenities, gathering areas, and refuge areas.
4. Provide opportunities for pedestrians to seek refuge from the elements.
5. Provide opportunities for outdoor dining, creation of plazas and other outdoor gathering spaces for pedestrian activity.
6. Create clear delineations or demarcations at on-site pedestrian crossings. This may include decorative crossings, change in paving height, signage, etc.

Other Pedestrian Policies

1. Town of Marana Subdivision Street Standards Manual.
2. Town of Marana Parks, Recreation, Trails and Open

   Space Master Plan.
3. Marana General Plan.
4. Town of Marana Strategic Plan
5. Adopted specific plans, and conditions of rezoning.

   (Note: The policies defined within the above-mentioned documents may be extensive and can be elaborated upon as needed during the development of the Plan).

Summary of Pedestrian Projects

- Numerous improvements to the Santa Cruz River shared-use path system including the construction of a trailhead, rest areas, and essential improvements and connections in the regional loop network.
- Town has completed a number of roadway improvement projects that have included pedestrian facilities including sidewalks, handicapped access ramps.
- A number of residential and commercial development projects have been constructed that included sidewalks and other pedestrian amenities.

Specific Projects

1. Santa Cruz River shared-use path: numerous improvements to the regional path system (Loop) including improved crossings at Ina Road, and underpass at Cortaro Road. Future improvements are currently in the planning process.
2. Twin Peaks Road from I-10 interchange northeast to Tangerine Road, which includes a 4-5-foot sidewalk on one side and asphalt shared-use path on the other. This project provides pedestrian connectivity between two major population centers - Continental Ranch and Dove Mountain and will serve to link future residential development in these areas and along Twin Peaks Road to the regional system.
3. Gladden Farms: master-planned development that includes sidewalks and shared-use paths extensively throughout the development and provides linkage to the regional system.
4. Continental Ranch: master-planned development that includes sidewalk and shared-use paths throughout the development and provides linkage to the regional system.
5. Dove Mountain: master-planned development that includes sidewalks and shared-use paths extensively throughout the development and provides linkage to the regional system.

Jurisdiction Name: City of Tucson

How are sidewalks and ramps constructed?

As part of roadway improvement projects, new developments and retrofitting projects as funding allows.

How is sidewalk construction and maintenance funded?

Primarily through private developers, RTA, and FHWA.

How are other pedestrian improvements funded?

RTA. In the past, funds have come from Pima County Neighborhood Reinvestment Bonds.

Sidewalk Standards

Arterial
6 feet

Collector
6 feet

Local Residential
6 feet, with the ability to reduce to 4 in retrofit situations

Residential Subdivisions
6 feet, with the ability to reduce to 4 in retrofit situations

Commercial Developments
6 feet

Other Standards
The City is considering wider sidewalks in the downtown area and along midtown RTA corridors (Grant, Broadway, etc.)

Travel Lane Standards

Arterial
12 feet, with the ability to reduce to 11

Collector
12 feet, with the ability to reduce to 11

Local Residential
12 feet

Residential Subdivisions
12 feet

Other Standards

Does your jurisdiction currently have any pedestrian friendly development/design standards or districts?

The City of Tucson is currently developing streetscape design guidelines for the areas adjacent to the Modern Streetcar. We also have an Urban Overlay District for the Main Gate area and are working on one for Grant Road.

Other Pedestrian Policies

TDOT will not install crosswalks at unsignalized locations on multi-lane roads because research indicates pedestrian safety decreases.

Existing Pedestrian Programs

The City of Tucson has a Safe Routes to School Program that provides region-wide support and also more comprehensive Safe Routes to School activities for K-8 schools within the region.

Tucson partnered with All State Insurance and Living Streets Alliance to develop a pedestrian safety campaign entitled Tucson on Two.

Mayor and Council established a citizen's Pedestrian Advisory Committee in 2013 to provide guidance on pedestrian-related issues.

Summary of Pedestrian Projects

The City of Tucson has been installing 2-3 HAWK lights each year.

Specific Projects

The City of Tucson is about to kick off the development of a comprehensive ADA Transition Plan. The plan will document the right-of-way for ADA compliance and will provide a blueprint for how to bring the network up to meet ADA standards.

Jurisdiction: Pima County

How are sidewalks and ramps constructed?

Pedestrian sidewalks are provided along major roadways where warranted by pedestrian travel. Determination of pedestrian travel shall be based on a visual inspection that notes an absence of sidewalks and evidence of pedestrian traffic, as well as an assessment of pedestrian demand/ travel generators.

Appropriate pedestrian improvements are included as part of larger roadway projects, and a list of stand-alone pedestrian improvements have been identified in Pima County's ADA transition plan and near school sites. Pima County's Neighborhood Reinvestment Program has also been used to improve pedestrian facilities region-wide. Sidewalks are typically required where new development is constructed adjacent to roadways.

How is sidewalk construction and maintenance funded?

Construction through various sources, including private developers; County Highway User Revenue Funds; Surface Transportation Funds; Transportation Alternative Program funds; and Regional Transportation Authority funds. Maintenance provided through County HURF.

How are other pedestrian improvements funded?

In addition to the above, Flood Control District funds, Regional Wastewater and Reclamation Department funds, private contributions, and bonds paid for through property taxes have been used to fund pedestrian/bike projects such as The Loop.

Sidewalk Standards

Arterial

The standard sidewalk width is 5 feet, but may be increased to accommodate special conditions taking into account the characteristics, i.e. age, mobility, of the primary users. Sidewalks shall be 6 feet where the sidewalk is flush with the back of the curb.

Rural uncurbed roadways shall include a 6-foot paved shoulder and 4-foot graded shoulder.

Collector
Collector street sidewalks shall be a minimum of 5 feet in width and shall incorporate a 3-foot curbway between the back of curb and the roadside edge of the sidewalk.

Local Residential
Sidewalks in local streets can be designed with or without curbway. If a curbway is provided, its minimum width shall be 3 feet and the sidewalk shall be 5 feet in width.

If the sidewalk is placed adjacent to the back of curb, the minimum sidewalk width shall be 6 feet.

Commercial Developments
Sidewalks shall be required on both sides of all streets within commercial or industrial subdivisions.

Other Standards
A 4-foot or wider clear area can be used in lieu of sidewalks along the non-lot side of a single loaded street if a proper request is filed and approved.

A maintenance space between the sidewalk and the lot property line shall be provided for sidewalks maintained by Pima County and must be 1-foot or greater depending on grade differentials and available right-of-way.

Travel Lane Standards – Typical Cross section
Urban 3-Lane Roadway
Travel Lane: 11 feet(can be reduced to 10 feet)

Two Way Left Turn Lane: 12 feet (can be reduced to 11 feet)

Shoulder: 6-foot (can be reduced to 5 feet)

Urban 5-lane Roadway
Travel Lane: 11 feet (can be reduced to 10 feet)

Two Way Left Turn Lane: 12 feet (can be reduced to 11 feet)

Shoulder: 6 feet (can be reduced to 5 feet)

Urban 4-lane Divided Road
Outside Travel Lane: 11 feet

Inside Travel Lane: 12 feet (can be reduced to 11 feet)

Median: 22 feet

Shoulder: 6 feet (can be reduced to 5 feet)

Urban 6-lane Divided Road
2 Outside Travel Lanes: 11 feet

Inside Travel Lane: 12 feet (can be reduced to 11 feet)

Median: 22 feet

Shoulder: 6 feet (can be reduced to 5 feet)

Rural 2-lane Roadway
Travel Lane: 11 feet

Shoulder: 6-foot paved (can be reduced to 5 feet)/4-foot graded

Rural 3-lane Roadway
Travel Lane: 11 feet

Two Way Left Turn Lane: 12 feet (can be reduced to 11 feet)

Shoulder: 6 feet paved (can be reduced to 5 feet)/4-foot graded

Rural 5-lane Roadway
Travel Lane: 11 feet

Two Way Left Turn Lane: 12 feet (can be reduced to 11 feet)

Shoulder: 6-foot paved (can be reduced to 5 feet)/4-foot graded

Collector Street Subdivision
Travel Lane: 11 feet

Shoulder: 6-foot paved (can be reduced to 5 feet)

Also, because of traffic volume considerations, a two way left turn lane must be included in the cross section unless authorization to use a two-lane section is obtained from Pima County. Vertical curb and a 3-foot or wider curbway must be provided between the roadway and the sidewalk to ensure clear separation between vehicular and pedestrian traffic.

Local Street Subdivision
Travel Lane: 11 feet

The sidewalk can be 5-feet wide if a 3-foot curbway is provided, or 6-feet wide if it is placed adjacent to the vertical curb.

Does your jurisdiction currently have any pedestrian friendly development/design standards or districts?

Raised median islands where feasible for pedestrian refuge while crossing; prefer divided roadway with raised median if 4-lane or wider; reduced curb radii where feasible; ramps and truncated domes included in projects; enhanced shade landscaping when budget permits; driveway consolidation to reduce crossing conflict points.

Other Pedestrian Policies

County provides pedestrian safety classes in elementary and middle schools throughout the region.

Summary of Pedestrian Projects

Various sections of The Loop
Manzanita Safe Routes To School project
Homer Davis SRTS
Old Vail Middle School SRTS
Summit View Elementary SRTS
Centennial Elementary SRTS
Laguna Elementary SRTS
Coronado Middle School SRTS
La Cañada roadway widening w/sidewalks
Magee roadway widening w/sidewalks
Valencia roadway widening w/sidewalks
Camino de Oeste roadway widening w/sidewalks
Orange Grove roadway widening w/sidewalks

Specific Projects

Additional Information Developed and distribute the Pedestrian Safety Guide for ADOT and assist with periodic updates. Distribute about 1,000 guides throughout the region each year. Developed pedestrian safety curriculum and guidance for elementary school students.

SECTION 4: Existing Walking Conditions in Eastern Pima County

Population of the Greater Tucson Region

As of 2012, the Tucson region was home to an estimated 992,000 residents, making it the second largest metropolitan area in Arizona and the largest in southern Arizona. It is located roughly 100 miles south of Phoenix and 60 miles north of the border with Mexico. As mentioned above, the greater Tucson region has been a high-growth area over the last half century, with population increasing rapidly in the years after World War II following the introduction of affordable home air conditioning. Since 1960, the region has grown by roughly 275 percent, at an average rate of about 3.7 percent annually. The greater Tucson region is the 53rd largest metropolitan area in the United States just behind Grand Rapids, Mich.

Growth has slowed more recently as the housing crash and subsequent economic recession has led to a sharp decline in both domestic and international in-migration. Between 2000 and 2010, Pima County grew at an average annual rate of about 1.6 percent, and even had a few years of possible zero or negative growth at the close of the decade. With the economic outlook improving, growth is expected to return to the region, albeit at a lower rate than what occurred during much of the 20th century.

The Arizona Department of Administration Office of Employment and Population Statistics projects that the region will see future annual growth rates of between 1 percent and 1.6 percent over the next 30 years, roughly comparable with the last decade. Of course, as with all population projections, any number of factors, such as economic boom or bust, climate change, shifting residential preferences and/or immigration policy, will undoubtedly cause these estimates to be revised upward or downward over the course of the coming years.

Much of the population growth of the last few decades has occurred in fast-growing suburban areas outside of the central city. The share of the region's population residing in Tucson vs. outside of Tucson has decreased from 75 percent in 1970 to about 53 percent today. In terms of the pedestrian environment, this has mixed results. On the one hand, areas that have developed since the early 1990s tend to include high-quality sidewalks or other pedestrian accommodations in residential developments and as part of roadway improvements, making it easy to walk for recreation or exercise. On the other hand, many of these areas, though certainly not all, have developed in a way that makes it difficult to walk for transportation purposes, based on a combination of long distances between locations and low street connectivity.

TABLE 1 – POPULATION RANK OF THE TUCSON METROPOLITAN AREA

Rank by Population	Metropolitan Area	2012 Population Estimate
47	Raleigh, NC	1,188,564
48	Birmingham, AL	1,136,650
49	Buffalo, NY	1,134,210
50	Salt Lake City, UT	1,123,712
51	Rochester, NY	1,082,284
52	Grand Rapids, MI	1,005,648
53	**Tucson, AZ**	**992,394**
54	Urban Honolulu, HI	976,372
55	Tulsa, OK	951,880

Source: U.S. Census Bureau; American Community Survey, 2012 American Community Survey 1-Year Estimate; Table DP05; generated using American FactFinder

Recently, the trend of rapid suburbanization appears to be balancing somewhat. Downtown Tucson, after years of disinvestment and neglect, and in spite of the recession, has begun to develop at rates not seen in more than a generation. Encouraged by the arrival of Tucson's Sun Link streetcar and taking advantage of economic and regulatory incentives, many restaurants, businesses, and higher-density housing and mixed-use developments are springing up around the region's urban core extending to the University of Arizona campus, transforming the whole area into a very walkable, attractive destination. Also, through recent long-range visioning and planning efforts, residents across the region have expressed a strong desire to see the development of more mixed-use, pedestrian-oriented neighborhoods throughout the region. Many of the region's towns are now in the process

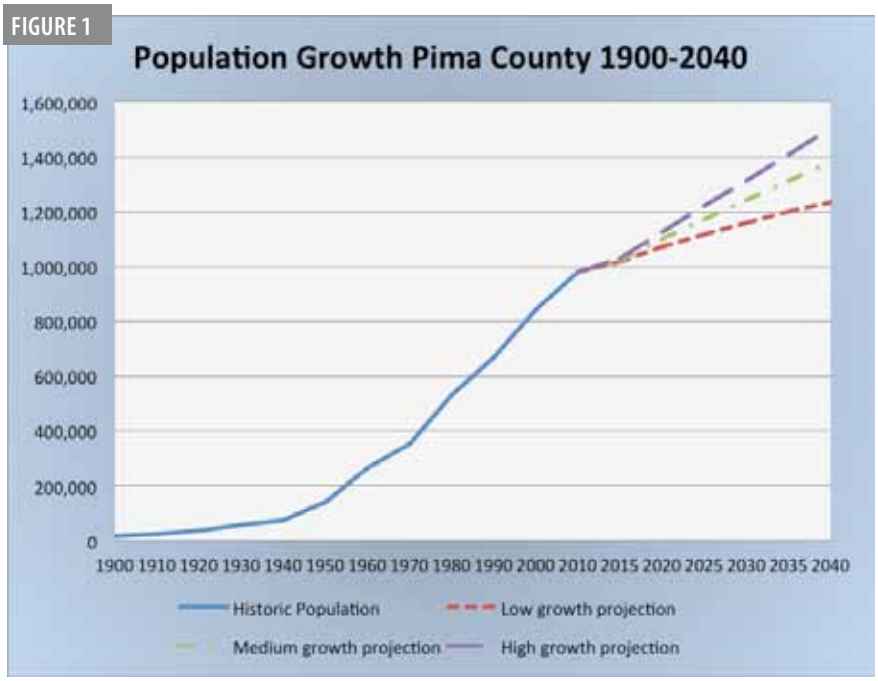
of planning for more walkable central districts.

In the coming years, the greater Tucson region will continue to see growth in more auto-oriented suburban areas likely balanced with increasing density in and around the urban core town centers and the walkable nodes and other nodes, mirroring national trends. This will expand walkable residential options for those who choose to live in that type of neighborhood while retaining lower-density more traditional suburban options that many still prefer. In both instances, people should have the opportunity to walk for transportation purposes or exercise on an interconnected network of safe and accessible sidewalks or pedestrian walkways.

Demographics

When addressing current and future pedestrian needs, it is important to consider who uses the pedestrian network and what the different behaviors and vulnerabilities of those users may be. While almost everyone is a pedestrian at some point, and the entire region benefits from improvements to the pedestrian environment, certain populations are more likely to use the region's pedestrian facilities or may be at greater risk of injury when they do use them. For example, residents who are unable to drive due to disability, age or lack of access to an automobile are much more dependent on the pedestrian network for transportation than the population as a whole, and therefore at greater risk when facilities are inadequate.

FIGURE 1



Source: Historical Data U.S. Census Bureau. Projections from Arizona Department of Administration Office of Employment and Population Statistics

Walking is an option to meet varying personal needs or interests.

TABLE 2 – Jurisdictional Population Growth 2000-2010

Jurisdiction	Pop. 2000	Pop. 2010	Percent Change
Marana	13,556	34,961	158%
Oro Valley	19,657	41,011	109%
Sahuarita	3,242	25,259	679%
South Tucson	5,490	5,652	3%
Tucson	486,699	520,116	7%
Unincorporated Pima County	305,059	353,264	16%

Source: U.S. Census Bureau; Census 2000, Census 2010; Summary File 1; Table DP-1; generated using American FactFinder

Additionally, those who would simply prefer not to drive for any number of reasons need to have high-quality alternative options available to them.

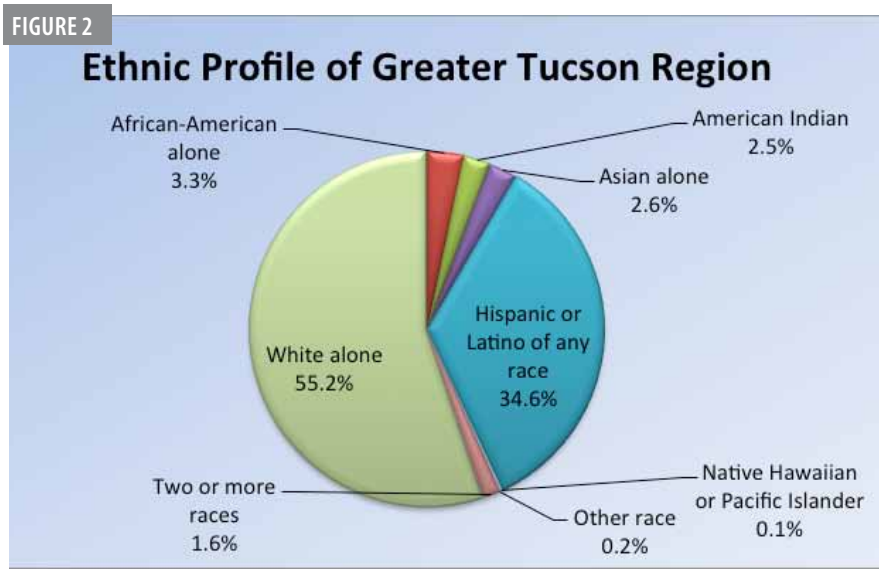
All of these residents must be able to use a safe and comfortable pedestrian network in order to access transit stops and other important destinations.

Race/Ethnicity

The Tucson metropolitan region has a diverse population on account of a history of in-migration from other parts of the country, its proximity to the Mexican border, the region's status as a refugee destination, and the presence of an internationally respected research university. Just over half of residents of the region self-identified as white alone, according to 2009-2011 American Community Survey (ACS) 3-year estimates, and 34 percent of residents identify as Hispanic or Latino. 13.2 percent of Pima County residents were born in a foreign country.

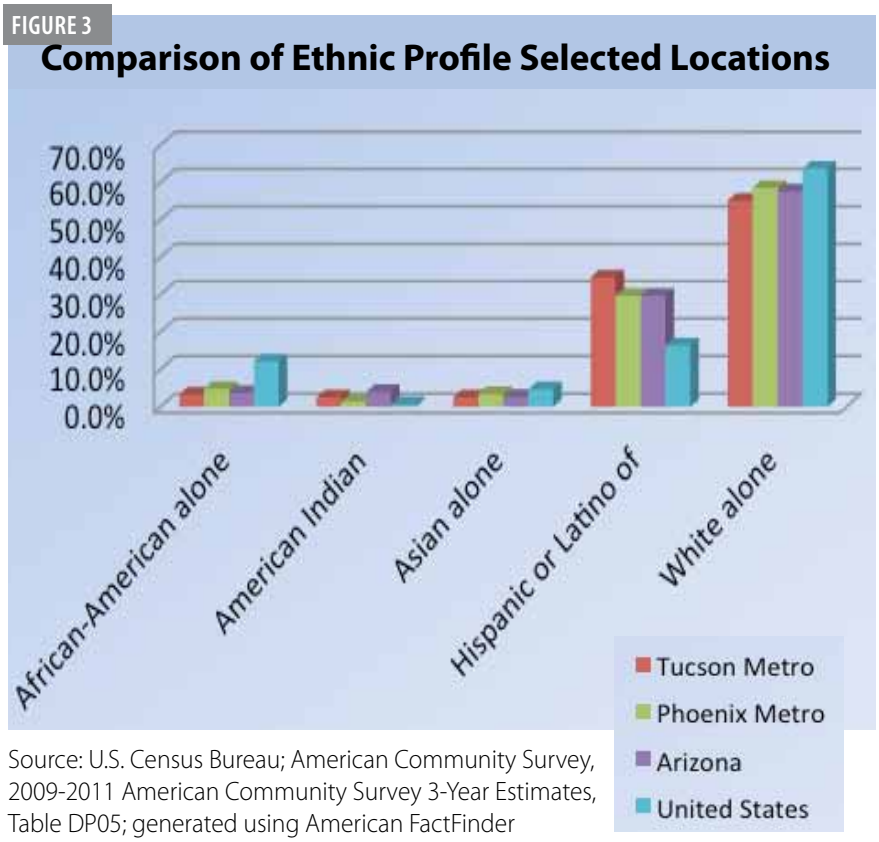
Pima County is projected to be a minority-majority county by 2022 – meaning that people who identify as white alone will constitute less than 50 percent of the population – and a majority Latino county by 2048 (by way of comparison, the United States as a whole is expected to become a minority-majority country by around 2043). Nationally, (though this may certainly change in the coming years) Hispanic residents are over-represented as victims in pedestrian traffic

FIGURE 2



Source: U.S. Census Bureau; American Community Survey, 2009-2011 American Community Survey 3-Year Estimates; Table DP05; generated using American FactFinder

FIGURE 3



Source: U.S. Census Bureau; American Community Survey, 2009-2011 American Community Survey 3-Year Estimates, Table DP05; generated using American FactFinder

[1] Knoblauch, Richard L., Rita Furst Seifert, and Nhora Barreva Murphy. Center for Applied Research, Inc., "The Pedestrian and Bicyclist Highway Safety Problem As It Relates to the Hispanic Population in the United States." December 30, 2004. http://safety.fhwa.dot.gov/ped_bike/hispanic/03p00324/index.cfm

crashes versus their non-Hispanic white counterparts.[1] This is something to be aware of as the Hispanic population continues to grow.

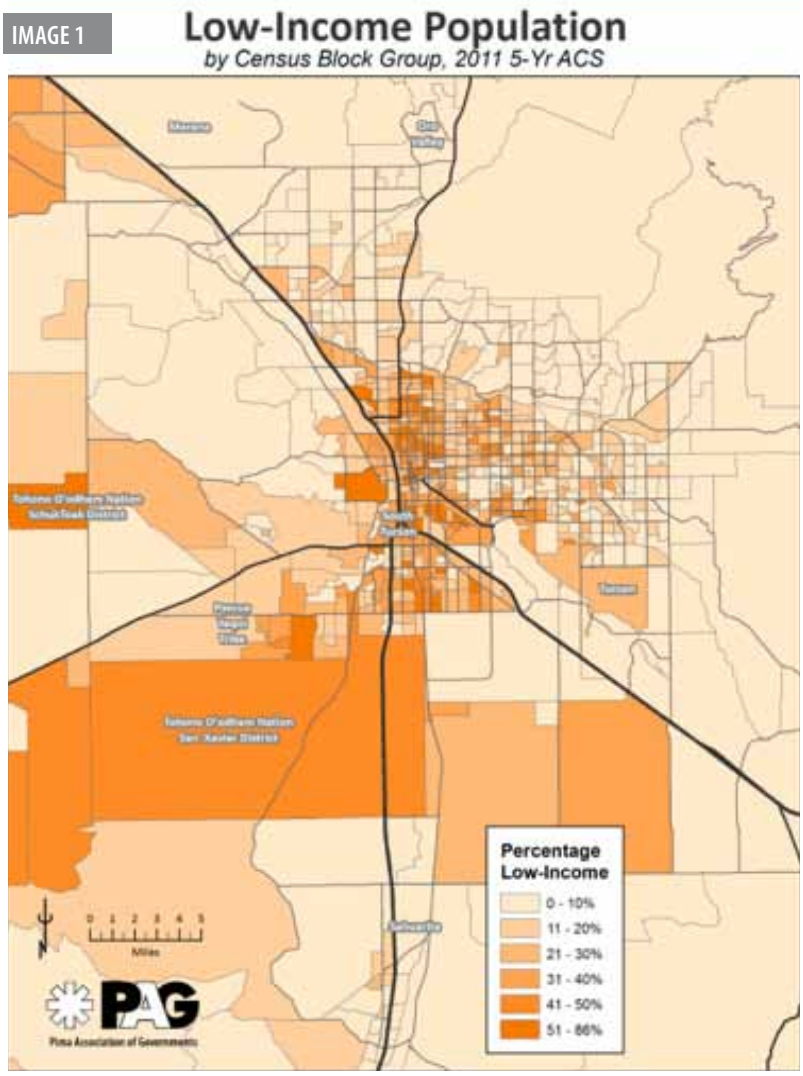
Income

The Tucson metro's income statistics reveal that the region has lower incomes and higher poverty levels than the state and nation as a whole. According to ACS estimates, the median household income in Pima County is $44,679 which is about $3,800 below the state median. In the second quarter of 2012, Pima County was ranked 209th out of 338 counties in terms of the average weekly wage rate.[3] Poverty rates are also high with over 13 percent of families and 27 percent of children living in households that earn below the federal poverty level.

Low-income individuals and families are also more likely to be overly burdened by the costs of car-ownership or unable to own a private vehicle altogether and, therefore, are more likely to rely on other forms of transportation. According to the ACS, 8.25 percent of households in Pima County have no vehicle available. Workers in these households are far more likely to rely on pedestrian facilities and public transit (which requires walking to or from bus stops) for their daily commute and other trips. Of workers 16 years old or older without access to a vehicle, 15.4 percent walk to work and 24 percent take the bus, rates well above workers residing in households with available automobiles.

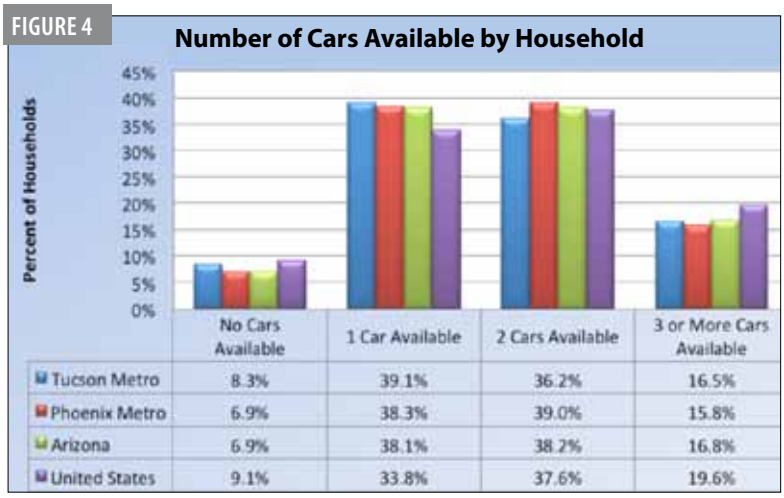
Given this higher-level of exposure, low-income individuals are often at higher risk of being involved in a pedestrian crash than other members of the community.

IMAGE 1



Source: U.S Census Bureau; American Community Survey 2007-2011 5-year estimates

FIGURE 4



U.S. Census Bureau, American Community Survey, 2009-2011 American Community Survey 3-Year Estimates, Table B08201; generated using American FactFinder

[3] Bureau of Labor Statistics, "County Employment and Wages in Arizona – Second Quarter 2012." February 27, 2013. http://www.bls.gov/ro9/qcewaz.htm

Age

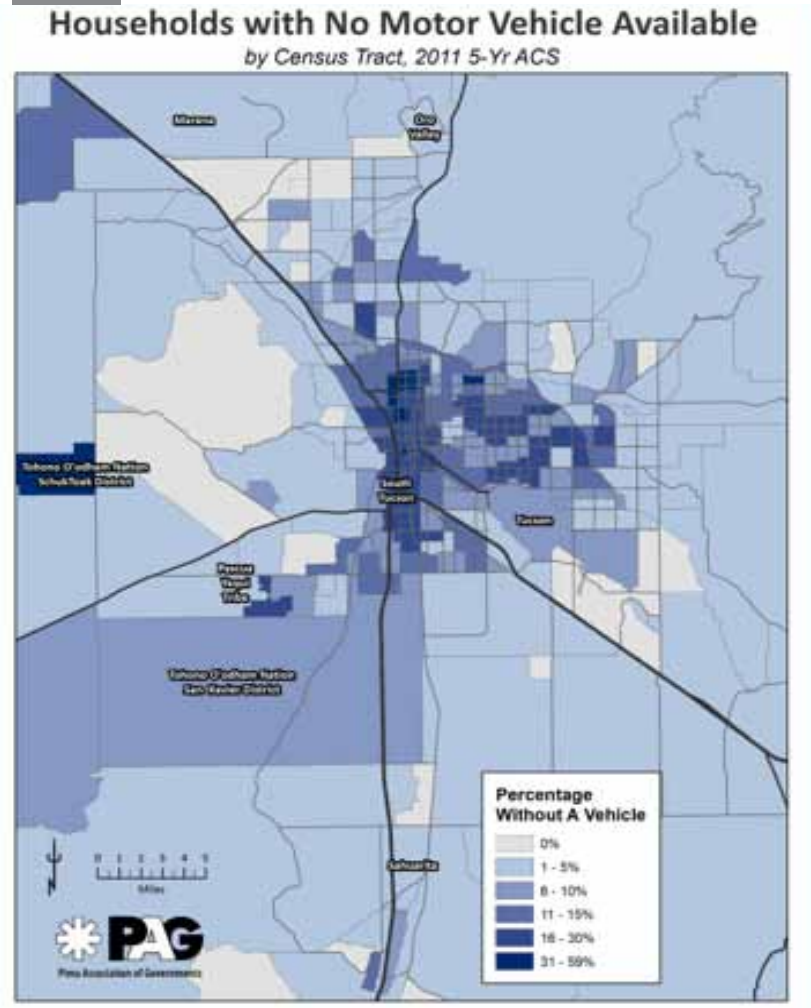
The median age in the Tucson metro region is 37.8, older than both Arizona (35.9) and the United States (37.2) overall. In this sense, the Tucson metro is on the front end of the so-called "graying of America," or the aging of America's population. Fully 15.4 percent of residents in Pima County are now 65 years old or older, a number that is expected to grow to over 22 percent by 2030. As the population of the region continues to age, and people are able to live longer, there will likely be an increase in the number of people with ambulatory challenges, emphasizing the importance of ensuring that the region's pedestrian facilities and public spaces are accessible to all users.

The Centers for Disease Control (CDC)[4] reports that the pedestrian fatality rate increases with age; with people over the age of 85 at greatest risk to be killed while walking. This is especially true among Hispanics and American Indians who have the highest senior pedestrian fatality rate of any ethnic group.

For seniors, having a safe, comfortable and accessible pedestrian network provides an easy opportunity to engage in the community and to get a low-stress and enjoyable form of exercise. Both of these are well-known ways to extend longevity and increase quality of life into the older adult years.

Ultimately, as the greater Tucson region's population ages and grows more diverse, strategies will need to be developed to meet changing needs and to mitigate the risks that have led to higher fatality rates among certain vulnerable groups, such as seniors, low-income residents, and Hispanics of any race.

IMAGE 2



Source: U.S Census Bureau; American Community Survey 2007-2011 5-year estimates

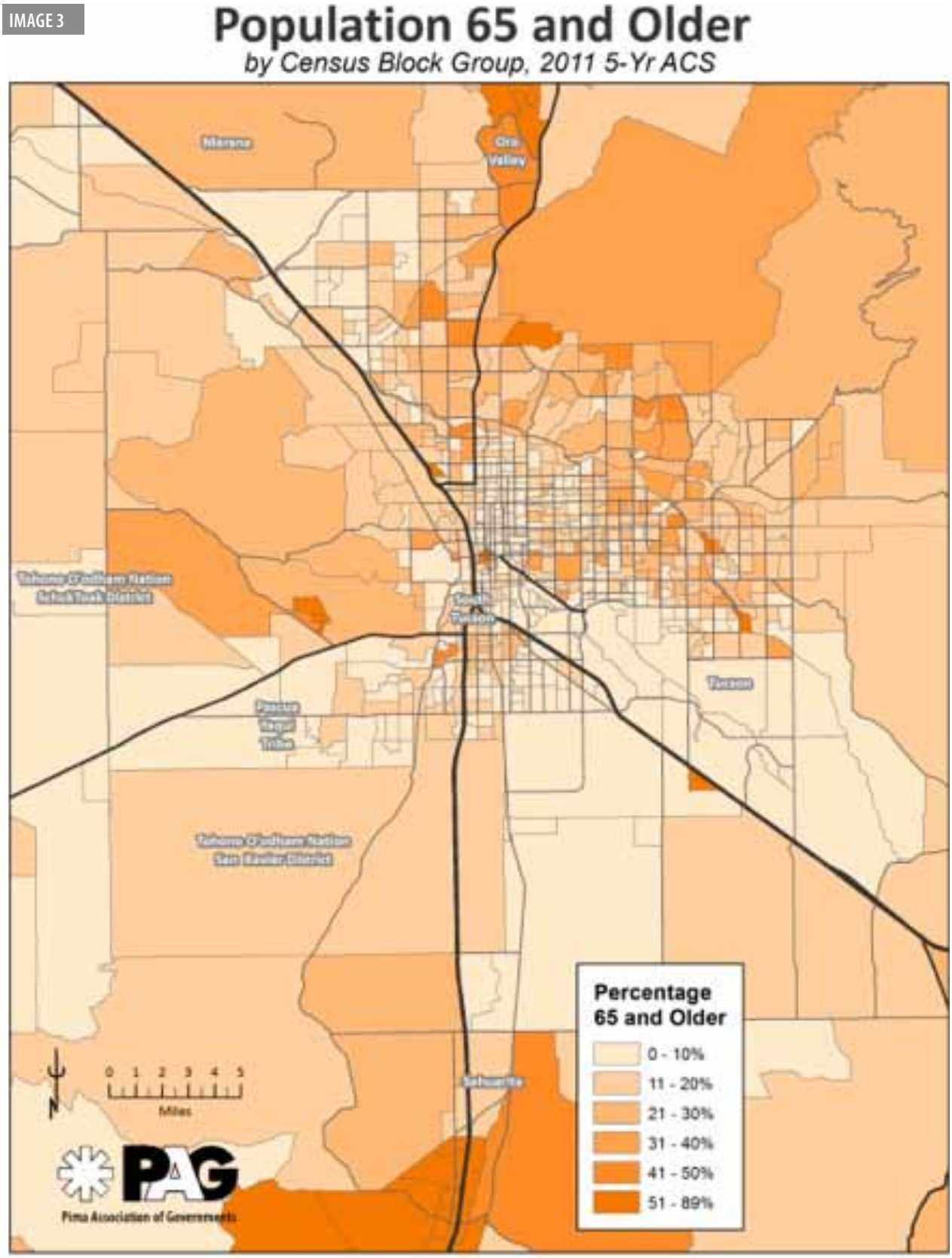
TABLE 3 – Walking Purpose by Age Group

	Pima County	Maricopa County	Arizona	United States
Median Household Income	$44,679	$51,946	$48,518	$51,484
Average Weekly Wage*	$795	$905	$862	$903
Poverty Rate				
Families	13.6%	11.8%	12.8%	11.1%
Individuals	19.4%	16.1%	17.6%	15.2%
Children	27.1%	22.9%	24.9%	21.4%[2]

Source: Bureau of Labor Statistics, "County Employment and Wages in Arizona – Second Quarter 2012." February 27, 2013. http://www.bls.gov/ro9/qcewaz.htm
Poverty Data from the U.S. Census Bureau, American Community Survey, 2009-2011 American Community Survey 3-Year Estimates, Table DP03; generated using American FactFinder

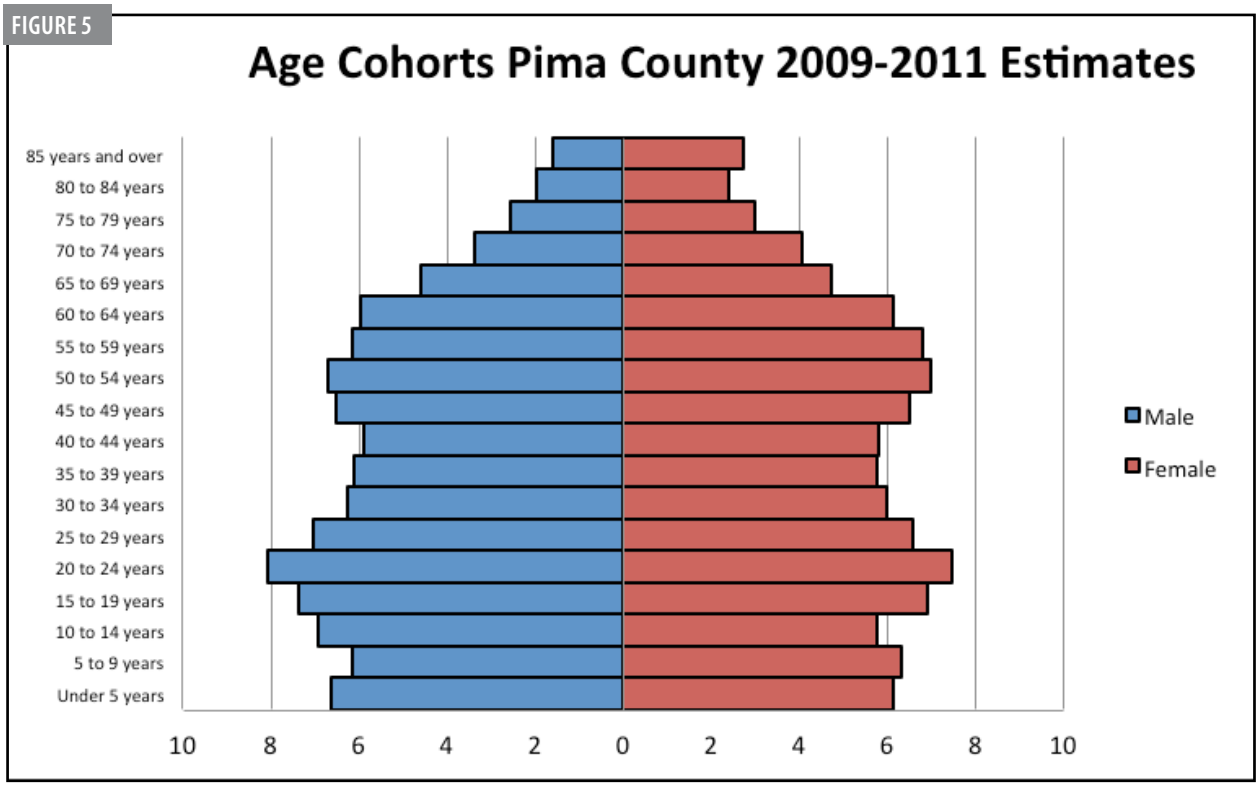
[4] Naumann, Rebecca B. "Motor Vehicle Traffic-Related Pedestrian Deaths — United States, 2001–2010." Morbidity and Mortality Weekly Report. Centers for Disease Control and Prevention, April 19, 2013. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6215a1.htm?s_cid=mm6215a1_w

IMAGE 3



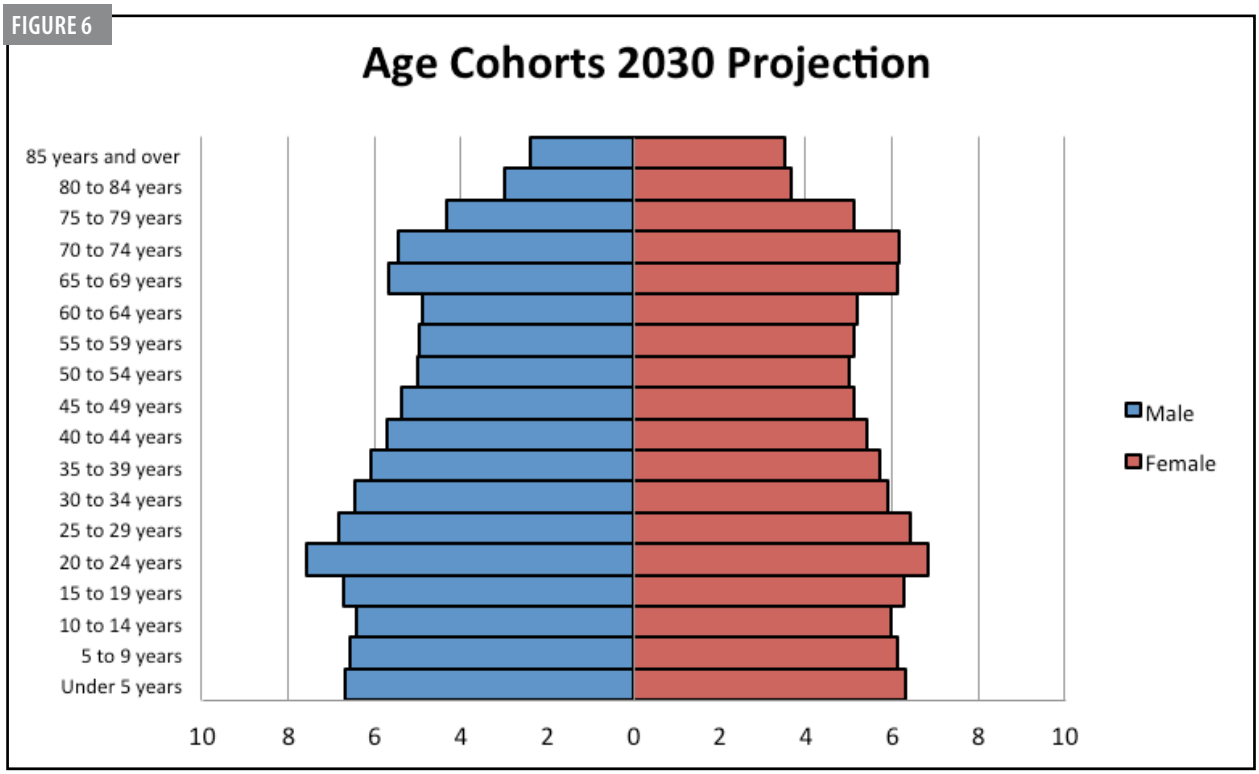
Source: U.S. Census Bureau; American Community Survey, 2009-2011 American Community Survey 3-Year Estimates, Table B01001; generated using American FactFinder

FIGURE 5



Source: U.S. Census Bureau; American Community Survey, 2009-2011 American Community Survey 3-Year Estimates, Table B01001; generated using American FactFinder

FIGURE 6



Source: Arizona Department of Administration; Office of Population and Employment Statistics; "2012-2050 State and County Population Projections". December 12, 2012

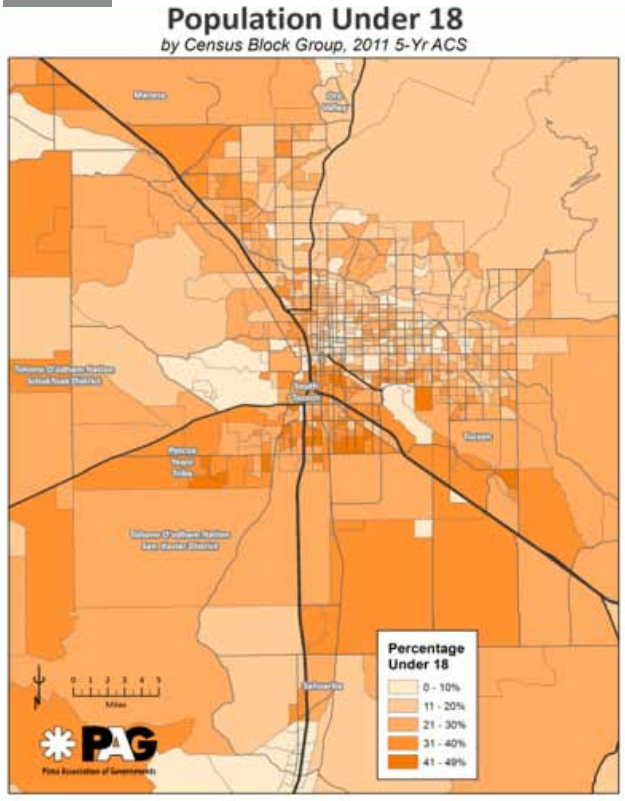
Youth

For children under the age of 16, walking, biking and transit are the primary options for independent transportation. Whether going to school, to the bus stop, or meeting up with friends, walking is a great way for many older kids and teenagers to demonstrate autonomy, be active and relieve some of the driving burden faced by parents or grandparents who are often depended upon to provide most transportation for the family.

But, this option needs to be safe. Nationally, pedestrian crashes are the third leading cause of death by unintentional injury for children 15 and under, with boys between the ages of 5 and 9 being at especially high risk.[5] Roughly 19 percent of the population, around 186,000 people, is under the age of 16 in Pima County.

Increasingly, though, it is not just younger kids who do not drive. A growing number of teenagers and young adults, both out of choice and for economic reasons, are foregoing driving and auto ownership. In 2011, the percentage of 16-24 year olds who had a driver's license dropped to 67 percent, the lowest percentage recorded in the United States since the Federal Highway Administration began tracking the data in 1963. Between 2001 and 2009, the average annual

IMAGE 4



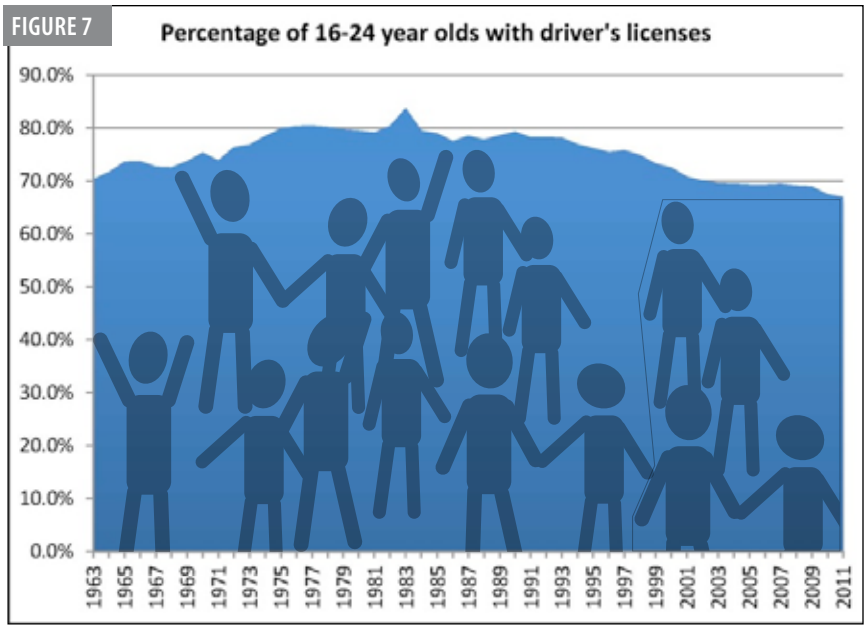
Source: U.S Census Bureau; American Community Survey 2007-2011 5-year estimates

[5] Ernst, Michelle, Marisa Lang, and Stephen Davis. Transportation for America, "Dangerous by Design 2011: Solving the Epidemic of Preventable Pedestrian Deaths ." 2011. http://t4america.org/docs/dbd2011/Dangerous-by-Design-2011.pdf

[6] Davis, Benjamin, Tony Dutzik and Phineas Baxandall. Frontier Group and U.S. PIRG Education Fund, "Transportation and the New Generation: Why Young People Are Driving Less and What It Means for Transportation Policy." April 2012. http://www.uspirg.org/reports/usp/transportation-and-new-generation

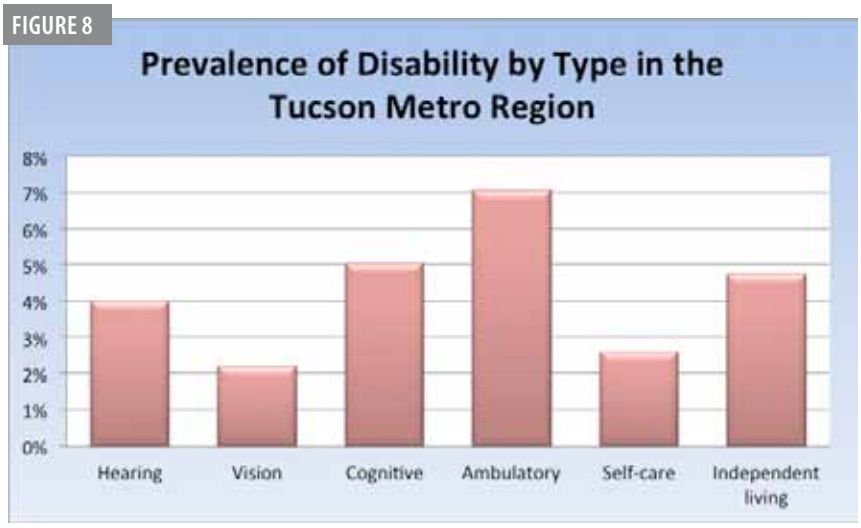
number of vehicle-miles traveled by 16-34 year olds decreased 23 percent. Auto-ownership rates are also down considerably for this group; all of which indicates a changing relationship in the role of the private automobile in younger people's lives. Whatever the specific reasons for the shift (economic recession and stagnant earnings, technological changes, changing living preferences and urbanization), this will be a trend to pay attention to as the young adult cohort ages into its prime earning and consumption years and how that may affect the attitudes of subsequent generations. In the short run, the trend may influence the way the region makes decisions about the transportation network because fewer drivers ultimately means more walkers, bikers and public transportation users, as well as demands for different kinds of living options.

FIGURE 7



Source: Dutzik, Tony, D.C. Streetsblog , "D.C.Streetsblog.org." March 15, 2013. http://dc.streetsblog.org/2013/03/15/as-youth-driver-licensing-dips-again-a-focus-on-the-millennials

FIGURE 8



Source: U.S. Census Bureau; American Community Survey, 2009-2011 American Community Survey 3-Year Estimates, Table S1810; generated using American Fact-Finder

People with Disabilities

According to ACS 3-year estimates, there are nearly 128,000 people in the Tucson metro region who report having a disability, equal to a little more than 13 percent of the entire population. This is particularly prevalent among seniors over 65, 35 percent of whom report having a disability. Having a disability is in fact the one federally protected class (in terms of discrimination) that anyone can join at any time, as a result of injury, sickness or age. The National Council on Disabilities estimates that 70 percent of people will have a temporary or permanent disability at some point in their lives. With the Tucson metropolitan region aging, it is very likely then, that the number and proportion of people with a disability will increase over the next 20 years. As such, it is critical that the region bring more of its pedestrian network into compliance with the requirements of the Americans with Disabilities Act of 1990, thus ensuring that public spaces and facilities are accessible to everyone regardless of age or ability.

Health

With the nation focused on combating the twin epidemics of obesity and increasing diabetes rates, national, state and local leaders are looking more seriously at building walkable communities as a solution to the public health crisis. Medical professionals, public health officials, and land use

and transportation planners are converging around the idea that living in a neighborhood with high-quality and complete sidewalks and other pedestrian amenities can lead to positive health outcomes; much more so if those sidewalks are part of a complete network that connects to nearby transit stops and other destinations like parks, schools, shopping and work places. There is a growing body of evidence showing that, not surprisingly, people who have access to decent sidewalks and walking paths and are within walking distance of a variety of destinations tend to walk more than those who don't, and that has tangible benefit for a community's health. Walking is a low-impact form of exercise that is enjoyable and easy to do and it may just be a good start for tackling some of the nations' health problem. After all, the likelihood of obesity increases 6 percent with every additional hour per day spent in a car, but decreases 5 percent with each additional km walked (0.6 miles).[7]

In the Tucson metropolitan region, over half of adults and a third of children are overweight or obese and roughly 8 percent have diabetes (a 26 percent obesity rate in Pima County is higher than the state, but lower than the national rate). [8] However, these health afflictions don't affect everyone equally. Hispanic and Native American residents are more likely to be overweight or obese than non-Hispanic white residents and rates of obesity and diabetes are higher among people with lower-income levels and lower-levels of educational attainment. [9]

In regards to current levels of physical activity, about 20 percent of Pima County residents report being physically inactive, meaning that Pima County has lower rates of physical inactivity than many other counties in the country. For many people, walking is the most commonly undertaken physical activity.

Studies have shown:

People walk more in neighborhoods that are safe, walkable, and aesthetically pleasing.

Improved pedestrian and cycling infrastructure may promote physical activity by making walking and cycling more appealing, easier, and safer. One of the most frequently cited barriers to physical activity is lack of safe areas. Street-scale urban design and land-use policies and practices may increase environmental supports, such as safety, walkability, improved sense of community, decreased isolation, and reduction in crime and stress.

- Centers for Disease Control and Prevention. "The CDC Guide to Strategies to Increase Physical Activity in the Community"

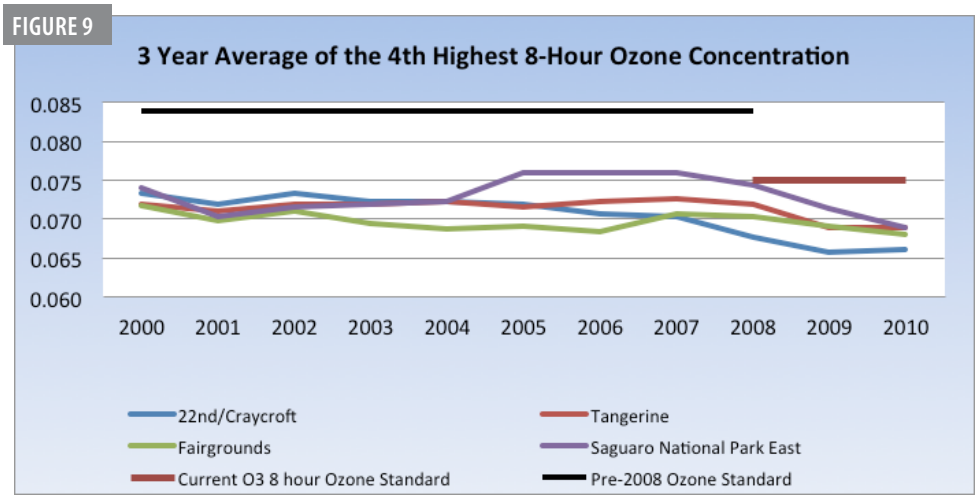
[7] Lawrence, D. Frank, Martin A. Andresen, and Thomas L. Schmid. "Obesity Relationships with Community Design." American Journal of Preventive Medicine. Vol. 27 no. 2 (2004): 87-96. http://policy.rutgers.edu/vtc/tod/newsletter/vol7-num1/ajpm-aug04.pdf

[8] Resolution of the Pima County Board of Supervisors, March 13, 2012 http://www.pima.gov/cob/e-agenda/03132012/AD-Health%20Reso.pdf

[9] "Pima County Communities Putting Prevention to Work Initiative: Target Area Report." University of Arizona College of Public Health, 2012. http://azprc.arizona.edu/sites/azprc.arizona.edu/files/pdf/Pima County CPPW Target Area Final Report.pdf

Air Quality

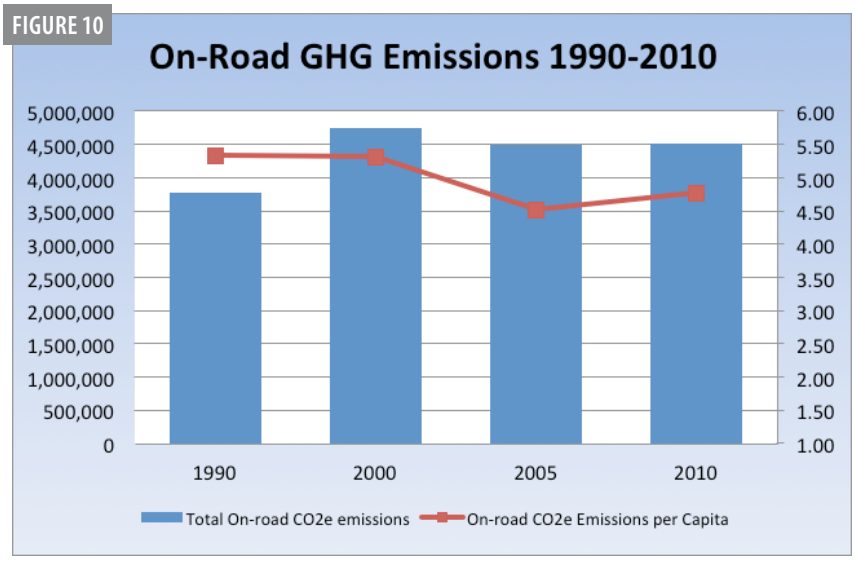
FIGURE 9



Source: Pima County Department of Environmental Quality

Overall, the greater Tucson region has relatively clean air. Carbon monoxide (CO), nitrogen dioxide (NO2) and sulfur dioxide (SO2) concentrations are all well below the federal standards, and the region hasn't exceeded federal standards for particle pollution since 2006. In fact, according to the American Lung Association's 2013 State of the Air Report, Pima County has the 18th lowest year-round particle pollution levels in the nation.

FIGURE 10



Source: Pima Association of Governments Air Quality Model

In Pima County, motor vehicles are the single largest source of ambient air pollution, producing over 318 tons of pollution per day. On average, motor vehicles emit about one pound of pollution for every 41 miles driven. So, if every household in Pima County replaced one mile of driving per week with walking or biking, the region could reduce overall emissions by about 500,000 pounds annually. By shifting trips out of cars and onto the sidewalks, bicycles and public transit, the region can make significant progress in mitigating the air-quality impacts, and related public health impacts, of a growing population.

The one area of particular concern for the region is ground-level ozone (O3) concentrations. The principle component of smog, ground-level ozone forms when volatile organic compounds (VOC) and oxides of nitrogen (NOx) react in the presence of sunlight. For that reason, ozone levels are higher in the summer months, especially in cities with hot sunny climates. Ozone is a harmful respiratory irritant that poses a serious health risk for seniors, children, and people with chronic lung diseases such as asthma, although even active, healthy people can experience irritation to their respiratory systems in the presence of high ozone concentrations. Ozone concentrations have remained relatively stable over the last 10 years, and are currently at about 90 percent of the federal standard.

The Tucson region is also responsible for about 14.2 million tons of greenhouse gas (GHG) emissions per year (equal to about 15 tons per person per year); the primary cause of global climate change. However, while overall GHG emissions are up since 1990, per capita emissions have actually fallen by 3.8 percent. On-road sources (cars, trucks, etc.) account for roughly one-third of all GHG emissions in the region and are down from their peak in 2000. Overall, per capita on-road GHG emissions have fallen by more than 10 percent since 1990, though there has been a slight reverse in that trend since 2005.

Walking in the Greater Tucson Region

Pedestrian Trip Generators and the Urban Environment

The amount that people walk, particularly for transportation purposes (as opposed to recreational or health purposes) is closely related to the urban form and context of the built environment, rather than specifically to the presence or condition of pedestrian facilities. That is to say, people will not be inspired to walk simply by the presence of a sidewalk if there is nothing to walk to. However, many people may be discouraged from walking if conditions are hostile to pedestrians even though there are nearby destinations. Those who walk under these conditions will do so either out of necessity or a commitment to active transportation, but most will likely choose another mode.

Obstacles such as missing and incomplete sidewalks, unsafe road crossings, and no shade create real barriers for people who would otherwise like to walk, in addition to presenting a hazard for people who don't have other options.

It is well-established that areas or neighborhoods with higher population and/or job densities, mixed land uses, well-connected street networks, high concentrations of intersections, transit stops, and short distances to destinations (such as parks, schools, shops, libraries and community centers) see much higher rates of pedestrian activity than areas that don't have those characteristics. Any one of these features alone will encourage a fair amount of pedestrian activity assuming it is accessible on foot; together they can make for a truly pedestrian-friendly environment.

One of the purposes of this plan, then, is to identify those areas in the region where the need is greatest, where walking is already occurring, or where walking is likely to occur due to the presence of one or more of these pedestrian generators, and ensuring that pedestrian facilities in those areas encourage and facilitate walking instead of discouraging it.

In this way, the region can make the most efficient use of limited pedestrian funds to prioritize improvements to the locations where people most likely walk, thus benefiting the greatest potential number or people with the least amount of resources committed.

IMAGE 5

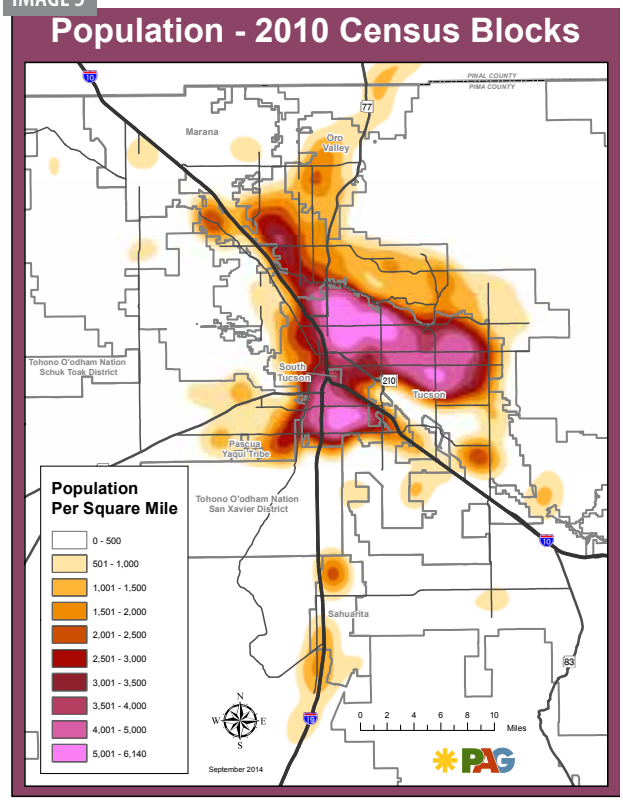
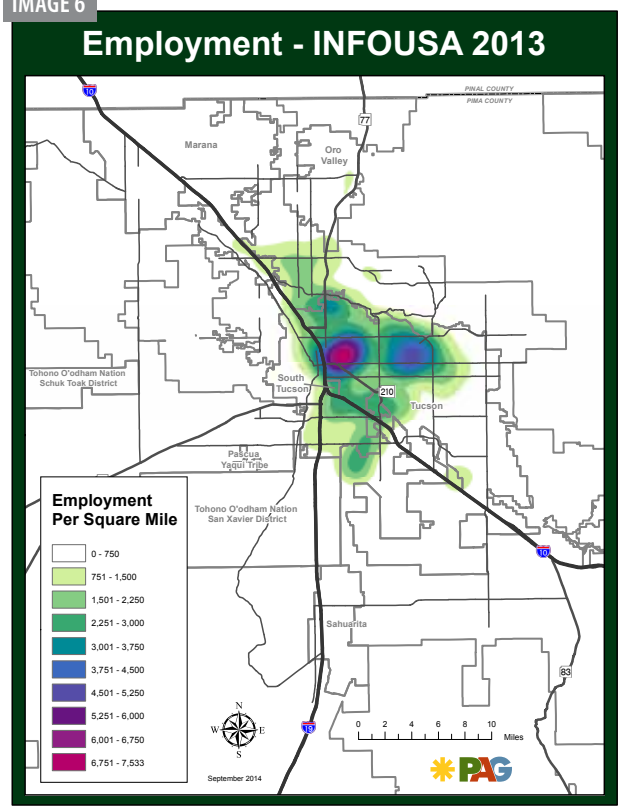


IMAGE 6



Population and Jobs Density

Population density and employment density have a very strong influence on travel behavior and, more specifically, on walking rates, in the community. [10] Generally, the higher the density and the greater the mix of land uses in a given location, the higher the rate of walking.

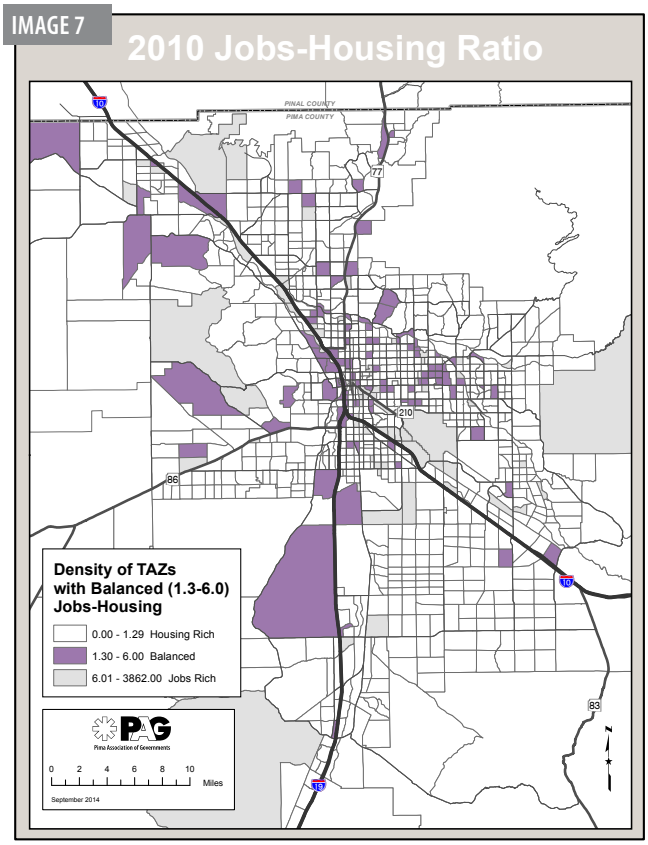
One has to be cautious, however, about overstating the effect of just density on walking rates: high-density development with poor pedestrian connectivity and limited pedestrian facilities will not result in much walking, whereas lower-density development with nearby destinations and good pedestrian connectivity will be quite walkable for those who live there. Density must be considered as one element of the overall urban environment and not viewed as the sole determinant of behavior. Density works best when complemented with pedestrian-oriented design, high-quality pedestrian facilities, and good connectivity to destinations.

As of 2010, the population density of the Tucson urbanized area was 2,385 people per square mile, similar to that of Reno, Nev., Spokane, Wash., and Buffalo, N.Y. For comparison, the Phoenix-urbanized area has a population density of about 3,160 people per square mile. The most densely populated areas in the region are around Tucson's downtown core, the neighborhoods south of the I-10/I-19 interchange, and in southeast Tucson near Golf Links Rd and 22nd Street. The highest density found in the region is just over 6,300 people per square mile in and around the urban core. The highest density of jobs is located in the downtown and midtown Tucson areas.

Mixing Land Uses: the Jobs-to-Housing Ratio

As mentioned above, looking exclusively at density as a predictor of travel behavior is only part of the picture. In addition to where people and employment are concentrated, it is important to know the relationship of jobs and housing to each other. Locating activities closer together can reduce trip lengths and allow more trips to be made by walking or biking. The most straightforward, albeit far from perfect way of measuring this is through a metric known as the jobs-to-housing ratio, which is simply a metric for the ratio of the number of jobs to the number of houses in a given geographical area. While most people who live in a given neighborhood won't necessarily work close to where they live, the jobs-to-housing ratio can serve as an approximate measure for the availability of nearby services and destinations.

IMAGE 7



A healthy jobs-to-housing ratio on a regional scale is roughly around 1, or one job per housing unit. However, this masks imbalances at a sub-regional scale. Within a smaller geographical area, a jobs-to-housing ratio of between 1.3 to around 6 indicates that jobs and housing are located close enough together to allow for pedestrian access. What jobs-to-housing ratio does not show, though, is the type of jobs within the given geographic area, or how concentrated or dispersed the jobs are within the area.

Public Transportation

Transit and walking are closely related and serve as complementary transportation modes. Transit systems thrive when pedestrians can easily and comfortably access transit stops, and almost all other transit users will need to walk as part of their transit trip. Nationally,

[10] Frank, Lawrence D., and Gary Pivo. "Impacts of Mixed Use and Density on Utilization of Three Modes of Travel: Single-Occupant Vehicle, Transit, and Walking." Transportation Research Record. no. 1466 (1994): 44-52. http://www.reconnectingamerica.org/assets/Uploads/Frank-and-Pivo.pdf

[11] Besser, Lilah M. , Andrew L. Dannenberg "Walking to Public Transit: steps to help meet physical activity recommendations." American Journal of Preventive Medicine. Vol. 20. no. 4 (2005): 273-280. http://www.cdc.gov/healthyplaces/publications/besser_dannenberg.pdf

the average transit user walks about 19 minutes per day, which is much more than the population as a whole.[11] For transit systems to work well, they need to have stops that are accessible from where people live and have routes that travel to major destinations. With nearly 2,400 bus stops in the greater Tucson region an estimated 48 percent of the region's population and 79 percent of jobs are within ¼ mile of a stop. Ensuring those stops are connected to an accessible sidewalk network and walkways will make it easier and safer to people to reach their destinations by all modes, especially if transit ridership continues to increase in the region.

Other Pedestrian Generators

In addition to the elements discussed above, there are several specific destinations that are known to attract pedestrian trips. In particular, schools, libraries and other community centers generate considerable pedestrian activity, especially of children, youth, and seniors. Special care should be taken around these locations to ensure that the people who use them can reach them safely, no matter how they get there.

Other special pedestrian attractors include but are not limited to:

- **Parks**
- **Neighborhood Retail**
- **Convenience Stores**
- **Multi-Family Housing**

Current Walking Rates

FIGURE 11

Source: 2009 National Household Travel Survey- Pima County

Although the greater Tucson region developed largely around the automobile, walking remains a very important piece of the transportation system. Walking is the second most common form of transportation in the region representing 10.4 percent of all trips, which is roughly equal to the national rate. In total, about 16.7 percent of residents make at least one walking trip each day. But walking is actually more common than this would indicate, since nearly every trip taken, by any mode, involves walking at some point. If walking trips to or from transit stops, from parking lots, and for recreational or exercise purposes are included, these number are much higher.[12]

Detailed walking data are not currently available at the sub-regional, neighborhood or corridor level, but a few sources of information can be used to approximate pedestrian activity levels, at least for comparative purposes.

American Community Survey: Means of Transportation to Work

One source of sub-regional pedestrian data come from the U.S. Census Bureau's American Community Survey Means of Transportation to Work table, which provides information on how people commute to work. While commute trips only account for around 20 percent of all trips, the ACS data are useful in showing where current conditions are conducive for walking within the region and for comparing between regions.

In terms of rates of walking to work, the greater Tucson region compares favorably with many Western or similarly-sized American Metropolitan regions. According to 2007-2011 ACS 5-year estimates, a higher percentage of commuters walk to work in the Tucson region than do in the Phoenix, Austin, or Albuquerque metropolitan areas. Of comparably sized or Western metro areas in the table below, only Portland has a higher share of commuters walking to work.

Within the Tucson region, there is considerable variation in the mode split for how residents commute to work. Not surprisingly, cities, towns and places which are further from the major concentrations of employment, have developed in lower-density, more suburban patterns, and have a high proportion of

[12] Note: Trips refer to a single leg of travel beginning and ending at separate destinations. Dependable data for recreational walking trips (often trips beginning and ending at the same location) is not available for the region, but the pedestrian survey conducted as part of this planning process indicates that recreational, or exercise, walking trips make up a significant portion of total walking trips, a fact not reflected in the 10.4 percent walking mode share.

houses-to-jobs tend to have higher driving rates and lower walk to work rates. This does not mean that residents in these areas are not walking, or do not have the option of walking for other purposes, it only means that those residents likely live farther from where they work than residents living in more central areas and, therefore, tend to commute to work by car.

Note: Commute data for areas with smaller populations, such as South Tucson and Vail, have a much higher margin of error than for areas with larger populations and are therefore less reliable

As could be expected, then, the highest concentration of residents who walk to work can be found around the University of Arizona and near downtown Tucson. Other areas with higher levels of walking to work include some of the neighborhoods in east Tucson around Wilmot Road and Speedway Boulevard, Harrison Road and Broadway Boulevard, at Davis-Monthan Air Force Base, and near Rita Ranch. Walking to work is fairly prevalent in the neighborhoods near Oracle and Prince Roads and around Ina and Thornydale to Cortaro Road.

Again, while trips to work only represent about 1/5 of all trips, and are not representative of overall mode choice, ACS walking to work data can serve as an indicator of where current conditions may support more walking or where the need is greatest. It does not, however, provide any information about pedestrian volume on specific roadways or at individual intersections.

TABLE 4

Means of Transportation to Work by Metropolitan Statistical Areas (2007-2011 5-year ACS estimates)

	Drive to Work Alone	Carpool	Transit	Bike	Walk
Portland	71.4%	9.9%	6.1%	2.1%	**3.3%**
Tucson	76.4%	10.6%	2.3%	1.4%	**2.5%**
Salt Lake City	76.0%	12.0%	3.2%	0.8%	**2.3%**
Fresno	76.7%	12.3%	1.3%	0.6%	**2.2%**
El Paso	79.3%	11.1%	1.9%	0.1%	**2.1%**
Albuquerque	78.7%	11.0%	1.7%	0.9%	**1.9%**
Austin	74.9%	11.7%	2.6%	0.7%	**1.7%**
Phoenix	75.9%	12.4%	2.2%	0.8%	**1.7%**

Source: U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates; Table B08301; generated using American FactFinder

TABLE 5

Means of Transportation to Work by Selected Places within the Tucson Metropolitan Statistical Area (2007-2011 5-year ACS estimates)

	Drive to Work Alone	Carpool	Transit	Bike	Walk
South Tucson	54.6%	21.4%	9.7%	2.3%	**7.7%**
Tucson	73.6%	10.8%	3.5%	2.3%	**3.6%**
Catalina	80.7%	12.4%	0.8%	0.0%	**2.6%**
Casas Adobes	82.4%	8.7%	1.4%	0.4%	**1.5%**
Marana	82.4%	8.3%	0.5%	0.2%	**1.0%**
Oro Valley	79.8%	9.8%	0.4%	0.2%	**0.8%**
Sahuarita	77.3%	16.9%	0.0%	0.3%	**0.7%**
Catalina Foothills	80.4%	7.2%	0.6%	0.3%	**0.5%**
Drexel Heights	80.8%	10.6%	1.7%	0.0%	**0.5%**
Vail	83.9%	8.8%	0.0%	0.2%	**0.3%**

Source: U.S. Census Bureau; American Community Survey, 2007-2011 American Community Survey 5-Year Estimates; Table B08301; generated using American FactFinder

PAG Regional Bicycle and Pedestrian Count

Another source of pedestrian activity data comes from PAG's annual regional bike and pedestrian count. The regional bike count began in 2008 as way to better understand trends and characteristics of cycling in the region. Beginning in 2010, pedestrians were also counted as part of the program.

The count is conducted each fall by PAG and local jurisdictional staff, along with a number of volunteers, who observe selected roadways across the region and count the number of pedestrians and bicyclists passing through the intersection. In general, each location is counted for two hours during one morning weekday peak period and for two hours during one afternoon weekday peak period for a total of four hours of observation time. At most locations, activity is recorded from 7 a.m. to 9 a.m. and again from 4 p.m. to 6 p.m., though there are a few exceptions depending on local travel patterns. Count locations are chosen based on estimated levels of cycling activity and achieving a broad regional/geographic distribution. Each year roughly 100 locations are counted, with the same 39 core locations counted year-after-year in order to observe variations and trends.

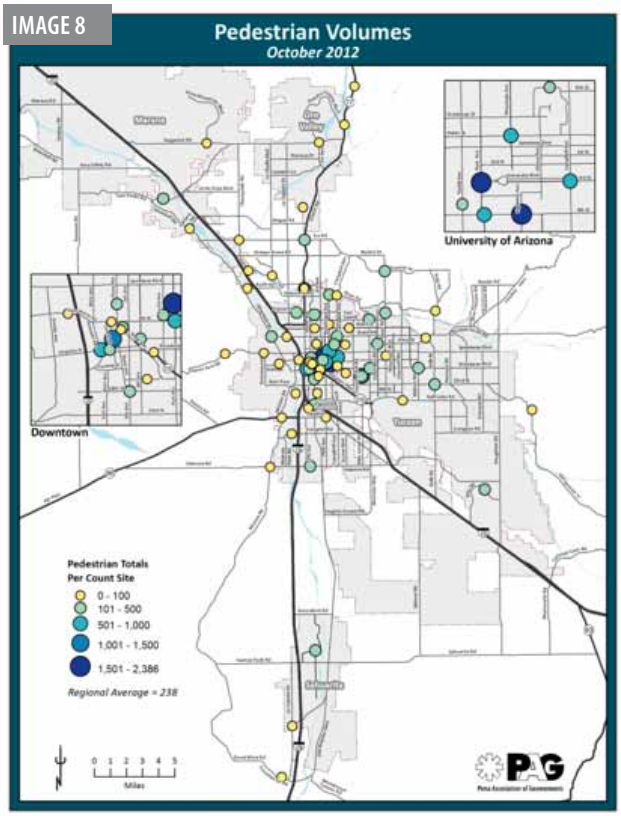
Unlike the ACS, the bike pedestrian count provides comparable volume information at the intersection level, without regard to trip purpose. In some ways the bike pedestrian count confirms what the ACS data suggests, which is, that during the 2012 count, 90 percent of observed pedestrian activity occurred around the University of Arizona, downtown Tucson and in Tucson's urban core (roughly midtown Tucson). While it is certainly true that these areas experience the highest pedestrian volumes, the share of pedestrian activity observed in central locations is likely skewed by the limited number of locations observed, the number of locations observed in the highest-volume locations, and the hours of the observation.

Regardless of the limitations of both sources of pedestrian activity data, ACS Means of Travel to Work and regional bike pedestrian count are complementary and when combined, provide a fairly strong indication of where the most pedestrian activity is occurring in the region.

Walking Purpose

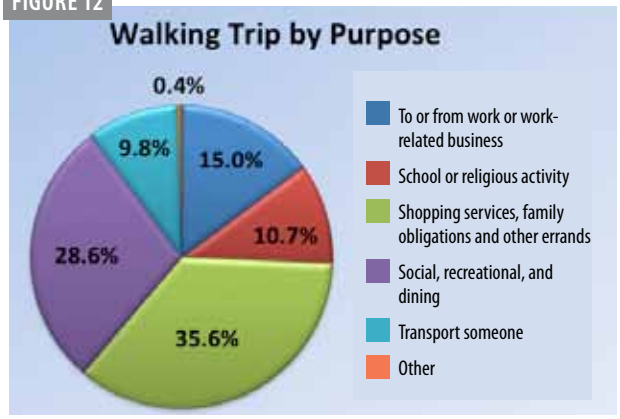
Having generally established high pedestrian activity areas in the region, it is now important to consider

IMAGE 8



Source: PAG 2012 Bicycle and Pedestrian Count

FIGURE 12



Source: 2009 National Household Travel Survey

why and how frequently people walk. This information is available through the 2009 National Household Travel Survey (NHTS) for Pima County, a representative travel survey involving over 2,300 households in the region. Travel data were collected through participating households keeping detailed diaries of their travel behavior over a single 24-hour period – called their "travel day." Travel days were spread over an entire year.

According to NHTS results, the most common

walking purpose is to go shopping and run other errands, followed by walking for social, or recreational purposes, such as dining out, going to the coffee shop or bar, or to a park. Taken together, nearly two-thirds of all walking trips are made in order to run errands or to go to social or recreational destinations.

Not surprisingly, the shopping-and-services category represents the most common walking trip purpose, as this is the most common trip purpose by all modes of transportation. However, in looking at mode split by trip purpose, it is actually the more optional trips, such as dining out and social visits, for which walking captures the largest mode share. Nearly one-fifth of these optional recreational trips are taken on foot, which although still significantly lower than the share of these trips taken by private automobile, may indicate a higher degree of willingness of people to walk for more optional trip purposes. Part of this is probably that these optional trips are less likely to be geographically determined and time constrained than other trip purposes, such as going to work or school; that is to say, most people can choose to walk to the nearest park, café or restaurant or drive or bike to one further away, as is convenient, but have far less flexibility in choosing where and when to go to work or school.

Walking Behavior

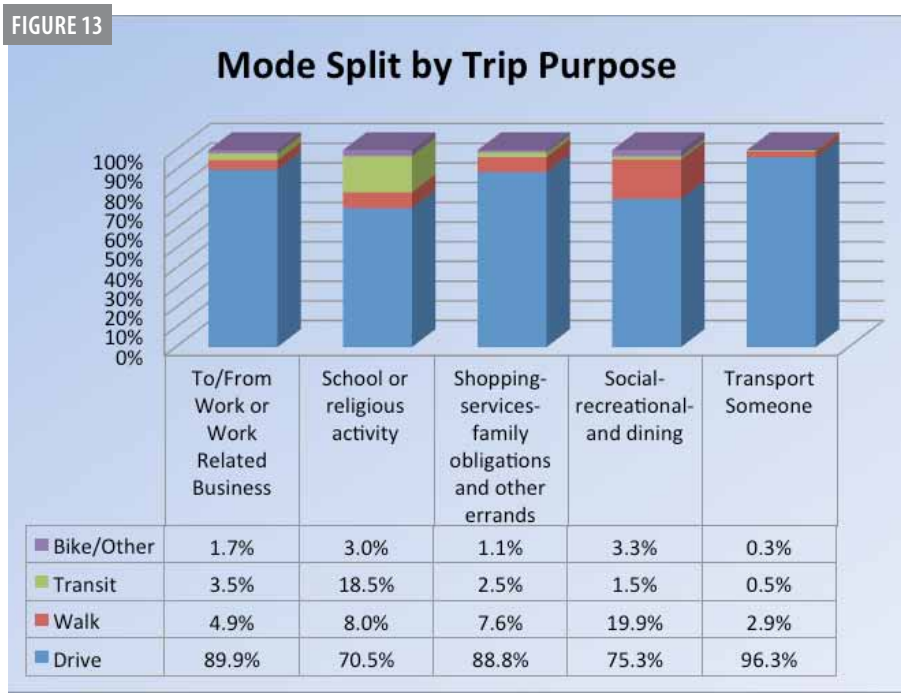
The average resident of the greater Tucson region takes one transportation walking trip about every three days, walking just under two miles a week. This is a per capita measurement, including both people who report taking walking trips and those who don't. For those who report walking for transportation purposes (about 17 percent of the population on a given day), they typically walk around 12 miles per week. The

TABLE 6 WALKING TRIPS INFORMATION

0.67	**Average Walking Trip Distance (miles)**
0.39	**Daily Walking Trips Per Capita**
0.26	**Daily Walking Distance Per Capita (miles)**
5.57	**Daily Walking Duration Per Capita (minutes)**
142.72	**Annual Walking Trips Per Capita**
95.61	**Annual Walking Distance Per Capita (miles)**
33.91	**Annual Walking Duration Per Capita (Hours)**

Source: 2009 National Household Travel Survey

FIGURE 13

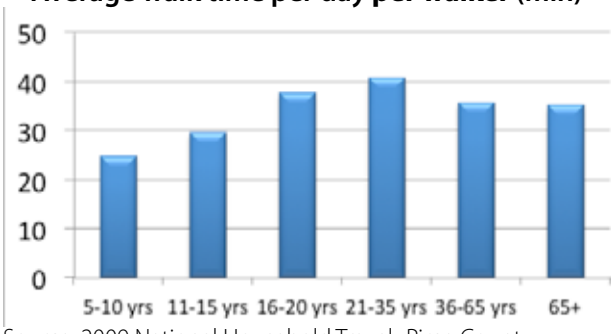


Source: 2009 National Household Travel Survey [13]

[13] Note: The Transit Mode share also includes school buses and other specialized group transportation besides Sun Tran.

FIGURE 14

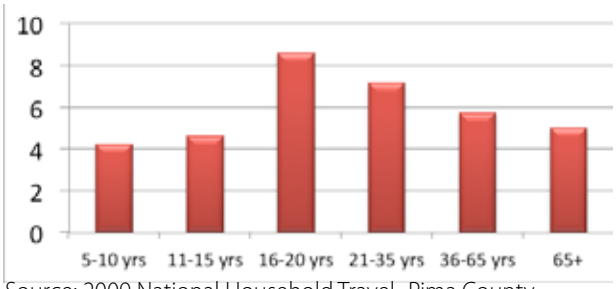
Average walk time per day per walker (min)



Source: 2009 National Household Travel- Pima County

FIGURE 15

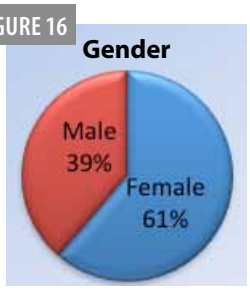
Average walk time per day per capita (min)



Source: 2009 National Household Travel- Pima County

average walking trip distance is about two-thirds of a mile, which will take a healthy adult approximately 15 minutes to travel.

FIGURE 16



Looking at walking distances by age group reveals that 21-35-year-olds who report walking will walk for more time than other age groups, though 16-20-year-olds actually walk for the most time on a per capita basis (meaning that more 16-20 year olds walk for transportation than other groups).

One area for opportunity in encouraging more walking trips in the region is with short trips. Approximately, 18.5 percent of all trips taken in the greater Tucson region are one mile or less. And 44 percent of those trips are driven, while 47 percent are walked. Nationally, about 17 percent of all trips are one mile or less and 47 percent are driven (it should be noted that this is a national survey which includes urban, suburban and rural areas, which will affect the data). Building a more complete, comfortable and safe pedestrian network (as well as encouraging more walkable development patterns) should ultimately result in an increase share of walking for short trips.

Regional Pedestrian Survey Results

In preparation for this planning effort, PAG conducted a regional survey of pedestrians. The survey results provide information on pedestrian behavior, perceptions and preferences, things that cannot be understood from the household travel surveys or census data. In particular, the pedestrian survey shows why people do or do not choose to walk, and their attitudes about doing so, information critical for making decisions about the pedestrian network.

Unlike the National Household Travel Survey, or the American Community Survey, however, the Regional Pedestrian Survey did not seek a representative sampling of the community. Instead, the survey was available for all who wished to participate. Regardless

FIGURE 17

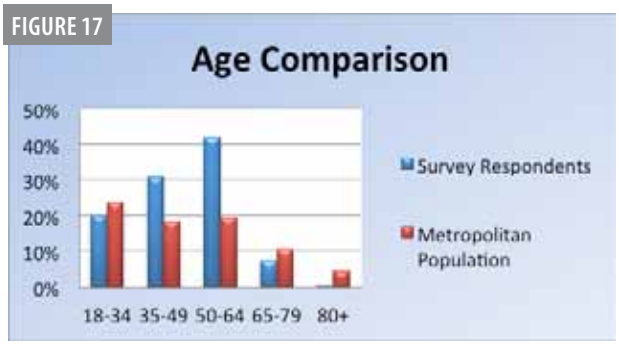


FIGURE 18

FIGURE 19

of that fact, the results provide a good indication of the community's priorities in regard to improving the pedestrian environment and an excellent supplement to regional travel data.

18.5%
of all trips are 1 mile or less
44% are driven
47% are walked

Source: 2009 National Household Travel- Pima County

A total of 670 residents of the Tucson region participated in the pedestrian survey, with the overall pool of respondents skewing more female and toward middle age than the region as a whole. Household automobile availability rates and household income distribution were more closely in line with the region's profile.

Summary of Survey Results

The survey consisted of a mix of question types ranging from walking purpose, to recommendations for improving the pedestrian environment, and included both closed and open-ended questions. A full copy of the survey with results is included as Appendix 1.

The regional pedestrian survey results reinforce and expand on the Household Travel Survey data in that respondents report walking primarily for what is described in the previous charts as optional trip purposes. The most common reason respondents give for walking is for recreational or exercise purposes (a trip purpose that is not included as part of the NHTS) followed by walking for transportation to shopping, services and dining. Importantly, these trip purposes may not be mutually exclusive in that people opting to walk to a restaurant, for example, also may be doing so for recreation.

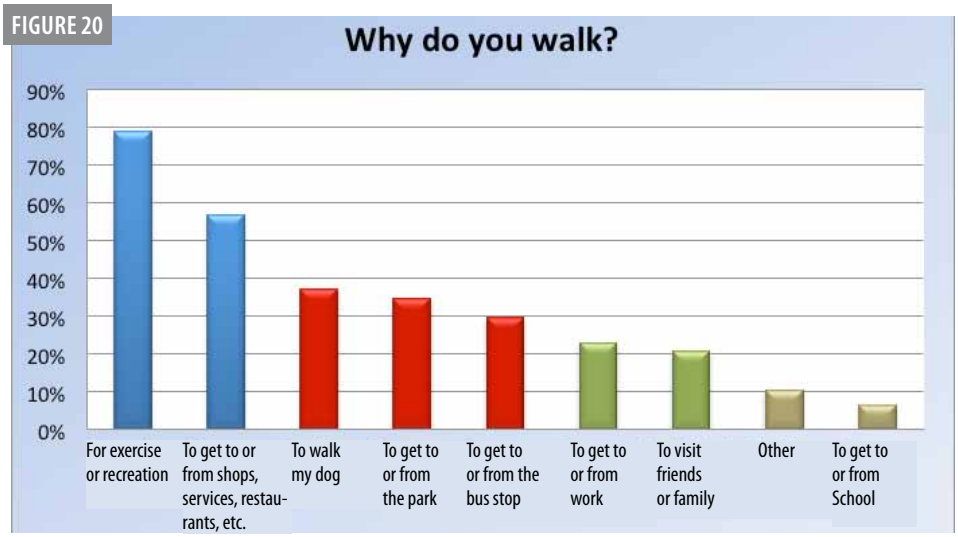
There is some interesting variation by age group as it relates to walking purpose, as younger respondents (18-34) are far more likely to walk for transportation purposes than older respondents (50-64); primarily expressed in walking rates to non-work destinations. (70 percent of 18-34 year olds report walking to restaurants, shopping, etc. vs. 49 percent of 50-64 year olds). Conversely, older respondents are slightly more likely to report walking for exercise or recreation than their younger counterparts (79 percent to 74 percent, respectively).

This may be a local indication of what has been observed nationally; namely, that many members of the millennial generation (roughly 18-34 year olds) are now opting to live in denser, more centrally located neighborhoods in order to take advantage of walking and biking as viable modes of transportation. The premium that many people, and in particular younger people, are placing on walkability in choosing where to live will be a phenomenon to track in the coming years as it may have a strong influence on the decisions shaping the region's built environment.

Survey respondents generally feel that the Tucson region is a good place to walk (67 percent), with the older respondents more likely to have a positive opinion. That said, respondents still identified a number of characteristics of the regional pedestrian system that deter them from walking or make walking difficult or unpleasant. The most common barrier to more walking for respondents was incomplete or missing sidewalks (56 percent), followed by high-speed/high-volume roadways (46 percent), distance to destinations (42 percent), and the weather (40 percent).

Respondents also were asked in the survey which pedestrian improvements they would like to see made in the region. The most common response was

FIGURE 20



increasing the amount of shade (49 percent) followed very closely by building a more complete network of sidewalks (48 percent). Other improvements respondents would like to see include developing more non-arterial walking routes (44 percent) and building larger buffers between sidewalks and busy roadways (37 percent).

Overall, respondents report doing most of their walking on local streets or in the downtown area, as traffic speed, wide roads and driver behavior are seen as impediments to enjoyable and safe walking on busier roadways. Lower-income and respondents without access to a car are much more likely to report walking regularly along major roadways than other groups, placing them at higher risk as pedestrians. As with the NHTS, respondents who walk for transportation purposes report doing so to primarily non-work destinations, such as to restaurants or shopping. Most respondents are willing to walk around a ½ mile or slightly more to get to a destination. Recreational walking primarily takes place within neighborhoods, in parks, and on urban recreational trails where people generally walk between 1 to 3 miles.

TABLE 7

Walking Purpose by Age Group

	18-34	35-49	50-64	65-79
To get to or from work	29.1%	23.7%	21.7%	4.4%
To get to or from shops, services, restaurants, etc.	70.9%	56.7%	49.4%	55.6%
To visit friends or family	27.6%	22.2%	16.5%	20.0%
To get to or from the park	52.0%	40.7%	22.5%	24.4%
To get to or from school	16.5%	8.8%	1.5%	0.0%
To get to or from the bus stop	30.7%	27.8%	32.2%	22.2%
For exercise or recreation	74.0%	78.4%	79.0%	75.6%
To walk the dog	35.4%	43.3%	36.0%	33.3%

(PAG Regional Pedestrian Survey results)

FIGURE 21

What prevents you from walking more? What makes your walk unpleasant?

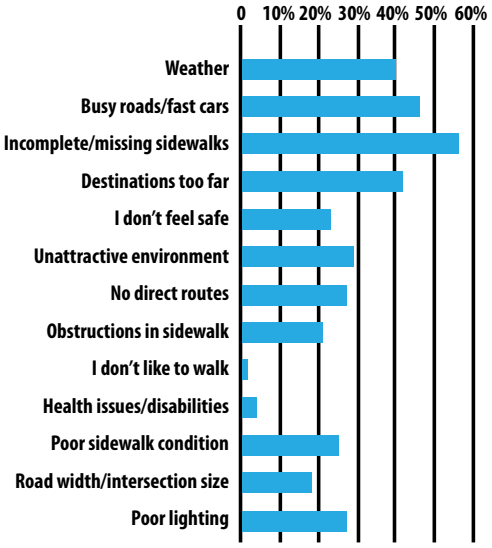
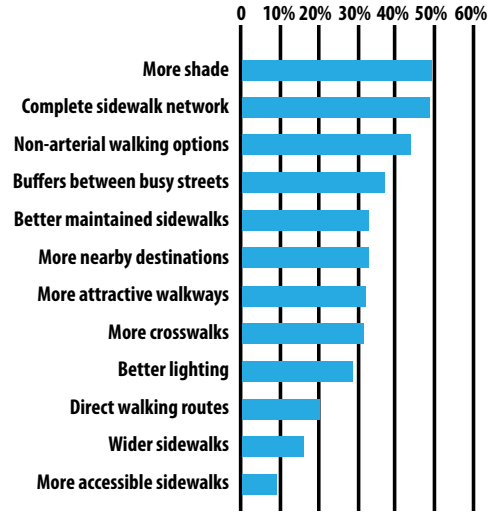


FIGURE 22

Which improvements would encourage you to walk more?



Network Conditions

Now that we've looked at contextual factors (e.g. demographics, urban environment, and walking rates) we can turn our attention to the pedestrian network itself.

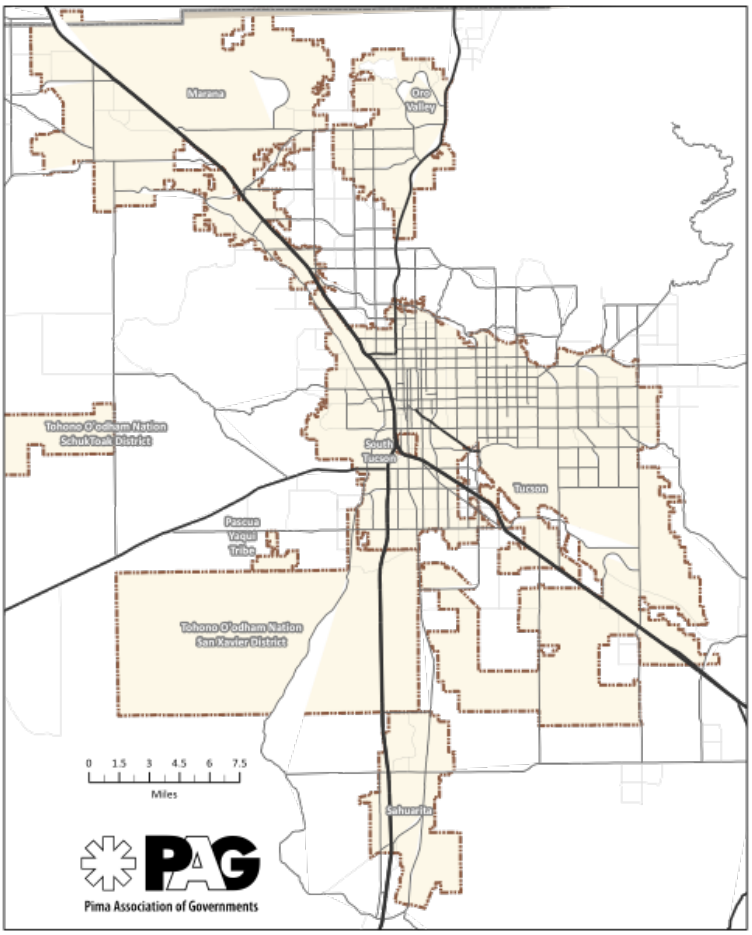
Regional Sidewalk Inventory

In 2012, the City of Tucson and Pima Association of Governments partnered to complete an accessibility inventory of sidewalks along major roadways in the region. The resulting report, titled ADA Sidewalk Inventory Study Report, identified considerable gaps in the region's

sidewalk network and large sections of the system that are inaccessible to people with disabilities. As the report noted, older parts of the region, those that largely developed in the 1980s or before, are particularly likely to be without sidewalks or to be otherwise inaccessible to people with disabilities. This largely results from the fact that these areas developed prior to the enactment of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and Americans with Disabilities Act of 1990 (ADA), which emphasized the needs of pedestrians and people with disabilities and prohibited discrimination in the provision of public services, including in public rights-of-way. Before the enactment of these bills, it was common practice to not include pedestrian improvements in roadway projects. So even though the importance of accommodating all users of public roadways is now widely recognized, the greater Tucson region is still encumbered with the legacy of earlier development practices and needs to start making investments to retrofit many roadways to bring them up to currently accepted standards.

IMAGE 9

Greater Tucson Region Road Network

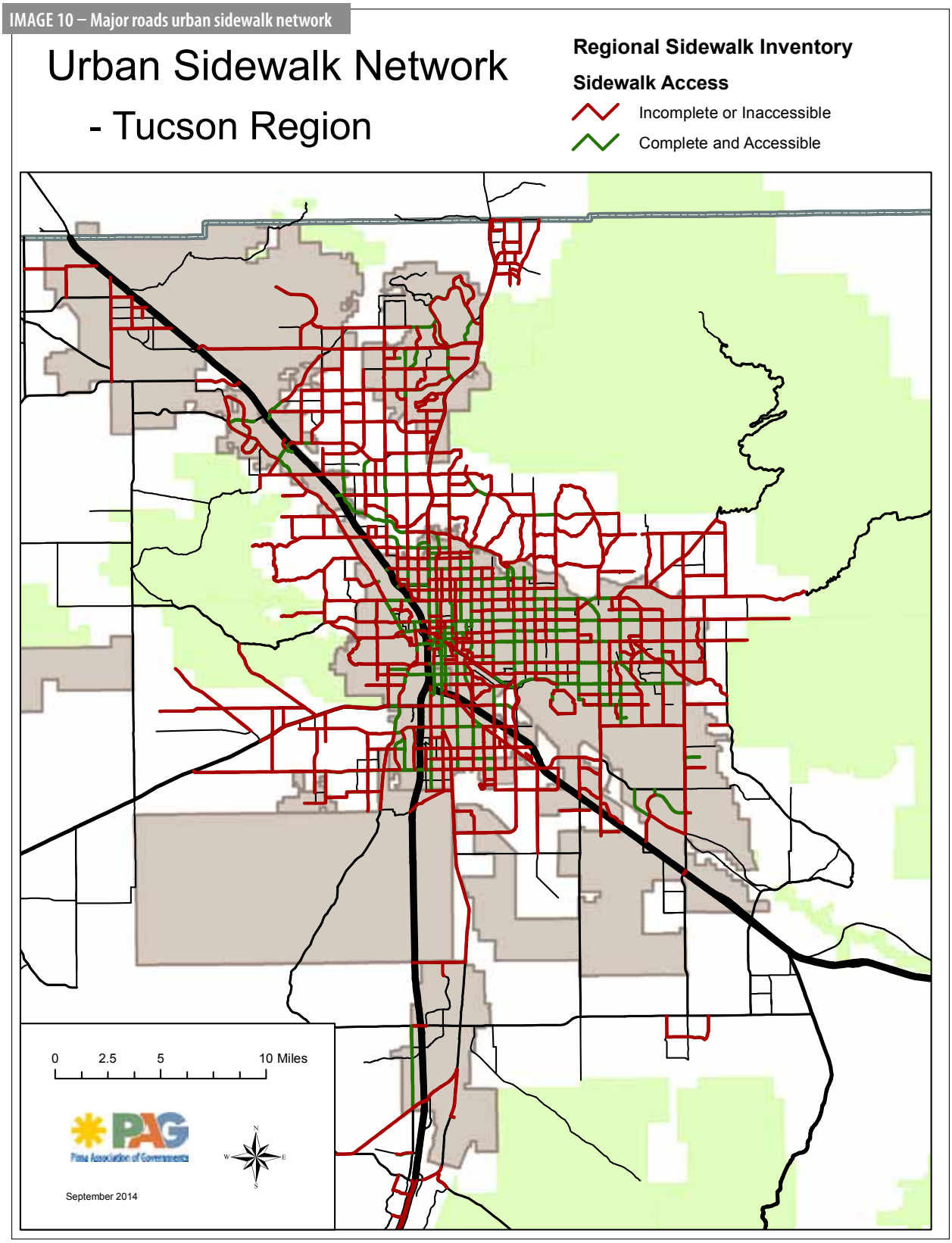


Using a mix of digital tools and field verification, the City of Tucson and PAG staff surveyed roughly 3,670 directional miles along the sides of arterial and collector roadways in Pima County. The report revealed that of roadsides inventoried, only about 537 miles of roadside segments have complete sidewalks with only 442 miles of that being completely accessible to people with disabilities (which includes curb ramps and other requirements). Another 484 miles of roadsides have some sidewalks, but they are incomplete or otherwise not continuous along the segment.[14]

It is important to note that not all miles of roadside inventoried for the report are appropriate for sidewalk installation. Some of the roadways included in study are rural routes, on which sidewalks are not necessary, and probably would not make a lot of sense given the low-volume of pedestrians using the facilities. For rural roadways, wide shoulders are adequate to provide safe and accessible travel options for both pedestrians and bicyclists. Having said that, of 3,670 miles of roadside inventoried, roughly 1,600 miles are considered urban facilities; that is, within the more densely populated parts of the region located in and around the City of Tucson (including most of Oro Valley, parts or Marana, and the most populous areas of Unincorporated Pima County), where one would expect higher rates of pedestrian activity. Within the urbanized area, only about 25 percent of the mileage of roadside segments inventoried has complete sidewalks that are accessible to all members of the public, indicating a critical need to invest in sidewalks along the region's arterials and collectors. Again, this report only looked at major roadways; local streets were not considered.

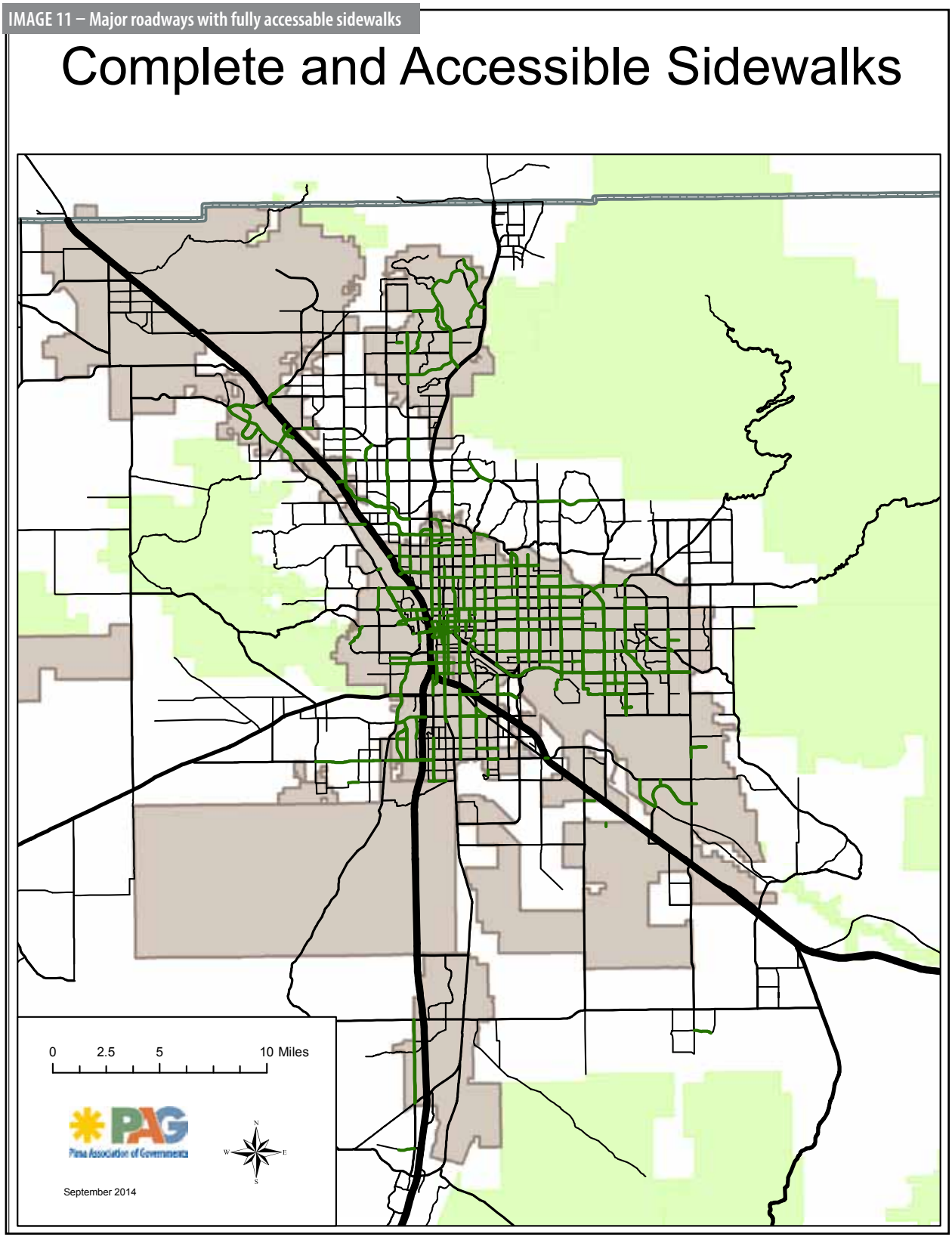
[14] The Inventory looked at roadway segments for the presence of complete and accessible sidewalks, but didn't tally the total mileage of existing sidewalks. The 537 miles of complete sidewalks refers to the segments with a complete sidewalk running the entire distance of the segment. Segments with partial or incomplete sidewalks are those where some sidewalks are present but not continuous for the entire length of the roadway segment. Therefore, the complete mileage of existing sidewalk is higher than the 470 miles mentioned above. A roadway segment is the length of roadway running between two intersections.

IMAGE 10 – Major roads urban sidewalk network



Source: City of Tucson and Pima Association of Governments Sidewalk Inventory Report

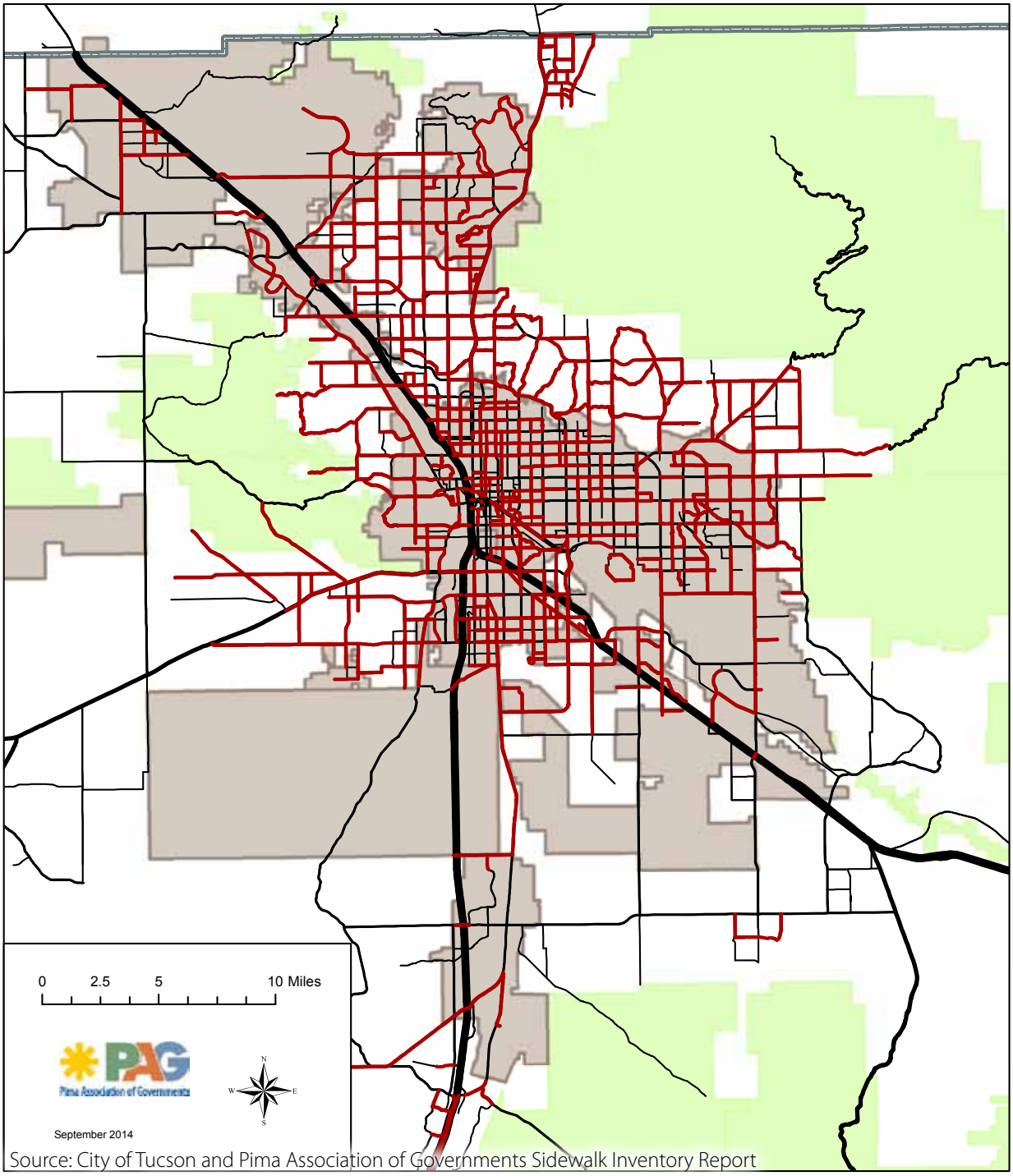
IMAGE 11 – Major roadways with fully accessable sidewalks



Source: City of Tucson and Pima Association of Governments Sidewalk Inventory Report

IMAGE 12 – Major roadways with no sidewalk present

Incomplete or Inaccessible Sidewalks



Source: City of Tucson and Pima Association of Governments Sidewalk Inventory Report

Note: Sidewalks are not appropriate along many rural routes, particularly west of the City of Tucson in unincorporated Pima County, but will still show red on this map. Also, the Sidewalk inventory looked at each side of the roadway separately, so some segments with a complete sidewalk on one side of the road and partial or no sidewalk on the other will show up on two of the maps above.

The Americans with Disabilities Act of 1990

The Americans with Disability Act (ADA) of 1990 is a civil rights statute enacted to prohibit discrimination against people with disabilities. Title II of the Act prohibits discrimination against people with disabilities by state and local governments in all services, programs and activities, including on public facilities such as sidewalks and other pedestrian routes. The ADA is not a transportation bill and, therefore, does not require sidewalks or accessible routes. Instead the ADA is an anti-discrimination bill, which means that where pedestrian facilities are provided (such as sidewalks or other walkways) they must be accessible to everyone, to the greatest extent feasible.

The Department of Justice is responsible for ADA rulemaking and enforcement, and the Department of Transportation has been designated to implement ADA compliance procedures relating to transportation.

Though originally written for the purpose of ensuring access in public and private buildings, the standards contained within the Uniform Federal Accessibility Standard (UFAS) or the ADA Accessibility Guidelines (ADAAG) have been applied, where appropriate, to public facilities in the public right-of-way (such as sidewalks) under Title II. All pedestrian routes built to either ADAAG or UFAS standards are deemed ADA compliant.

Selected current common standards for construction of accessible pedestrian routes in public rights-of-way include:

- Ground surfaces must be stable, firm and slip resistant
- Continual 36-inch wide minimum clear space for pedestrian access routes (such as sidewalks)
- Where pedestrian access routes are less than 60 inches wide, a 60-inch clear passing space must be provided at maximum intervals of 200 feet
- Where there is a height difference between adjacent surfaces of greater than ½ inch (or where a pedestrian access route crosses a curb) a ramp is required
- Ramps are not to exceed a slope of 1/12 or a total rise of 30 inches
- Cross slopes are not to exceed 1/48
- The running slope of a pedestrian access route shall not exceed 1/20

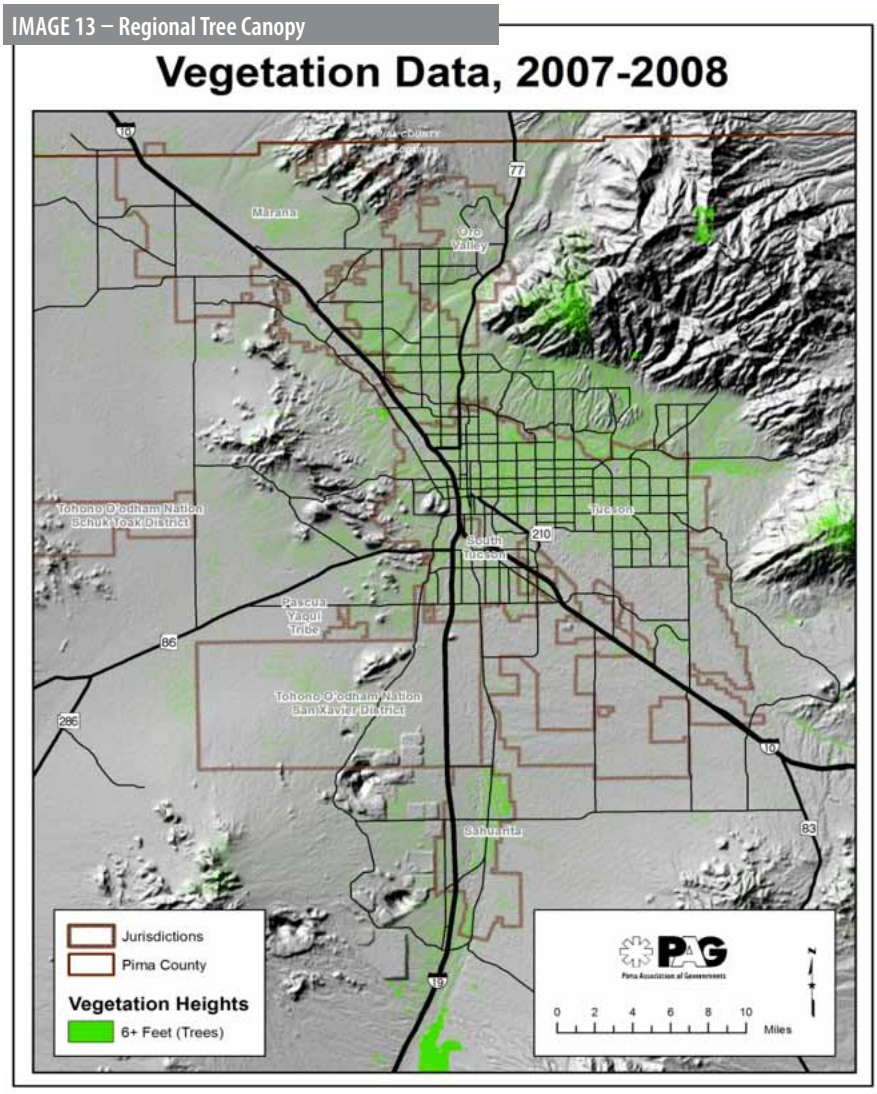
The Architectural and Transportation Barriers Compliance Board (Access Board) has proposed accessibility guidelines specifically for the design, construction and alteration of pedestrian facilities in the public right-of-way. The new guidelines, known as PROWAG, will cover pedestrian access to sidewalks and streets, including crosswalks, curb ramps, street furnishings, pedestrian signals, parking and other parts of the public right-of-way. The new guidelines will make some changes to the existing standards, for example, by requiring 4-foot-wide pedestrian access routes instead of the 3 feet currently required under ADAAG and UFAS. A final rulemaking on the proposed guidelines is expected soon and, as such, most public agencies have already begun to use the PROWAG standards in design, alteration and construction in public rights-of-way.

The Access Board has held trainings in the region to provide regional staff with information on the requirements ADA rules for public rights-of-way to ensure that facilities are made compliant with the law.

Shade

With more than 350 days of sunshine each year, 60 to 70 of which exceed 100 degree temperatures, shade is a critical consideration for improving the pedestrian environment in the Tucson region. Not only does providing shade increase comfort on the region's sidewalks, it is also a matter of public health as shade provides relief from direct exposure to the sun and reduces the risks of heat stress, particularly for more vulnerable populations.

IMAGE 13 – Regional Tree Canopy



Shade can be provided for pedestrians in a number of ways. In areas of the region with a more urban character, buildings located adjacent to sidewalks, shade structures, shelters and street trees can all provide relief from the sun. In residential areas where buildings are set back from the roadway, trees are the most common means of providing shade along roadways.

PAG staff, using a remote sensing technology called LiDAR, has been able to estimate the hours of sun exposure of the region's roadsides. Taking periodic images from the hottest months, PAG generated a map of hours of direct sunlight on all of the region's pedestrian surfaces. This information can be used to identify areas where little or no shade is present.

Intersection Density

Another factor to consider in how well the pedestrian network encourages walking is intersection density. Intersection density is simply the number of intersections in a given area (usually a square mile), and is a general measurement for the area's street network connectivity. As a measurement of connectivity, intersection density has actually been shown to be a very strong predictor of walking rates,[16] particularly when complemented by higher residential and employment density, pedestrian-oriented design and a mix of uses. Having a higher density of intersections supports walking as a means of transportation by ensuring more direct walking routes to destinations, thus reducing walking distances, providing a variety of walking route options, offering more potential variety in the built environment and reducing vehicular traffic speeds.

Although there is no universally agreed upon threshold for a walkable density of intersections, the Traditional Neighborhood Development (TND) Design Rating Standards for neighborhood development can be instructive.[17] According to the TND approach, the highest-ranked neighborhoods in terms of high-quality development are those with more than 330 intersections per square mile.

Currently, the area with the greatest intersection density within the greater Tucson region is in Tucson's central core, where the density of intersections tops out around 250 intersections per square mile.

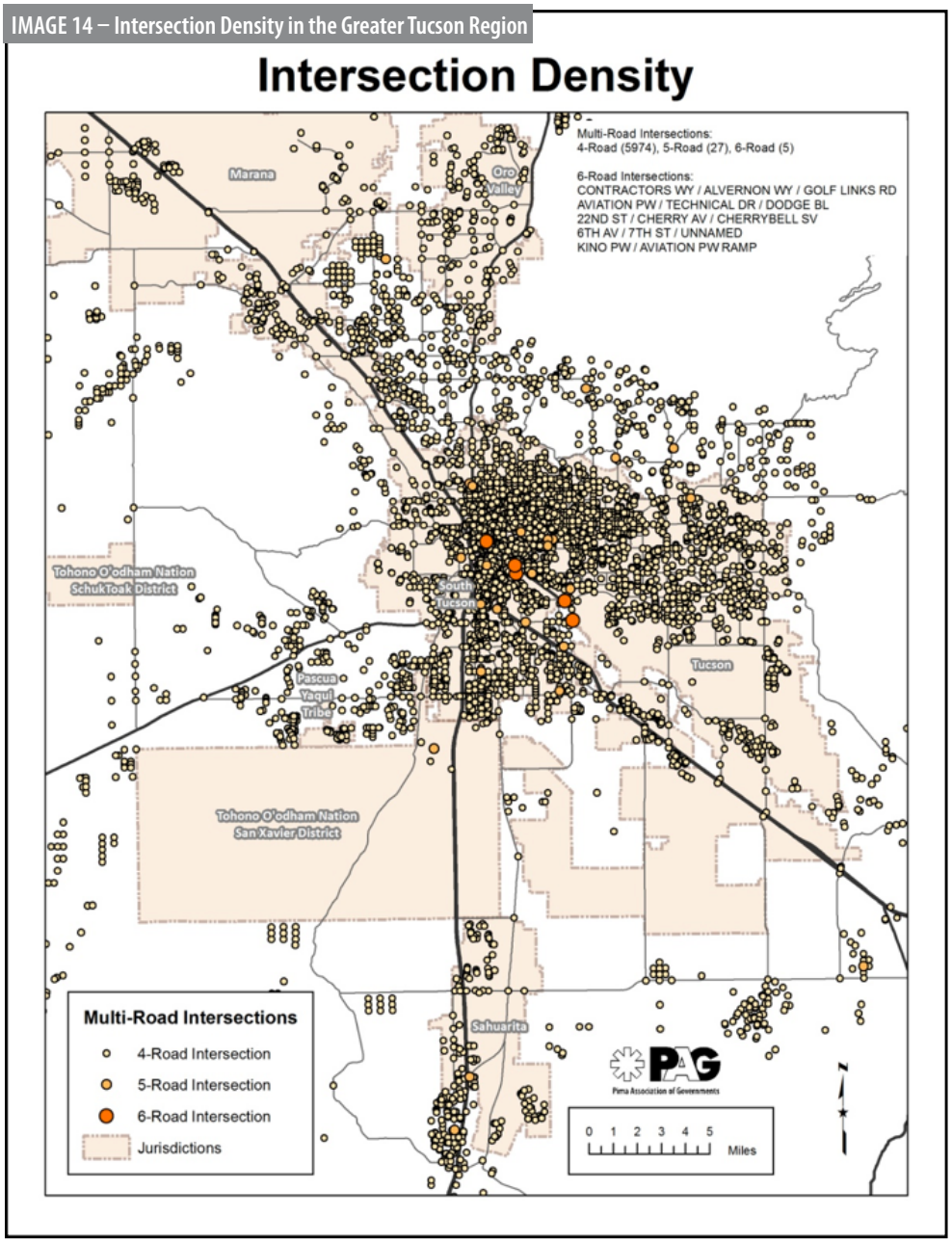
TABLE 8 – Traditional neighborhood design rating - Intersection density

TND Design Rating Standards for Connectivity	
Five Stars	More than 330 intersections per square mile
Four Stars	290-330 intersections per square mile
Three Stars	250-290 intersections per square mile
Two Stars	80-250 intersections per square mile
One Star	Fewer than 80 intersections per square mile

[16] Ewing, Reid, and Robert Cervero, "Travel and the Built Environment: A Meta Analysis." Journal of the American Planning Association. No. 3 (2010): 265-29. http://www.tandfonline.com/doi/abs/10.1080/01944361003766766

[17] TND Design Rating Standards 2.2. http://www.epa.gov/dced/scorecards/TND_Design_Rating_Standards_2.2.pdf

IMAGE 14 – Intersection Density in the Greater Tucson Region



Safety

Safety is the final, and perhaps most important, element of creating a high-quality pedestrian environment that this Plan will consider. As the Federal Highway Administration (FHWA) notes in *How to Develop a Pedestrian Safety Action Plan*, vehicle-pedestrian crashes are a major problem on our nation's roadways and major cause of preventable injury and death. Nationally, more than 4,700 pedestrians are killed annually as a result of motor vehicle crashes, and a far greater number are seriously injured.

Pedestrian crashes are also a continuing concern in the greater Tucson region. In 2011, the region experienced a pedestrian fatality rate above the national average, qualifying the Tucson metro as an FHWA pedestrian safety focus area (Arizona has already been identified as an FHWA pedestrian focus state due to Phoenix having higher-than-average pedestrian fatality rates).

A pedestrian is struck by a motor vehicle every 1 ½ days in Pima County.

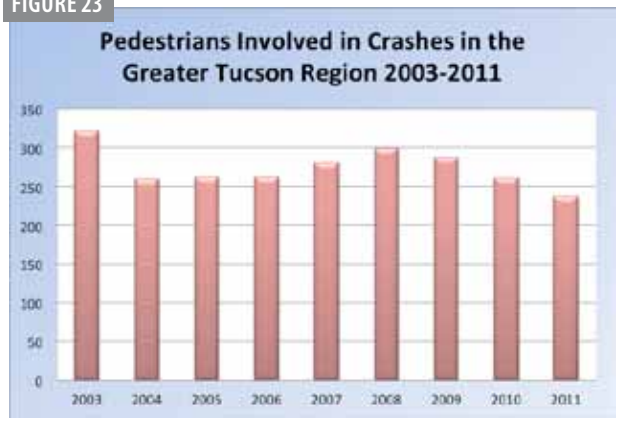
A pedestrian is struck by a motor vehicle every 1 ½ days in Pima County. Each year in the region, between 250 and 300 pedestrians are involved in crashes with motor vehicles.

Improving pedestrian safety is important as an end in itself, as it can reduce the number of preventable deaths and injuries, particularly for higher-risk populations such as children, the elderly and lower-income residents. This also will eliminate a major obstacle to increased walking in the community and can have significant economic impacts.

Injury Severity

Pedestrian involved crashes are more likely to result in serious injury or death than other types of crashes on the region's roadways, especially along roadways with higher travel speeds. The National Highway Traffic Safety Administration (NHTSA) reports that the occurrence of pedestrian crashes and risk of severe injury or death are both strongly associated with the travel speed of the motor vehicle at the time of the crash. [18] More specifically, according to a study by the AAA Foundation for Traffic Safety, "the average risk of severe injury for a pedestrian struck by a vehicle reaches 10 percent at an impact speed of 16 mph, 25 percent at 23 mph, 50 percent at 31 mph, 75 percent at 39 mph, and 90 percent at 46 mph. The average risk of death for a pedestrian reaches 10 percent at an impact speed of 23 mph, 25 percent at 32 mph, 50 percent at 42 mph, 75 percent at 50 mph, and 90 percent at 58 mph." [19]

FIGURE 23



Source: Arizona Department of Transportation Crash Statistics

TABLE 9

Pedestrians Involved in Crashes by Responding Jurisdiction 2007-2011

	2007	2008	2009	2010	2011	Total
Pima County	36	46	57	50	35	224
Tucson	232	233	223	208	197	1093
Marana	5	5	5	2	4	21
Sahuarita	0	1	2	3	1	7
South Tucson	9	10	5	5	3	32
Oro Valley	2	5	1	1	4	13

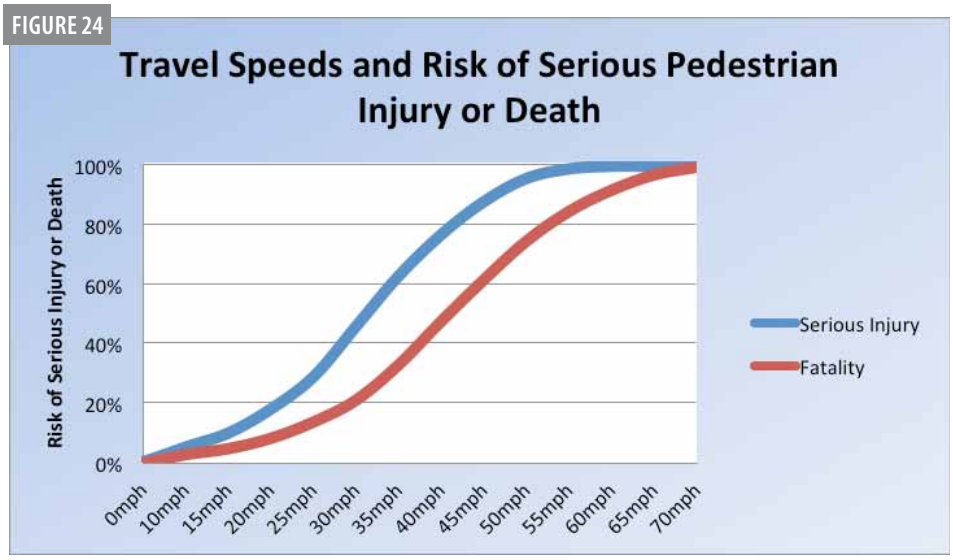
Source: Arizona Department of Transportation Crash Statistics

[18] U.S. Department of Transportation; National Highway Traffic Safety Administration, "Literature Review on Vehicle Travel Speeds and Pedestrian Injuries." October, 1999. http://www.nhtsa.gov/people/injury/research/pub/hs809012.html

[19] Teft, Brian C. AAA Foundation for Traffic Safety, "Impact Speed and a Pedestrian's Risk of Severe Injury or Death." September 2011. https://www.aaafoundation.org/sites/default/files/2011PedestrianRiskVsSpeed.pdf

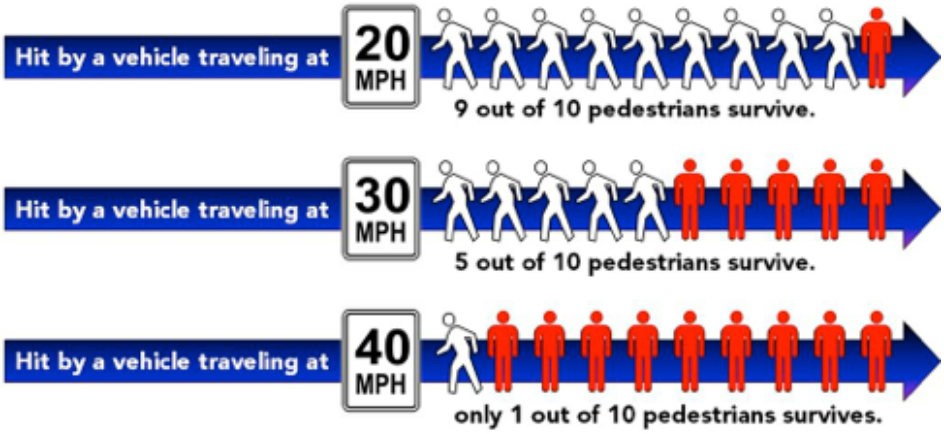
This helps to explain why in the greater Tucson region, 70 percent of fatal crashes occur on major or minor arterial roadways where posted speed limits are typically between 35 and 45 mph. Overall, approximately 7.5 percent of all reported pedestrians involved in crashes with motor vehicles suffered a fatal injury during the period, while another 24 percent were severely injury.

FIGURE 24



Source: AAA Foundation for Traffic Safety

Between 2006 and 2011, 124 people were killed while walking in the region, an average of just under 21 per year, and another 403 were severely injured (called an incapacitating injury). Another way to look at this is that, even though only about 10 percent of trips are made on foot in the metropolitan region, roughly 18 percent of people killed in traffic accidents are pedestrians. This is slightly higher in the City of Tucson itself, where nearly 1 person in 4 killed in traffic accidents is a pedestrian. These pedestrian fatality numbers have resulted in the Tucson metropolitan region being ranked as the 25th most dangerous region for walking of the country's 52 largest metros, according to Dangerous by Design 2011, a report on pedestrian safety released by the advocacy group Transportation for America. The greater Tucson region was also listed as the 5th most dangerous large Western metropolitan region for walking. [20] (Note: in the 2014 edition of Dangerous by Design the Tucson metropolitan area is not included in the comparative national rankings as the list only includes metro areas over 1 million in population.)



Other Studies show higher likelihood of pedestrian fatality. In both cases, likelihood of pedestrian fatality doubles between 30 and 40 mph. Image: Peds.org

[20] Ernst, Michelle, Marisa Lang, and Stephen Davis, Transportation for America, "Dangerous by Design 2011: Solving the Epidemic of Preventable Pedestrian Deaths." 2011. http://t4america.org/docs/dbd2011/Dangerous-by-Design-2011.pdf

In addition to the human cost of pedestrian crashes, economic costs are high. Using cost estimates from the National Safety Council of average cost of motor vehicle crashes, deaths and injuries, the Arizona Department of Transportation (ADOT) develops statewide and county estimates for economic loss due to motor vehicle crashes. In 2012, ADOT estimated the economic cost of a traffic fatality at $1,448,400 based on an estimate of wage and productivity losses, medical expenses, administrative expenses, motor vehicle damage and employer costs.[21] Since 2006, it is estimated that the region experienced $179,601,600 in economic loss as a result of pedestrian fatalities (increasing to $208,581,330 if pedestrian crashes that resulted in an incapacitating injury are also included).

Crash Characteristics

Not all pedestrian crashes are of a single type or occur in equal distribution across all groups of people or all areas of the region. For that reason, it is important to look at common crash characteristics and high-frequency crash locations in order for the region to develop appropriate strategies and implement countermeasures to effectively address common safety issues.

Pedestrians are at greatest risk to be involved in a crash when crossing roads or are otherwise exposed to vehicular traffic, particularly on wide, high-volume, high-speed roadways.

FIGURE 25

Source: National Highway Traffic Safety Administration, Fatality Analysis Reporting System

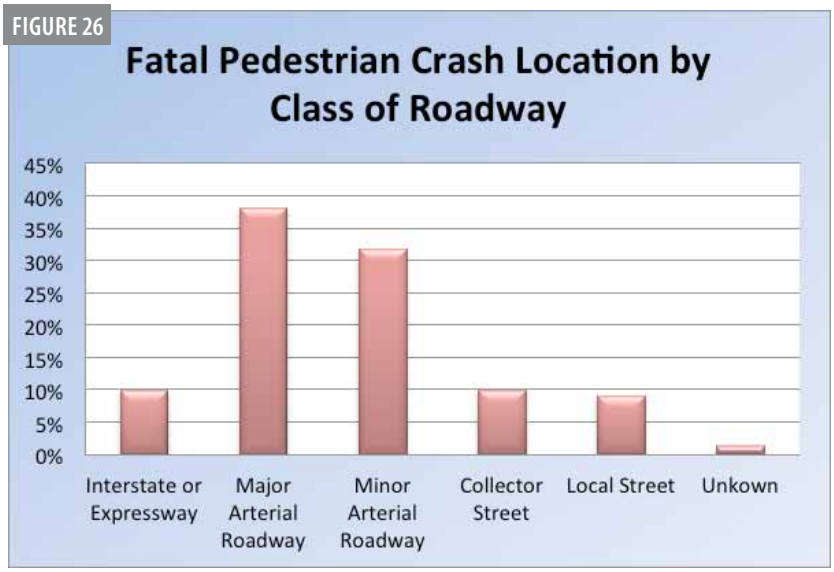
TABLE 10

Pedestrians Involved in Crashes by Injury Severity in the Tucson Metropolitan Region 2006-2011

	2006	2007	2008	2009	2010	2011
Fatal	20	24	13	19	19	29
Incapacitating Injury	57	73	90	71	65	47
Non-Incapacitating Injury	112	107	113	112	104	110
Possible Injury	56	62	62	63	49	43
No Injury	17	14	21	23	24	8
Unknown	-	4	1	5	8	7
TOTAL	**264**	**284**	**300**	**293**	**269**	**244**

Source: Arizona Department of Transportation Crash Statistics

FIGURE 26



Source: National Highway Traffic Safety Administration, Fatality Analysis Reporting System

[21] Arizona Department of Transportation, "2012 Motor Vehicle Crash Facts for the State of Arizona." 2012. http://www.azdot.gov/mvd/statistics/crash/PDF/12CrashFacts.pdf

One place where this pedestrian/vehicle conflict is likely to occur is at intersections. Between 2007 and 2011, 53 percent of pedestrian-involved crashes occurred at intersections or were otherwise intersection related. In over half of pedestrian-involved crashes at intersections, the driver was making a right or left turn that resulted in the crash. Thirty-six percent of pedestrian crashes occurred away from intersections. Another 106 pedestrian crashes occurred where driveways intersect with the pedestrian zone.

While most crashes occur at or near intersections, the mid-block crashes have resulted in the most severe injuries. Since 2007, 66 percent of pedestrian fatalities occurred outside of intersections, even though this location only represented 36 percent of all pedestrian crashes. The disproportionate rate of fatal crashes is likely a result of higher vehicle travel speeds at mid-block locations than at intersections, where many vehicles may have slowed down due to traffic signals, stop signs, or in order to turn.

FIGURE 27

Source: Arizona Department of Transportation Crash Statistics

FIGURE 28

Source: National Highway Traffic Safety Administration, Fatality Analysis Reporting System

TABLE 11

Pedestrian Crash Location, 2009-2011

	2009	2010	2011	TOTAL
At intersection but no marked crosswalk	34	34	26	94
Dedicated Bike Lane	5	3	0	8
Driveway access crosswalk	8	7	8	23
In roadway not in crosswalk or intersection	116	97	87	300
Marked crosswalk at intersection	86	86	85	257
Non-intersection crosswalk	3	6	7	16
Other	5	5	4	14
Outside trafficway	1	3	3	7
School crosswalk	0	1	2	3
Shoulder or roadside	8	6	4	18
Sidewalk	10	7	10	27
Unknown	10	7	5	22

Source: Arizona Department of Transportation Crash Statistics

FIGURE 29

Time

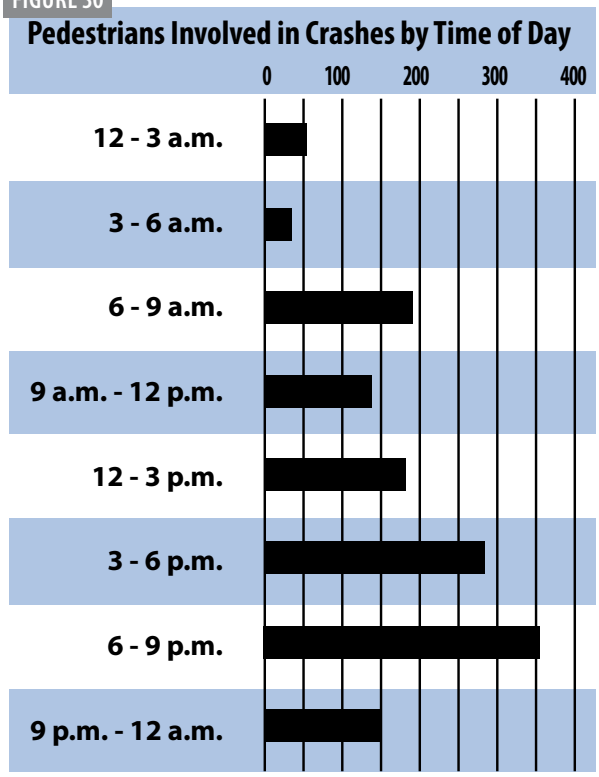
Most pedestrian crashes take place in the evening hours, during peak travel times when many people are leaving work or school or traveling for other purposes, such as shopping or dining. Approximately 46 percent of pedestrians were struck in the hours between 3:00 and 9:00 p.m., with the majority happening between 6:00 and 9:00 p.m.

Pedestrian fatality rates are higher during nighttime hours than during the day, with 34 percent of fatalities occurring during the peak crash hours between 6:00 and 9:00 p.m. (though only 26 percent of all pedestrian crashes occur then). This is most apparent in the later evening hours (9:00 p.m. to 3:00 a.m.) during which time 30 percent of pedestrian fatalities occur but only 14 percent of pedestrian crashes. Overall, 75 percent of pedestrian fatalities occur at night.

Nearly 40 percent of pedestrian crashes occur under dark conditions. Thirty-two percent of crashes occurring in dark conditions occurred where no lighting was present. Pedestrian crashes are more frequent on weekdays than during the weekend, peaking around mid-week. This is likely a reflection of higher vehicular and pedestrian volumes during the weekdays than on weekends.

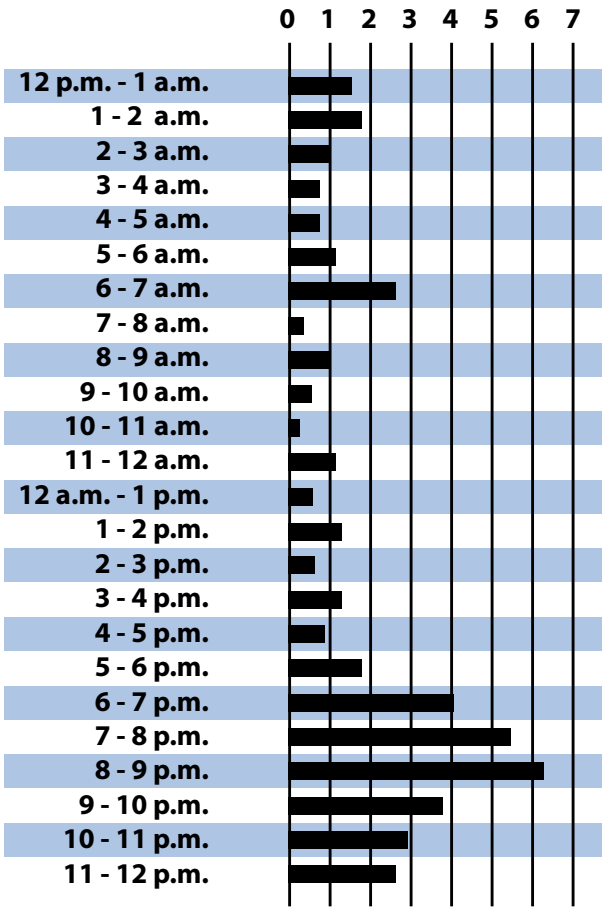
Also, pedestrian crashes occur more frequently in autumn and early spring and dip in the summer months, again, likely reflecting pedestrian activity levels as a result of weather conditions and local population fluctuations.

FIGURE 30



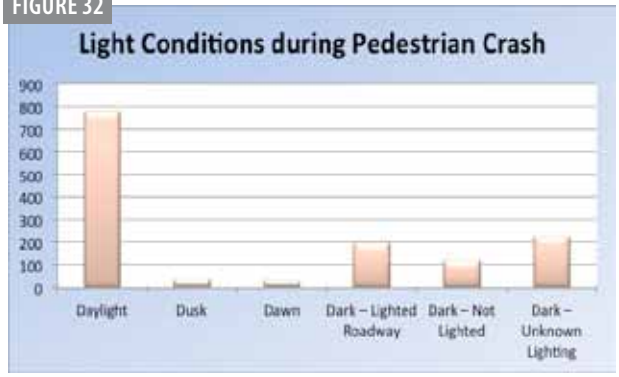
Source: Arizona Department of Transportation Crash Statistics

FIGURE 31



Source: Arizona Department of Transportation Crash Statistics

FIGURE 32



Source: Arizona Department of Transportation Crash Statistics

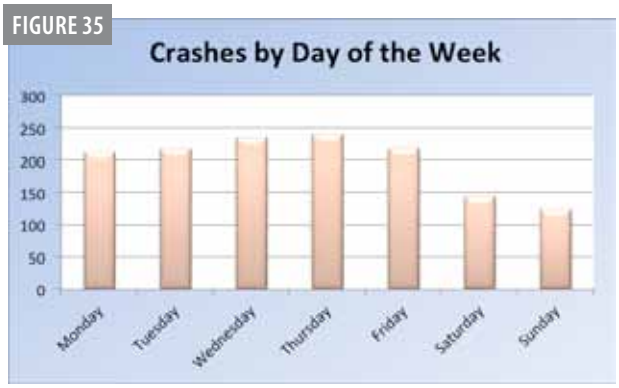
FIGURE 33

Source: Arizona Department of Transportation Crash Statistics

FIGURE 34

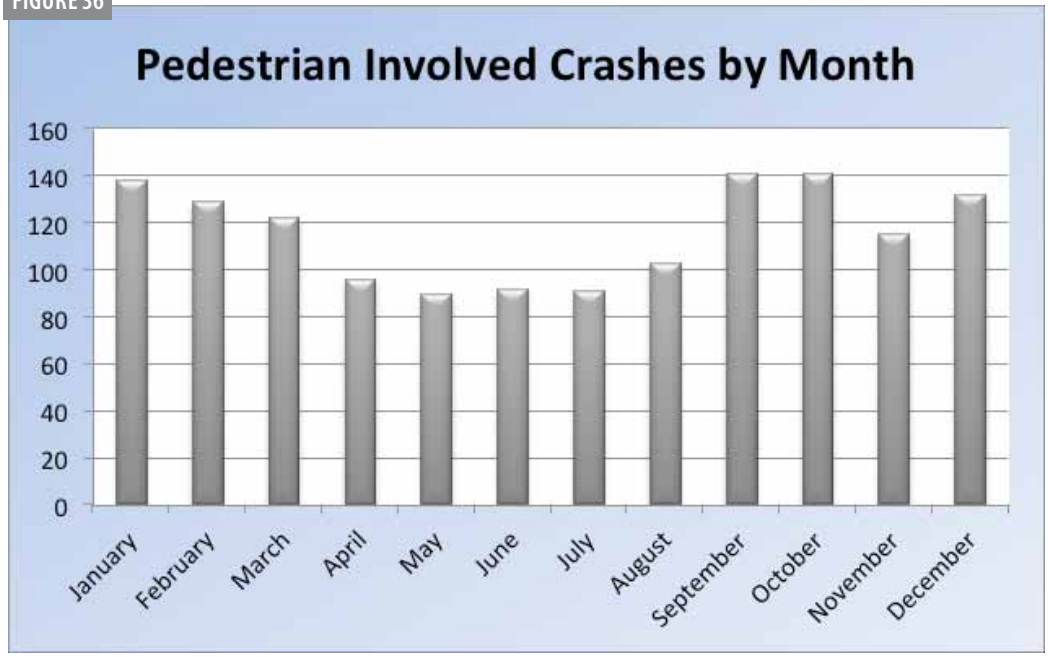
Source: Arizona Department of Transportation Crash Statistics

FIGURE 35



Source: Arizona Department of Transportation Crash Statistics

FIGURE 36



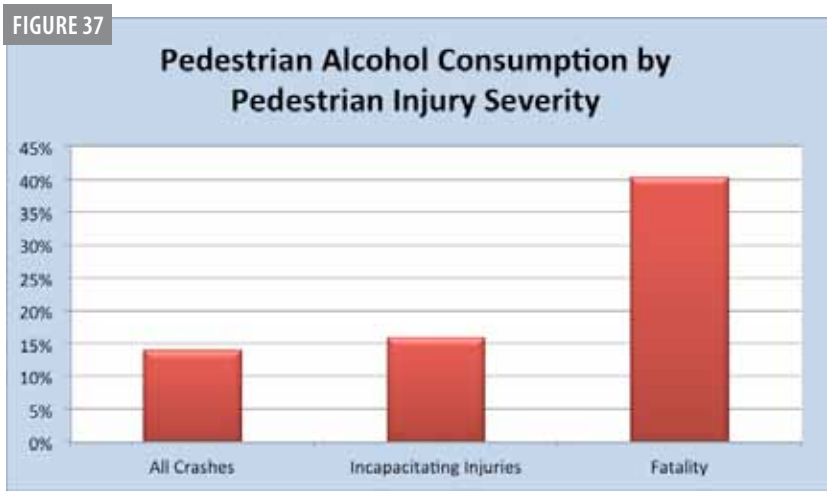
Source: Arizona Department of Transportation Crash Statistics

Alcohol

Consumption of alcohol is a significant factor in pedestrian crashes. In around 14 percent of pedestrian-involved crashes, the pedestrian tested positive for alcohol. For nighttime crashes, this number increases to 28 percent. More startling, in fatal crashes where a test was given, 40 percent of pedestrians had been consuming alcohol. In 50 percent of nighttime fatal pedestrian crashes, the pedestrian tested positive for alcohol. (Note: In 40 percent of pedestrian fatalities, no test was given or results were unreported in the crash data. So depending on the circumstances of those incidents, the 40 percent number for alcohol consumption could be considerably higher or lower. State estimates are that alcohol consumption plays a factor in about 43 percent of pedestrian fatalities).

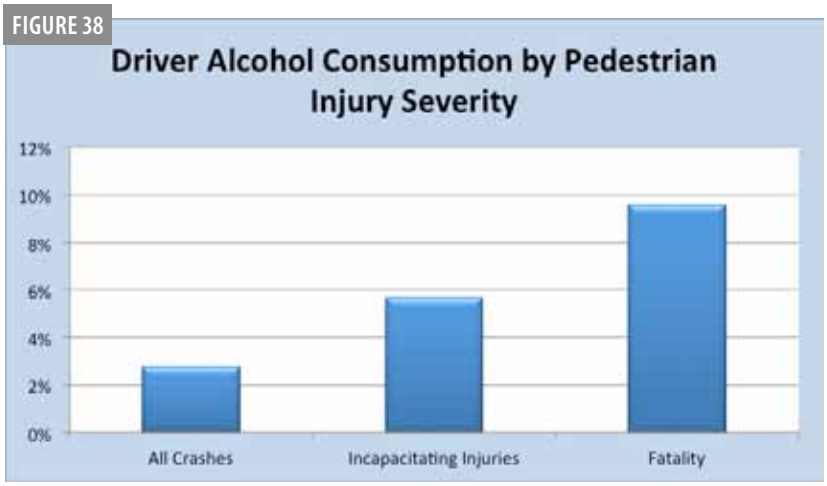
In 10 percent of fatal pedestrian crashes, the driver tested positive for alcohol. The difference, of course, is that in the case of pedestrian alcohol consumption, the person is primarily putting him or herself at risk, whereas a person driving under the influence is putting others as well as him or herself in danger. The presence of alcohol does not necessarily mean that it was the primary cause of the crash. It only indicates that someone involved in the crash tested positive for the presence of alcohol in his or her system.

FIGURE 37



Source: Arizona Department of Transportation Crash Statistics

FIGURE 38



Source: Arizona Department of Transportation Crash Statistics

Gender/Sex

Males are over-represented in both pedestrian crashes and in pedestrian fatalities. More than 6 in 10 pedestrians involved in crashes with vehicles are males, representing more than 70 percent of pedestrian fatalities.

Age

As discussed above, pedestrian crash and injury risk varies by age group. While some age groups, such as young children and seniors, are involved in pedestrian crashes at a relatively low frequency, they have a higher risk of sustaining serious or fatal injuries when struck. Other groups, such as 15-19 year olds, are involved in crashes at a much higher rate than others, but have a lower chance of sustaining serious injury.

The disparity in crash involvement between genders exists across all age groups, though it is more pronounced among 45-49 year olds. The male-to-female crash involvement ratio is most equal among the 15-19-year-old demographic, which is also the group that was involved in the most pedestrian crashes from 2007-2011.

Pedestrian crashes involving older residents are more likely to result in an incapacitating or fatal injury than those involving other groups. People over 65 in particular are much more likely to be killed in a pedestrian crash (20 percent of pedestrian crashes involving a senior result in a fatality vs. 7.8 percent for the population as a whole).

FIGURE 39 **Pedestrians Involved in Crashes by Sex**

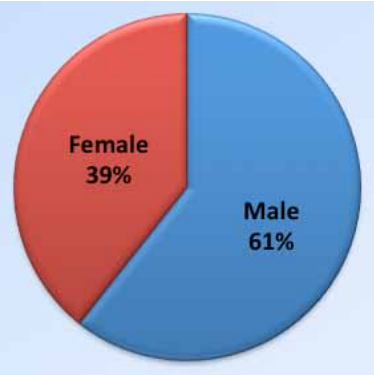
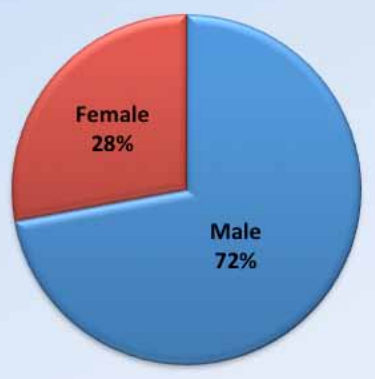
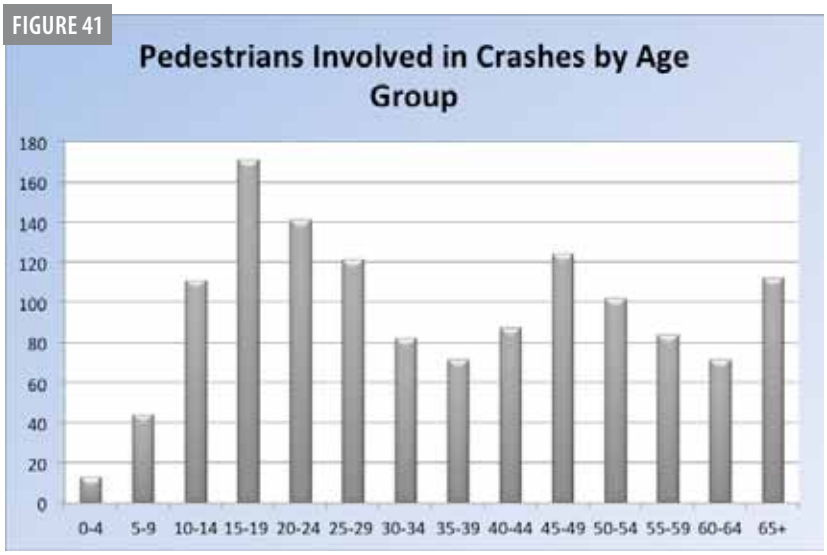


FIGURE 40 **Pedestrian Fatalities by Sex**



Source: Arizona Department of Transportation Crash Statistics

FIGURE 41



Source: Arizona Department of Transportation Crash Statistics

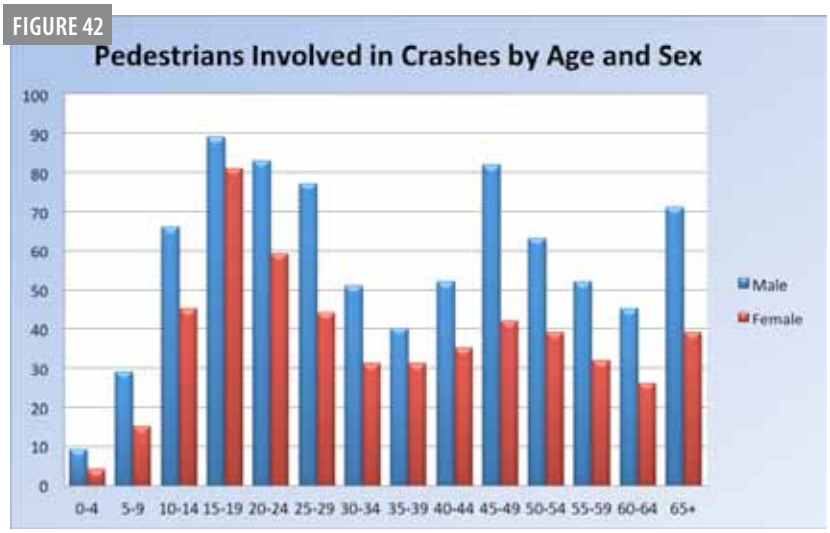
High-Crash Areas

Finally, it is important to know where pedestrian crashes are occurring with the greatest frequency. This will allow the region to target specific areas for safety improvements where they will have the greatest positive impact.

To do this, PAG used crash data provided by the Arizona Department of Transportation to map the location of pedestrian crashes that occurred from 2007 to 2011. Then, in order to identify high-frequency crash areas in the region, PAG used Geographic Information System (GIS) software to generate kernel density heat maps of high crash locations.

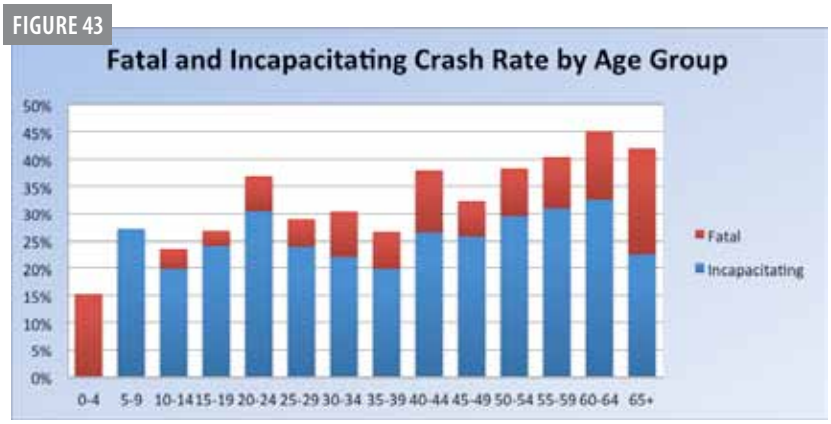
The following maps provide a general picture of where crashes are occurring and, as such, are a useful indicator at a regional scale. However, to get a complete understanding of what factors are contributing to the high frequency of crashes in these areas, a more detailed analysis is required, including, but not limited to, reviewing incident reports, conducting site examinations, and doing pedestrian counts.

FIGURE 42



Source: Arizona Department of Transportation Crash Statistics

FIGURE 43



Source: Arizona Department of Transportation Crash Statistics

IMAGE 15 – Pedestrian Involved Crash Locations 2007-2011

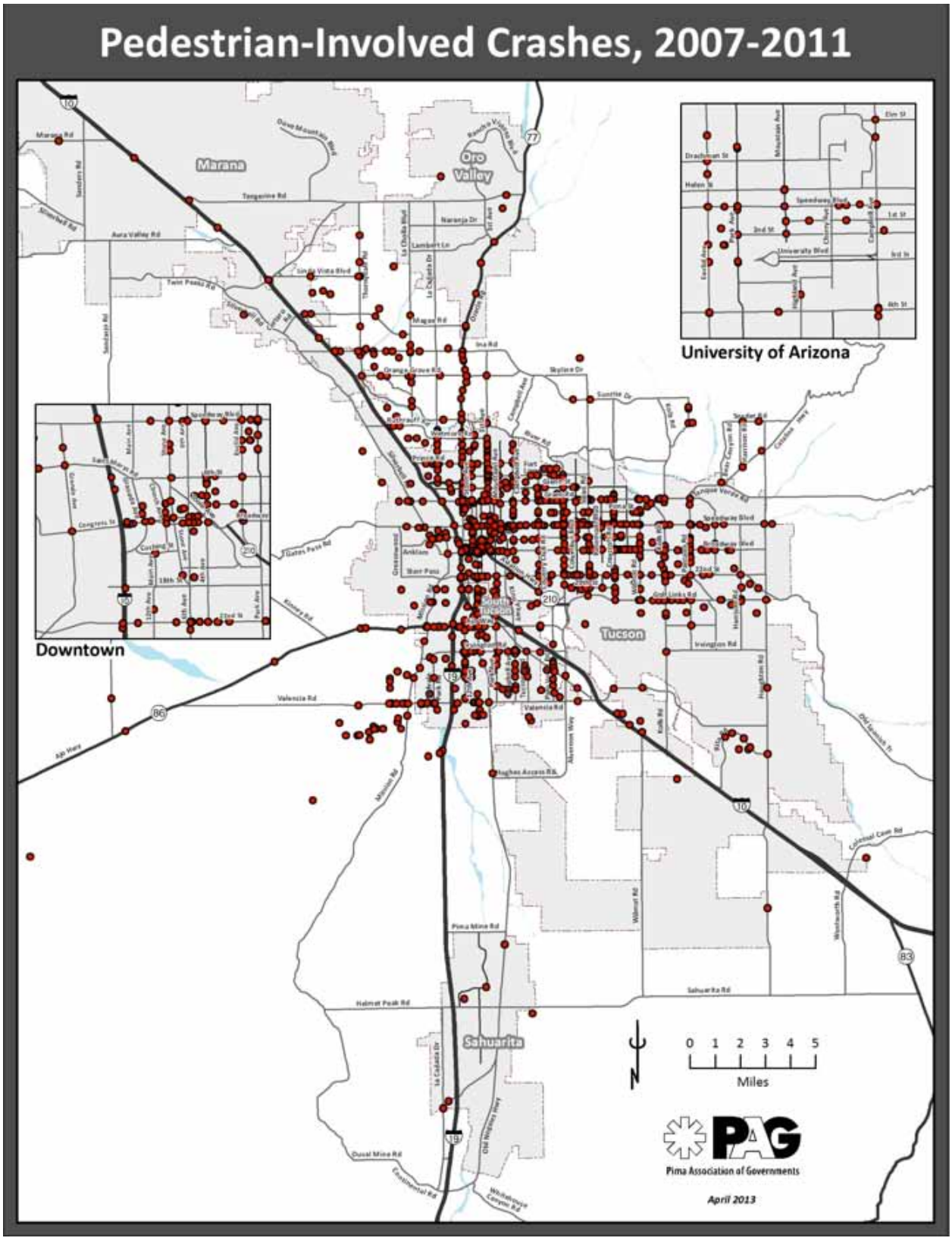


IMAGE 16 – Pedestrian Involved Crash Location Intensity Map

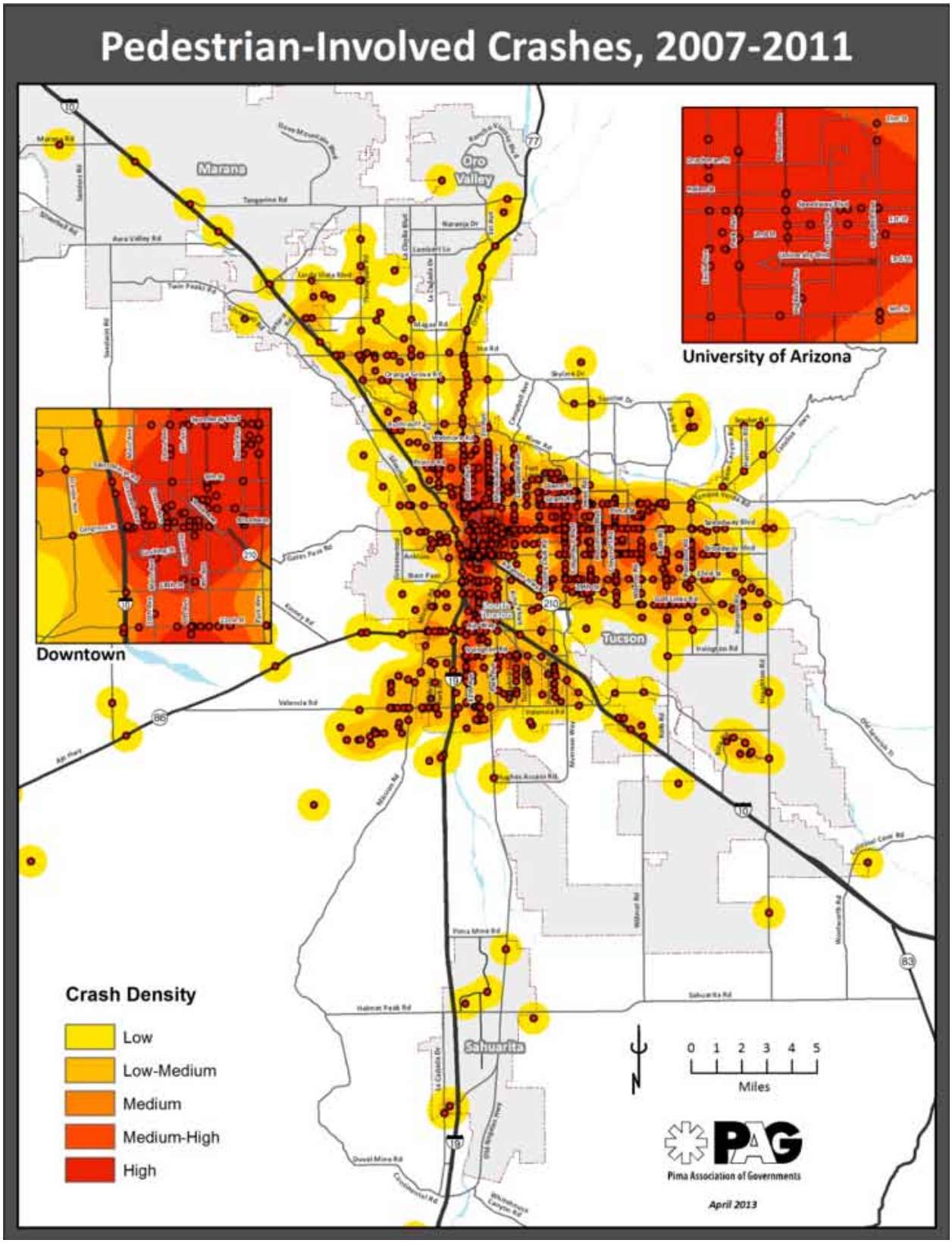


IMAGE 17 – Pedestrian Involved Crash Location Intensity Map

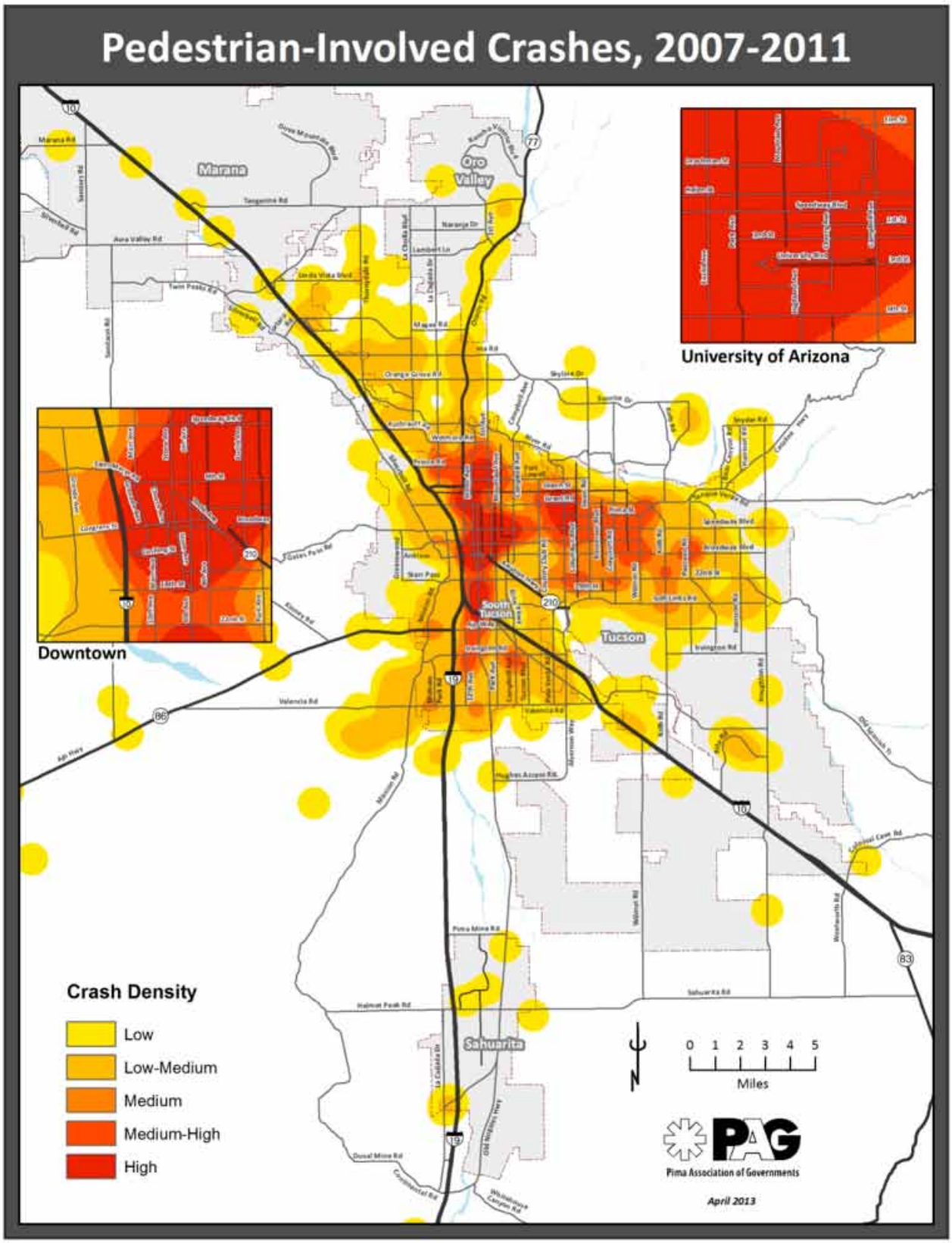


IMAGE 18 – 15 Years Old and Younger Pedestrian Involved Crash Location Intensity Map

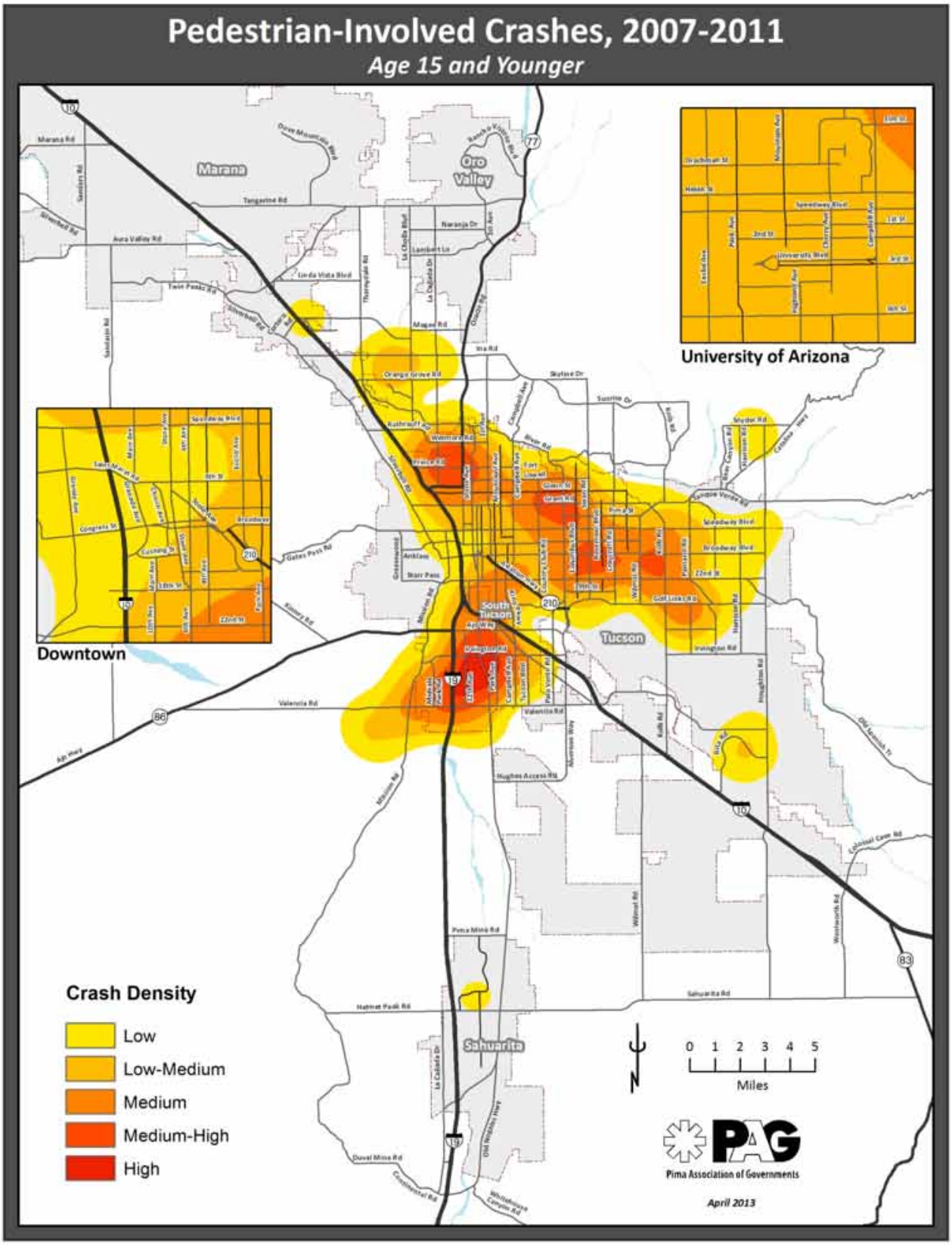


IMAGE 19 – 65 Years Old and Older Pedestrian Involved Crash Location Intensity Map

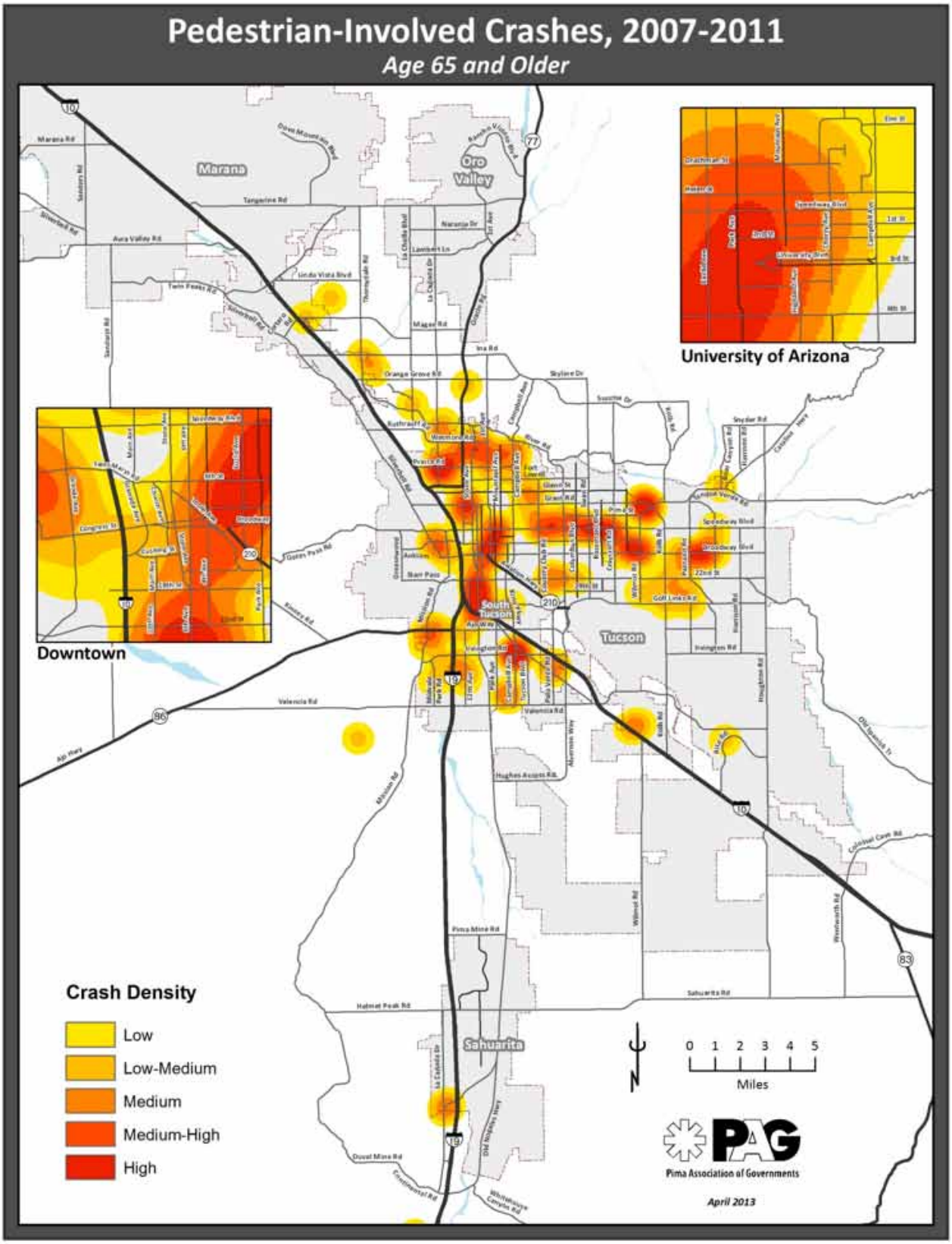
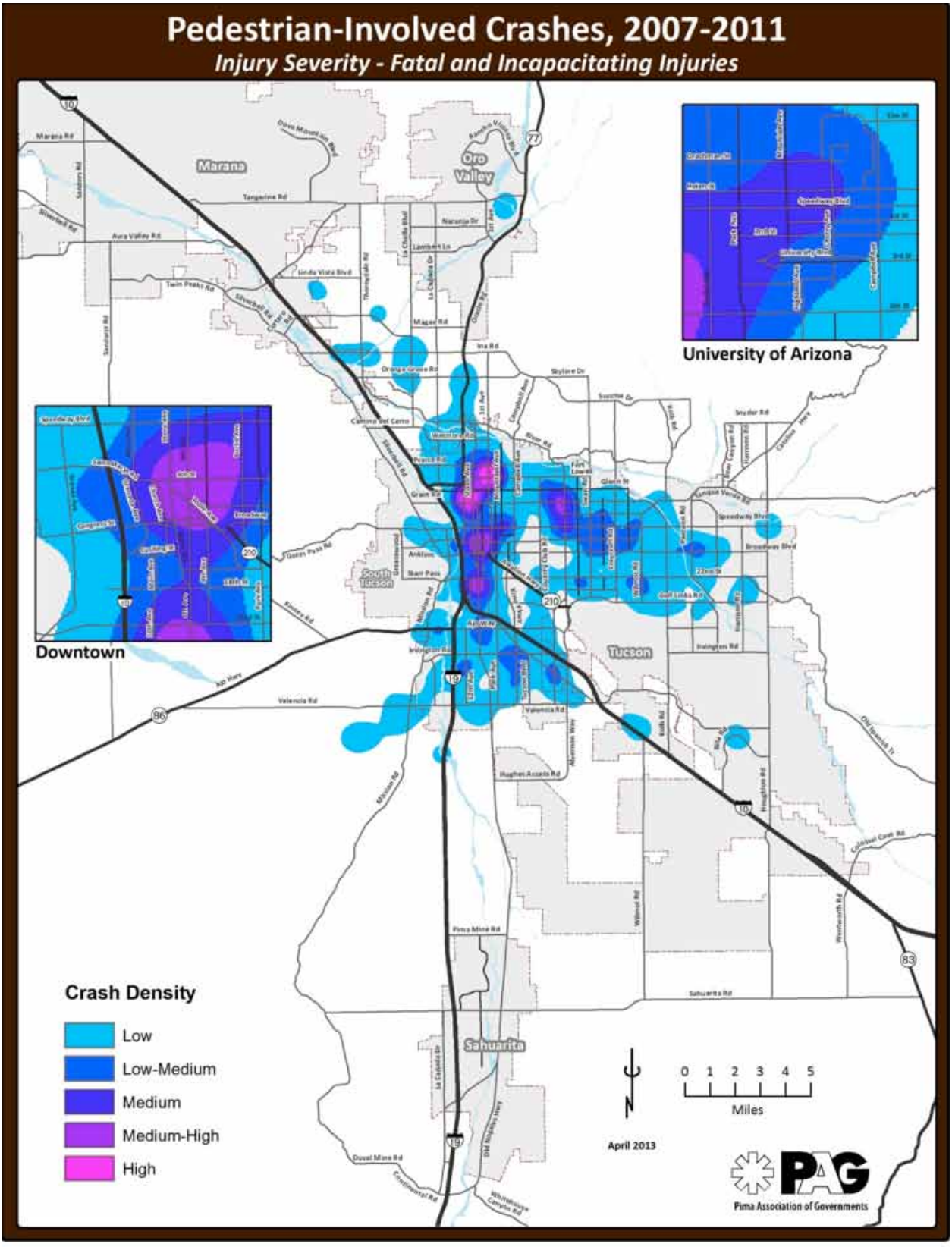


IMAGE 20 – Pedestrian Injury Severity Location Intensity Map



Summary of Existing Conditions

The examination of existing pedestrian conditions in the greater Tucson region is an important first step for developing solutions to the most pressing issues and for building on current strengths.

- The Tucson region's most rapid growth occurred largely after the automobile began to shape American cities, resulting in a very auto-oriented development pattern and a transportation network built around wide, high-volume arterial roadways.
- After years of economic stagnation, the Tucson region is expected to resume growing, albeit at lower than historic rates. Groups that have been identified to be at greater risk while walking (Seniors, people with ambulatory disabilities, and Hispanics) are projected to comprise a larger share of the region's population in the future, underscoring the importance of investing in pedestrian safety.
- 1/2 of adults and 1/3 of children in Pima County are overweight or obese. 20 percent do no daily physical activity, and 8 percent have diabetes. Making it easier to walk could help to improve the region's health outcomes.
- Overall, the region has relatively clean air. However, it is in danger of exceeding the federal standard for ground-level ozone concentrations. Total and per capita on-road greenhouse gas emissions have decreased slightly since 2000.
- Approximately 10.4 percent of all trips are made on foot, making it the second most common form of transportation in the region and comparable to the national walking rate. This undercounts the actual walking rates however, as walking for exercise, walking to or from transit stops, and walking to or from off-site parking are not included in the number. Roughly 16.5 percent of the region's residents walk for transportation each day.
- The most common walking trip purposes are to go shopping, run errands, dine out, or go to social or recreational destinations. The average walking trip distance is 2/3 of a mile.
- Pedestrian survey respondents report that walking for exercise is the most common reason for walking. Younger survey respondents (18-34) are much more likely to walk for transportation than other age groups. Survey respondents are most likely to walk on local streets in their own neighborhood, followed by the downtown/University of Arizona Area. Most respondents prefer not to walk along arterial roadways.
- Survey respondents would like more shade along walking paths, a more connected sidewalk network, and more non-arterial walking routes.
- The City of Tucson and PAG jointly developed ADA Sidewalk Inventory Study Report reveals considerable gaps in the sidewalk network along arterial and collector roadways and large areas of the region that have inaccessible pedestrian facilities for persons with disabilities.
- Pedestrian safety continues to be a major issue in the region, with between 250 and 300 pedestrian-involved crashes each year and an average of 21 annual pedestrian fatalities (29 were killed while walking in 2011).
- Over half of pedestrian-involved crashes occur at intersections or are intersection related, though most fatal crashes occur away from intersections where vehicles are likely to be travelling at higher speeds.
- The hours between 6:00 p.m. and 9:00 p.m. have the highest share of both pedestrian crashes and pedestrian fatalities, as these hours are likely to have a combination of risk factors including high pedestrian and vehicular volumes, changing light conditions, and greater rates of alcohol consumption.
- In over 40 percent of pedestrian fatalities, the pedestrian had consumed alcohol. In 10 percent of fatalities, the driver had consumed alcohol.
- Young adults (15-29 year olds) are involved in pedestrian crashes at higher frequencies than other groups, though seniors are at much greater risk of sustaining serious injury or being killed in a pedestrian crash. Males are much more likely to be struck while walking than females. This is true across all age groups.
- Four high-frequency pedestrian crash locations have been identified in the region. These are around Tucson's urban core (extending to the University area), north of downtown Tucson, south of downtown Tucson (roughly in and around the City of South Tucson), and in north-central Tucson. While much of this likely corresponds to pedestrian volumes, further analysis is needed to know whether other factors are contributing to higher crash densities.

SECTION 4: Walkability Toolbox

The following section represents current best practices in designing for pedestrian safety and comfort. Most of the information presented is derived from and consistent with Pedsafe 2013: Pedestrian Safety Guide and Countermeasure Selection System (http://www.pedbikeinfo.org/) and the Federal Highway Administration Office of Safety's Proven Safety Countermeasures (http://safety.fhwa.dot.gov/provencountermeasures/) unless otherwise indicated. This document should be used as a guide and toolbox for engineers and planners in improving pedestrian safety and comfort on the Tucson region's roadways. This does not represent design standards for roadways and roadsides.

Best Practices for Sidewalk Design, Accessibility and Comfort

Creating attractive, safe, comfortable and connected walking environments not only provides a better experience on people's current walks, it also will encourage people to walk more often, to walk farther, and increase the overall number of people walking.

Sidewalks

In urban and suburban areas, sidewalks are the fundamental element of the pedestrian system, forming the spine of the network, connecting destinations and defining the pedestrian realm. Sidewalks create separation from the vehicular traffic which provides a sense of comfort and safety for the pedestrian and can encourage more walking.

Where sidewalks are not present in urban and suburban areas, people will either be forced to walk along the roadway adjacent to automobile traffic or, for those who have the option, choose another means of transportation for trips that would otherwise be manageable, and enjoyable, on foot.

Different sidewalk sizes and types will be appropriate depending on the type of roadway and level of development but, at minimum, sidewalks must comply with Americans with Disabilities Act guidelines for accessibility and should be installed on both sides of the roadway where present.

Within the greater Tucson region, sidewalks should be (and currently are) installed as part of roadway

projects and with new development where people are reasonably expected to walk. In those instances, sidewalks and pedestrian facilities should be built to the highest practicable standard for achieving pedestrian comfort, safety and accessibility. Where current levels of development are not expected to necessitate sidewalk installations, but where it may do so in the future, adequate right-of-way should be acquired to allow for future installations of high-quality walkways.

The greater challenge for the region will be retrofitting older neighborhoods and roadways to include safe, comfortable and accessible facilities. In the case of retrofits, where funding is very limited, investments should be prioritized based on proximity to pedestrian generators (such as schools, libraries and shopping), resident need and walking rates.

Arterial/Collector Streets

Arterial roads are high-volume thoroughfares that are necessary for the distribution of goods and movement of traffic throughout the region. Collectors, by comparison, have lower traffic volumes and serve more sub-regional travel needs or connect to the regional arterial network. Because of the high-visibility major roads provide for businesses, many commercial services, transit stops and other destinations are located along arterials and collectors, making these roads serve both as thoroughfares and as destinations in their own right. This means that in addition to moving vehicular traffic, larger roads also will attract pedestrians, potentially creating conflicts between road users and safety issues, particularly at intersections or other pedestrian crossing locations. Between 2007 and 2011, nearly 70 percent of the region's pedestrian fatalities occurred on arterial roads. As such, the region's arterials and collectors should accommodate all users in the safest, most comfortable manner possible.

A shaded sidewalk with buffering improves pedestrian comfort on this suburban arterial street. Image: Town of Marana

Arterial/Collector Sidewalk Design Considerations

For safe walking along the roadway, all urban and suburban arterials and collectors should include sidewalks on both sides of the roadway. Due to generally high traffic volumes and travel speeds, the best pedestrian experience along major roads can be realized through creating a large lateral separation between vehicular travel lanes and the pedestrian realm. This can be achieved through the inclusion of 5 to 6-foot bike lanes and 4 to 6-foot buffers along roadways. Beyond simply providing separation, buffers can be designed to capture stormwater and accommodate street trees and other landscaping. This increases the sense of safety and comfort for the pedestrian and improves the look and feel of the corridor for all users.

Wide sidewalks installed on newly improved urban arterial roadway. A 12-foot landscaping strip, continuous level 8-foot sidewalks, 11-foot travel lanes, and future tree growth in the planting strip make this a high-quality arterial pedestrian facility.

The sidewalks themselves should be at least 6 to 8 feet wide if possible, or at least wide enough to comfortably accommodate two adults walking side-by-side if space is not available. Wider sidewalks can be constructed where pedestrian volumes are potentially high due to the concentration of pedestrian generators. If possible, building sidewalks directly adjacent to, or abutting, travel lanes should be avoided. (cross sections)

Continuous sidewalk on residential street segment. Utility conflict prevents installing a direct route but adequate right-of-way allows installation around barriers.

Local Streets

Neighborhood or local streets are typically narrower, low-speed, low-volume streets serving circulation needs primarily within or between residential

neighborhoods. Because very few shops and services are located on local streets, they are not likely to attract a lot of destination-based pedestrian travel. However, local streets do connect residential neighborhoods to the regional arterial/collector network and can provide a more comfortable alternative to walking along the larger roadways. To maximize local streets' utility in linking pedestrians with destinations, barriers to access will need to be eliminated and connectivity improved (through such measures as putting pedestrian paths through cul-de-sacs, providing access through walled subdivisions, and providing rear entries to shopping centers from adjacent neighborhoods.)

Local Street Sidewalk Design Considerations

Accessible sidewalks should be constructed in all new urban or suburban developments as part of the development process. In older neighborhoods where sidewalks are sporadic or non-existent, sidewalk retrofit installations should be targeted along those streets that connect directly to the regional network or other destinations or are known to otherwise have high volumes of pedestrian use. Lateral separation is of less importance on local streets than on busier roadways, as traffic volumes and speeds are much lower, and in many cases, curb side parking can buffer pedestrians from any vehicle traffic. Where possible, including a 4-foot planting strip between the roadway and the sidewalk will allow space for trees or to manage stormwater on site to create "green streets."[22] Sidewalks should be 5 feet wide where possible, or at minimum 4 feet with wider areas for passing to ensure accessibility.

On lower-volume local streets, where, due to limited funding availability it may not be feasible to install sidewalks, a program of traffic calming can be pursued to keep vehicular travel speeds low. A fully accessible pedestrian clear area should be preserved on the roadway and night-time visibility improved to reduce crash risk due to dark conditions.

Bike Boulevard: City of Tucson Bike Boulevards Program:

While the goal is to have all streets safe and comfortable for pedestrians, the City of Tucson has prioritized a network of residential streets to enhance to provide better walking and bicycling opportunities. Although called Bicycle Boulevards, the planned improvements help residents walk around the neighborhood, access local destinations and serve as regional corridors for pedestrians as well as cyclists.

Residential sidewalk. A 5-foot sidewalk and 5-foot planting strip provide adequate walking space and room to plant shade trees.

4th Ave. and University

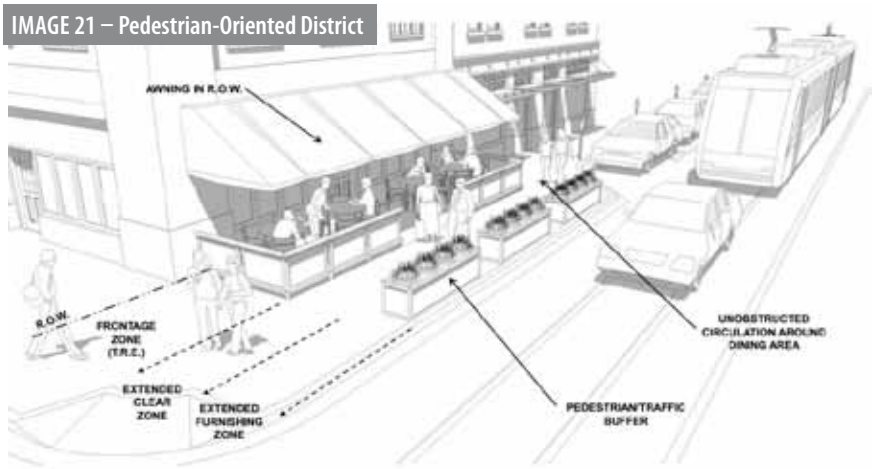
Pedestrian-Oriented Districts

Walkability, and by extension walking rates, is fundamentally a land use issue. Nowhere is this more apparent than with pedestrian-oriented districts. Pedestrian-oriented districts are areas that deploy a number of land use and transportation strategies that favor and encourage walking, transit use and biking over automobile travel. Common characteristics of

[22] Watershed Management Group, Inc "Green Streets - Green Neighborhoods." http://watershedmg.org/green-streets

pedestrian-oriented districts are compact development patterns, mixed-land uses, minimal building setbacks, active and interesting facades, narrow travel lanes and slower traffic speeds; all characteristics typical of a healthy downtown or certain commercial centers. (picture of 4th ave)

IMAGE 21 – Pedestrian-Oriented District



Pedestrian-oriented design elements showing the three zones. Buffering improves the sense of comfort and safety. Image: Courtesy of The Planning Center and City of Tucson Office of Integrated Planning.

Within the greater Tucson region, this is currently primarily found within the urban core around downtown Tucson, 4th Avenue, and the University of Arizona. However, other areas may soon develop with a pedestrian focus, and some existing roadways could be converted to be more pedestrian-oriented.

Pedestrian-Oriented Districts Design Considerations

While the specific details of developing a pedestrian-oriented district is outside the scope of this document, consider a few general guidelines when developing more pedestrian-friendly areas in the region.

The high-level of pedestrian activity resulting from more compact, mixed-use, zero-lot-line development, requires the sidewalk to serve several functions simultaneously. It will at once be a pedestrian circulation route, a public gathering and activity space, an advertising and access point for local businesses, an outdoor dining room and an attractive space. With that many functions, it is necessary that sidewalks in pedestrian-oriented areas are wide enough to accommodate it all.

The sidewalk in pedestrian-oriented districts is generally divided into three zones: 1) the frontage zone, or the area immediately adjacent to building facades; 2) the clear zone, for pedestrian circulation; and 3) the furniture zone, for locating street trees, benches, lights, bike racks, fire hydrants, electrical enclosures and other items. The sidewalk in pedestrian-oriented areas does not typically have a landscaped buffer as the furniture zone serves largely the same purpose.

In developing pedestrian-oriented districts, a 14 to 18-foot sidewalk is desirable. This includes roughly 4 feet for the furniture zone, an 8 to 10-foot clear area for walking, and a 2 to 4-foot frontage area for window shopping, signs and easy access to businesses. Outdoor dining can be accommodated on sidewalks

Pedestrian-oriented street near the University of Arizona. The clearly defined sidewalk zone system, wide clear area, shade trees, on-street parking and structures built to the sidewalk contribute to a high-quality pedestrian experience.

by reducing the clear zone in some locations, by locating tables in the furniture and/or frontage zones, or by extending the furniture zone into the street by replacing on-street parking with dining structures. The pedestrian clear area should not be less than 4 feet at any point.

Since pedestrian-oriented districts will see high-pedestrian volumes, vehicular traffic should be slowed considerably to improve pedestrian safety and comfort. This can be achieved through the use of narrow travel lanes (10 or 11 feet), the deployment of a traffic calming measures, and by building shorter blocks. Curbside parking will buffer pedestrians from the street and may provide a barrier to discourage mid-block crossings (though it can also reduce visibility).

TABLE 12

General Recommended Sidewalk Guidelines

Roadway Type	Sidewalk Width	Buffer	Other Considerations
Urban/Suburban Arterials and Collectors	6-8 feet	Minimum 4-6 feet of separation between sidewalks and roadways • 5-foot bike lane • 4-6 foot landscaped strip	• Wider sidewalks are better in high-volume pedestrian areas (8 feet or more) • Narrowing travel lanes (10-11 feet) can provide more space for roadside improvements
Local Residential	5-6 feet (4 foot sidewalks are acceptable if passing opportunities are provided and pedestrian volume is low)	• 3-4 feet of separation • 3-4 foot planting strip • Curb side parking	• Incorporate stormwater management and green infrastructure practices • Narrower streets are more comfortable for pedestrians. Can accommodate slow, low-volume traffic and some on-street parking with 26-30 foot street widths
Pedestrian-Oriented	14-18 foot total sidewalk area (includes furniture, clear, and frontage zones)	• 4-6 foot furniture zone with plantings, bike parking, benches, etc. • Curb side parking separates and improves pedestrian realm	• Travel lanes should be narrow • Plantings and other street furniture considerably improve pedestrian comfort • Short blocks are better for walkers • Constructing buildings to the sidewalk greatly improves the pedestrian environment

Paved Shoulders and Shared Use Paths

In rural parts of the region, sidewalks are not necessarily appropriate given low pedestrian volumes, length of roadways and cost of construction. In these cases, the best approach will likely be to include wide paved shoulders along rural routes. Paved shoulders should be at least 6 feet wide to provide lateral separation and allow space for bicyclists and pedestrians to use the shoulder safely and comfortably. Where there is evidence of higher levels of pedestrian activity, or where pedestrian activity is reasonably expected to occur (due to the presence of one or more known pedestrian generators), sidewalks are preferable.

Another option along rural routes could be the construction of a parallel shared-use path. A shared use-path should be at least 10 feet wide to accommodate different user groups (e.g. pedestrians, cyclists, people in wheelchairs and others) and should be constructed where warranted by actual or potential use. (Note: shared-use paths also are constructed in urban areas to provide a safe and comfortable route for cyclists and pedestrians, such as along rivers.)

The Pima County Loop

The Tucson region is home to one of the most extensive urban shared-use pathway systems in the country. The Loop, as it is known, currently features over 100 miles of car-free trails that are beginning to connect Tucson, Pima County, Marana, Oro Valley and South Tucson. The Loop's highlights include the soon-to-be-completed 55-mile pathway along the perimeter of the city of Tucson; numerous parks; and walking, biking, or running alongside natural riparian habitat.

When completed, The Loop will total 131 miles and connect the Rillito River Park, Santa Cruz River Park, and Pantano River Park with Julian Wash and the Harrison Greenway.

Image: Pima County

Bridges provide connectivity of shared-use paths over the region's many washes. Image: Oro Valley

Shared-use path adjacent to roadway can accommodate both pedestrians and cyclists for a safe and comfortable travel and recreation option in a low-density location. Image: Town of Marana

Accessible Pedestrian Facilities

Sidewalks, walkways and other pedestrian facilities should be accessible for all users in the greater Tucson region. In order to do so, all new pedestrian facilities should be built, at a minimum, to the specifications contained in the U.S. Access Board's Public Rights-of-Way Accessibility Guidelines (PROWAG), which is likely to soon be adopted as the federal standard for ADA-compliant pedestrian access routes. Additionally, existing facilities need to be made accessible, either through retrofitting and filling gaps, or as part of other roadway improvements and alterations.

The priorities, schedule and method for bringing public facilities into compliance with ADA requirements are identified by jurisdictions through their ADA Transition Plans.

A critical feature of accessible sidewalks is that they have ramps wherever a sidewalk or other identified pedestrian access route crosses a curb. Curb ramps cannot exceed an 8.3 percent running slope, a 2 percent cross slope, provide a 48-inch flat landing for navigating with wheelchairs, and must have detectable warnings (the brightly colored pad of truncated domes often located at the bottom of ramps), among other specifications.

The Department of Justice requires that when a roadway is constructed or altered within a public right-of-way containing a curbed pedestrian walkway (e.g sidewalk), the walkway must be made accessible to people with disabilities through the construction of ADA compliant curb ramps. Routine road maintenance work does not require that curb ramps be built. Until recently, the application of this rule was unclear as to what exactly is considered maintenance vs. a road alteration.

A joint decision issued by the Department of Justice and the Department of Transportation has now clarified which specific pavement treatments constitute maintenance and which are considered alterations and thus require construction of curb ramps.

Maintenance

• Chip Seals • Fog Seals • Scrub Sealing • Crack Filling and Sealing • Joint Crack Seals • Slurry Seals • Diamond Grinding • Joint repairs • Spot High-Friction Treatments • Dowel Bar Retrofit • Pavement Patching • Surface Sealing

Alteration

• Addition of New Layer of Asphalt • Mill & Fill / Mill & Overlay • Cape Seals • New Construction • Hot In-Place Recycling • Open-graded Surface Course • Microsurfacing / Thin-Lift Overlay • Rehabilitation and Reconstruction

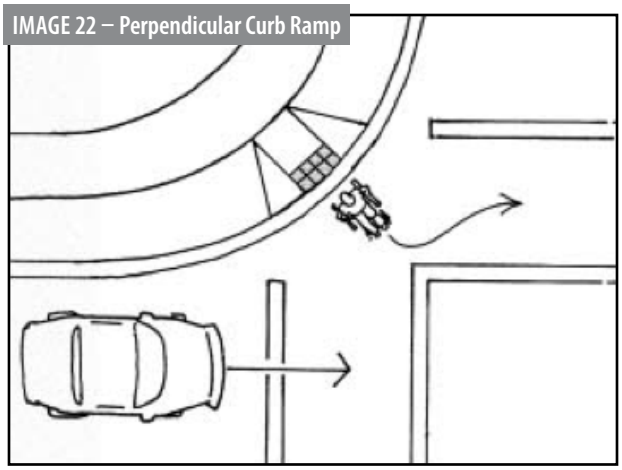
There are two dominant types of acceptable curb ramps at intersections: diagonal and perpendicular.

Diagonal curb ramps are those which intersect with the roadway between perpendicular streets, so that each corner of an intersection would require only one ramp. Perpendicular curb ramps are those which align directly with crosswalks, requiring two curb ramps per corner of an intersection.

While both options are acceptable under ADA requirements, the perpendicular curb ramp is a better option, where possible, for meeting the needs of all pedestrians. Diagonal curb ramps can be challenging for people with visual impairments, as they do not necessarily provide an indication on the direction of the crosswalk. This may increase the risk of visually impaired or blind pedestrians walking into the center of the intersection. Also, perpendicular curb ramps are easier for people in wheelchairs to navigate, since they require minimal change in direction.

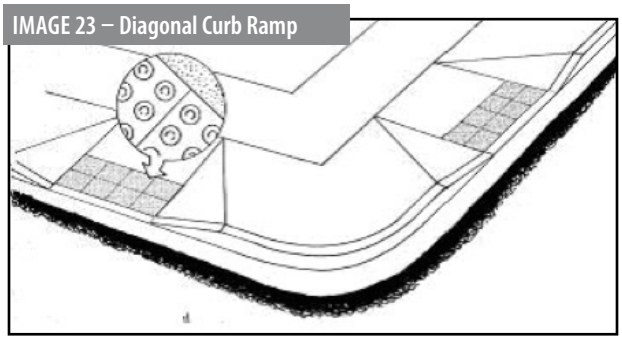
The challenge of installing perpendicular curb ramps is that they can't be used on narrow sidewalk corridors because the landing area cannot be accommodated. Perpendicular curb also is considerably more expensive to install than diagonal ramps. That being said, perpendicular ramps should be used where space permits.

IMAGE 22 – Perpendicular Curb Ramp



Diagonal curb ramp: Although a diagonal curb ramps are acceptable practice, they should only be used when perpendicular ramps are not feasible. Image: FHWA

IMAGE 23 – Diagonal Curb Ramp



Perpendicular ramps direct pedestrians directly towards the crosswalk. This is preferable for both pedestrians using wheelchairs and those with visual impairments. Image: FHWA

A well-designed ramp isn't always enough

Access Management and Driveway Design

A major potential vehicle conflict point for people walking along the roadway is where driveways intersect with the sidewalk. Research has shown that crash rates increase, including pedestrian crashes, as driveway density increases.[23] Within the greater Tucson region alone, roughly 100 pedestrians were struck – with four resulting in a fatality – at driveway locations between 2007 and 2011. Pedestrians are particularly at risk along higher-volume, multi-lane roadways were no median is installed to impede access to left turning vehicles. In such cases, there are potential vehicle-pedestrian (and bicycle) conflicts with both right and left turning vehicles entering and exiting the driveway. Vehicles turning left from across the roadway present a particular challenge, as drivers turning left on arterial roadways may be concentrating on finding a gap in traffic and not on pedestrians moving along the sidewalk. Additionally, a left turning vehicle entering a driveway will likely be traveling at a higher rate of speed than one exiting, thus increasing the probability that a crash will result in a more severe pedestrian injury.

Unnecessary pedestrian-vehicle conflicts can be reduced at driveways by eliminating, shrinking and consolidating driveways and by adding medians to block potential conflicts with left turning vehicles. Where driveways have been eliminated and consolidated, vehicles can be directed to enter establishments through driveways or access points with appropriate traffic controls. Controlling access also has the added benefit of reducing vehicle delay without increasing the road's footprint.

Driveways, where they do cross sidewalks or walkways, should be designed in such a way as to clearly delineate the pedestrian realm across the driveway. Sidewalks should be distinguished from driveways through the use of different materials and by continuing the sidewalk across the driveway surface (such as a concrete sidewalk continuing across an asphalt driveway.) Also, sidewalks should maintain a level walking surface where they cross driveways to ensure accessibility and pedestrian comfort. Where possible, the driveway apron should be located between the sidewalk and the roadway or the sidewalk should wrap behind the apron. If this is not a possibility due to limited public right-of-way, the sidewalk can drop to meet the level of the apron so long as the sidewalk cross-slope does not exceed 2 percent.

To slow entering vehicles and minimize the conflict zone, the turn radii of driveways should be reduced and driveways narrowed. Driveways should also look distinct from intersections to provide a visual cue to drivers to slow as they enter. Visibility should be maintained so exiting drivers can see pedestrians and not feel the need to pull forward to impede pedestrian travel while waiting for an opportunity to turn into the roadway.

Transit Stops

Public transit and walking are complementary modes of transportation. All fixed-route transit users are a pedestrian for part of their trips, and the most successful transit systems are those which have stops located along safe and comfortable pedestrian routes and in walkable environments. A good public transit system encourages more walking and good walking conditions encourage more transit use.

Well-shaded accessible bus shelter located on the far side of a crosswalk.

Transit stops should be easily accessible and visible so they can be reached safely by users of all abilities. Shelters will allow transit users to wait in a shaded location and are also easy to find and identify. Shelters should be located in such a way as to not block pedestrian travel on sidewalks (by respecting the 5 to 6 foot pedestrian clear zone) and to also allow an accessible space for wheelchair users to board and alight buses or other transit vehicles. Keeping transit

[23] Federal Highway Administration Office of Safety, "Access Management in the Vicinity of Intersections." February 2010. http://safety.fhwa.dot.gov/intersection/resources/fhwasa10002/

shelters well lit also can improve riders' sense of safety and make stops easier to find at night.

As many disabled residents depend on public transit to meet their mobility needs, sidewalk approaches to transit stops should be high priorities for accessibility improvements. Gaps in sidewalks should be filled, curb ramps should be constructed, and other deficiencies identified and corrected.

Safety is an important consideration in determining where to locate transit stops. Bus stops should be located at intersections where possible in order to facilitate transit connections and to provide signalized crossing opportunities for pedestrians. Placing stops on the far-side of the intersection is generally preferable as this will encourage passengers who need to cross the street to cross behind the bus and improve visibility for pedestrians and drivers. The traffic signal also will create breaks in traffic so buses can more easily re-enter the roadway (where bus pullouts have been constructed). Mid-block crossing signals can be considered at busier stop locations where placing stops at intersections is not feasible.

In addition to making bus stops more accessible for people using mobility devices, there are improvements that can be made to bus stops to assist the blind and those with visual impairments.

One idea suggested by a member of the Pedestrian Plan Technical Advisory Committee is to distinguish bus stop signs from all other road signs by making them tactile and cane audible. This could be accomplished by placing a 4-foot tall reflective plastic tube on bus stop signs, which, when struck by a cane will give a distinctive audible cue to the pedestrian. The reflective striping will provide a visual cue to those with low vision.

Example of plastic tubing on a road sign. Extending the tubing to the ground and potentially changing the coloring will distinguish bus stops from other types of road signs.

Traffic Calming

Traffic calming is a roadway design strategy, and set of engineering measures, intended to slow traffic speeds and improve safety. Traffic calming has proven to be very effective, with research showing considerable reductions in travel speeds where traffic calming is employed.[24] Traffic calming is perhaps most appropriate in residential or pedestrian-oriented areas where streets are intended to serve other purposes in addition to moving vehicles, and where the likely presence of children, seniors and overall higher pedestrian volumes increases potential risk or conflicts. More than simply a safety measure, traffic calming also improves neighborhood livability by reducing the number of speeding vehicles. In many cases, retrofitting existing local streets with traffic calming measures is necessary because the large width of many of the greater Tucson region's local streets can encourage higher-speed driving.

On new low-volume local streets, traffic can be calmed through design of the roadway itself by constructing narrower residential streets (30 feet curb-to-curb or less), whereas existing streets in older neighborhoods will need to be retrofitted to calm traffic.

More information on specific traffic calming strategies is listed below:

Landscaping

While roadside landscaping may not immediately seem like a traffic calming device, if used strategically, it can narrow the visual width of the roadway, encouraging drivers to drive slowly. Landscaping also will create separation from the roadway

[24] Huang, Herman F. and Michael J. Cynecki, Federal Highway Administration, Turner-Fairbank Highway Research Center, "The Effects of Traffic Calming Measures on Pedestrian and Motorist Behavior." August 2001. http://katana.hsrc.unc.edu/cms/downloads/TrafficCalmingMeasures_Effects_PedMotorist.pdf

and enhance the attractiveness of the public realm. Landscaping should be combined with other traffic calming methods for maximum effectiveness.

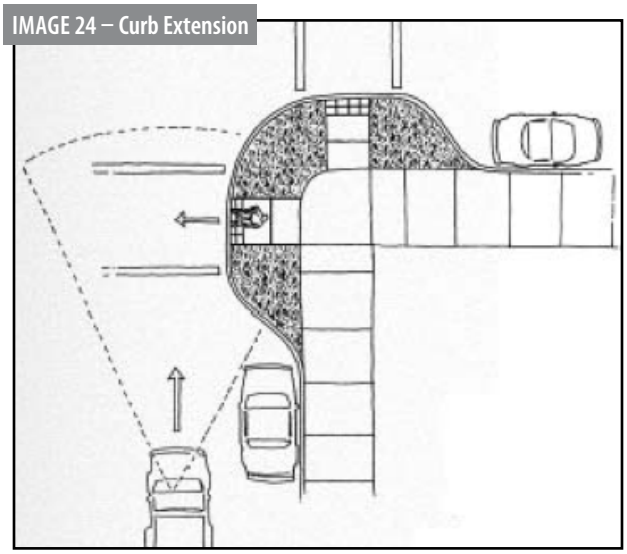
Curb Extensions

Curb extensions – sometimes called bulb outs – are traffic calming devices in which the curb line is pushed out into the parking lane, narrowing the width of the street. Curb extensions are most commonly located at intersections, but can also be used at mid-block pedestrian crossing locations. Curb extensions improve pedestrian safety and comfort by reducing crossing distance, improving visibility between pedestrians and motorists, slow traffic, and provide additional space for landscaping and beautification.

This traffic calming device is mostly commonly used on residential streets, in downtowns and in pedestrian-oriented commercial districts.

Care should be taken not to eliminate or squeeze bike lanes with the construction of curb extensions.

IMAGE 24 – Curb Extension



Curb extensions reduce crossing distances, improve pedestrian visibility, decrease turn radius, and allow for perpendicular ramps where space is limited. Image from FHWA

Mid-block curb extension at Tucson Modern Streetcar stop.

Chicanes

The purpose of installing chicanes is to create a diversion in the line of the travelway as a means of reducing traffic speed. This diversion can be achieved through installing landscaped islands, tapering lanes and shifting the direction of travel. On low-volume residential streets, chicanes can even be used to pinch the roadway and force drivers to slow down to maneuver through the obstacles, or potentially queue for oncoming traffic (if the road is narrowed to 16 feet or less). Chicanes can even be installed on collector streets or minor arterials to slow traffic, so long as lanes are not restricted.

Example of a landscaped chicane on a residential street. The chicane diverts the direction of travel and slows speeds.

Mini Circles

Mini circles are the small raised circular islands located at intersections on some local residential streets. They reduce vehicle speeds at intersections by forcing drivers to maneuver around the circle through the intersection. Left turning drivers are required to travel all the way around the circle to complete the left turn. With proper signing, mini circles can be used in place of stop signs or other intersection controls. Mini circles should be designed in such a way as to discourage speeding through the intersection so a tight turn

radius around the circle is recommended. Additionally, circles should be installed so that they allow larger vehicles, such as school buses and fire trucks, to make left turns without having to go all the way around the intersection.

Landscaping traffic circles with durable drought-tolerant plants can make neighborhoods more attractive, but visibility at the intersection and maintenance needs must be taken into consideration.

Mini circle with landscaping in Tucson's Keeling neighborhood.

Speed Tables and Speed Humps

The traffic calming devices which are probably most familiar to people are speed tables and speed humps (not to be confused with speed bumps, which are typically prohibited on streets, but common in shopping center parking lots.) Speed humps and speed tables are very effective at slowing travel speeds. Humps are typically 12 feet across and are designed to slow vehicle speeds to between 15 and 20 mph. Tables are wider than humps, 22 feet, and are designed to slow vehicle speed to between 25-30 mph. These devices should not be installed at less than 400 to 600 foot intervals and should be located where sight distances are good.

Vehicle slowing down as it goes over a speed hump.

Speed tables and speed humps should be a used sparingly where all other traffic calming and roadway design solutions have been exhausted. Humps and tables can increase noise, cause wear and tear on vehicles, and slow response time for emergency vehicles.

TABLE 13 – Traffic Calming Countermeasures

Summary of Traffic Calming Countermeasures

Treatment	Purpose	Considerations
Landscaping and Street Trees	Improve roadway aesthetics Provide shade Manage stormwater Narrow the visual width of the road	Don't block pedestrian visibility at crosswalks and intersections Maintain landscaping to keep sidewalk clear zone Combine with other traffic calming to improve effectiveness
Curb Extensions	Slow traffic by narrowing roadway Reduce crossing distances Improve visibility Reduce turn radius Allow more space for ramps and landings	Locate at crosswalks and intersections Set parking back to maintain visibility Take care not to squeeze or eliminate bike lane if possible
Chicanes	Slow traffic by diverting the path of travel	Do not diminish visibility with large plantings Maintain safe bicycle travel
Mini Circles	Reduce travel speeds on local streets Reduce intersection crashes on local streets	A tight turn radius to slow traffic Allow safety other large vehicles the space to turn left in front of circles Add vegetation, but be sure to maintain sight distances
Speed Tables/Humps	Very predictable and effective at slowing speeds on local streets	Slows emergency response vehicles May create drainage problems Might increase noise problems

Lighting

The appropriate use of outdoor lighting to illuminate sidewalks and pedestrian pathways improves pedestrian safety and comfort while walking at night. The FHWA has shown that the benefits of installing street lighting (in terms of crash reduction) far outweigh the cost of installation and operation of lighting.

Lighting is particularly important in areas where pedestrians are exposed to motor vehicles, such as at pedestrian crossing locations or where pedestrians are forced to walk in the roadway due to lack of a separate pedestrian pathway or sidewalk. Of all roadway users, research has shown that lighting has the largest benefit for pedestrians. It is estimated that installing street lighting can reduce all nighttime pedestrian crashes by 50 percent.[25] And at intersections, installing lighting has been shown to reduce pedestrian nighttime injury crashes by between 40 percent and 60 percent, and fatal crashes by up to 80 percent.[26] Between 2007 and 2011, 75 percent of pedestrian fatalities in the Tucson region occurred in the evening hours.

Street lighting, at a minimum then, should be installed at intersections, on approaches to crosswalks, at transit stops, and at other points of potential pedestrian-vehicle conflict where appropriate. To maximize the effectiveness of lighting at crosswalks, it is recommended that they be placed roughly 10 feet in front of the crossing (on the side of approaching traffic.)

[25] http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP05-19_LitReview.pdf

[26] http://www.cmfclearinghouse.org/

Continuous Illumination

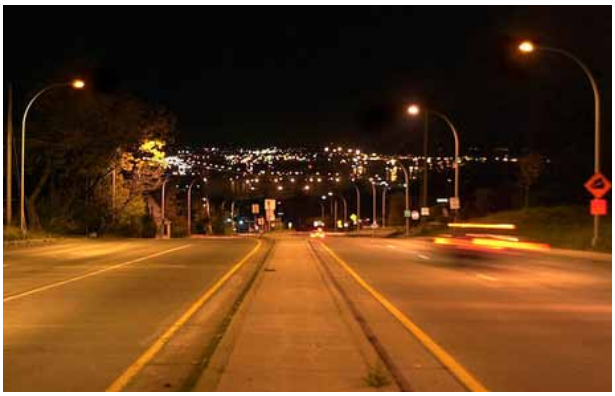
Going broader and installing, or increasing, illumination on the region's poorly-lit arterial and collector streets to provide continuous illumination would greatly improve pedestrian safety. Initially, lighting could be targeted in areas where pedestrians regularly cross outside of signalized intersections, near convenience stores, or other common nighttime destinations. Light poles can either be laid-out on one side of the road, staggered on opposite sides of the road, placed directly opposite one another, or located in a median. The FHWA identifies the following light layouts as typical:[27]

TABLE 14 – Lighting Placement

Spacing Layout	Road Type
One-sided Lighting	One to three lanes
Staggered	Three to six lanes
Opposite	Five lanes or more
Median	Where median can accommodate lights – lower capital costs but may be more expensive to maintain

More information about lighting levels and pole placements can be found in the AASHTO Roadway Lighting Design Guide.

Pedestrian-scale lighting, as opposed to street lighting, can be used in pedestrian-oriented and more walkable areas, as well as on separate pedestrian pathways, to enhance the streetscape, improve the sense of security, increase night-time activity and add character to an area. Pedestrian-oriented lighting differs from street lighting in that pedestrian luminaires are shorter and spaced more closely together. They provide continuous lighting along the sidewalk more appropriate for pedestrian travel speeds. Pedestrian lights also tend to be more decorative than the entirely functional streetlights, often matching or complementing the dominant architectural styles or historic character of buildings in the area.



Staggered streetlights in Duluth, Minn., providing continuous arterial lighting. These lights feature full cut-off luminaires to reduce light pollution. Photo: Bob King

Example of dark-sky approved pedestrian scale lighting in Tucson. Image: The New Streetlights

In order to protect the night sky, reduce glare and light trespass, save electricity, and comply with jurisdictions' lighting ordinances, lighting strategies must be carefully considered and dark sky-friendly lighting used, such as the full cut off luminaires.

[27] Lutkevich, Paul, Don McLean, and Joseph Cheung. Federal Highway Administration Office of Safety, "FHWA Lighting Handbook." August 2012. http://safety.fhwa.dot.gov/roadway_dept/night_visib/lighting_handbook/

Shade

Shade is critical for improving pedestrian comfort in the hot and sunny desert Southwest. In the summer, when temperatures routinely sit above 100 degrees, shade also can be beneficial to the health and safety of residents.

In more pedestrian-oriented areas, like downtown, shade can be provided by the buildings themselves, awnings, stand-alone shade structures, and street trees. On residential streets and along arterial roadways, the best option for providing shaded walking areas is often through planting shade trees.

In more pedestrian-oriented areas, like downtown, shade can be provided by the buildings themselves, awnings, stand-alone shade structures, and street trees. On residential streets and along arterial roadways, the best option for providing shaded walking areas is often through planting shade trees.

Trees in particular provide a number of benefits beyond their direct shade value to pedestrians. Shade trees have been shown to reduce long-term road maintenance costs in hot climates[28], increase property values of nearby homes[29], slow traffic speeds[30] and provide a number of ecosystem services, such as filtering the air and absorbing stormwater.

In designing, constructing or improving roadways, adequate space should be reserved for tree plantings through the inclusion of a planting strip. Strategies to minimize potential utility conflicts with tree roots and branches should be developed in the design stage. Planting along older roads may be more complicated, as a combination of narrow planting strips, narrow sidewalks and utility conflicts reduces potential locations for trees. Some options might include working with property owners to plant on the property side of the sidewalk, planting in the sidewalk using tree grates (if it doesn't infringe on the required 4-foot clear zone), or using the space provided by traffic calming devices on residential streets.

It is important that branches are trimmed and trees maintained so as not to create a barrier for pedestrians and to ensure healthy trees. Maintenance costs are

Trees in the planting strip provide shaded walkway. Scott Avenue in Downtown Tucson uses water harvesting techniques to provide water for landscaping and to mitigate stormwater run-off

Where buildings are built to the sidewalk, shade can be provided with awnings and by the buildings themselves.

[28] Center for Urban Forest Research, "Why Shade Streets? The Unexpected Benefit." http://www.fs.fed.us/psw/programs/uesd/uep/products/cufr_673_WhyShadeStreets_10-06.pdf

[29] USDA Forest Service PNW Research Station, "The Value of Street Trees in Portland, Oregon." March 2008. http://www.portlandoregon.gov/bes/article/267031

[30] Burden, Dan. Glatting Jackson and Walkable Communities, Inc, "22 Benefits of Urban Street Trees." May 2006, http://www.northlandnemo.org/images/22BenefitsofUrbanStreetTrees.pdf

TABLE 15

Summary of Lighting and Shade

Treatment	Purpose	Considerations
Pedestrian Lighting	• Increase pedestrian safety • Improve pedestrian sense of security	• Continuous illumination of major streets will improve pedestrian visibility • Full cut off luminaires will reduce light trespass and light pollution • Lights should be placed 10 feet in front of the crosswalk on the side of approaching traffic for maximum effectiveness
Shade	• Lower temperature • Improve pedestrian comfort • Enhances appearance of the public right-of-way • Narrow the visual width of the road	• Provided through street trees or other structures • Consider stormwater harvesting as a way of reducing potable water usage and maintenance costs for mature trees • Trees need to be trimmed so as not to impede pedestrian travel

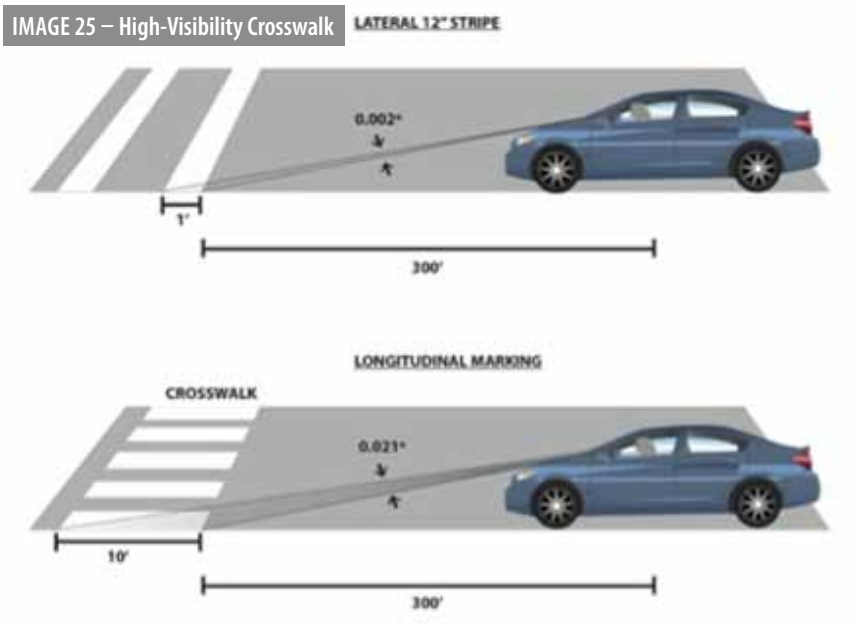
highest for young trees (usually up to 4 years old), but are returned in the long run if trees survive to a healthy maturity.

Best Practices for Creating Safe Pedestrian Crossings

One of the biggest barriers to walking for many people is the prospect of crossing high-speed, high-volume roadways. Having to cross a major road to a destination can discourage many from choosing to walk and increase risk for those who may not have other options. In fact, it is probably the most dangerous and stressful situation a person regularly encounters while walking, since it is the only time under normal circumstances a pedestrian is occupying the same space as automobiles. This is particularly true for seniors, children and people with disabilities, who, due to slower walking speeds and lower visibility, are far more vulnerable to the risks presented by crossing the road. Regionally, roughly 75 percent of pedestrian crashes occur while a pedestrian is crossing, or otherwise occupying, the roadway.

Reducing pedestrian risk by improving crossings should be incorporated at the inception of roadway design and be a fundamental element of all roadway projects. It must be planned in a wider perspective of the traffic situation in order to increase traffic safety for all road users.

IMAGE 25 – High-Visibility Crosswalk



Longitudinal markings are more visible to drivers than lateral stripes. Spacing markings to avoid wheels will reduce the frequency of restriping.www.core77.com. Image:Michele Weisbart

Crosswalks

A crosswalk is anywhere a pedestrian is legally permitted to cross the road. not just those locations indicated by paint or other markings. In Arizona, a legal crosswalk exists wherever roadways intersect, unless crossing the road is specifically prohibited at that location. Generally there are 4 types of crosswalks: 1) unmarked crosswalks at intersections, 2) marked crosswalks at intersections, 3) signalized crosswalks at intersections, and 4) marked crosswalks not at intersections. This section will look briefly at marked and unmarked crosswalks and at non-intersection crosswalks. Intersections, particularly larger intersections, are dealt with in more detail in the next section.

Unmarked and Marked Crosswalks

As mentioned above, a crosswalk exists anywhere two roadways intersect. Unless a pedestrian crossing is specifically prohibited, every intersection has a crosswalk where the curb line or roadside crosses through the intersecting roadway, regardless of whether the crosswalk is marked or not. Marked crossings are used only to guide pedestrians in their crossing and to alert drivers of the possibility of pedestrian activity. They are most useful in areas of higher pedestrian volumes to indicate the likelihood of encountering pedestrians crossing the road. Marked crosswalks also can be used to establish legal crossing locations away from intersections; this is particularly important where there are considerable distances between signalized intersections along high-speed, high-volume roadways.

Note that marking a crosswalk, without other controls or measures, does not improve pedestrian safety. In some circumstances, marked crosswalks can actually result in less safe crossing conditions.[31]

Crosswalk Markings

Crosswalks, where marked, must be visible to the driver in order to serve their intended purpose. Crosswalks with longitudinal markings are far more visible to drivers than those with just a lateral stripe. Crosswalks that combine lateral striping with longitudinal markings provide the greatest visibility.

If textured crosswalks are used (such as stamped patterns in downtown areas) they should be supplemented with lateral white lines to improve visibility.

Crosswalks should be marked at signalized intersections and at other crosswalks with high pedestrian activity. Non-intersection crosswalks should be located where sight distance is good and where pedestrians are expected to or are frequently observed crossing the road.

Additional Crosswalk Treatments

As noted, marking a crosswalk alone does not improve pedestrian safety. However, crosswalks can

[31] Zegeer, Charles V., Richard Stewart, Herman H. Huang, Peter A. Lagerwey, John Feaganes and B.J. Campbell, Federal Highway Administration Office of Safety Research and Development. "Safety Effects of Marked versus Unmarked Crosswalks at Uncontrolled Locations: Final Report and Recommended Guidelines ." August 2005. http://www.fhwa.dot.gov/publications/research/safety/04100/04100.pdf

be combined with other countermeasures to make a safer pedestrian environment. Below are examples of additional crosswalk improvements.

- **Crosswalk Signs**

  The most basic enhancement for marked crosswalks is to include visible pedestrian warning signs. This will alert drivers that they are approaching a crosswalk. Additional signs can be placed at crosswalks to indicate expected crossing locations. Regulatory signs such as STOP FOR PEDESTRIANS IN CROSSWALK may increase compliance when located in the middle of the street on smaller roadways. At midblock crossing locations with very high pedestrian volumes, flashing crosswalk signs, HAWKs or other high-visibility approaches may be appropriate.

- **Rectangular Rapid Flash Beacon (RRFB)**

  A higher-visibility option, than just the sign alone, for the pedestrian crossing is the rapid flash beacon (RRFB). The RRFB is a device using flashing LED beacons in combination with a pedestrian warning sign and high visibility painted crosswalk. The flashing beacon provides a strobe-like warning to drivers when pedestrians wish to use the crosswalk. The RRFB is activated by a pedestrian wanting to cross the street at a marked crosswalk by pushing a button.

  Soon to be released research of these units nationwide by FHWA have shown that RRFB's improved driver stopping compliance at crosswalks to in the average range of 44 percent to 77 percent (though as low as 12 percent to 25 percent in some locations).

  RRFBs should not be used with YIELD or STOP signs or other traffic control devices other than pedestrian signs. RRFBs are best suited for 2-lane low speed roadways as they still may leave pedestrians vulnerable to the multiple-threat crashes common on multi-lane arterials.

  RRFBs are not currently widely used in the Tucson region, in lieu of the RED signal HAWKs that require a full stop and have a 97% driver compliance rate. The RRFB has received interim approval for optional use through the MUTCD in locations where a HAWK may not be needed.

Activated RRFB. Image: City of St. Petersburg

- **Advanced Yield/Stop Lines**

  At midblock crosswalks on multilane roadways, it may be appropriate to include advanced stop lines. Advanced stop lines are painted markings on the roadway placed about 30 feet in front of marked crosswalks. Advanced stop lines reduce the risk of multiple threat crashes (crashes in which the vehicle in the first lane stops but the vehicle in the second lane does not) by improving pedestrian visibility of approaching traffic. Advanced stop lines work best when combined with signs indicating to stop for pedestrians. [33]

[32] Pécheux, K., J. Bauer, and P. McLeod. United States Department of Transportation. • ITS Joint Program Office, "Pedestrian Safety Engineering and ITS-Based Countermeasures Program for Reducing Pedestrian Fatalities, Injury Conflicts, and Other Surrogate Measures Final System Impact Report ." January 30, 2009. http://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_scdproj/sys_impact_rpt/index.cfm

[33] American Association of State Highway and Transportation Officials, Guide for the Planning, Design, and Operation of Pedestrian Facilities, July 2004.

- **Raised pedestrian crossings**

  One potential enhancement at marked crosswalks is the raised crosswalk. Raising a crosswalk makes it essentially act as a speed table, which increases visibility and slows vehicles as they approach. This also raises the crosswalk to same level as the sidewalk, eliminating the need for curb ramps. As with speed tables, raised crosswalks should only be used on lower speed roads near major pedestrian destinations (such as at schools). Raised crosswalks can also be used in combination with slip lanes (see slip lane discussion under intersection treatments) to improve driver compliance with yielding requirements. Over use of raised crosswalks may be disruptive and slow emergency response vehicles.

Pedestrian Hybrid Beacon (often called HAWK locally)

- **Hybrid Beacons – (HAWK Lights)**

  Developed in the Tucson region, and now used nationally, the Pedestrian Hybrid Beacon (often called HAWK locally) provides a safe mid-block crossing opportunity on wide, high-volume, high-speed roadways where there may be long distances between signalized intersections. HAWK signals work especially well at providing pedestrian crossing opportunities along important walking routes or to specific destinations (e.g. schools, parks, commercial centers) without a substantial delay for motorists. HAWK signals help to prevent multiple threat crashes and in fact have been shown to reduce pedestrian crashes by 69 percent and all crashes by 28 percent where installed, with an observed 97 percent driver compliance rate. [34]


Bike HAWK at Speedway Blvd. and 10th Ave.

- **Bike HAWKS**

  The Bike HAWK is a variation on the HAWK signal that provides a safe crossing opportunity for both pedestrians and cyclists, usually at high-speed, high-volume roadways that intersect bikeways. The Bike HAWK has special signaling and signing devices to assist the cyclist in activating the crossing lights without leaving the bicycle facilities. The Bike HAWK has a 97 percent driver compliance rate and a 96 percent cyclist usage rate, with a 100 percent child and/or family usage rate. They can be expected to provide identical crash reduction rates as the pedestrian HAWK.

[34] Fitzpatrick, Kay and Eun Sug Park. Federal Highway Administration Office of Safety Research and Development, "Safety Effectiveness of the HAWK Pedestrian Crossing Treatment." July 2010. http://www.fhwa.dot.gov/publications/research/safety/10042/10042.pdf

TABLE 16

Summary of Crosswalk Treatments

Treatment	Purpose	Considerations
Marked Crosswalks	• Indicate to driver pedestrians may be crossing • Indicate a legal non-intersection crossing location	• Locate crosswalks where sight distances are good • On roadways with over 12,000 ADT (15,000 with raised medians) marked crosswalks with no other safety treatments are less safe than unmarked crosswalks • Crosswalks with both lateral and longitudinal striping considerably improve crosswalk visibility
Signing	• Alerts driver of approach to crosswalk • Increases compliance	• Do not over-use, drivers will stop paying attention • In areas with too many other signs, drivers may not see pedestrian signs • Flashing lights on signs can be used to catch driver attention • In-street signs can be very effective at improving driver compliance
Raised Crosswalks	• Improve visibility of crosswalk and pedestrians • Serve as speed tables to slow traffic • Enhances the pedestrian environment	• Should be used on relatively high-speed local streets or at high-pedestrian volume locations on collectors • Use in isolation. Multiple raised crosswalks is disruptive • If level with sidewalk can be used without curb ramps (detectable warnings are still necessary)
Advance Yield or Stop Lines	• Reduce risk of multiple threat crashes on multi-lane roadways	• Work best when combined with signage or signals • Use at mid-block crossing locations • Place lines roughly 30 feet in advance of crosswalks
Hybrid Beacons (HAWKS)	• Reduce risk of multiple threat crashes on high-volume multilane roadways • Improve driver stopping compliance at crosswalks	• Must be used in conjunction with signs and pavements markings • Function at corners as well as at mid-block locations • Consider at schools, parks, senior centers, along bike routes and at other unsignalized crossing locations with heavy pedestrian and vehicular traffic

Intersections

The most common point of pedestrian exposure to vehicular traffic is at intersections. Here pedestrians are not only at risk from traffic moving through the intersection (where either pedestrians or vehicles fail to yield), but also from left and right turning vehicles. In fact, a typical signalized intersection has 16 vehicle-pedestrian conflict points. This can present a challenging, and at times confusing situation for motorists and pedestrians alike. Also, major roadways often widen at signalized intersections to accommodate additional turn lanes, which increases pedestrian crossing distances. Over half of pedestrian crashes in the region occur at or near an intersection, most resulting from driver error.

Countdown signal at large intersections lets pedestrians know how much time they have left to cross.

To improve pedestrian safety, intersections and signals should be designed to reduce pedestrian crossing distances, reduce vehicle-pedestrian conflict points, allow sufficient crossing time, slow traffic speeds, improve pedestrian visibility and minimize complexity.

Intersection Traffic Signals

At signalized intersections, major improvements in pedestrian safety can be realized at relatively low-costs through the use of various signal strategies.

Pedestrian Signals

Pedestrian signals are used at intersections to provide guidance to pedestrians as to when it is safe to cross the roadway. These are particularly important where intersection signal phasing is complex, such as where there is a dedicated left turn phase for motorists, or where visibility is poor.

All pedestrian signals should use the international pedestrian symbol (instead of a WALK/DON'T WALK symbol). Countdown displays must be used where the pedestrian clearance interval is more than 7 seconds. Where the distance between a push button or the pedestrian waiting area is more than 100 feet, the number display should be 9 inches in height, otherwise a 6-inch height is adequate. (More detail regarding pedestrian signals is provided in the Manual of Uniform Traffic Control Devices Chapter 4E).[35] Shorter cycle lengths and longer WALK intervals generally provide better service to pedestrians and encourage better signal compliance.

Actuated Signals

Actuated signals are those signals in which a pedestrian typically pushes a button to bring up a WALK signal for crossing the roadway. Pedestrian crossing signals also may be actuated passively using sensor technology. Push buttons should be unobstructed and on flat surfaces with the face of the button parallel to the crosswalk. They should be located where pedestrians are expected to congregate between 1.6 and 6 feet from the crosswalk and mounted between 3.5 to 4 feet from the ground; low-enough for a person in a wheelchair to reach easily. Actuated signals are most appropriate at suburban or arterial locations where vehicular traffic volumes are high and pedestrian activity intermittent. A quick response to signal actuation will improve the pedestrian crossing experience.

Fixed-time Pedestrian Signals

Fixed-time pedestrian signals are those that change automatically as part of the regular signal cycle (not requiring a push button to activate the WALK symbol). Fixed-timed signals work best for providing optimal pedestrian service at intersections with high pedestrian volumes. They should be used (and currently are) as a first choice in pedestrian-oriented districts, such as in downtown Tucson and near the University of Arizona.

Crossing Times and Distances

The long crossing distances at the region's larger signalized intersections present a major challenge for many pedestrians, especially where multiple turn

[35] Federal Highway Administration. Manual on Uniform Traffic Control Devices Chapter 4E. Pedestrian Control Features. 2009. http://mutcd.fhwa.dot.gov/htm/2009/part4/part4e.htm

lanes increase potential conflicts and intersection complexity. It is not unusual at the intersections of major roads for pedestrians to encounter crossing distances of 120 feet or greater; a distance that takes a healthy young adult around 25 seconds or more to clear (at a walking speed of about 4.8 feet per second). For older adults or people with disabilities, this can take significantly longer. The MUTCD requires pedestrian signals have clearance intervals (the flashing red hand signal phase) to be timed for a walking speed of 3.5 feet per second (or about 36 seconds to cross a 120-foot intersection).

Longer pedestrian crossing times may be considered where intersections are regularly crossed by seniors, children and people with disabilities. Another option is for installing an extended push button press function, whereby pedestrians needing more time press the button continuously for 2 seconds, or more, to indicate the need for a longer walk phase. Where passive sensors are used, signal times can be extended when slower-moving pedestrians are detected in the crosswalk.

Leading Pedestrian Intervals

One strategy for increasing pedestrian visibility at intersections and thereby reducing crash risk, particularly with turning vehicles, is the leading pedestrian interval (LPI). LPI is a relatively simple change to signal phasing which gives pedestrians a 3-second advanced walk signal before vehicles receive a green light. This gives pedestrians enough time to establish themselves in the intersection by crossing roughly one travel lane before vehicle movements begin. LPI should be considered at intersections with two turning lanes or where there is a history of pedestrian crashes with turning vehicles.

Where LPI signals are used, non-visual crossing indicators should be employed. People with visual impairments often rely on auditory cues to cross roadways and so may struggles with LPI's in the absence of regular traffic movements.

Traffic Signal Cycles

One of the most common pedestrian conflicts at intersections is between pedestrians and turning vehicles, most dangerously with vehicles making a permissive left turn (that is, left turns permitted during green lights for through-traffic).

Right Turn on Red Conflicts

Widespread allowance of right turns on red (RTOR) was introduced in the 1970s as a fuel-saving method and to increase intersection capacity. In Arizona, drivers are allowed to turn right on red after they have come to a complete stop. A right-on-red turning vehicle must yield to all other traffic as well as pedestrians. Conflicts occur when drivers look left to find an opening in traffic and do not check for pedestrians approaching from their right. In some cases, drivers may also roll or pull through crosswalks and inhibit pedestrian crossing.

RTOR prohibitions or restrictions (such as during peak hour) may be considered at intersections with high-pedestrian volumes and a history of RTOR crashes, but should not be a first option. RTOR prohibitions may potentially increase right turn on green conflicts, due to an increase in the number of drivers making right turns during a green light. Other options to reduce RTOR conflicts and potential pedestrian injury include improving driver awareness through the use of signage, slowing turning speeds through intersection design and actively enforcing existing laws.

Left Turning Vehicle Conflicts

The more serious issue at intersections is with left turning drivers. Not only are drivers more likely to be distracted by oncoming traffic, but, as with driveways, increased turning distances and the desire to get out of oncoming traffic will result in higher travel speeds. Regional pedestrian crash data reveals that pedestrian crashes with left turning vehicles are about 60 percent more likely to result in a fatal or incapacitating injury than those with right turning vehicles. The highest risk occurs at intersections allowing permissive left turns. A simulated-study from Oregon State shows that between 5 percent and 11 percent of drivers navigating a permissive left fail to look for pedestrians in the crosswalk.

Intersections with only permissive left turn phasing tend to be the most dangerous for pedestrians, as drivers are anxious to take advantage of any opportunity to turn and may not be aware of a pedestrian in the parallel crosswalk.

Implementing a protected left turn only phase (a green left arrow without the permissive left on green) reduces pedestrian conflicts on parallel crosswalks considerably, but adds complexity to the intersection, increases delay, and adds waiting time for pedestrians (making pedestrian more likely to disregard pedestrian signals and cross against the light). Protected-only left turns should only be considered where parallel pedestrian volumes are high and where there is a very

high-volume of turning vehicles; or where left-turn crashes are disproportionately high. Protected lefts also could be used at some intersections only during peak hours, when the potential for vehicle-pedestrian intersection conflicts is high.

Lagging left-turns

Also, developed in the Tucson region, and now used nationally, the lagging left provides an opportunity for increasing pedestrian visibility of parallel crossing walks. Left turns are normally held from turning by opposing traffic during the GREEN signal, but the crossing pedestrians can start crossing immediately. The pedestrian is afforded an opportunity to get an advanced start similar to the LPI. When the left turning driver gets a gap in traffic and looks to begin the turn, the pedestrian is in the most visible position in the intersection. If traffic is so heavy the turn cannot be made during the GREEN, an arrow is actuated after the pedestrian signal goes to the DON'T WALK sign.

The lagging-left, when compared to the leading-left arrow, has been shown to decrease both intersection crashes and intersection delay.

TABLE 17

Summary of Signal Treatments

Signal Treatment	Purpose	Considerations
Signalized Intersections	• Pedestrian Signals provide information for pedestrians • Assign right-of-way	• Must time signals for maximum walking speeds of 3.5 ft per second • Consider long intervals (or passive sensors) in areas with a concentration of seniors and people with disabilities • Use countdown signals for improved safety • Fixed-time pedestrian signals should be used in high-pedestrian volume areas
Leading Pedestrian Interval (LPI)	• Reduces pedestrian crash risk from turning vehicles	• Consider at intersections with multiple turn lanes and a history of turning vehicle crashes • A 3-second leading interval will provide enough time for a pedestrian to cross 1 lane of traffic • Use auditory cues for pedestrians with visual impairments
Right Turn on Red Restrictions	• Reduces pedestrian/ vehicle red light conflicts on perpendicular crosswalks	• Reduces intersection capacity so use sparingly • May restrict turn movements only at peak hours • Only consider at intersections with high-volumes of right turning vehicles and pedestrians on perpendicular approaches • RTOR restrictions may increase right-turn on green pedestrian conflicts
Permissive/ protected lagging-left turns	• Eliminating permissive only left turn phasing, or adding a protected left turn phase, reduces pedestrian conflict with left turning vehicles on parallel crosswalks	• Permissive-only left turns create a conflict on parallel crosswalks • Protected/permissive lagging left turns improve intersection capacity and safety over leading protected/permissive • Protected-only lefts are safest for pedestrians but increase delay for both pedestrians and motorists.

Intersection Design

While intersection signal timing and phasing adjustments are the lowest cost and least invasive means of improving pedestrian safety at intersections, the intersection itself also can be redesigned to improve pedestrian safety. Designing intersections for pedestrian safety should be incorporate at the outset of all roadway improvements. Retrofitting intersections for pedestrian safety should be considered where signal adjustments alone have failed to significantly improve safety conditions for pedestrians.

Curb Radius Reductions

Larger curb radii often result in higher-speed turn movements for right turning vehicles. This increases the risk of pedestrians being struck in parallel crosswalks as well as increases the potential for more serious injuries when crashes occur. Smaller turn radii improve pedestrian safety at intersections by slowing travel speeds of turning vehicles, reducing intersection crossing distances, and increasing pedestrian visibility.

When determining the curb radius of a given intersection, the "effective radius" should be used instead of the "actual radius" for design considerations. The "effective radius" takes into account the wheel tracking of the design vehicle utilizing the width of parking and bicycle lanes. Use of the effective turning radii allows a smaller curb-return radius while retaining the ability to accommodate larger design vehicles. (Note: The design vehicle for an intersection is the largest vehicle that will frequently turn at the corner.)

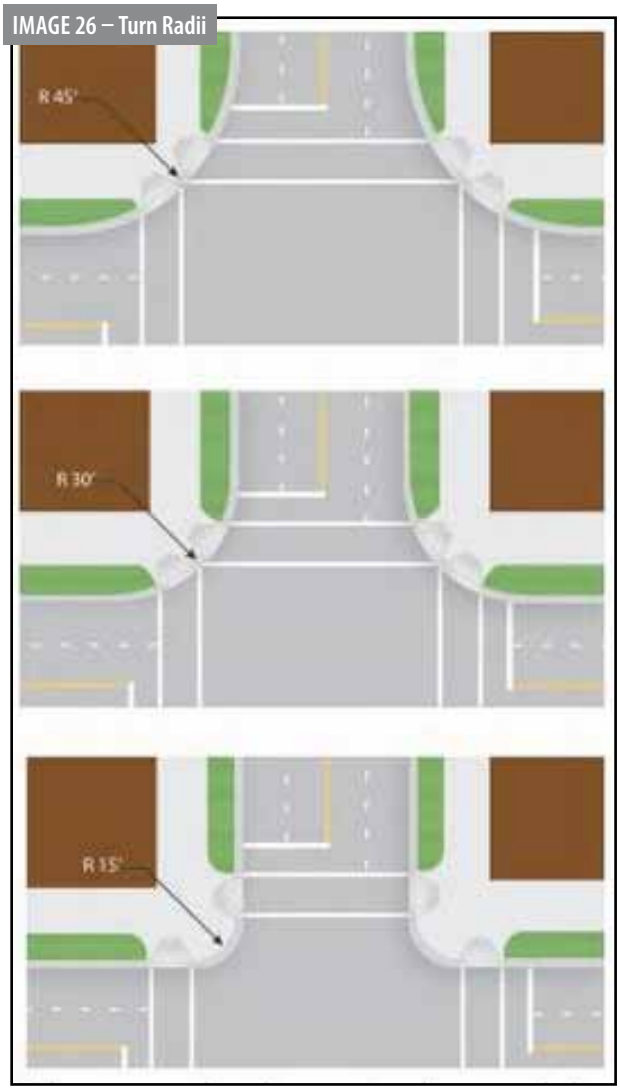
The smallest practical curb radius should be chosen based on the design vehicle. In pedestrian-oriented areas an appropriate effective turn radius is 15 to 20 feet. On arterial streets with substantial truck and bus traffic an effective curb radius of 25 to 30 feet is appropriate. The effective curb radius of an intersection should not exceed 35 feet.

Larger vehicles can be accommodated at smaller curb radii intersections by allowing large vehicles to turn into adjacent parallel lanes and by locating stop lines for opposing traffic and medians further back from the intersection.

Slip Lanes

A slip lane is a separate road traffic lane provided at an intersection - with a raised island known as a "pork chop" - which allows vehicles to turn at the intersection without actually entering it and interfering with through traffic. While right-turn

IMAGE 26 – Turn Radii



Tighter corner radii reduce crossing distance and slow turning traffic Image: Michele Weisbart, pedsafe.org

IMAGE 27

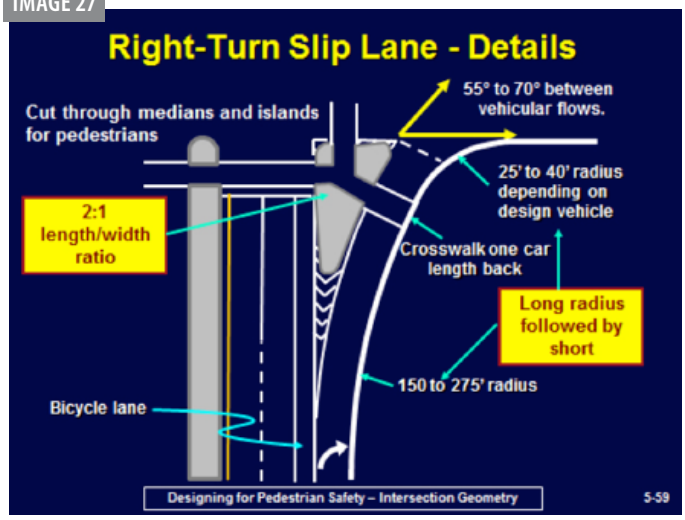


Image: pedsafe.org

slip lanes are generally a negative facility from the pedestrian perspective due to the emphasis on easy and fast vehicle travel, a well-designed slip lane can slow turning vehicles, allow drivers and pedestrians to easily see each other, reduce pedestrian exposure in the roadway, reduce the complexity of an intersection by breaking it into manageable parts, and allow drivers to see oncoming traffic as they merge into the receiving roadway. The major concerns of slip lanes from a pedestrian safety perspective are the high turning speeds they enable and the driver's awareness of approaching pedestrians as large turn radii can make pedestrians difficult to see.

"Porkchops" can reduce crossing distances, but vehicles may pull into crosswalks if not highly visible with signs

A well-designed slip lane should:

- Include a fully accessible "pork chop" which can safely and comfortably accommodate waiting pedestrians
- Make crossing and approaching pedestrians easily visible to right-turning drivers
- Orient the crosswalk at a 90-degree angle to the right-turn lane and locate it at least one car length back from the intersection
- Have the narrowest possible turn lane width
- Use signage and lighting to increase visibility of the crosswalk
- Intersect with the cross street at a relatively low angle

Accessible pedestrian refuge island with push button signal activation for pedestrians who are unable to cross the roadway in a single phase.

Pedestrian Refuge Islands

Pedestrian refuge islands are raised islands placed in the center of the street at intersections or midblock crossings to help protect crossing pedestrians from motor vehicles. Center crossing islands allow pedestrians to deal with only one direction of traffic at a time. This enables pedestrians to stop partway across the street to wait for an adequate gap in traffic before crossing the second half of the street. Pedestrian refuges can reduce the instances of pedestrians waiting in turn lanes while waiting to make the second half of the street crossing. Refuge islands are particularly helpful for those who may be intimidated by wider streets and those who struggle to cross in the allotted clearance time.

Refuge islands have been demonstrated to decrease pedestrian-vehicle incidents by 46 percent at marked crossings, and by 39 percent at unmarked crossings.

Refuge islands should be used in areas with intermediate to high traffic and pedestrian volumes, high travel speeds and large crossing distances. Islands must be designed with a cut-through and detectable warning strips for people in wheelchairs or with visual impairments. Islands should be at least 4 feet wide, and preferably 8 feet, to accommodate pedestrians

comfortably and safely. At signalized crossing locations, signals should be timed to allow a pedestrian to cross the entire roadway in a single phase. Where signal phasing is timed for a two-stage crossing (to the refuge island), a pedestrian signal (with pedestrian push buttons or other detectors) must be located in the island.

At mid-block locations a staggered (or Z-crossing) crosswalk may improve safety by slowing darting pedestrians and turning them to face oncoming vehicles.

Pedestrian island with staggered high-visibility crosswalk. The direction of the crosswalk goes against traffic for improved safety

Indirect left turn at Grant and Oracle. Well-signed "porkchop" and pedestrian islands break up crossing. Eliminating left-turns on Grant reduces potential conflicts.

Indirect left turns

The indirect left turn, often called the Michigan left, is an innovative intersection design pioneered in southeast Michigan and recently rolled out in the Tucson region. The indirect left functions by prohibiting left turn movements at the intersection and requiring left-turning drivers to proceed through the intersection to make their turn at a crossover turn. Indirect left turns have been shown to increase intersection capacity by between 20 percent and 50 percent, while reducing intersection crashes by 30 percent to 60 percent.[37, 38]

From a pedestrian perspective, indirect left turn intersections are simpler, safer and more convenient. By eliminating 1 or 2 left turn signal phases, indirect lefts reduce left turning vehicle conflicts with pedestrians, minimize confusion some pedestrians have with multi-phased signals, and permit more pedestrian crossing time due to longer parallel through-traffic phases. Indirect lefts also use a raised median, which allows for a pedestrian refuge island and makes for a safer intersection.

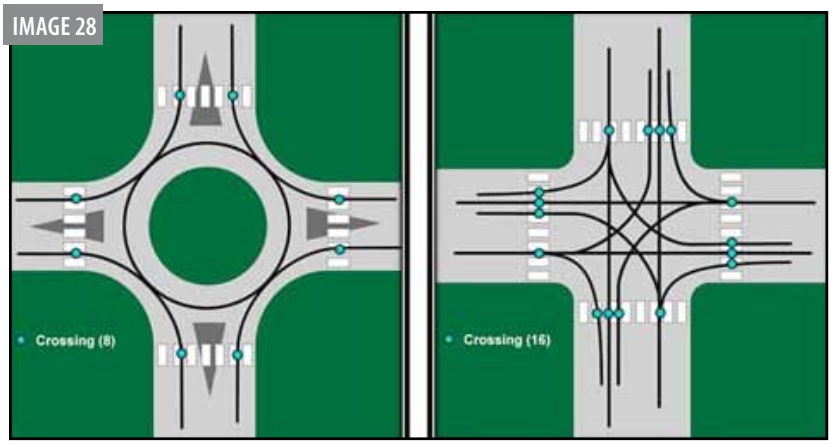
Pedestrian island with staggered high-visibility crosswalk. The direction of the crosswalk goes against traffic for improved safety

[37, 38] Hummer, Joe. North Carolina State University News Release, "No Left Turn: 'Superstreet' Traffic Design Improves Travel Time, Safety." January 10, 2011. http://news.ncsu.edu/releases/wmshummersuperstreets/

Hughes, Warren, Debra Chappell, and Shyuan-Ren Chen,. Federal Highway Administration Office of Safety, "Innovative Intersection Safety Improvement Strategies and Management Practices: A Domestic Scan." September 2006. http://safety.fhwa.dot.gov/intersection/resources/fhwasa06016/chap_6.htm

Roundabouts

IMAGE 28



A roundabout has 1/2 the vehicle-pedestrian conflicts as a traditional intersection. Image: FHWA

Another non-traditional intersection treatment which is becoming more common around the United States is the modern roundabout. The roundabout functions by eliminating traffic signals altogether and moving vehicles in a circular pattern through the intersection. Under the right conditions, roundabouts have been shown to reduce delay and greatly improve safety over signalized intersections.[39, 40] Roundabouts work best where vehicle approach volumes are roughly equal. They are generally not recommended where high-speed, multilane roadways intersect. For maximum safety benefits, roundabouts should be designed to slow entry speeds to around 20 miles per hour.

For pedestrians, roundabouts have some of the same benefits as indirect left turn intersections. They eliminate pedestrian conflicts with turning vehicles and reduce complexity by breaking pedestrian crossings into smaller parts. This allows pedestrians to navigate only one direction of approaching traffic at a time. Roundabouts reduce pedestrian crashes by about 27 percent and are increasingly being used in school zones.

Well-lit, high-visibility, ADA compliant crosswalks should be located at least 20 feet from the entry to the roundabout. A pedestrian refuge, or splitter island, should be located at the crosswalk to both slow vehicle speeds and provide for safer crossings. Roundabouts may present a particular challenge for those with visual impairments. To address this issue, pedestrian signals must be installed at multilane roundabouts. Optional signals also could be considered at single-lane roundabouts for people with visual impairments.

IMAGE 29

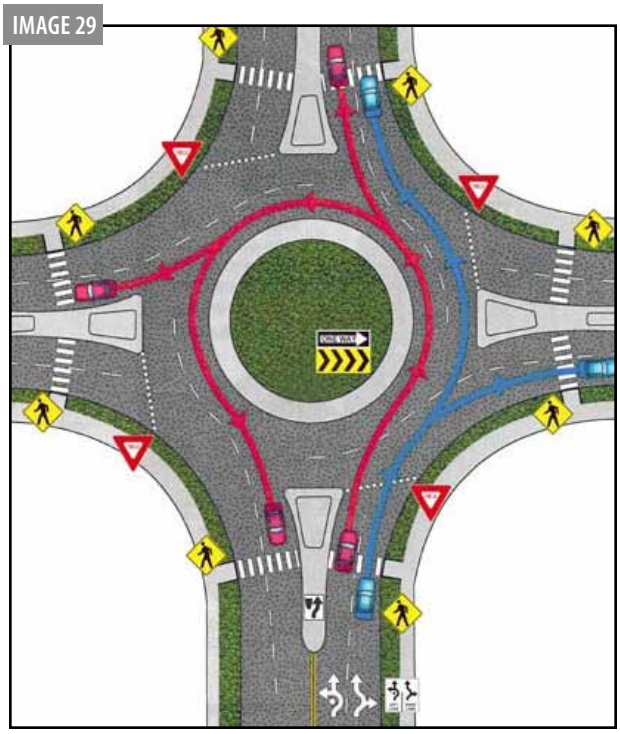


Image: Minnesota Department of Transportation

[39] Federal Highway Administration Office of Safety, "Proven Safety Countermeasures." January 2012. http://safety.fhwa.dot.gov/provencountermeasures/fhwa_sa_12_005.htm

[40] Federal Highway Administration, "Roundabouts: An Informational Guide." http://www.fhwa.dot.gov/publications/research/safety/00068/00068.pdf

TABLE 18

Summary of Intersection Treatments

Intersection Design Treatment	Purpose	Considerations
Curb radius reduction	• Slows travel speeds of right turning vehicles	• Use effective radius rather than actual radius to accommodate design vehicle • Choose the smallest possible effective radius • The effective turn radius on large urban arterials should not exceed 35 feet under normal conditions • Where there are a high number of large vehicles making right turns, a larger radius can be considered
Slip lanes	• Slip lanes allow vehicles to make a right turn without slowing through traffic • Slip lanes can reduce pedestrian exposure at large intersections	• Place crosswalk at 90 degree angle to approaching road • Locate crosswalk 1 car length back from intersecting roadway • Long approach followed by small turn radius • Use narrowest possible slip lane • A tighter angle improves pedestrian visibility
Pedestrian Refuge Island	• Breaks up long crossing distances • Provides a safe resting space for slower pedestrians • Improves safety at both midblock crossing locations and at intersections • Allow pedestrian to navigate one direction of travel at a time while crossing the roadway	• Should be at least 4 feet wide, and preferably 8 • Recommended on roads with over 12,000 ADT with intermediate to high travel speeds • Design for wheelchair access and include detectable warnings • Combine with curb extensions to further reduce crossing distances
Indirect left turn	• Improve intersection capacity • Reduce left turn conflicts • Simplifies signal phases for pedestrians • Increases crossing times as signal phases are longer	• Should include a raised median with pedestrian refuge island
Roundabout	• Considerably improves intersection safety by eliminating turning vehicle conflicts • Reduces vehicle delay by maintaining continuous vehicle flow	• Use where volumes on approaching roadways are about equal • Turn radii must be kept tight to slow travel speeds • Splitter islands should be used on all approaches

Roadway Design

Larger, higher volume roadways are necessary for the efficient movement of people and goods around the region, but there are some design improvements that can be made to increase safety and improve the pedestrian experience without sacrificing the roadway's ability to move motor vehicles. The way roads are designed affects pedestrian safety and comfort as much or more than the state of sidewalks and roadsides. Wide travel lanes and large cross sections encourage high travel speeds and present long crossing distances, posing a major challenge and threat to pedestrians. The more time a pedestrian spends in the roadway while crossing, and the faster vehicles are traveling, the greater the likelihood of severe pedestrian crashes.

Building a raised median as part of the La Cañada improvement project.

This is particularly true where pedestrians are crossing away from intersections. While work certainly needs to be done on educating pedestrians on the risk of road crossing and discouraging certain risky behaviors, safer roadway design – and providing more crossing opportunities – can compensate for human behavior. High-speed vehicles passing along sidewalks also discourages people from walking because of the noise and general human discomfort it produces.

Raised Medians

Raised medians have many benefits for pedestrians. Most importantly, they serve access management, thereby reducing pedestrian conflicts with left turning vehicles at driveways while walking along the roadway. Additionally, raised medians give refuge for pedestrians crossing the roadway. Even if not at a designated crosswalk, medians allow pedestrians to negotiate just one direction of traffic at a time.

The less direct benefits of raised medians is that they allow for landscaping or trees in the median, which beautifies the roadway and breaks up excessive uninterrupted expanses of asphalt. Medians also can narrow the visual width of the roadway to reduce traffic speeds (and improve the sense of pedestrian comfort). Where raised medians intersect with crosswalks, median curbs should be cut and a landing constructed at the level of the roadway. Detectable warnings must be installed at the entrances to the landing.

Lane Width Reductions

A major challenge for making more comfortable, livable streets and safe streets, particularly in urban areas, is the limited amount of right-of-way available for bicycle and pedestrian improvements and the competition for that space.

Where this is an issue, narrowing the width of travel lanes by restriping is one, relatively low-cost, roadway design change that can be used to free up space for other roadway users. On arterial roadways the width of a typical travel lane is 12 feet and occasionally more. Restriping urban arterial roads for 11- or even 10-foot travel lanes can make additional space available for improved sidewalks, installing wider bike lanes, and/or providing roadside landscaped buffers. Narrower travel lanes may also slow travel speeds (between 1 and 3 mph per foot reduction of the travel lane

[41] Columbia Pike Street Space Planning Task Force, "Relationship Between Lane Width and Speed: Review of Relevant Literature ." September 2003. http://www.arlingtonva.us/Departments/CPHD/forums/columbia/pdf/lane_width.pdf

[42] Pedestrian and Bicycle Information Center, "The Truth about Lane Widths." http://www.pedbikeinfo.org/data/library/details.cfm?id=4348

Example of a four to three lane road diet in Myrtle Beach, South Carolina. Five lanes of traffic were converted to two travel lanes, a center turn lane and bike lanes. The addition of landscaped median islands and high visibility crosswalks improves pedestrian safety and provides more crossing opportunities. Image 1: Google. Image 2: City of Myrtle Beach. Road diet example from rethinkingstreets.com

in some studies),[41] thus reducing the likelihood of more severe crashes. There is no strong evidence that narrowing travel lanes on urban arterials reduces vehicle capacity or increases crashes.[42]

Thus, 10-foot travel lanes should be considered as the standard for most vehicle travel lanes for arterials and collectors in urban areas, unless there are significant volumes of buses or large trucks (roughly more than 8 percent of daily traffic), in which cases 11-foot travel lanes should be used. Wider outside lanes for buses and trucks, with narrower interior lanes also could be considered.

The American Association of State Highway and Transportation Officials' A Policy on Geometric Design of Highways and Streets (the Green Book) permits this flexibility in land widths, which is further developed in the Institute for Transportation Engineers and Congress for New Urbanism's jointly authored and FHWA supported, [43] *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach.*

On rural roadways, wider lane widths should be maintained as this has been shown to have real safety benefits in reducing run-off-the-road and cross-centerline crashes.

Road Diets

In some cases, it may be appropriate to reduce excess travel lanes all together in order to improve safety. This is known as a road diet. The road diet consists of removing 1 to 2 travel lanes and reallocating that space to other uses (such as bike lanes, sidewalks, turn lanes, etc.). The classic road diet takes a 4-lane roadway (4 travel lanes with no turn lane) and converts it to a 3 lane roadway (2 travel lanes and a continuous left turn lane), though 5 lane roads (2 directional travel lanes with continuous left turn lane) also may be appropriate for a road diet under the right circumstances. Road diets have been shown to result in fewer crashes, reduced vehicle noise, and increased bicycle and pedestrian activities, and at volumes below about 20,000 ADT, do not result in a loss of road capacity or in diverting traffic onto other routes.

The best candidates for road diets are 4- and 5-lane roadways with ADT below 20,000 (with best results around 15,000 ADT), ongoing safety issues, high current or latent bike and pedestrian demand, and roads that are located in residential or business districts with an interest in creating more lively and active streetscapes.

Above 20,000 vehicles per day, candidates for road diets must be carefully evaluated to ensure that capacity reductions will not result in undue impact

[43] Federal Highway Administration, "Memorandum: Bicycle and Pedestrian Facility Design Flexibility." August 20, 2013. http://www.fhwa.dot.gov/environment/bicycle_pedestrian/guidance/design_guidance/design_flexibility.cfm

[44] Federal Highway Administration Turner-Fairbank Highway Research Center, "Evaluation of Lane Reduction "Road Diet" Measures on Crashes." June 2010. http://www.fhwa.dot.gov/publications/research/safety/10053/

Before and after example of a 4-lane to 3-lane road diet on 36th Street in the City of Tucson. Removing one travel lane in each direction allows space for bike lanes and a continuous left turn lane.

TABLE 19

Summary of Designing Roadways for Pedestrian Safety

Roadway Design Treatment	Purpose	Considerations
Raised Medians	• Eliminates left-turning vehicle conflicts • Narrows visual width of drivers • Breaks up long pedestrian crossing distances	• Cut medians at marked crosswalks to allow pedestrian access • On larger roadways (wider than 60 feet) medians should be 16-18 feet wide to accommodate turn lanes and pedestrian refuges • Landscaping and trees improve effectiveness and attractiveness, but must not reduce visibility
Narrow Travel Lanes	• Re-allocates space in the right-of-way for bike lanes, buffers, and/or wider sidewalks • Reduces crossing distances • May slow vehicle travel speeds	• 10 foot travel lanes should be starting point on urban collectors and some arterials • Use 11 foot lanes on roads with target speeds of 35 mph and with high bus and truck volumes • 12 foot travel lanes are appropriate in rural areas • Mixing narrow inside travel lanes (10 foot) with wider outside lanes (11 to 12 foot) can accommodate larger vehicles but still add pedestrian benefits
Road Diets	• Slows vehicle travel speeds • Re-allocates space in the right-of-way for bike lanes, buffers, and/or wider sidewalks • 4-to-3 lane road diets eliminate multiple-threat crashes	• Can be considered on roadways below 20,000 ADT • Roads at or slightly above 20,000 ADT could be candidates if impacts on neighborhoods and adjacent roads can be minimized

of adjacent roadways or neighborhoods. Using roundabouts instead of signalized intersections works well with road diets by increasing intersection capacity and improving pedestrian safety.

Pedestrian Programs: Beyond Engineering

The engineering tools described above are a very important piece of transforming the Tucson region's transportation system into one that accommodates all users in a safe and comfortable manner. However, these are longer-term solutions which will be implemented through changing design standards and policies, and will only be felt incrementally as existing transportation facilities are upgraded and new facilities are built.

A more immediate impact can be achieved through expanding and supporting pedestrian-focused programs. These include 1) educating pedestrians and drivers of the rights, responsibilities, and expectations of all road users (including discouraging unsafe behavior), 2) actively and visibly enforcing existing pedestrian safety laws, and 3) encouraging more walking as part of residents' transportation habits.

Safe Routes to School

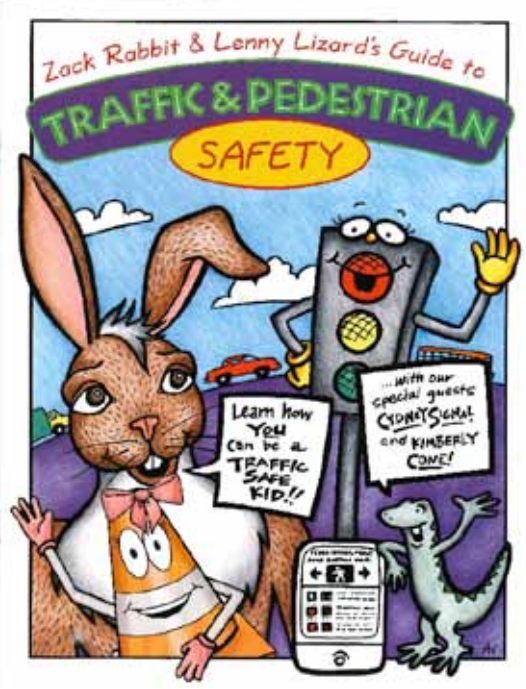
In July 2005, Congress passed federal legislation, as part of SAFTEA-LU, that established a National Safe Routes to School (SRTS) program to improve safety on walking and bicycling routes to school and to encourage children and families to travel between home and school using these modes. At its heart, the SRTS program empowers communities to make walking and bicycling to school a safe and routine activity. Until October 2012, the program made funding available for a wide variety of programs and projects, from building safer street crossings to establishing programs that encourage children and their parents to walk and bicycle safely to school.

With the passage of MAP-21, however, federal funds are no longer dedicated exclusively for SRTS. Instead,

SRTS programs are now eligible for funding under the broader Transportation Alternatives (TA) program and through the Surface Transportation Program (STP).

SRTS encouraged communities to take a comprehensive approach to improve walking and biking to school, including engineering improvements, in-class education, encouragement activities, and crime reduction among other things.

SRTS programs are already in place locally and the jurisdictions within the greater Tucson region remain committed to improving walking and biking options to school and supporting SRTS programs, even with the elimination of a dedicated federal funding stream. For more information of Safe Routes to School visit the National Center for Safe Routes to School (www.saferoutesinfo.org).



Zack Rabbit and Lenny the Lizard. A pedestrian safety coloring book developed by the City of Tucson, PAG, and the Governor's Office of Highway Safety to teach children about safe walking.

Pima County currently conducts a region-wide pedestrian safety education campaign in schools for elementary and middle school students as part of their Safe Routes to School program. Each year, Pima County staff works with an average of 45 schools, providing information and safety education to more than 2,400 students per year.

Education

Education of pedestrians and motorists is essential for non-motorists' safety and mobility. This can be one of the most effective and cost effective ways of reducing collisions and encouraging walking. To be effective in reducing risky behavior, pedestrian safety campaigns need to target different age and demographic groups who may have different risk factors, and have different messages for motorists and pedestrians.

Education campaigns should be multifaceted and include materials and messages to be integrated into school curriculum, public service announcements on TV and radio, social media and in public signs. Education programs work well when they are coordinated with enforcement activities.

Some examples of best practices in easy-to-consume public pedestrian safety education include the work done by peds.org in metro Atlanta (you can see some of their informational flyers here http://peds.org/resources/flyers/) and the "It's road safety, not rocket science" campaign out of Philadelphia (examples of their messages targeting all road users can be found at the Mayor's Office of Transportation Utilities blog site. http://phillymotu.wordpress.com/category/other/walk-right-ride-right-drive-right/). For a more complete listing of best practices in pedestrian and roadway education, please visit the Pedestrian and Bicycle and Information Center's section on education (http://www.pedbikeinfo.org/programs/education)

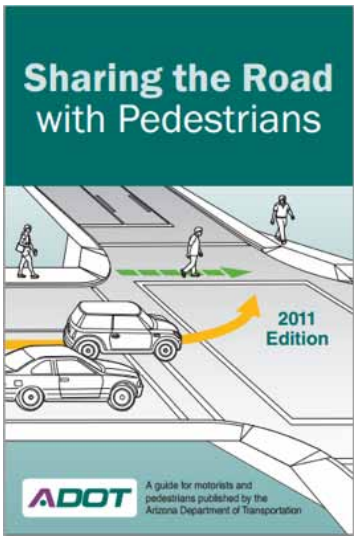
In December 2013, the City of Tucson partnered with Allstate insurance to launch the "Tucson on 2" safety campaign. The campaign was aimed at improving pedestrian and bicycle safety in the community through education and awareness efforts. The campaign included safety advertisements, sign installations, events and giveaways.

City of Tucson's
Pedestrian Advisory Committee

On February 12, 2013, as the result of an alarming increase in pedestrian crashes in the city, Tucson's Mayor and Council established a Pedestrian Advisory Committee (PAC) for the City of Tucson. The 13-member Committee's purpose is to provide input from a pedestrian perspective on major roadway projects, such as road plans, bridges, street repaving, and Plan Tucson (the City of Tucson's General Plan). The PAC meets monthly to discuss pedestrian issues, listen to updates from public safety personnel, and identify potential strategies for improving walking conditions in the city which can be communicated to the elected leadership of the Tucson.

Encouragement

Encouraging more walking for recreational purposes and as a replacement for shorter driving trips, can, if successful result in better health, a stronger connection to community and reduced driving. Encouraging walking also can improve pedestrian safety by raising awareness about the presence of pedestrians.



ADOT's Sharing the Road with Pedestrians booklet provides guidance to pedestrians and drivers on safe behavior

Of course, the most effective way to encourage walking is by making it an enjoyable, comfortable, and convenient way to travel. This is best achieved through improving pedestrian facilities and other aspects of the built environment. However, it is also important to build a culture of walking in the community, so that, although pedestrian conditions may not be perfect on the ground, people can still feel comfortable about choosing to walk. A good step is seeing others out walking, which will increase awareness, the sense of safety, and will normalize the activity. In the same way that the bicycling community has been so effective at building an identity around cycling and using that to improve conditions for cyclists on the roadways, everyone should be able to identify himself or herself as a pedestrian. Currently, the Living Streets Alliance is leading a number of activities to encourage more walking in this region (www.livingstreetsalliance.org), including some of those discussed below.


Cyclovia Tucson: A community event in which city streets are turned over to bicyclists, pedestrians and others to enjoy. In 2013, 25,000 of the region's residents attended the two Cyclovia events.

Some ways to encourage walking may be to:

- **Demonstrate Successes**

  The Tucson region may not be able to make everywhere a walkable neighborhood or destination in the immediate future, but it can certainly start by creating smaller-scale but great walking places and demonstrating and promoting those successes region-wide. A good place to start is on routes and streets where many people are already walking or where they could expect to be walking with some improvements. A nice walking environment often becomes a destination in and of itself.

  Part of demonstrating successes is also highlighting what is already great about walking in the region. This can be done by creating walking maps and brochures of the great walks of the Tucson region, for example. This could include routes through historic neighborhoods, along recreational trails, or just highlighting enjoyable and high-quality places for walking.

- **Organize Events and Campaigns**

  Small or large walking and biking events may get people out on the streets who could otherwise be disinclined to walk. The 2013 Tucson Cyclovia events, for example, drew over 25,000 participants over two Saturdays in April. It gave those who came out an opportunity to see the city at slower speed and may help to plant the seeds for choosing to walk in the future.

  Other campaigns that have been used to encourage walking in the Tucson region include Tucson Mayor Jonathan Rothschild's campaign to challenge residents to walk 100 mi les in a year and PAG's car free Tucson challenge, as well as numerous others.

- **Build Pride and Shared Identity**

  Promotional materials can be an effective way of building support and shared identity around the

idea of walking. These could allow people to declare that they choose to walk. Bumper stickers, T-shirts, key chains and other individual merchandise allow people to promote a commitment to walking and connect with others who also do. Ideally, everyone should be able to see themselves as a pedestrian.

- **Partner and Work through Existing Organizations**

  A good number of people will never attend a walking event, participate in a walking campaign, or purchase merchandise; however, almost everyone has a connection to an institution or organization of some sort. This could be through work, school, neighborhood group, religious organization, or another optional affiliation. Employers, for example, could set up challenges for their employees to walk a certain number of miles per month, or provide incentives. Neighborhood associations or HOAs can promote comfortable walking routes and nearby walk-friendly businesses and religious organizations may wish to promote walks to improve health and community connections, among other examples.

For more information on strategies for encouraging walking, visit (http://www.walkinginfo.org/promote/)

Enforcement

Enforcing existing laws for motorists, pedestrians and cyclists is the final piece of ensuring that roadways are safe for all users, and people feel comfortable walking in the region. Targeted enforcement can help to educate drivers and pedestrians about the laws of the road, discourage unsafe behavior, and reinforce the importance of following the rules. Many people may be unfamiliar with the rules of the road when it comes to pedestrians, so these enforcement programs provide a good learning opportunity for pedestrians and motorists alike. For that reason, enforcement efforts do not necessarily need to focus on citing violators, instead some of the most effective efforts coordinate with education campaigns to distribute information.

For example, a number of cities, including the city of Tucson, periodically conduct crosswalk stings, in which a plain-clothes police officer repeatedly crosses the road in a crosswalk. Those drivers who fail to yield to the crossing officer are flagged down and pulled over by another waiting officer. In some cases, the drivers are cited, and in some cases they are given a written or verbal warning. A study from Miami suggests that where crosswalk stings are coordinated with a broader education campaign, such as where drivers are given pamphlets on pedestrian safety, driver compliance increases at the targeted crosswalk well beyond the length of the sting itself. Coordinating with local news agencies to run a series on the stings also will spread awareness of the action, and improve the educational opportunity for motorists and pedestrians. Pedestrian safety enforcement works best when there is a coordinated and sustained effort between public safety officials, transportation planners and engineers, pedestrian advocacy organizations, community advisory committees, local media and other promotional/educational campaigns. In addition to educating the public, working with public safety agencies to ensure that officers are also familiar with pedestrian laws, may help to change perceptions.

Example of a crosswalk sting in Glendale, California. A plainclothes police officer crosses back and forth in a crosswalk. Vehicles that fail to yield are pulled over by a waiting motorcycle unit. Instead of citing violations, officers can distribute educational materials about pedestrian safety and the law. Courtesy of the Glendale News-Press

Another opportunity for expanding the educational focus of enforcement activities would be to establish a class for drivers, pedestrians, and cyclists who have

[45] Van Houten, Ron, and J. E. Louis Malenfant. "Effects of a Driver Enforcement Program on Yielding to Pedestrians." Journal of Applied Behavior Analysis. Vol. 37 no. 3 (2004): 351. http://eric.ed.gov/?id=EJ696619

received a citation for being in the wrong place on the road (such as drivers violating crosswalks, or pedestrians crossing in an unsafe manner). This would be similar to Portland's Share the Road Safety Class. The class would focus on rights and responsibilities of different users of public rights-of-way, including educating attendees on traffic law and safe behavior. Successful completion of the class for residents receiving a traffic citation could result in dismissal of conviction.

Pima County currently conducts a safety diversion class for bicyclists, called the Bicycle Safety Diversion Program, for cyclists who have received a traffic citation while riding their bikes.

Downtown Tucson contains many of the elements of a walkable place. This could be emulated at a smaller scale elsewhere in the region.

For more information on strategies for enforcing pedestrian safety, visit http://www.pedbikeinfo.org/programs/enforcement.cfm

Designing for Pedestrians: Taking the next step

Many of the tools described above concern engineering practices and programs for improving the pedestrian environment on our existing system; a system that was largely designed and constructed around the private automobile. These tools are appropriate for many contexts and outline the changes that can be made anywhere to improve safety, accessibility and comfort for pedestrians; because although not everywhere will be oriented toward pedestrian travel (the region still needs a network of larger roads to support cross-town travel and the movement of goods, for example) at least the basic facilities that make pedestrian travel a viable choice for people of all ages and of all abilities should be available.

But in certain districts and locations, this region should strive to go beyond simply accommodating pedestrians through safety and accessibility improvements, and seek to design all elements of the public realm and adjacent land uses at the pedestrian scale. For no matter how good and safe the sidewalks are, an area is not truly walkable until all elements of the environment are contributing to the pedestrian experience. The best walkable streets and neighborhoods are about more than just walking: they encourage people to be outside, to engage the public realm; they become destinations in and of themselves as people are drawn to them for their energy, street life, and for the intentional or incidental interactions that are essential for the healthy functioning of community. At their best, these places belong to everyone.

With the notable exceptions of the main gate area of the University of Arizona, 4th Avenue, and parts of downtown Tucson, the greater Tucson region has very few truly walkable areas. Most commercial development is located on wide arterial streets, set back from the roadway to accommodate surface parking lots, with narrow sidewalks and poor connectivity with residential areas. This is not the kind of environment that encourages one to be a pedestrian.

Residential streets and shared-use paths are much better for walking from the standpoint of comfort, but oftentimes lack decent connections to destinations or, in the case of many residential streets, even the most basic pedestrian infrastructure.

The elements of a walkable place

While it must be re-stated that specific urban design and land use considerations are outside the scope of

this document, there is a helpful general framework for considering the land use/transportation nexus, particularly as it relates to building more walkable communities: this framework is the 4 D's (density, distance, diversity, and design). Integrating the concept of the 4 D's into land development and transportation planning can promote transportation efficiency, reduce vehicle distance traveled, encourage physical activity, and make for a more pedestrian friendly community. The 4 D's works as a development and transportation concept at all relevant scales (regional, community and local), though the specifics will change with context. Keep in mind that the 4 D's are complementary, each enhancing the effectiveness of the other at improving transportation choices, and often overlapping.

Density

The first of the D's, *density*, is quite simply the number of people (housing units) and/or jobs within a certain geographic area. Higher-density development can support more transportation choices and shorten travel distances by providing the critical mass of jobs and houses necessary to sustain high-quality public transportation and a greater concentration and diversity of commercial destinations in a small area.

Increased population and employment density, while critical in enabling greater walkability, though is not in itself sufficient. (Consider, for example, a large office park near a freeway interchange, or a residential tower set back and disconnected from the surrounding community or street. Both are examples of higher-density developments, but neither will likely support more walking or transportation choices.) Walkability also depends on the distance to and between destinations; the diversity of shops, services, and amenities that can be reached by walking, and the design of the public realm.

Distance

Closely related to density is the idea of *distance*. Most people will walk about ½ mile to maybe 1 mile before opting for another mode of transportation (this can be longer or shorter, depending on the comfort of the walking route.) So, the more destinations (parks, shops, restaurants, etc.) that are within a 10-minute walk of each other, and the closer these destinations are to residences, the more likely people are to walk.

The directness of the pedestrian route is also very important to consider. For example, while two destinations may be near each other physically, they may be separated by a multi-lane, high-volume roadway with long blocks and few crosswalks. Unless there is a convenient mid-block crosswalk, a person will have the options of walking to the nearest crosswalk (greatly increasing trip distance), putting him or herself at risk by crossing in between crosswalks, driving to the destination, or just not making the trip at all.

Diversity

Diversity refers primarily to the variety of uses located in close proximity to each other. This is also commonly known as mixed-use development. Mixing compatible and complementary uses, such as residential, neighborhood scale shopping, parks, schools, restaurants and cafes, in a single neighborhood (and in some cases, within a single building), allows residents to meet many different needs on foot.

Diversity also can refer to the form of the buildings. Long, uninterrupted and monotonous, streetscapes and building facades detract from the pedestrian experience and make walks seem longer than they are. Adding variety to buildings and streets will make walking far more engaging for pedestrians.

Design

Design is the broadest of the 4 D's encompassing everything from street layout to building design. Each element of walkable design is discussed briefly below.

Geometry- As mentioned previously, road and sidewalk widths and design have a considerable impact on pedestrian comfort and safety. In more walkable commercial and mixed-use areas, roads should be narrow (lanes of 10'-11' and curb-to-curb not exceeding 60') and sidewalks should be wide (14'-18'). Blocks should be kept short (300'-400') to slow traffic, permit more crossing opportunities, and add to the diversity of the built environment. In residential areas, 5-6' sidewalks should be sufficient, with narrow (30') roadways, and short blocks.

Network- The most walkable areas tend to be built on the classic grid pattern, with small blocks, and highly connected streets. The grid allows for shorter and more direct pedestrian travel and a variety of walking route choices to a given destination. In residential subdivisions developed on a cul-de-sac – or "lollipop" – pattern, direct pedestrian and bike access can be accommodated by ensuring that cul-de-sacs have a pedestrian pathway connecting to other streets or parts of the neighborhood. In this way, cul-de-sacs can prevent through traffic while not making it difficult to walk to destinations.

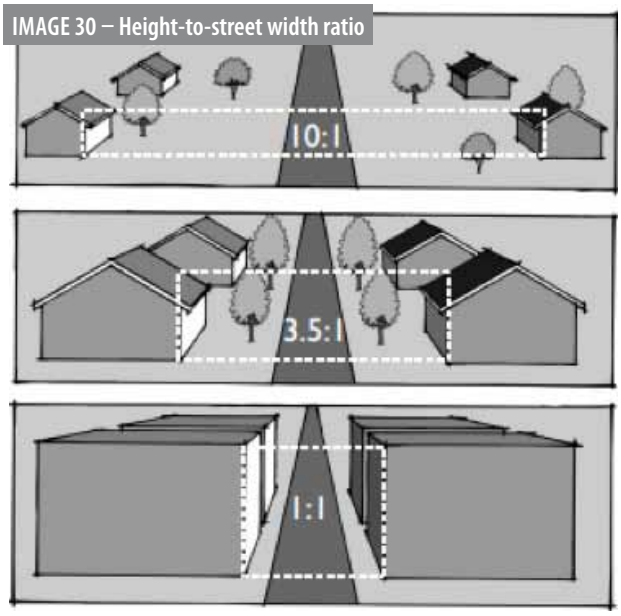
Streetscape/street furniture- Active and interesting streetscapes engage the pedestrian and encourage walking. In walkable commercial and mixed-use areas, street furniture such as benches, outdoor dining and parklets invite people to use the sidewalk as a public space and help define the pedestrian realm. Street trees and landscaping beautify and cool these spaces. Public art, way-finding signs, and water features contribute to a sense of place and landmarks can assist visitors with navigation. Emphasizing significant, historical or otherwise interesting buildings will add to the character of a walkable district as well.

Public Spaces- Public spaces, such as parks, plazas and green spaces should be integrated into walkable areas and neighborhoods to provide gathering and rest spaces for people. Where appropriate these places can host entertainment or street performers to enliven the area.

Building location and orientation- In walkable commercial areas, buildings should be located at or close to the sidewalk. In residential areas, homes may be set back from the sidewalk 10'-15' but will make for a better pedestrian environment if they are oriented to the street, that is, if they have front porches, windows and do not sacrifice too much of their façades to a garage.

Buildings serve to frame the pedestrian realm and should contribute to giving the pedestrian a sense of enclosure. In walkable districts this can be achieved through building to the sidewalk and establishing building height-to-street width ratios of roughly 1:3

IMAGE 30 – Height-to-street width ratio



Example of building height-to-street width ratios. Image: Maine Department of Transportation's Sensible Transportation Handbook

(where the height of the building is 1/3 of the distance between buildings on opposite sides of street. So an 80-foot cross-section would need 25 foot tall buildings to create the sense of enclosure). On residential streets, the ideal ratio may be closer to 1:3.5 or even 1:4, and in downtown districts it could be around 1:1.

Even the arterial network would benefit from locating buildings closer to the street as it could reduce the exposure felt by pedestrians as they walk along a wide roadway on one side of the sidewalk and a surface parking lot on the other.

Active Façades- The final piece of design is the design of the buildings themselves. Traveling at 3 miles per hour, pedestrians engage with architectural designs much differently than motorists traveling at 30 mph. Active façades on commercial buildings, with window displays, awnings, arcades, and articulation can make walking through these areas interesting, encourage "window shopping," and provide sufficient variety to stimulate the senses. In residential areas, active façades means that houses engage the street and demonstrate a variety of architectural styles and/or unique details.

In summary, each of the 4 D's complements the others in creating a walkable community. So, for example, higher residential and employment density makes it economically feasible to locate more, and a greater diversity of businesses and services in close proximity to each other and to residences, thus reducing potential walking distances to different destinations. Where these diverse uses are tied together by well-connected streets, interesting streetscapes, unique buildings, and high-quality public spaces, higher levels of pedestrian activity can reasonably be expected.

Even where implementing a 4 D's approach in its entirety is not feasible due to existing development patterns or other constraints, using the 4 D's as a framework for development decisions can greatly improve walkability in the long term. For example, areas already exhibiting some of the more fundamental elements of the 4 D's, such as short block lengths, narrow streets and good street network connectivity, can be targeted for walkability improvements by allowing greater density, mixed-use development, and creating pedestrian-focused design standards. As these areas become more pedestrian friendly, streetscape improvements can help define the districts and tie each of the elements together into a coherent whole.

Newly developing areas may wish to incorporate the 4 D's framework at the outset, and older areas that might currently be less walkable due to poor street connectivity, building location and orientation, or which are along wide, high-volume roadways can begin to use elements of the 4 D's framework to improve pedestrian comfort. Because even though the 4 D's function best in combination, individual elements can be used to increase transportation choice in a given area. For example, a multi-lane arterial roadway featuring primarily strip-mall style commercial development might not currently provide the best foundation for creating a better walking environment, but making certain changes such as requiring new buildings be constructed to the sidewalk, accommodating parking in the rear of the buildings, consolidating driveway access, widening sidewalks, adding more mid-block crossings, and ensuring access to adjoining neighborhoods, could provide a significantly more comfortable and attractive walking environment.

SECTION 6: Pedestrian Demand Model

Part of the process to update the Regional Pedestrian Plan was for PAG to develop a pedestrian demand model. The purpose of pedestrian demand model for the PAG region is to assist in identifying areas and roadway segments within eastern Pima County with high pedestrian activity levels, or that have a potential for high pedestrian activity (that is, areas where people should be walking, but may not be because existing pedestrian conditions and infrastructure are not supportive of comfortable and safe walking.) The intended use of the model is to identify high-priority areas for pedestrian improvements so that investments can be targeted to locations where people have a likelihood of walking but where conditions are difficult. In this way, the region can improve walking conditions for the greatest number of users with limited available funds, thereby having the best potential to improve safety and increase walking rates for the largest number of people.

Step 1: Pedestrian Activity Areas

In identifying high pedestrian activity areas, the pedestrian demand model takes into account four factors:

1) Pedestrian Generators and Attractors – that is, those destinations to or from which pedestrians are known to walk

2) Current Walking/Transit Rates to Work – Census block groups where people are walking and taking transit as their primary means of transportation to work

3) The Urban Context – Elements of the urban environment that research indicates support higher rates of pedestrian activity. These include population and employment density, housing and employment mix, and intersection density

4) Vulnerable Users – Populations that are more likely to be dependent on walking or transit, have special accessibility needs, or are at greater risk to be injured or killed while walking

Methodology

The Pedestrian Demand Model uses GIS computer-mapping software to identify pedestrian activity areas. First, a grid consisting of 75'X75' cells is overlaid on the base map of eastern Pima County. Then each of the four pedestrian factors is mapped and assigned a score based on a system described below. Finally, the four pedestrian factor maps are combined so that each unique cell receives a score reflecting its relative likelihood of being within a high pedestrian activity zone. This is based on current conditions and should be considered a snapshot in time.

Generators and Attractors

Pedestrian attractors are the single destinations to or from which pedestrians commonly walk or indicate a willingness to walk to. The pedestrian demand model uses 7 types of attractors:

- Schools
- Parks
- Community Facilities
- Transit Stops
- Commercial Destinations
- Multi-family housing
- Recreational pathways

Each of these types is further sub-divided as needed and then a score applied based on an assumed level of pedestrian attraction. After each individual attractor is scored, a multiplier is applied to rank based on a buffered distance from the attractor. The multiplier ranges from 1/8 of a mile up to 2/3 of a mile, roughly encompassing the distance that most people are willing to walk to reach a destination.

Commercial destinations are classified into supermarkets, high-demand retail and dining, and low-demand retail. The specific business types that comprise the commercial categories are derived from the North American Industry Classification System (NAICS), which can be seen on the next page.

TABLE 20 – Pedestrian Demand Model - Pedestrian Generators

			Multipliers			
			X3	X2	X1	X0.5
Generator	**Notes**	**Points**	**1/8 mile**	**¼ mile**	**½ mile**	**2/3 mile**
University		20	60	40	20	10
College		15	45	30	15	7.5
School		15	45	30	15	7.5
Park		10	30	20	10	5
Library, Community Center	Includes YMCA and Boys and Girls Clubs	10	30	20	10	5
Transit Centers		15	45	30	15	7.5
Transit Stops		5	15	10	5	2.5
Supermarket/Grocery Store*		10	30	20	5	5
Retail, Recreation, and Services – High- Demand	Bars, beer/ wine/ liquor, convenience stores, pharmacies/drug stores	7	21	14	7	3.5
Retail, Recreation, and Services – Medium-Demand*	Restaurants cafes, small markets, Convenience Stores ,etc.	5	15	10	5	3
Retail, Recreation, and Services – Low-Demand*	Miscellaneous retail	1	3	2	1	.5
Multi-family housing		5	15	10	5	2.5
Health Care and Social Assistance		3	9	6	3	1.5
HAWK Locations		5	15	10	5	2.5
Shared-use path	Urban loop, greenway, Santa Cruz, Reid Park, etc.	5	15	10	5	2.5

Current Walking Rates

The second factor considered in creating a Pedestrian Demand Model is locations where people are already known to be walking. This information is available through the Census Bureau's American Community Survey means of travel to work data table, where rates of transit use or walking to work can be mapped at the Census block level for Pima County. While trips to work or the bus only account for a small percent of all walking trips, this information does serve as an indicator of areas that already accommodate walking or where residents are more reliant on walking as a means of transportation.

Urban Environment

It has been well-documented in the research on walkability that the urban context is the primary determinant of walking rates. In particular, walking rates are usually highest in locations with high population and employment density, a mix of uses, and smaller block sizes (often measured in intersection density). Population density, employment density, and intersection density can be measured using readily available data sets. The mix-of-uses on the other hand must be approached through a more indirect method. The Pedestrian Demand Model uses the jobs-to-housing ratio, which looks at the relative number of jobs per house for each TAZ in the eastern Pima County, giving a general sense of mix of uses in relation to each other. Urban form is not considered in urban environment, though this does not mean that form is not important for pedestrian activity rates, only that form is not necessarily appropriate at a regional scale; it should be considered on an individual corridor level.

TABLE 21 – Pedestrian Demand Model - Retail and Services

NAICS Categories	NAICS Code
Supermarket and Grocery Store	
Supermarket and Other Grocery Store	445120
Retail, Recreation and Services – High Demand	
Convenience Store	445120
Beer, Wine, Liquor Stores	445310
Pharmacies and Drug Store	446110
Gasoline Stations with Convenience Store	447110
Drinking Places (alcoholic beverages)	722410
Retail, Recreation and Services – Medium Demand	
Full Service Restaurants	722511
Limited Service Restaurants	722513
Snack and Nonalcoholic Beverage Bars	722515
Retail, Recreation and Services – Low Demand	
Men's Clothing Stores	448110
Women's Clothing Stores	448120
Children's and Infants' Clothing Stores	448130
Family Clothing Stores	448140
Clothing Accessories Stores	448150
Book Stores	451211
All Other General Merchandise Stores	452990
Gift, Novelty and Souvenir Stores	453220
Used Merchandise Stores	453310
Theater Companies and Dinner Theaters	711110
Motion Picture Theaters	512131
Urgent Care	
Community Food Services	624210
Temporary Shelters	624221
Coin-Operated Laundries and Drycleaners	821310
Health Care and Social Assistance	
Continuing Care Retirement Communities	623311
Assisted Living Facilities for the Elderly	623312

TABLE 22 – Pedestrian Demand Model - Current Walking Rates

People Commuting on Foot vs. Commuting by Transit		
	Percent of People	**Points**
Commute to work on foot	35.01%+	10
	20.01-35%	7
	10.01-20	5
	3.01-10%	3
Commute to work by transit	35.01%+	10
	20.01-35%	7
	10.01-20%	5
	3.01-10%	3

Vulnerable Users

The final factor considered in developing the model is the location and concentration of the most vulnerable users of the pedestrian network. The relative concentrations of low-income individuals, seniors, households without access to a private automobile, persons with disabilities, and people under the age of 18 can all be mapped at the census block level using American Community Survey estimates. Each of these groups is at higher risk of injury or death while walking or more likely to walk than the population as a whole and, therefore, needs to be considered specifically in improving the pedestrian environment.

TABLE 23 – Pedestrian Demand Model - Urban Context

Urban Environment Characteristics

Characteristic	Density	Points
Population Density (per sq. mile)	5,001+	20
	4,001-5,000	15
	2,001-4,000	10
	501-2,000	5
Employment Density (per sq. mile)	5,001+	20
	4,001-5,000	15
	2,001-4,000	10
	501-2,000	5
Jobs/housing Ratio	1.3-6	10
	1 std. dev.	5
	2 std. dev	1
Intersection Density (per square mile)	201-300	10
	101-200	5
	50-100	1

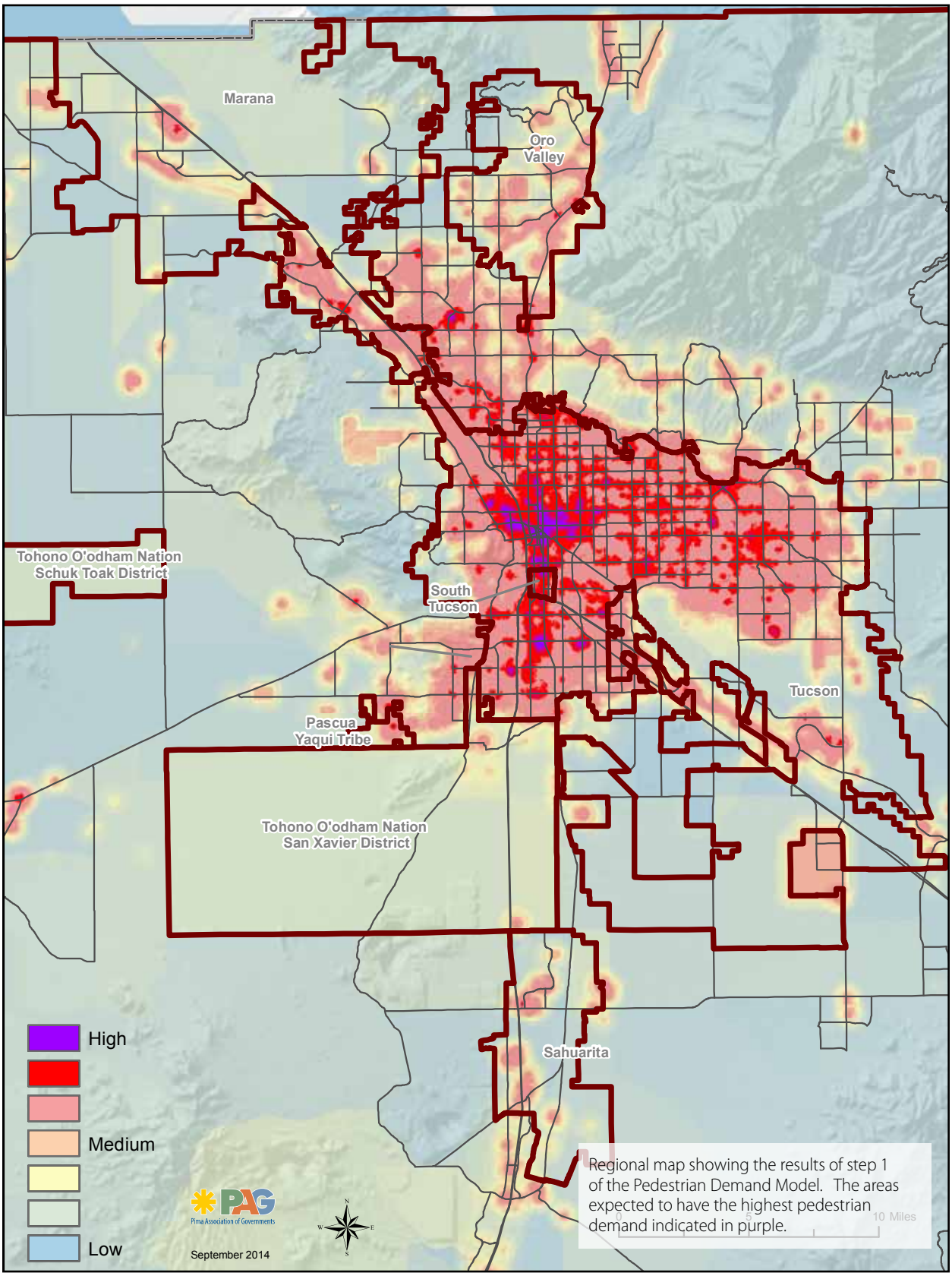
TABLE 24 – Pedestrian Demand Model - Vulnerable Users

Vulnerable Users

Need	Description	Scoring	Points
Low-income Pop.	Density of households living in poverty by Census block group	51%+	10
		41-50%	8
		31-40%	6
		21-30%	4
		11-20%	2
Elderly Population	Density of people 65+ by Census block group	51%+	10
		41-50%	8
		31-40%	6
		21-30%	4
		11-20%	2
Persons with Disabilities	Density of persons with disabilities at the Census Tract	31% +	10
		16-30%	8
		11-15%	6
		6-10%	4
		0-5%	2
Population w/o a car	Density of households w/o car by census block group	31% +	10
		16-30%	8
		11-15%	6
		6-10%	2
Population under 18	Density of population under 18 by census block group	41%+	10
		31-40%	8
		21-30%	6
		11-20%	4

IMAGE 31 – Pedestrian Demand Composite - Regional

High Pedestrian Demand Areas – Region



Regional map showing the results of step 1 of the Pedestrian Demand Model. The areas expected to have the highest pedestrian demand indicated in purple.

IMAGE 32 – Pedestrian Demand Composite - Marana

High Pedestrian Demand Areas – Marana

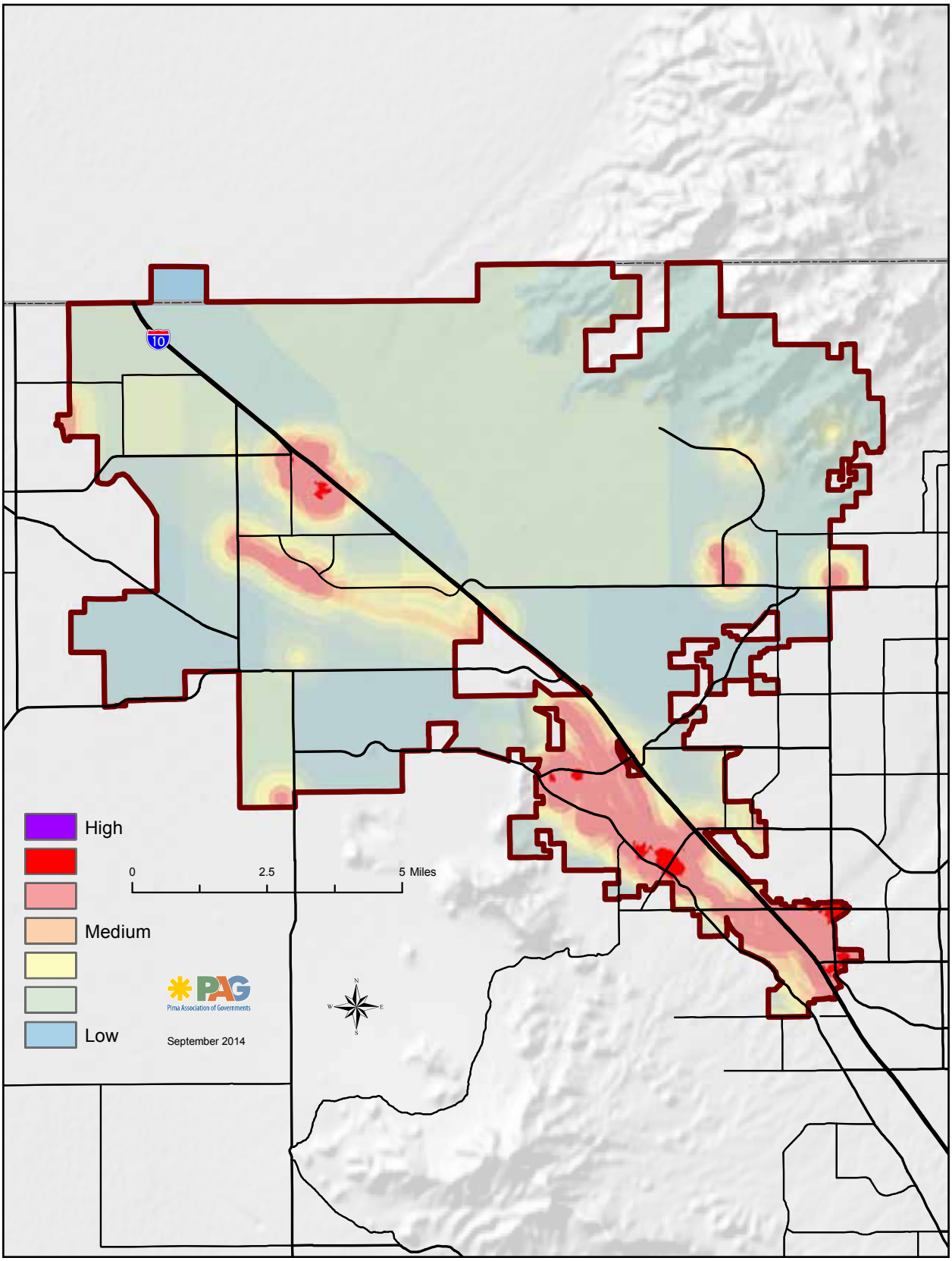


IMAGE 33 – Pedestrian Demand Composite - Oro Valley

High Pedestrian Demand Areas – Oro Valley

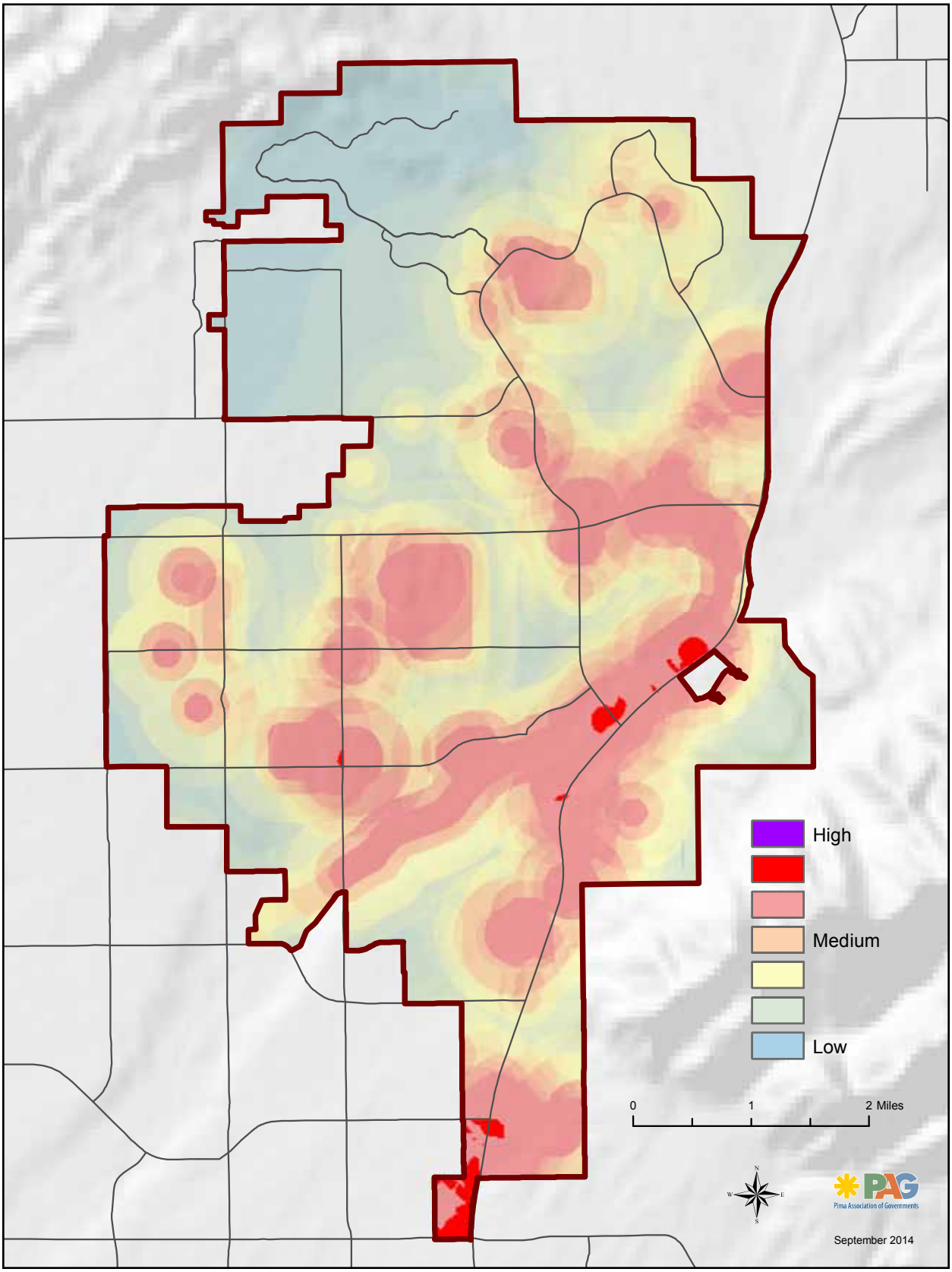


IMAGE 34 – Pedestrian Demand Composite - Sahuarita

High Pedestrian Demand Areas – Sahuarita

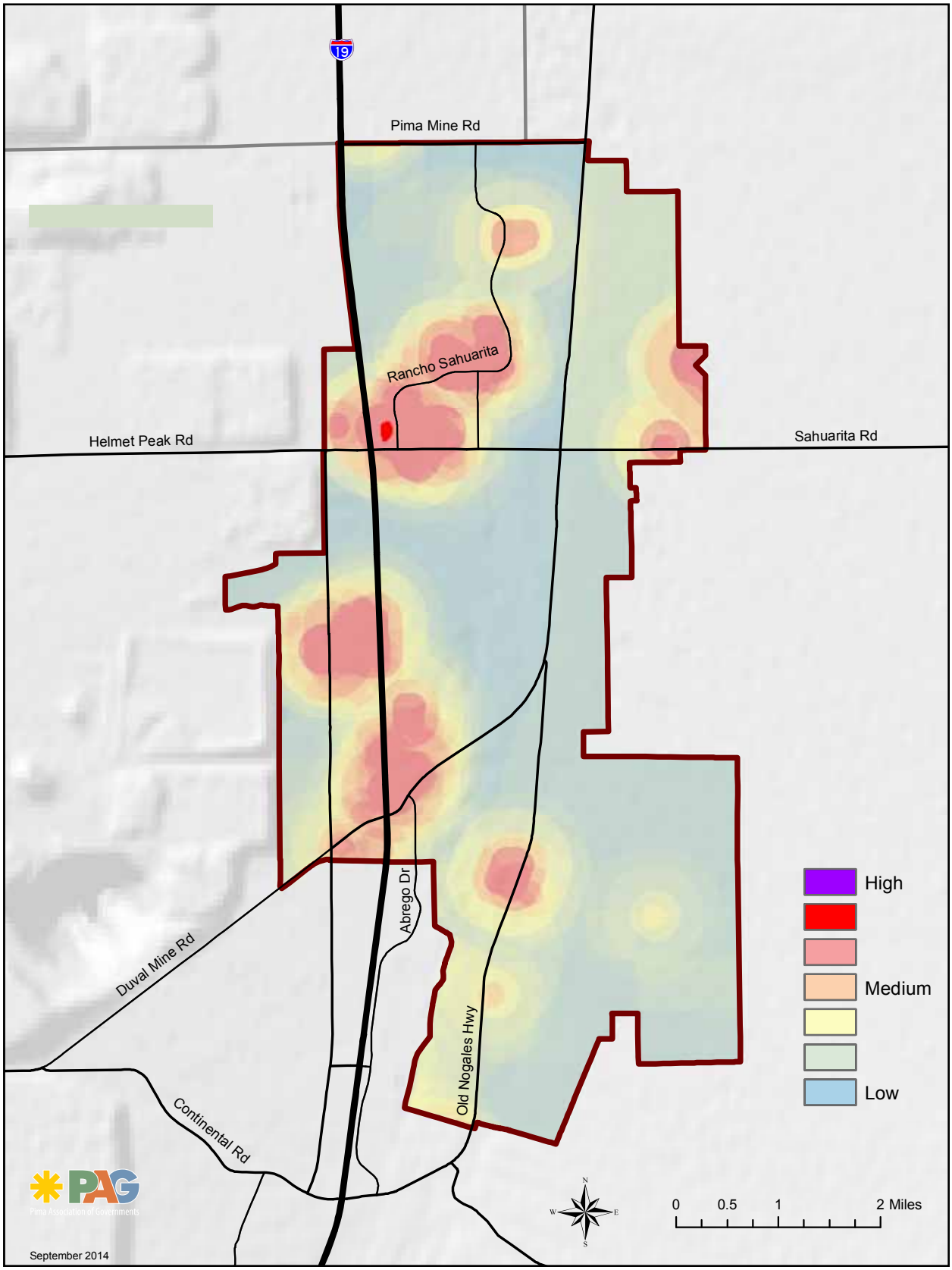


IMAGE 35 – Pedestrian Demand Composite - South Tucson

High Pedestrian Demand Areas – South Tucson

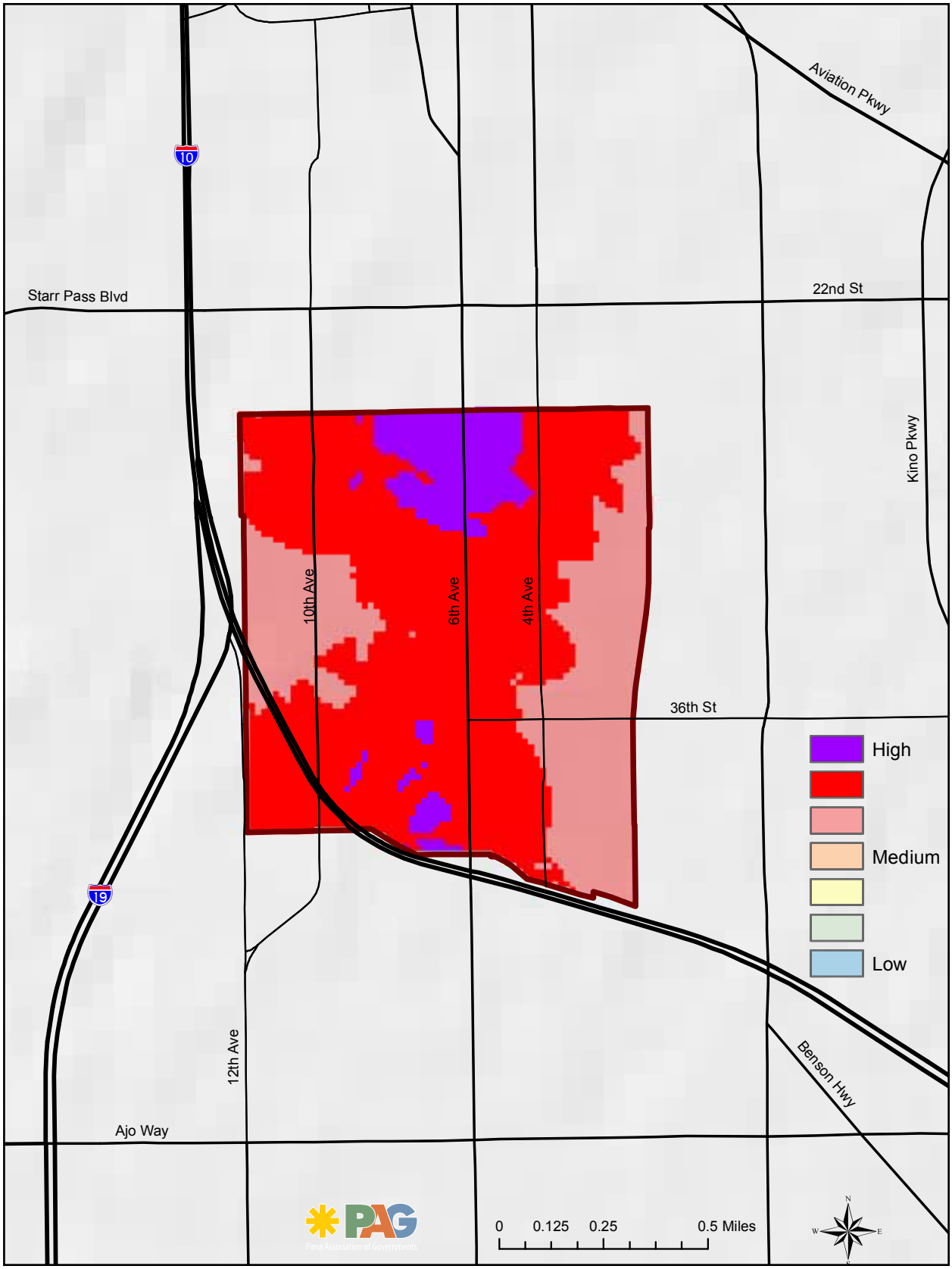


IMAGE 36 – Pedestrian Demand Composite - Tucson

High Pedestrian Demand Areas – Tucson

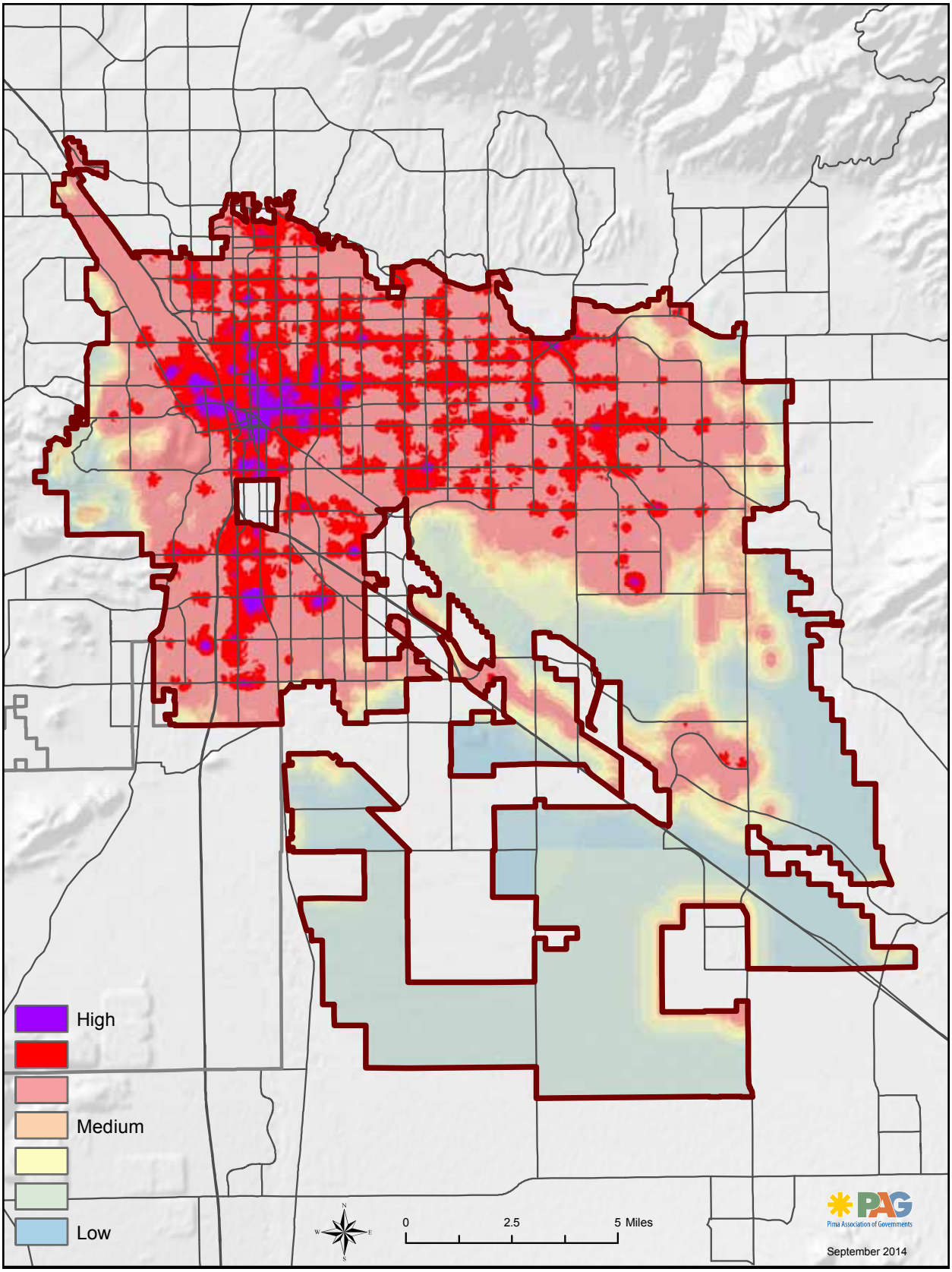
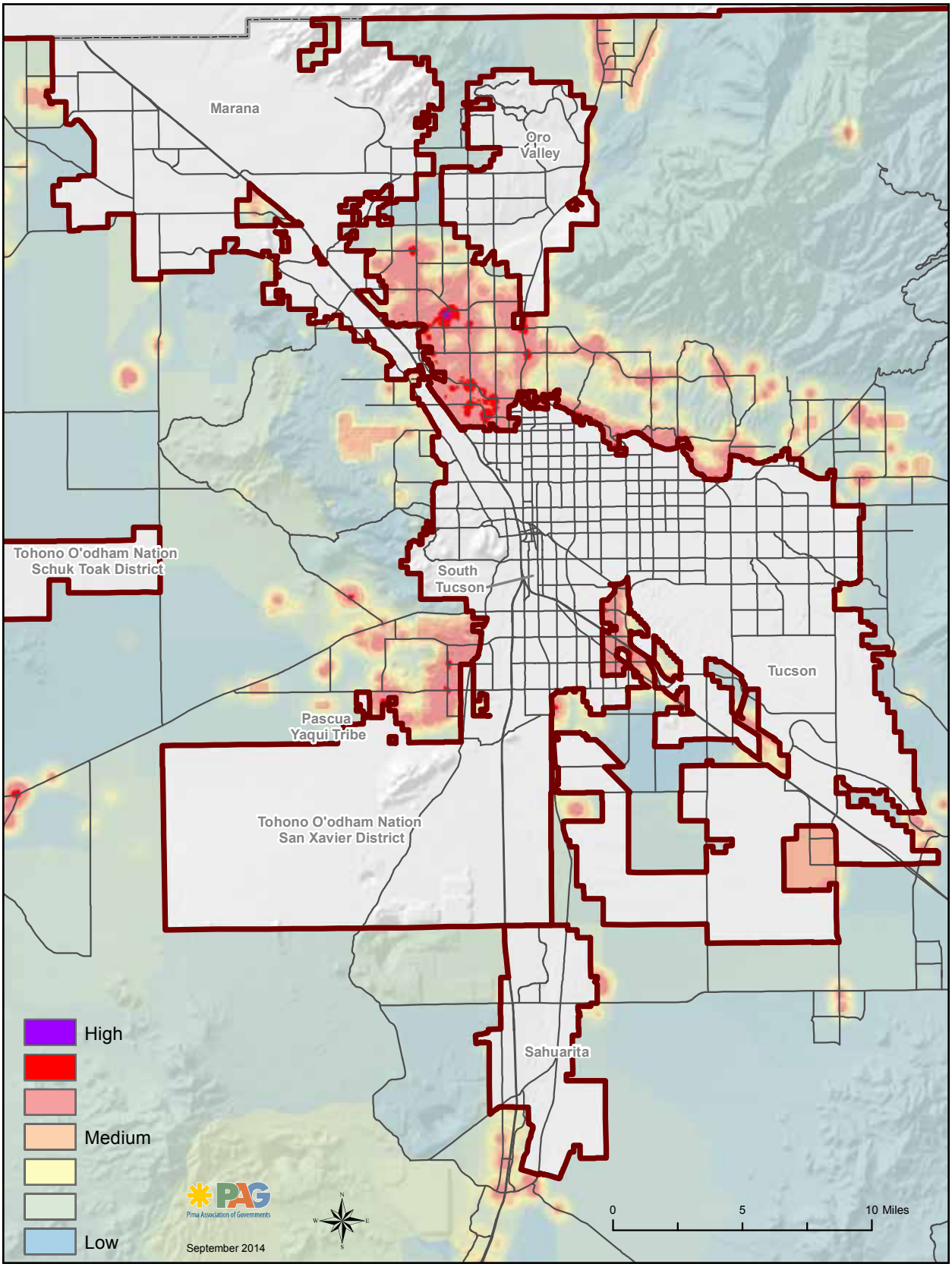


IMAGE 37 – Pedestrian Demand Composite - Unincorporated Pima County

High Pedestrian Demand Areas – Pima County



Step 2: Difficult Walking Conditions – Arterial and Collector Streets

Step 2 of the modeling process seeks to identify arterial and collector roadways where walking conditions are difficult. This includes the presence or absence of sidewalks and walkways, accessibility of walkways, traffic volumes, travel speeds, and pedestrian-involved crashes; all factors that affect the comfort and safety of pedestrians.

Following their identification, deficient arterial and collector corridors were overlaid on areas with high pedestrian demand and their point values summed. This led to a list of corridors in highest need of improvements, and a ranking of those locations. The list of highest ranking sidewalk segments is located in Appendix 2: "High-Scoring Sidewalk Needs."

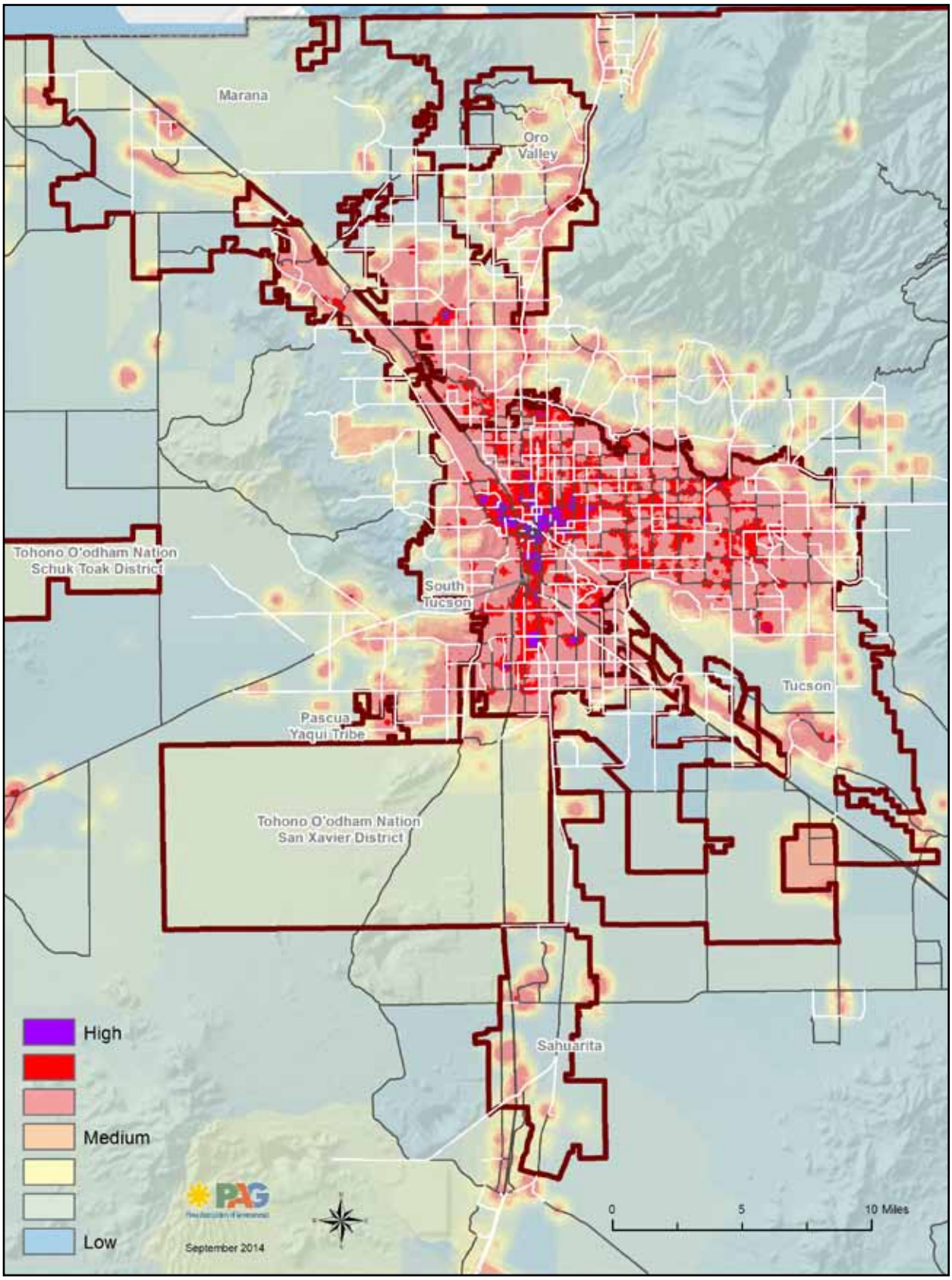
TABLE 25 – Pedestrian Demand Model - Walkway Characteristics

Walkway Characteristics (Roadway)

Criteria	Sub-criteria	Characteristic	Points
Walkway Status	**Sidewalk width and presence**	No or partial Sidewalks	20
		Narrow Sidewalks (<4')	10
		Standard Sidewalks (4-6+)	0
Paved Shoulders (rural)	**Bike Lanes**	No	10
		Yes	0
Accessibility	**Curbs Ramps**	No ramp at cross streets	10
		Partial Ramps	5
		Complete Ramps	0
	Sidewalk Barriers	Barriers Present	5
Traffic Volumes		50,000+	5
		30,000-49,999	4
		15,000-30,000	3
		<15,000	1
Speed Limit		40+	10
		35	8
		30	6
		25	0
Pedestrian Involved Crashes	**Non-intersection related crashes w/in previous 5 years on segment**	5+	15
		2-4	8
		1	5

IMAGE 38 – Map Showing Incomplete or Inaccessible Sidewalks On Top of Areas of High Pedestrian Demand

Incomplete or Inaccessible Sidewalks – Region



SECTION 7: Vision, Goals and Objectives

The PAG Regional Pedestrian Plan establishes a vision, three goals and four measurable objectives relating to pedestrian safety, pedestrian access and comfort, and pedestrian funding. In addition to the outcome-oriented goals and objectives, the plan recommends a number of actions that can be taken within the region to improve conditions for pedestrians. As stated earlier, this document should be treated as a guide for targeting pedestrian investments. It provides pedestrian crash density information, high potential pedestrian demand locations, tools for improving conditions, potential actions that can be taken, and a means of monitoring progress toward the region's pedestrian goals.

VISION: A region where people of all ages and of all abilities have the opportunity to walk in an environment that is safe, accessible, comfortable and well-connected

Measure of Success – Increase the Rates of Walking in the Region

POTENTIAL MEASURES:

- Pedestrian Counts (automated and manual)
- Travel Reduction Program commute to work surveys
- American Community Survey 3-year average means of transportation to work
- School Surveys
- HAWK and Intersection Signal Activations
- Walking event data

GOAL A:
A safe region for walking

OBJECTIVE:
Reduce the rate and number of pedestrian crashes, injuries, and fatalities

POTENTIAL MEASURES:

- Pedestrian 5-year average crash rates per 100,000 residents
- Pedestrian 5-year average fatality rate per 100,000 residents
- Pedestrian 5-year average injury rate per 100,000 residents
- Total number of injuries, fatalities and crashes
- Crash rate per ACS walking to work rate

1) RECOMMENDED ACTION:
Develop periodic regional pedestrian crash reports in order to track trends, emerging needs, common regional crash characteristics, and high-frequency crash locations

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Immediate	PAG	Education Evaluation

2) RECOMMENDED ACTION:
Develop and implement a targeted comprehensive outreach and pedestrian safety improvement program to focus on high-crash and injury density locations

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Immediate	PAG/Jurisdictions	Education Enforcement Engineering Engagement

3) RECOMMENDED ACTION:
Expand pedestrian safety education in public, private, and charter schools

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Short	Jurisdictions/Schools/Public Safety	Education

4) RECOMMENDED ACTION:
Expand innovative enforcement strategies, such as continuous photo speed enforcement and crosswalk stings, in high pedestrian crash and injury density locations

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Short	PAG/Jurisdictions/Public Safety	Enforcement

5) RECOMMENDED ACTION:
Improve inter-agency coordination between planning, engineering, and public safety in targeted pedestrian safety enforcement efforts

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Short	PAG/Jurisdictions/Public Safety	Enforcement

6) RECOMMENDED ACTION:
Develop a public pedestrian safety awareness campaign using a mix of old and new media technologies

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Short	PAG/Jurisdictions	Education

7) RECOMMENDED ACTION:
Incorporate pedestrian safety as a primary consideration of roadway design at the inception of all transportation projects

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Short	Jurisdictions	Engineering

8) RECOMMENDED ACTION:
Improve pedestrian safety at intersections and other high-frequency pedestrian crossings using strategies identified in this plan's toolbox

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Mid-to-Long	Jurisdictions	Engineering

9) RECOMMENDED ACTION:
Improve visibility of pedestrians at night through lighting and educate pedestrians on the importance of being seen

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Mid-to-Long	Jurisdictions	Engineering Education

10) RECOMMENDED ACTION:
Institute a program of traffic calming strategies and pedestrian safety countermeasures focusing on identified high-crash, high pedestrian volume areas

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Long	Jurisdictions	Engineering

GOAL B
A region where people will choose to walk

OBJECTIVE 1:
Increase availability of accessible, complete and connected sidewalks and pedestrian walkways

POTENTIAL MEASURES:

- Linear miles of accessible sidewalks and paved shoulders
- Miles of accessible shared-use paths
- Ratio of accessible/inaccessible road segments
- Ratio of accessible/ inaccessible transit stops

1) RECOMMENDED ACTION:
Complete the inventory of all of the region's roadways, including rural and local roads, to determine the availability and continuity of accessible pedestrian sidewalks and walkways

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Immediate	PAG/Jurisdictions	Information

2) RECOMMENDED ACTION:
Conduct an automated annual pedestrian count in order to establish comparative pedestrian volume data along major roadways continue and expand annual manual count. Supplement information with push button activations as available

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Short	PAG	Information

3) RECOMMENDED ACTION:
Create incentives and/or requirements for new commercial developments and subdivisions to include direct pedestrian access routes through walls and cul-de-sacs

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Mid	Jurisdictions	Development Services

4) RECOMMENDED ACTION:
Evaluate current and potential pedestrian volumes on rural arterials and collectors in order to determine appropriate and accessible pedestrian facilities such as sidewalks, grade- separated shared-use paths, or paved shoulders and crossings

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Mid	Jurisdictions	Information

5) RECOMMENDED ACTION:
Finish and bring into ADA compliance incomplete or inaccessible sidewalk segments along urban arterials, collector streets, near transit stops and at other potential high pedestrian-volume locations particularly in those areas identified in pedestrian demand model

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Long	Jurisdictions	Engineering

6) RECOMMENDED ACTION:
Build sidewalks where none currently exist along urban arterials, collectors, and at other potential high pedestrian volume locations

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Long	Jurisdictions	Engineering

OBJECTIVE #2:
Improve pedestrian comfort by providing more high-quality and attractive walking options

POTENTIAL MEASURES:

- Average tree canopy on Right of Way
- Miles of walkways buffered from roadways
- Number of HAWKS

1) RECOMMENDED ACTION:
Develop a pedestrian comfort index in order to measure, to a practicable degree, the conditions of the pedestrian environment

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Short	PAG	Encouragement

2) RECOMMENDED ACTION:
Develop a set of context sensitive regional complete streets guidelines and policy using the flexibility allowed under the AASHTO "Green Book" as described in the ITE Designing Walkable Urban Thoroughfares Guidebook

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Short	PAG	

3) RECOMMENDED ACTION:
Identify and prioritize un-shaded sidewalk segments within current or potential high volume pedestrian areas

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Short	PAG/Jurisdictions	Engineering

4) RECOMMENDED ACTION:
Promote and support walking events and identify informal walking routes in the region's most interesting, attractive, and comfortable locations

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Short-to-Mid	PAG/Jurisdictions/Visitors bureau?	Encouragement

5) RECOMMENDED ACTION:
Prioritize and build safe, attractive, and comfortable non-arterial walking routes, including shared-use paths, to connect pedestrians to destinations

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Long	Jurisdictions	Engineering

6) RECOMMENDED ACTION:
Institute and maintain a program of traffic calming and identify clear and safe pedestrian walking areas on residential streets

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Long	Jurisdictions	Engineering

7) RECOMMENDED ACTION:
Work with developers and jurisdictional planners to enable the creation of more walkable pedestrian-oriented streets and districts

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Long	Jurisdictions	Land Development Engineering

GOAL C
A well-funded pedestrian system

OBJECTIVE:
Increase and continue funding for pedestrian programs and projects

POTENTIAL MEASURES:

- Total dollars spent of pedestrian improvements
- Money spent as share of transportation budgets
- Dollars spent of pedestrian improvements per 100,000 residents by funding source
- Dollars spent on pedestrian improvements as related to walking rates

1) RECOMMENDED ACTION:
Continue to coordinate with ADOT and the FHWA to ensure the full annual regional sub-allocation of HSIP funds are used, using an appropriate amount for pedestrian safety improvements

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Short	PAG	

2) RECOMMENDED ACTION:
Commit additional STP funds to pedestrian improvements through the Regional Transportation Plan and Transportation Improvement Program processes

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Short-to-Mid	PAG/Jurisdictions	

3) RECOMMENDED ACTION:
Work with the region's leaders to make improving pedestrian facilities a priority in both decision making and funding

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Mid	PAG/ Jurisdictions	

4) RECOMMENDED ACTION:
Research best practices in pedestrian funding and integrate successes from other communities into local approaches to funding

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Mid	PAG	

5) RECOMMENDED ACTION:
Work with state leaders to promote greater flexibility in allowing the use of state transportation funds for pedestrian and bicycle projects

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Mid-to-Long	PAG/ Jurisdictions	

6) RECOMMENDED ACTION:
Explore a wide range of innovative funding approaches to increase the amount of money available for pedestrian improvements (e.g. special districts, development fees, state infrastructure bank, sin taxes)

TIMEFRAME	RESPONSIBLE PARTY	PROJECT TYPE
Long	PAG/Jurisdictions	

Performance Measure and Targets

Establishing pedestrian performance measures and targets allows the region to track progress on achieving the vision of providing a safe, accessible, comfortable and connected pedestrian environment. The measures are those which can be readily tracked using available information and that are expected to be available for future comparison. There are additional measures that have been identified for which data are not currently available. These measures will be included in future pedestrian performance reports as the data become available.

The performance targets represent realistically achievable benchmarks that indicate progress in creating a more pedestrian-friendly region.

PAG staff members conducting annual bike and pedestrian count near the University of Arizona.

Objective:	Performance Measure	Baseline (Base Year)	Target	Source
Increase the rate of walking	Share of workers commuting on foot	2.54% (2009-2011)	Increase walk to work share by 30 percent by 2025 Target number: 3.3%	American Community Survey- Means of Travel to Work
	Walking Mode Share for all trip purposes	10.4% (2009)	Increase the walking mode share by 20 percent by 2025. Target number: 12.5% of trips are walked.	National Household Travel Survey
	Number of pedestrians counted in annual Bike and Pedestrian count at core locations	10,400 (2010-2013 4-year average)	Increase 4-year average peak-hour pedestrian counts at core locations by 20 percent by 2020 Target number: 12,500 by 2020	PAG Regional Bicycle and Pedestrian Count
Reduce the rate and number of pedestrian crashes, injuries, and fatalities	Pedestrian 5-year average crash rates per 100,000 residents	28 (2007-2011)	Reduce 5-year averages of pedestrian injuries and fatalities by 20% by 2020.	ADOT Crash Statistics
	Pedestrian 5-year average injury rate per 100,000 residents	24 (2007-2011)	Target number: 19 pedestrians injured per 100,000 residents by 2020	ADOT Crash Statistics
	Pedestrian 5-year average fatality rate per 100,000 residents	2.1 (2007-2011)	Target number: 1.68 pedestrian fatalities per 100,000 residents by 2020	ADOT Crash Statistics
	Injury rate per 1,000 ACS walk to work rate	22.4 (2007-2011)	Reduce 5-year average of pedestrian injuries and fatalities by 30 percent per 1,000 people who walk to work by 2020. Target number: 15.68 pedestrian injuries per 1,000 walk to work by 2020	ADOT Crash Statistics and ACS Means of Travel to Work

Keeping consistent with ADOT's Statewide Bicycle and Pedestrian Plan, the goal of the region is to eliminate all pedestrian injuries and fatalities. These incremental reductions represent the first benchmark in making progress towards that goal.

Objective:	Performance Measure	Baseline (Base Year)	Target	Source
Increase availability of accessible, complete and connected sidewalks and pedestrian walkways	Linear miles of complete and accessible sidewalks on major roadways within urbanized area and towns	442 (2012)	Target Number: 600 linear miles of accessible sidewalk segments by 2025	ADA Sidewalk Inventory Study Report
	Ratio of accessible/ inaccessible sidewalk segments on major roadways in urbanized area	1/3 (2012)	Target Number: 2/3 of sidewalk segments on arterial and collector streets fully accessible by 2025 in urbanized area	ADA Sidewalk Inventory Study Report
	Ratio of transit stops accessible from two directions to the nearest street intersection	1/2 (2011)	Target Number: 3/4 of transit stops accessible from two directions to the nearest street intersection by 2025	City of Tucson ADA Bus Stop Accessibility Study
Improve pedestrian comfort by providing more high-quality and attractive walking options	Tree canopy on public rights-of-way	Yet to be developed (see table below)		
	Percentage of street segments that score high on a performance comfort index	Yet to be developed (see table below)		
	Number of HAWK-controlled pedestrian crossings	115	Target Number: Install 100 additional HAWK pedestrian signals by 2025	
Increase and continue funding for pedestrian programs and projects	Average annual regionally programmed funding for pedestrian projects and programs	$6.5 million (2014)	Target Number: $9 million annually in regionally-programmed funds	Transportation Improvement Program
	Portion of transportation funds programmed for stand-alone pedestrian projects from eligible sources	7.5% (2014)	Increase funding from eligible sources for stand-alone pedestrian projects and programs to align with pedestrian mode share Target Number: 10.4%	Transportation Improvement Program

Potential Future Performance Measures

There are a number of potential pedestrian performance measures which the region is not yet in a position to establish baselines for and report on. Several of the recommendations in this plan relate to improving, tracking, and reporting pedestrian-related information. In future pedestrian performance reports, the region may wish to establish baselines and begin tracking the following pedestrian performance measures.

Potential Future Performance Measure	Description	Work required to establish performance measure	Relevant Plan Objective
Percentage of street segments that score high on a performance comfort index	A pedestrian comfort index will consider factors known to improve pedestrian comfort, including average daily traffic, shade, connectivity presence of sidewalks and ramps, buffers, and other items to assign a comfort score to each segment of roadside in the region	To establish a pedestrian comfort index the region will need to complete an inventory of tree canopy and sidewalks on all roads (including local streets) and collect information on sidewalk buffers. Once appropriate data are collected, the index can be created and maintained through GIS.	Improve pedestrian comfort by providing more high-quality and attractive walking options
Tree canopy on public rights-of-way	Understanding where tree canopy exists or does not exist, will help the region establish tree planting priorities for improving pedestrian comfort	An inventory of the region's trees has already been completed using a remote sensing technology know as Light Detection and Ranging (LiDar). The data now need to be interpreted to show the presence or absence of canopy on sidewalks.	Improve pedestrian comfort by providing more high-quality and attractive walking options
Participation in regional walking events	Walking events include those community events in which community members and visitors come together to experience areas of the region on foot or bicycle. These are great events for encouraging walking and promoting the neighborhood experience at 3 mph. Current events include Meet Me at Maynards (and La Encantada), Cyclovia and others.	The region would need to identify those events to be considered in tracking participation and work with event organizers to gather information on participation. For example, it is currently estimated that over 25,000 people participated at two Cyclovia Tucson events in April 2013.	Increase the rate of walking
Percentage of Students that Walk to School	In 1969, over 40 percent of the nation's school children walked or biked to school. Today, that number is a little over 10 percent. Understanding and tracking the number of kids walking or biking to school, and the reasons why they do not, may assist in developing and expanding policies that support walking and biking to school and help combat childhood obesity.	To collect information on travel choices to and from schools, the region's governments will need to work with school districts to develop a survey for parents about students travel to school mode choices.	Increase the rate of walking
HAWK Signal Activations	Many pedestrians and bicyclists choose to cross arterial streets by crossing at HAWK-crossing locations. Tracking HAWK push button activations will provide comparable year-over-year usage data at specific crossing locations. It can also show to what degree HAWK signals are attractors of pedestrian activity by doing before and after comparisons.	The region will need to develop a method for capturing and processing the data provided by HAWK signals	Increase the rate of walking

SECTION 8: Funding Sources

Perhaps the biggest challenge the region faces with regard to improving pedestrian facilities is retrofitting older areas for sidewalks and other improvements, especially where no roadway improvement is planned. In many developed areas, narrow rights-of-way, physical barriers, utility conflicts and drainage issues make installing new sidewalks challenging and cost prohibitive.

Where roadways are being improved, or where new development is occurring, pedestrian facilities are usually installed as part of the project. However, where that is not the case, the region needs to look at sources that can be used for standalone pedestrian projects.

This section covers federal, state, regional and local funding sources that are available for pedestrian projects. It discusses amounts currently available in the region and explores other ways of funding pedestrian improvements.

Federal Transportation Sources

Federal transportation funding for pedestrian improvements in the PAG region comes from four sources. They are the Surface Transportation Program (STP), the Transportation Alternatives Program (TAP), the Highway Safety Improvement Program (HSIP), and Federal Transit Administration (FTA).

- *Surface Transportation Program*
  The STP provides very flexible federal funding for the PAG region, which can be used on a wide variety of projects, including those for pedestrians. STP funds can be used for sidewalks and other pedestrian walkways, crosswalks, pedestrian signals and ADA sidewalk modifications among other things. Pedestrian projects on local, collector and arterial streets are eligible for funding under the STP program.

  The PAG region receives roughly $17.5 million annually in STP funding. This money is allocated to the region's jurisdictions through the Transportation Improvement Program (TIP) process. Since STP funding is flexible and can be used for roadways, transit capital projects, bicycle facilities, bridges and other transportation programs, all regional transportation priorities need to be considered in using these dollars, not just pedestrian improvement.

- *Transportation Alternatives Program*
  TAP, unlike STP, is dedicated almost exclusively to bicycle and pedestrian improvements and recreational facilities (as well as a few other items). TAP is set aside from the State's STP apportionment, with 50 percent sub-allocated to urban areas with populations over 200,000. The PAG region receives roughly $1 million annually in TAP funding. The dollars can be used for pedestrian improvements on any public street as well as for safe routes to schools programs, among others.

- *Highway Safety Improvement Program*
  HSIP is intended to reduce traffic fatalities and severe injuries on public roads. HSIP funds can be used for a variety of project types, including pedestrian safety improvements, so long as they take a data-driven approach and are consistent with the state's Strategic Highway Safety Plan (SHSP). Safety projects are often funded on a benefit/cost basis, which can present a challenge for using HSIP funds for pedestrian safety (since there are so few pedestrian crashes at a given location, it can be difficult to demonstrate that safety benefits outweigh costs in many instances). The PAG region receives an annual sub-allocation of roughly $1 million in HSIP through the Arizona Department of Transportation.

- *Federal Transit Administration*
  FTA funding is provided by the federal government for public transportation through a variety of grant programs, each with a specific and unique transit focus. According to the "Final Policy Statement on the Eligibility of Pedestrian and Bicycle Improvements under Federal Transit Law" issued by FTA, "most grant programs administered by FTA may be used to fund the design, construction, and maintenance of pedestrian and bicycle projects that enhance or are related to public transportation facilities." The policy simplifies the process of determining whether a bicycle or pedestrian improvement is related to public transportation by establishing a de facto physical and functional relationship. The policy states that all pedestrian improvements within ½ mile, and bike improvements within 3 miles, of a transit stop or station are determined to have a de facto functional relationship with transit and therefore are eligible uses of FTA grant funding. Improvements outside of those distances may be eligible if a functional relationship is established.

Federal Non-Transportation Sources

Some federal non-transportation funding is also available for pedestrian improvements. The most well-known of these is the *Community Development Block Grant*.

The *Community Development Block Grant (CDBG)* is provided annually through the Department of Housing and Urban Development (HUD) on a formula basis. CDBG is used primarily to benefit low-to-moderate income persons and neighborhoods. CDBG is a very flexible funding source which may be used for sidewalk and ADA improvements, streetscape upgrades, safe routes to school programs, and other facilities that benefit pedestrians in primarily lower-to-moderate income areas.

Because so many activities can be funded through CDBG (including acquisition and rehabilitation of property, construction of public facilities, public services, and activities relating to energy conservation to name a few) pedestrian and accessibility improvements should be identified as a community priority in order to access these funds.

Other federal funding sources may become available through periodic competitive grant programs – such as the Communities Putting Prevention to Work (CPPW), of which Pima County is a recent recipient, and Community Transformation Grants (CTG) programs administered through the Centers for Disease Control and Prevention (CDC).

State Sources

- *Highway User Revenue Fund (HURF)*
  Transportation funds in Arizona are distributed to cities, towns, counties and the PAG region through the Highway User Revenue Fund (HURF). The direct HURF, which is allocated to the region's jurisdictions is flexible and can be used on almost any kind of transportation-related project or program, including standalone pedestrian projects, as identified in the Arizona State Constitution, Article IX, Section 14. Direct HURF does not need to be programmed through a regional process.

  Regional HURF dollars are set aside for the PAG and MAG (Maricopa Association of Governments) regions and are far more restrictive than the direct HURF funds. Regional HURF must be programmed through a regional planning process and shall only be used for "the design, right-of-way purchase or construction of controlled access highways that are included in the regional transportation plan" and "the design, right-of-way purchase or construction… extension and widening of arterial streets and highways that are included in the regional transportation plan." (Arizona Revised Statutes (28-6538)). Pedestrian facilities may be constructed as part of an arterial roadway improvement, but may not be built as a standalone project.

  Arizona Governor's Office of Highway Safety (GOHS) – GOHS is a cabinet agency in Arizona that serves as a focal point for highway safety. GOHS develops, promotes, and coordinates safety programs, influences public and private policy, and increases public awareness of highway safety. One way that GOHS seeks to reduce roadway fatalities, injuries, and crashes is by making Highway Safety funding available to local agencies, primarily law enforcement and other public safety agencies, for safety enforcement and education programs. GOHS grants are often used for traffic safety enforcement efforts, including focusing on compliance with pedestrian safety laws (for both pedestrians and motorists).

Regional Funds

- *Regional Transportation Authority*
  Through ballot numbers 37 and 41, the RTA has dedicated $80 million in regional revenue to pedestrian safety and accessibility projects, and for bikeways, greenways, pathways, and sidewalks. These two RTA categories are restricted to the project types identified in the original RTA ballot language, meaning that like the federal Transportation Alternatives Program, these funds are dedicated for the purpose of improving bicycle and pedestrian conditions in the region.

  As of June 2013, roughly $33 million remains uncommitted to specific projects. Over the life of the plan, 80 HAWK crossings and 250 miles of sidewalks are anticipated to be constructed using RTA 37 and 41 funds.

- *Pima County Neighborhood Reinvestment Program*
  The Pima County Neighborhood Reinvestment Program (NRP) funds small capital improvement projects through a community consensus process. NRP funds are typically used for sidewalks, traffic calming, lighting and park improvements in neighborhoods based on economic and social need, with project requests being generated by

the neighborhoods themselves. The NRP program has been funded through the Pima County Bond program since 1997, with voters approving $20 million for the program in 2004.

Local Funds

- *Local funding*
  Generally, any local funding available for pedestrian projects comes from the region's jurisdictional transportation budgets and potentially from unrestricted general funds. General fund revenues come from a mix of property taxes, local sales taxes, state shared sales taxes, miscellaneous fees and fines, and various other local sources. The General Fund expenditures include public safety, parks and other programs. Transportation budgets come from a mix of federal, state, regional, and local sources. Any expansion of transportation funding beyond dedicated fund sources would either need to be transferred out of the General Fund (reducing the proportion of the General Fund available for other jurisdictional programs), or generated through a committed local revenue source, such as a bond. Within jurisdictions, specific capital projects are identified and scheduled through a Capital Improvements Program (CIP).

  An example of a local program that commits funding to community capital improvements, including pedestrian improvement, is the City of Tucson's now suspended (since 2009) Back-to-Basics Program. Similar to Pima County's regional NRP, the City of Tucson's Back-to-Basics Program provided funding for sidewalks, landscaping, lighting, traffic calming, park improvements, housing rehabilitation and other neighborhood projects.

  The combination of reduced tax revenue and commitments to other budget obligations can make it difficult for the region's jurisdictions to dedicate significant funding to pedestrian improvements, particularly as the region continues the long recovery out of recession. As the economic situation improves, more local funding may eventually be available for these types of projects.

Other Potential Funding Options

With tight jurisdictional budgets and many types of projects competing for flexible transportation funds, it may be necessary to explore additional funding options to significantly improve pedestrian conditions and accessibility in the region. The two options available are re-allocating existing revenues to increase funding for pedestrian improvements (thus reducing available funding for other capital improvement projects or public services) or seek additional revenues to meet pedestrian needs.

- *Local or Regional Bond Measures*
  Bonds provide upfront funding for capital improvements, which can be drawn down over time. Additional pedestrian capital projects (such as filling gaps in sidewalks, calming traffic, installing HAWK lights, or constructing curb ramps) could be funded through a regional or local bond, either as part of a larger bond package (like the Pima County Bond Program) or as a smaller standalone bond.

  Bonds can be financed in a number of ways, including through jurisdiction's general funds, or by raising revenue dedicated specifically to bond servicing (such as a dedicated sales or property or tax). Public bonds must be approved by voters.

- *Improvement Districts*
  In specific areas, pedestrian improvements could be funded through the establishment of an improvement district. The districts are created under Arizona Revised Statutes Title 48, Chapters 4 and 6, as a means of financing the construction or improvement of local public facilities, such as streets, sewer lines, lighting etc. An improvement district provides a means of financing the improvements either by imposing a special assessment on each property or by levying real property taxes to pay for the improvements or maintenance within a defined geographic area.

- *Committed Tax Revenues*
  Similar in some ways to passing a bond measure, jurisdictions could levy a specific tax dedicated to improving pedestrian conditions. Increasing sales or property taxes, or levying taxes on the use or purchase of specific items, by a small percentage over a given period of time, and dedicating those additional revenues to acquiring rights-of-way, relocating utilities, adding street lighting, filling sidewalk gaps, improving streetscape and other capital improvements could be a way of overcoming the most significant challenges in retrofitting region's roadways for pedestrian improvements.

  Funding pedestrian improvements directly through tax revenues would eliminate the cost of servicing a bond, and also reduce the potential risks associated with additional debt. Projects would be funded as revenue is generated. On the other hand, money

would only be available as taxes were collected, which would slow project delivery vs. bond funded projects. Also, depending on the source, year-to-year tax revenue could be more unpredictable than bond funds, and therefore be more difficult to plan for and execute.

Jurisdictional DOT's and public works departments can look for additional opportunities to leverage private and non-transportation funding sources through partnerships with other agencies or organizations. For example, the City of Tucson has partnered with Tucson Unified School District to fund HAWK lights near school crossings.

Other options for leveraging private or non-DOT funding might include coordinating to connect public facilities with private pedestrian circulation routes, partnering with large private companies to fund certain pedestrian enhancements, or soliciting donations to fund improvements. In Maricopa County, for example, Salt River Project is cooperating with the United States Bureau of Reclamation to install interpretive historic signs and benches on shared-use paths along SRP's canal system. Although this is a special circumstance regarding projects within the SRP canal system, it may prove useful in thinking about how private companies could participate in enhancing the public ROW. Another example of how other funding sources were used to support pedestrian improvements comes from Portland. There residents donated $15 apiece for a brick paver with a name inscribed on it. The $750,000 generated through the sale permitted the completion of Portland's Pioneer Courthouse Square.

Closer to home, Living Streets Alliance is currently working with the City of Tucson, local businesses Exo Roast Co. and Tap and Bottle, and volunteers to raise money for a parklet on the corner of 6th avenue and 7th St. Trees for Tucson, a program of Tucson Clean and Beautiful subsidized by Tucson Electric Power, makes low-cost trees available for home and community planting, including street trees.

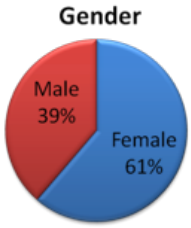
In preparation for the Regional Pedestrian Plan, PAG conducted a regional pedestrian survey of the Tucson metropolitan area. The survey was administered from March 1, 2013, until May 15, 2013. Over that period, 672 people participated in the survey.

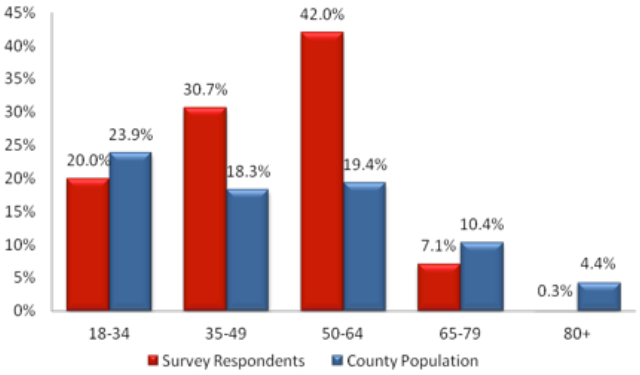
Summary of Results

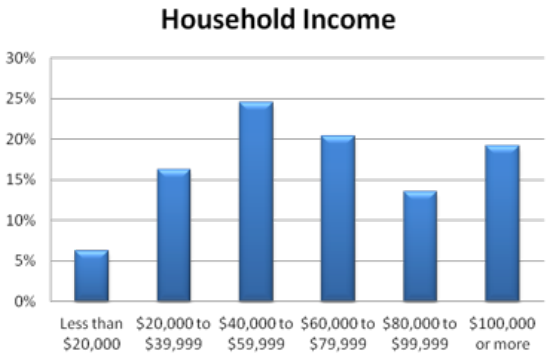
Close-ended Questions

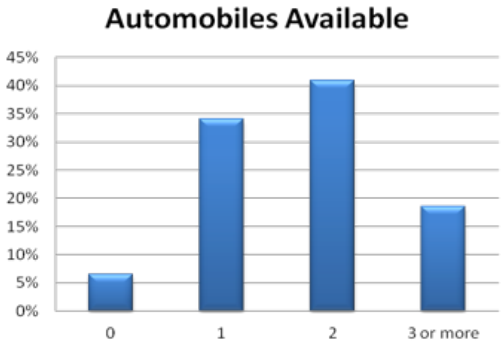
1) Respondent Profile

61% of respondents were female and they tended to skew older than the region as a whole. In particular, 50-64 year olds represented a share of the survey pool which more than doubles the age group's share of the regional population (42% of the survey pool vs. 19.4% for Pima County.) Rates of automobile ownership and household income levels were comparable to Pima County, with the exception of the share of the lowest-income households, which were underrepresented in participation.



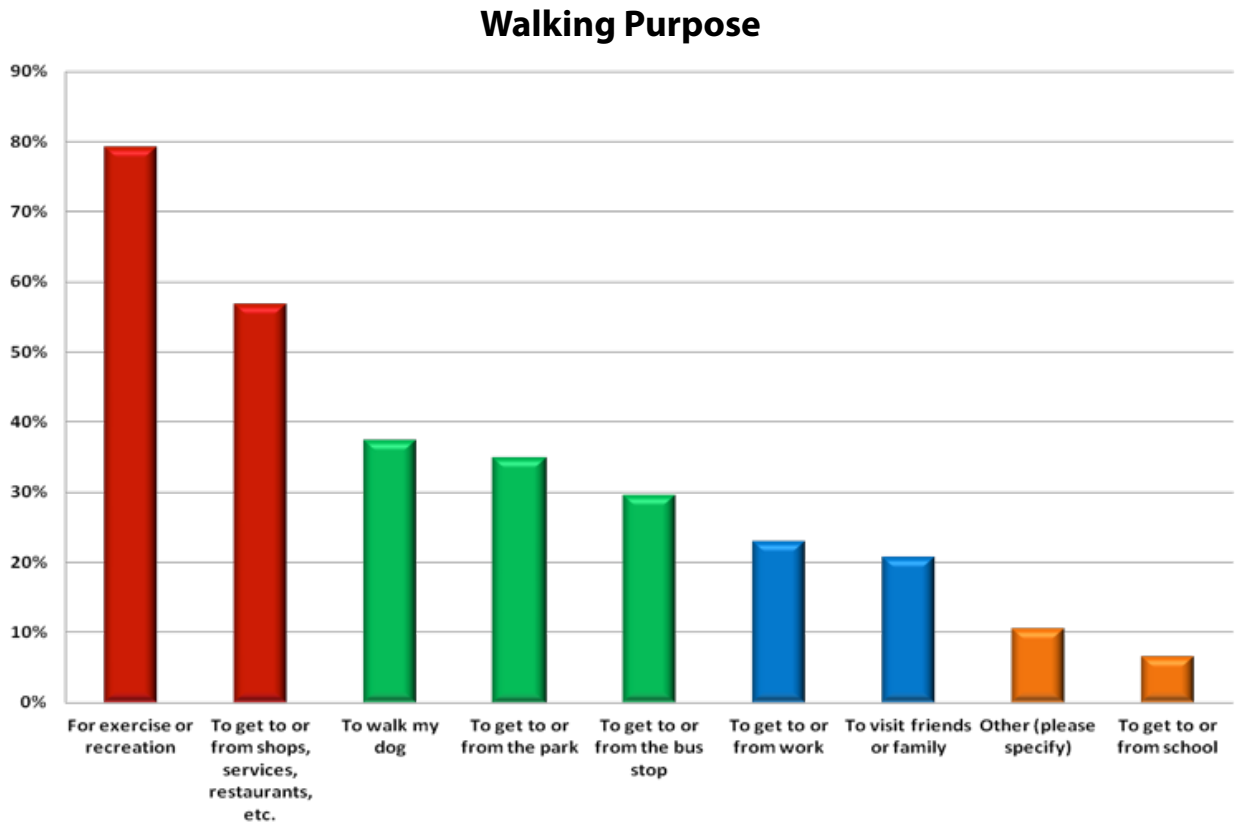






2) ***Walking Purpose***

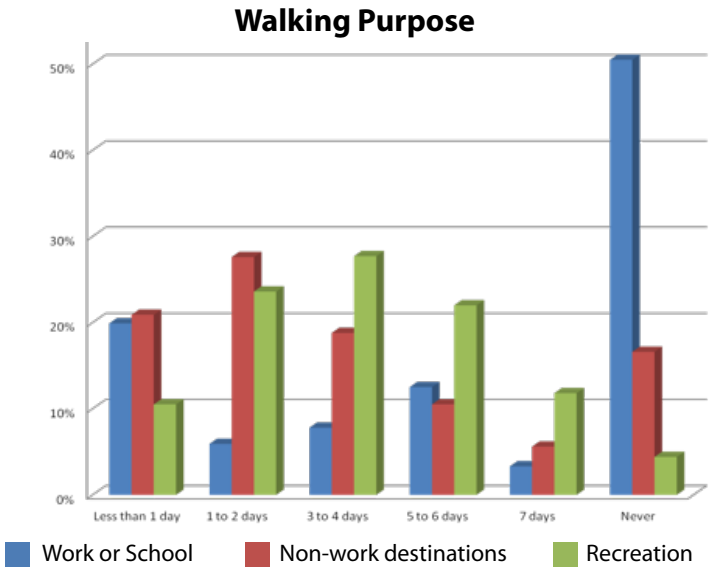
By far the most common reasons that people gave for walking are for recreation and exercise (79%) and to get to shops, services, restaurants, and other destinations (57%). These categories were not mutually exclusive, so respondents who walked to a destination may have also considered that walking for exercise. This is fairly consistent with the findings from the National Household Travel Survey (NHTS) for Pima County, which shows that over 64% of walking trips are for shopping, to restaurants, and other non-work/school trips. Work-related and school/religious trips account for about 26% of all walking trips, according to NHTS. (note: recreational/ exercise trips aren't counted as part of the NHTS). 18-34 year olds were the most likely to walk to destinations, while 50-64 year olds have the highest recreational walking rates.



Trip Purpose	18-34	35-49	50-64	65-79
To get to or from work	29.1%	23.7%	21.7%	4.4%
To get to or from shops, services, restaurants, etc.	70.9%	56.7%	49.4%	55.6%
To visit friends or family	27.6%	22.2%	16.5%	20.0%
To get to or from the park	52.0%	40.7%	22.5%	24.4%
To get to or from school	16.5%	8.8%	1.5%	0.0%
To get to or from the bus stop	30.7%	27.8%	32.2%	22.2%
For exercise or recreation	74.0%	78.4%	79.0%	75.6%
To walk my dog	35.4%	43.3%	36.0%	33.3%

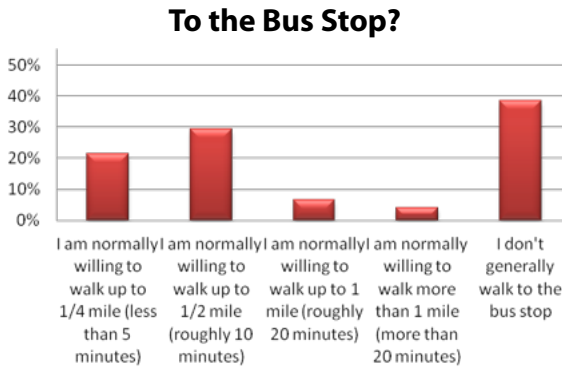
3) *Frequency of Walking*

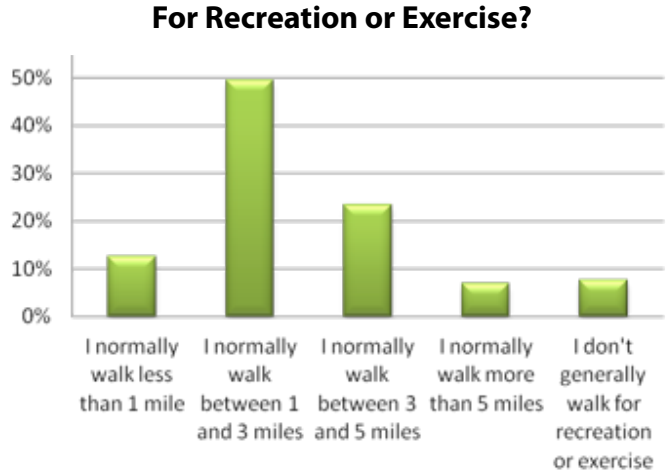
Consistent with the responses to walking purpose, respondents walked most frequently for exercise than for any other trip purpose. 60% of respondents walked at least 3 days a week for exercise, while only about 35% of respondents walk that frequently to a non-work or school destination, and 24% walk 3 days a week or more to work or school. 62.5% of respondents say they walk to a non-work destination at least once a week. According to NHTS data, about 16.5% of residents in the County walk each day for transportation.



4) *Walking Distance*

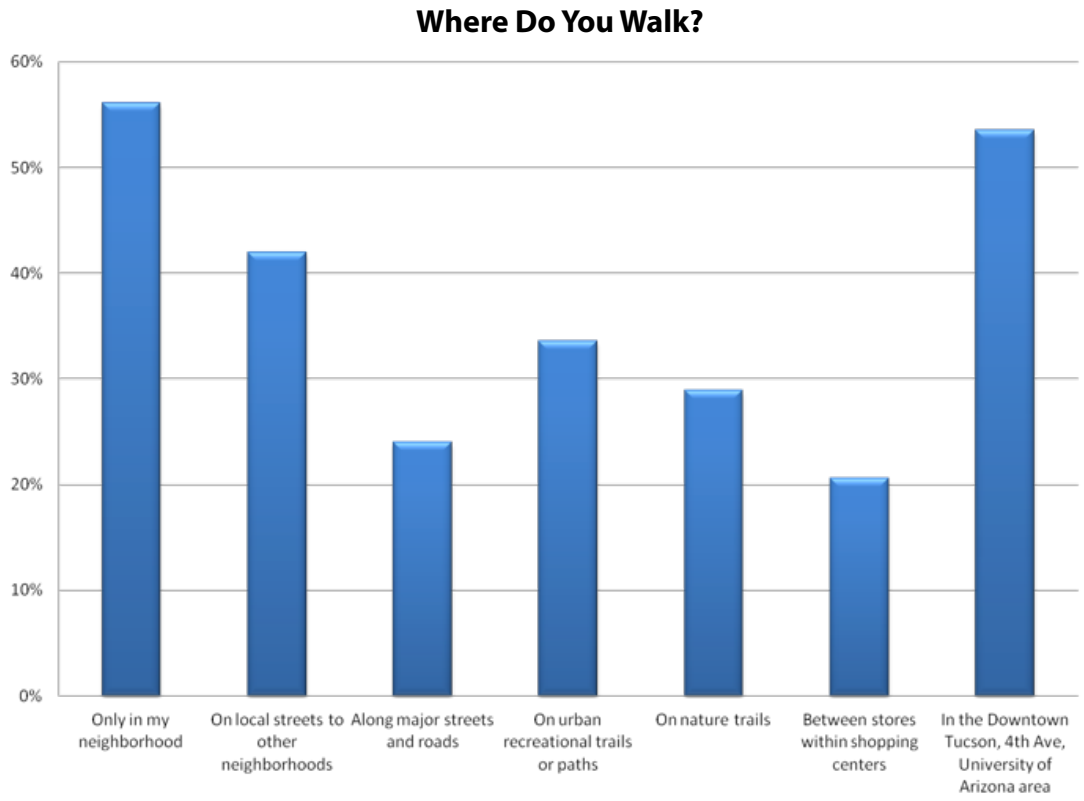
75% of respondents are willing to walk at least ½ mile to destinations (including work/school). 31% will walk up to a mile, while 26% will walk more than one mile. Respondents are far less willing to walk long distances to the bus stop. 83% of those who walk to the bus stop are only willing to walk up to ½ mile to get there. The average distance walked per week for survey respondents is 10.26 miles; the median is 8 miles per week. This is much higher than the County's per capita weekly walking distance, which is about 2 miles, but below the average for people who report walking (about 12 miles per week).





5) Walking Location

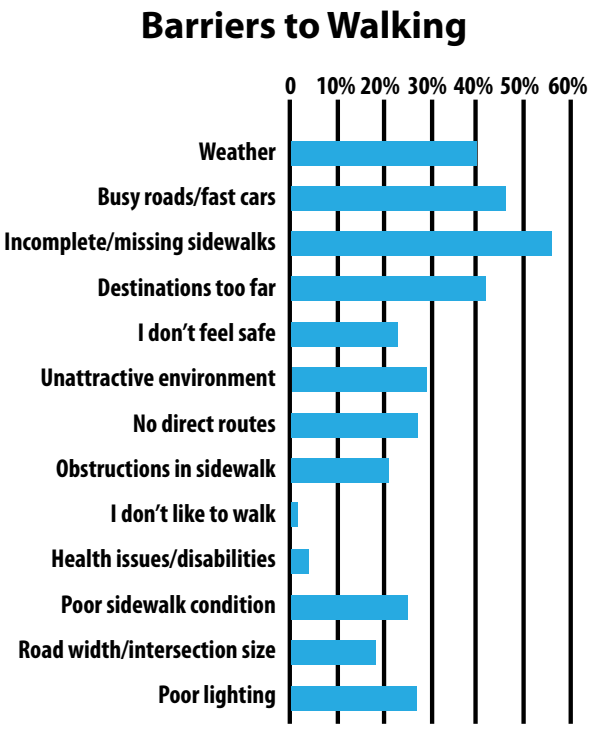
The most common locations for walking in the region are "only in my neighborhood" (56%) in the downtown Tucson, 4th Ave, University of Arizona area (53%) and on local streets other neighborhoods (42%). The most variation between age groups occurs in those who walk in the downtown area, with young respondents being nearly 3 times more likely to walk in the area than the oldest respondents (65-79). 65-79 year olds walk primarily in their own neighborhoods, while low-income and auto-less respondents are much more likely than the respondent pool as a whole to walk along major roadways (44% and 58.5% respectively, vs. 24% for all respondents), likely making them more vulnerable to dangerous walking conditions.



Walking Location	18-34	35-49	50-64	65-79
Only in my neighborhood	59.1%	57.4%	51.4%	56.8%
On local streets to other neighborhoods	53.5%	44.7%	35.9%	34.1%
Along major streets and roads	26.0%	23.2%	23.9%	25.0%
On urban recreational trails or paths	33.1%	32.6%	35.1%	34.1%
On nature trails	29.9%	27.4%	32.8%	11.4%
Between stores within shopping centers	22.0%	21.6%	18.1%	22.7%
In the Downtown Tucson, 4th Ave, University of Arizona area	71.7%	58.4%	47.5%	27.3%

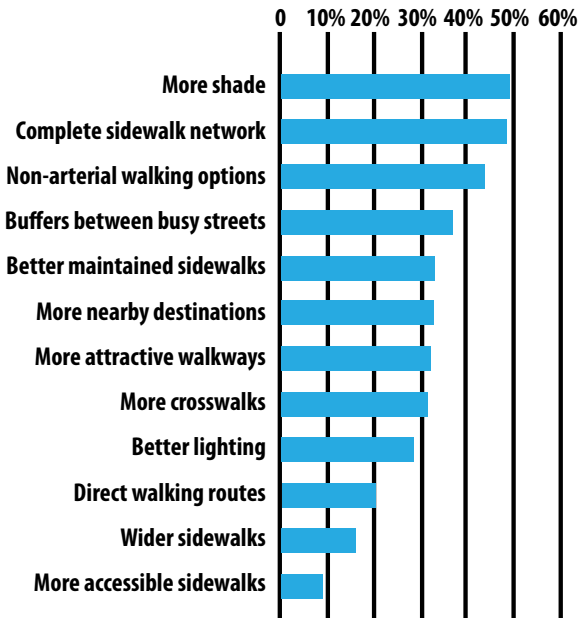
6) Barriers to Walking

When asked "what prevents you from walking more frequently or makes your walk unpleasant" 56% responded missing or incomplete sidewalks. The other reasons that respondents aren't walking or don't enjoy the walks they take is that the roads are too busy or the cars drive too fast (46.4%), destinations are too far away (41.9%) and the weather (39.8%).



7) Desired Improvements

When asked what improvements they would like to see made to the pedestrian environment, respondents would like to see more shade (49.1%), followed closely by a more complete sidewalk network (48%), more non-arterial walking options (43.5%), and bigger buffers between busy roads and sidewalks (36.6%)



Open-ended Questions

8) Safety

Over 85% of respondents stated feeling very or somewhat safe while walking in the region. 348 respondents (about 1/2) provided additional data through open-ended responses to the question "under what conditions do you feel safe or unsafe?" These were read and coded for the purpose of simple classification. The largest concerns were:

A) Traffic (42% of comments) – People identified feeling unsafe walking along high-volume, high-speed roadways. The biggest complaint was poor driver behavior, either distracted, speeding, not respecting the pedestrian realm, or being inattentive to pedestrians

B) Crossing the road (38.2% of comments) – similar to the first complaint in some regards, but only identified feeling unsafe crossing the road in intersections at crosswalks for any number of reasons

C) Crime/Other People (26.1% of comments) - Fear of high-crime areas, general sense of unease of potential crime, particularly at night and in poorly-lit locations.

Other common concerns regarded walking at night, poor lighting, and walking in areas without sidewalks.

9) Good Place to Walk

67% of respondents feel that the Tucson region is a good place to walk; owing mostly to the moderate weather most of the year, the flatness of the terrain, and the views. Older respondents are more likely to feel this is a good place to walk than younger respondents

10) ***Make Walking a Priority***

89% of respondents feel that improving pedestrian conditions should be a priority for the region. Two points of caution on this. 1) This is likely higher than would be seen from the population as a whole given that those who took the survey probably did so because they have an interest in walking and pedestrian issues (though there is no way to verify this). 2) "Priority" is not precisely defined in the question.

More important were the reasons that respondents gave for wanting to improve pedestrian conditions. Respondents feel improving conditions will increase walking which will have multiple benefits.

Respondents feel walking is important for health reasons, improving community (social interactions, connection to place, aesthetics) environmental impacts, the safety of walkers, and that it supports transit. Many want more viable options for transportation, particularly for low-income residents and with fuel costs rising. Many see it as a good thing simply to reduce driving.

11) Favorite Walking Place

In this question, respondents were asked to name and describe their favorite walking place. Those were then classified in the coding process into 4-types: Urban Trails, Paths, and Parks, Downtown/UA/4th Ave, Neighborhood, and Natural Parks and Nature Trails.

Favorite Walking Places are:

34% Urban Paths and Parks: Rillito/Santa Cruz/Reid Park/Tumamoc Hill most common responses

25% Downtown/UA/4th Ave

24% Neighborhoods

17% Natural Areas: Sabino Canyon, Catalina Park, hiking in the mountains

More importantly, this question was about getting at what characteristics people wanted in an enjoyable walking environment. By far the most common characteristic shared by all locations was that there was no, minimal, or slow-moving vehicular traffic. Other than that it should have sidewalks, be shaded and be safe. The characteristics varied by category of walking place.

Characteristics of different classes of place (number in parentheses indicates frequency of comment):

Natural Areas: Beautiful or scenic (39), no traffic (18), near wildlife (10), Quiet (8)

Urban Paths: No Traffic (56), Safe (30), other pedestrians or people (21), Beautiful (21)

Downtown: Destinations/things to do (40), Architecture and character (36), Low-speed traffic (28), Other people on the street (26), Shaded (22)

In neighborhoods: Limited Traffic (34), Sidewalks (21), Neighborhood character (19), Other people (14), Quiet (14), Safe (14)

12) Destinations

In this question, respondents were asked what type of locations they'd like to be able to walk to from their neighborhoods. The most common response (31.5%) was for miscellaneous or undefined "shops" or "shopping," followed closely by grocery stores (30.4%) and restaurants (29%).

Appendix 2: High-Scoring Pedestrian Need Segments

SEPTEMBER 2013

The following table of sidewalk segments and maps represents the highest scored sidewalk segments resulting from the use of the GIS-based pedestrian demand model developed for this Plan. Segments are limited to major roadways in the region. Other pedestrian-need locations have been included as high-need segments at the request of PAG member jurisdictions.

The following tables are not an exhaustive list of all segments lacking accessible sidewalks, rather they represent only the top scoring segments in each of the region's jurisdictions. Sidewalk status and accessibility data come from the 2012 ADA Sidewalk Inventory, which is current as of October 2011. The data are presented at the segment level, not at spot locations; therefore if any spot location (such as a single curb ramp) along a segment is not accessible, the entire segment will be treated as inaccessible for this Plan's purpose.

These tables of identified needs are the result of an effort to provide a regionally-standardized method for proactively identifying needed pedestrian improvements. They are to serve as guidance and support to PAG member agencies in developing their own plans, Capital Improvement Programs, and as they submit for regional funding for pedestrian improvements. Tables and supporting maps are presented for each of the region's jurisdictions. These do not represent a list of projects. The table also does not consider additional improvements, such as street furniture, shade, traffic calming, safety projects, or other elements that contribute to making public rights-of-way safe and enjoyable for all users. This Plan encourages incorporating those pedestrian safety and comfort concepts presented in the toolkit into individual pedestrian and roadway projects where appropriate.

Using the Table:

The table of high-scoring pedestrian need segments contains the following pieces of information.

Total Score – The cumulative score for each segment, calculated from the sum of the pedestrian demand factors and walkway deficiencies as described in Section 6 of the Plan.

Street Name – The name of the road or street on which the walkway is located

Side of the Road – The side of the roadway on which the pedestrian walkway is located

From – The location where the segment begins. Usually at the intersection with another major roadway

To – The location where the segment ends. Usually at the intersection with another major roadway

Jurisdiction – The jurisdiction in which the segment is located. In cases where the segment crosses jurisdictional boundaries more than one jurisdiction is listed.

Miles – The length of the segment in miles

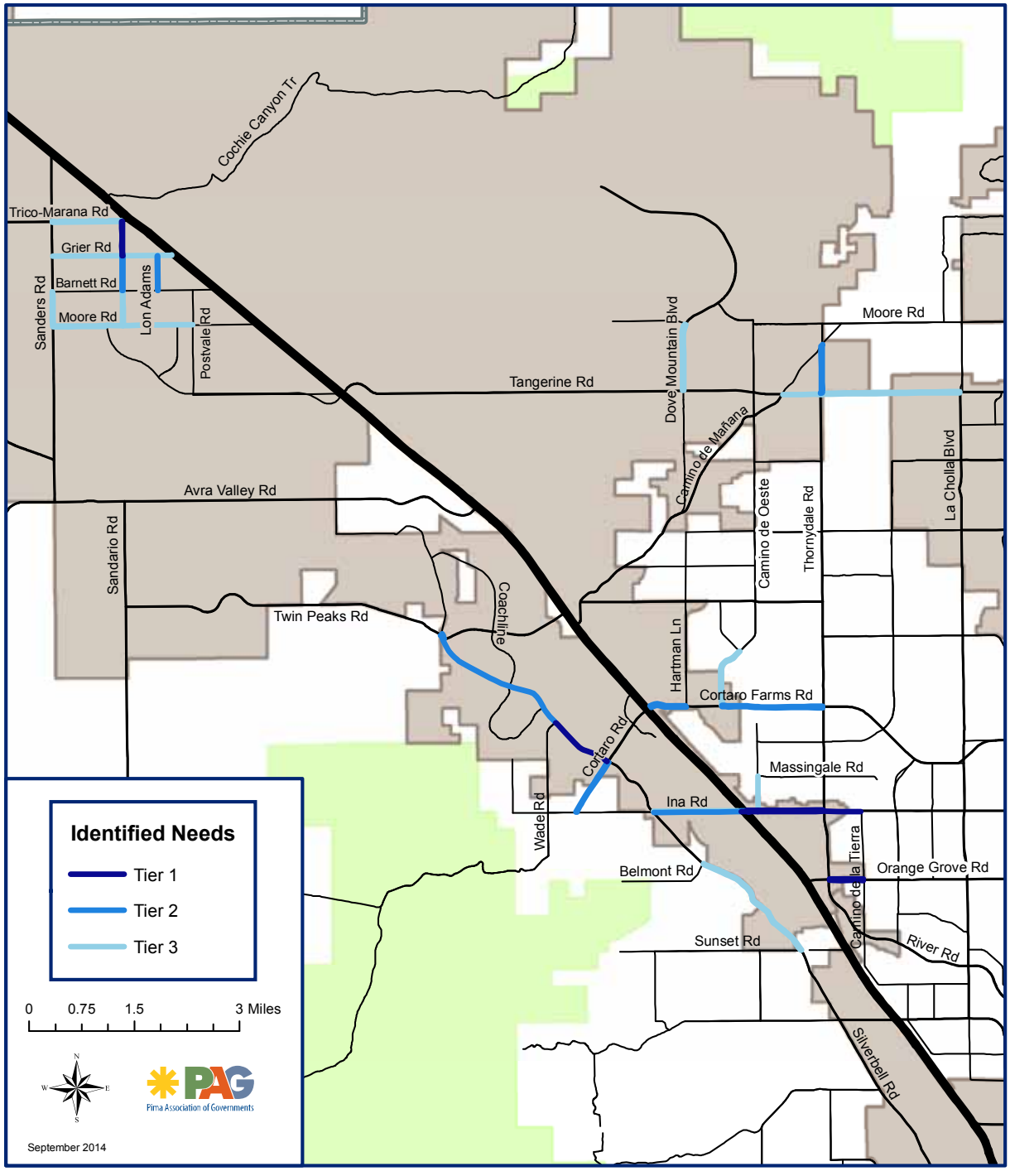
Deficiencies – The list of issues identified for the pedestrian walkway along each roadway segment

- No Sidewalk –No sidewalk was present on the roadside at the time of data collection
- Partial Sidewalk – Some sidewalk was present on the segment at the time of data collection. Partial sidewalk could indicate anything from 1% sidewalk completion to 99% sidewalk completion along the segment.
- No curb ramps – No accessible curb ramps were identified along the segment at the time of data collection
- Partial ramp access – Curb ramps were present at some intersections at the time of data collection
- Barriers Present – Barriers were identified along the segment which make the segment inaccessible to persons with disabilities. These may include excessive cross-slopes at driveways, utility poles in the pedestrian path of travel leaving an inadequate clear path, insufficient passing opportunities at required intervals, walls or landscaping encroaching on pedestrian rights of way, and others.
- History of Crashes – Segments that had a high number of pedestrian crashes between 2007-2011

Segments are listed alphabetically, not by priority.

High Scoring Pedestrian Needs

Marana Sidewalk Segments



Marana

Many of Marana's residential subdivisions, particularly those that are west of Interstate-10, feature complete, attractive, and accessible pedestrian facilities, and the on-going improvements to the shared-use path along the Santa Cruz offers residents recreational opportunities for walking, running or biking.

The Pedestrian Demand Model identified more than 50 high-scoring segments totaling just slightly more than 38 miles within the Town. Some of these, such as parts of Ina Rd, are already programmed for improvements, while other areas will likely be improved as part of the development process; particularly in the northwest area.

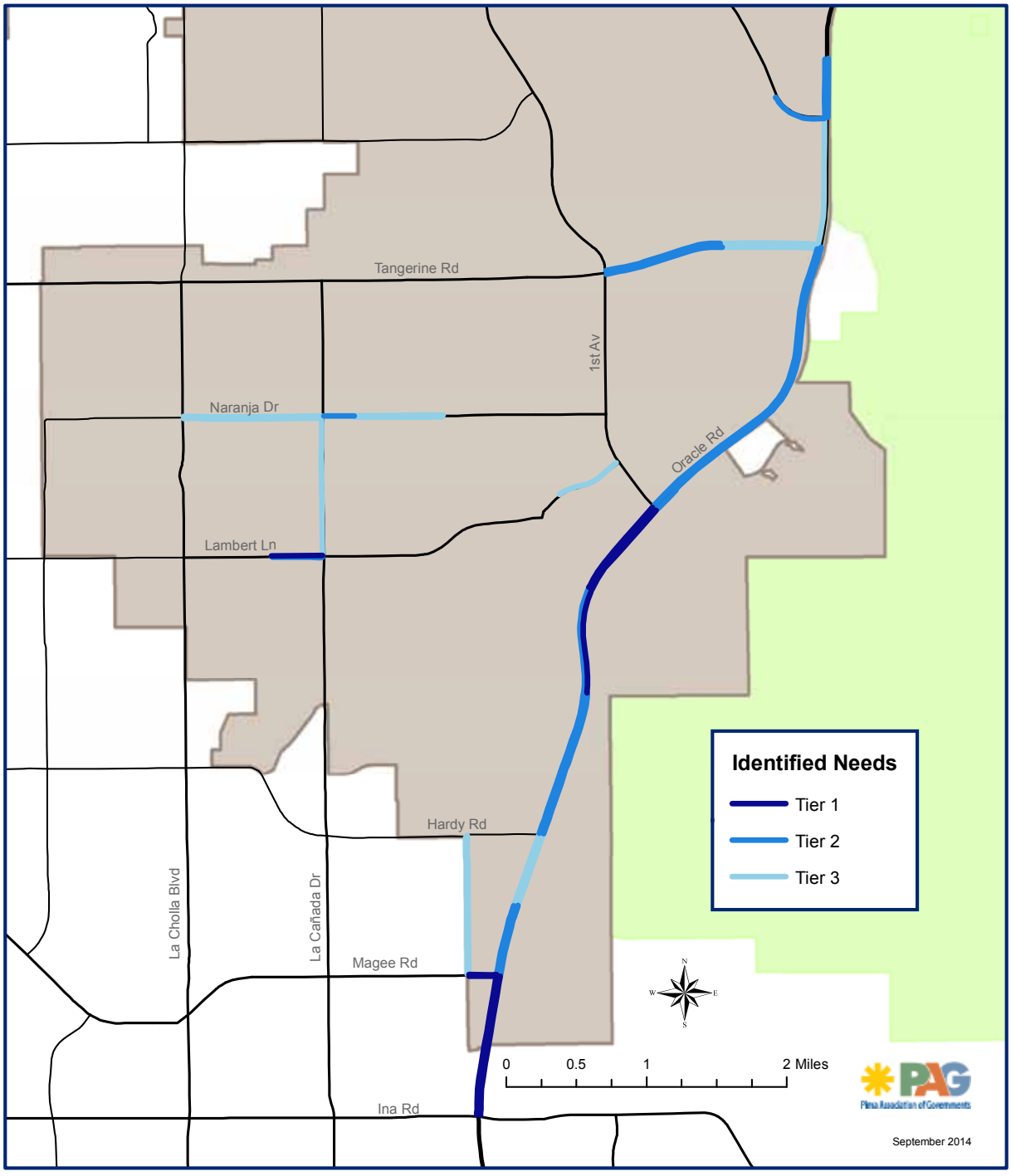
Marana High-Scoring Pedestrian Needs - PAG Pedestrian Demand Model

Total Score	Street Name	Side of Road	From	To	Jurisdiction	Miles	Deficiencies
55.11	CAMINO DE OESTE	E	Bald Eagle Av	Cortaro Farms Rd	Pima County / Marana	0.90	Partial sidewalk, partial ramp access
53.51	CAMINO DE OESTE	W	Bald Eagle Av	Cortaro Farms Rd	Pima County / Marana	0.90	Partial sidewalk, partial ramp access
52.77	CAMINO DE OESTE	E	Massingale Rd	Ina Rd	Pima County / Marana	0.48	No sidewalk, no curb ramps
63.69	CORTARO FARMS RD	N	Hartman Ln	I10 Frontage Rd (E)	Marana	0.52	Partial sidewalk, partial ramp access, barriers present
63.51	CORTARO FARMS RD	S	Hartman Ln	I10 Frontage Rd (E)	Marana	0.51	Partial sidewalk, partial ramp access, barriers present
60.30	CORTARO FARMS RD	N	Thornydale Rd	Camino de Oeste	Pima County / Marana	1.43	Partial sidewalk, partial ramp access
59.95	CORTARO FARMS RD	S	Thornydale Rd	Sandy Desert Tr	Pima County / Marana	1.43	Partial sidewalk, partial ramp access
61.49	CORTARO RD	NE	Silverbell Rd	Ina Rd	Marana / Pima County	0.85	Partial sidewalk, partial ramp access
57.42	CORTARO RD	SE	Silverbell Rd	Ina Rd	Marana / Pima County	0.84	Partial sidewalk, partial ramp access
50.38	DOVE MOUNTAIN	E	Moore Rd	Tangerine Rd	Marana	0.94	No sidewalk, no curb ramps
50.20	DOVE MOUNTAIN	W	Moore Rd	Tangerine Rd	Marana	0.95	No sidewalk, partial ramp access
50.42	GRIER RD	N	Casa Grande Hy	Sandario Rd	Marana	0.70	Partial sidewalk, partial ramp access
54.14	GRIER RD	S	I10 Frontage Rd	Sandario Rd	Marana	0.71	Partial sidewalk, partial ramp access
85.55	INA RD	S	Camino De La Tierra	Thornydale Rd	Pima County / Marana	0.51	Partial sidewalk
73.03	INA RD	N	Camino De Oeste	I10 Frontage Rd (E)	Marana	0.15	Partial sidewalk, partial ramp access
71.79	INA RD	S	Camino De Oeste	I10 Frontage Rd (E)	Marana	0.14	Partial sidewalk, partial ramp access
71.61	INA RD	S	I10 Frontage Rd (E)	I10 Frontage Rd (W)	Marana	0.08	No sidewalk, no curb ramps
62.79	INA RD	N	I10 Frontage Rd (E)	I10 Frontage Rd (W)	Marana	0.07	No sidewalk, no curb ramps
58.88	INA RD	S	I10 Frontage Rd (W)	Silverbell Rd	Marana	1.23	Partial sidewalk, partial ramp access
53.58	INA RD	N	I10 Frontage Rd (W)	Silverbell Rd	Marana	1.21	Partial sidewalk, partial ramp access
84.88	INA RD	S	Thornydale Rd	Camino De Oeste	Marana	0.93	Partial sidewalk, partial ramp access
83.64	INA RD	N	Thornydale Rd	Camino De Oeste	Marana	0.93	Partial sidewalk, partial ramp access
62.17	LON ADAMS RD	E	Grier Rd	Barnett Rd	Marana	0.49	Partial sidewalk, partial ramp access
60.13	LON ADAMS RD	W	Grier Rd	Barnett Rd	Marana	0.49	No sidewalk, no curb ramps
54.81	MARANA RD	S	Sandario Rd	Sanders Rd	Marana	0.99	No sidewalk, no curb ramps
54.27	MARANA RD	N	Sandario Rd	Sanders Rd	Marana	0.99	No sidewalk, no curb ramps
87.19	ORANGE GROVE RD	S	Camino De La Tierra	River Rd	Pima County / Marana	0.48	Partial sidewalk, partial ramp access
48.20	MOORE RD	S	Tangerine Farms Rd	Sanders Rd	Marana	0.76	No sidewalk, partial ramp access
47.50	MOORE RD	N	Tangerine Farms Rd	Sanders Rd	Marana	0.76	No sidewalk, partial ramp access
44.66	MOORE RD	N	Sandario Rd	Tangerine Farms Rd	Marana	0.25	No sidewalk, partial ramp access
43.60	MOORE RD	N	Postvale	Sandario	Marana	1.00	No sidewalk, no curb ramp

85.77	ORANGE GROVE RD	N	Camino De La Tierra	Thornydale Rd	Pima County / Marana	0.48	Partial sidewalk, partial ramp access
45.19	SANDARIO RD	W	Barnett Rd	Moore Rd	Marana	0.49	No sidewalk, no curb ramps
44.84	SANDARIO RD	E	Barnett Rd	Moore Rd	Marana	0.49	No sidewalk, no curb ramps
58.29	SANDARIO RD	W	Grier Rd	Barnett Rd	Marana	0.49	No sidewalk, no curb ramps
57.41	SANDARIO RD	E	Grier Rd	Barnett Rd	Marana	0.49	No sidewalk, no curb ramps
72.45	SANDARIO RD	E	Marana Rd	Grier Rd	Marana	0.49	No sidewalk, no curb ramps
72.27	SANDARIO RD	W	Marana Rd	Grier Rd	Marana	0.49	No sidewalk, no curb ramps
50.73	SANDERS RD	W	Barnett Rd	Moore Rd	Marana	0.50	No sidewalk, no curb ramps
50.03	SANDERS RD	E	Barnett Rd	Moore Rd	Marana	0.49	No sidewalk, no curb ramps
50.56	SILVERBELL RD	S	Belmont Rd	Sunset Rd	Marana / Pima County	1.91	No sidewalk, no curb ramps
50.56	SILVERBELL RD	NE	Belmont Rd	Sunset Rd	Marana / Pima County	1.93	No sidewalk, no curb ramps
62.25	SILVERBELL RD	S (W)	Continental Reserve Lp (N)	Continental Reserve Lp (S)	Marana	0.59	Partial sidewalk, partial ramp access
60.30	SILVERBELL RD	S	Continental Reserve Lp (S)	Wade Rd	Marana	0.25	Partial sidewalk, partial ramp access
62.82	SILVERBELL RD	S	Scenic Dr / Twin Peaks Rd	Twin Peaks Rd	Pima County / Marana	0.08	No sidewalk, no curb ramps
63.00	SILVERBELL RD	N	Silverbell Rd / Twin Peaks Rd	Twin Peaks Rd	Pima County / Marana	0.09	No sidewalk, no curb ramps
61.54	SILVERBELL RD	S	Twin Peaks Rd	Continental Reserve Lp	Marana	1.16	Partial sidewalk, partial ramp access
70.39	SILVERBELL RD	S	Wade Rd	Cortaro Rd	Marana	0.94	Partial sidewalk, partial ramp access
50.91	TANGERINE RD	N	La Cholla Bl	Thornydale Rd	Oro Valley / Pima County / Marana	1.96	No sidewalk, no curb ramps
50.03	TANGERINE RD	S	La Cholla Bl	Thornydale Rd	Oro Valley / Pima County / Marana	1.97	No sidewalk, no curb ramps
50.73	TANGERINE RD	S	Thornydale Rd	Camino De Manana	Marana	0.53	No sidewalk, no curb ramps
57.11	THORNYDALE RD	E	Camino De Manana	Tangerine Rd	Marana	0.69	No sidewalk, no curb ramps
56.93	THORNYDALE RD	W	Camino De Manana	Tangerine Rd	Marana	0.68	No sidewalk, no curb ramps

High Scoring Pedestrian Needs

Oro Valley Sidewalk Segments



Oro Valley

The Town of Oro Valley has a well-connected network of shared-use paths, such as the recently completed Canyon Del Oro Shared Use Path, and many of the Town's residential subdivisions and commercial developments feature complete and accessible sidewalks. However, some of the larger roadways in the Town still lack complete pedestrian facilities. Most notably, Oracle Road (also called State Route 77, which is an ADOT facility) still lacks pedestrian infrastructure in many locations beyond paved shoulders.

The PAG Pedestrian Demand Model identified 40 high-scoring segments totaling about 26 miles of pedestrian facilities. Some of these will improved through roadway projects, while others may be constructed as part of the land development process.

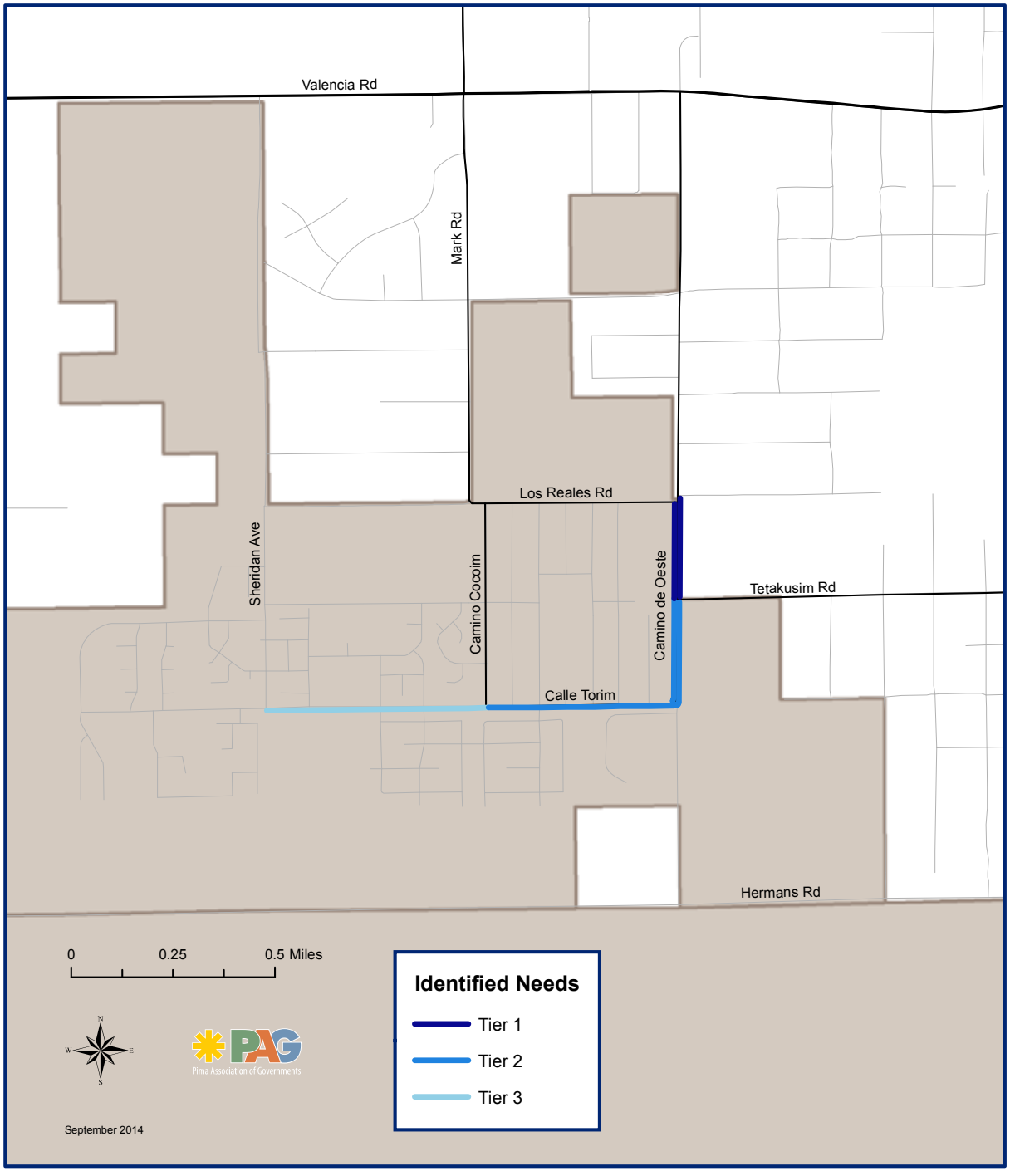
Oro Valley High-Scoring Pedestrian Needs – PAG Pedestrian Demand Model

Total	Street Name	Side of	From	To	Jurisdiction	Miles	Deficiencies
58.12	LA CANADA DR	W	Naranja Dr	Lambert Ln	Oro Valley	0.98	Partial Sidewalk, partial ramp access
57.81	LAMBERT LN	NE	1st Av	N Shore Cliff Dr	Oro Valley	0.48	Partial Sidewalk, partial ramp access
77.46	LAMBERT LN	N	La Canada Dr	Rancho Sonora Dr	Oro Valley	0.36	No sidewalk, no curb ramps
70.87	LAMBERT LN	S	La Canada Dr	Rancho Sonora Dr	Oro Valley	0.36	Partial Sidewalk, partial ramp access
78.65	MAGEE RD	S	Oracle Rd	Northern Av	Oro Valley	0.20	No sidewalk, no curb ramps
74.22	MAGEE RD	N	Oracle Rd	Northern Av	Oro Valley	0.20	No sidewalk, no curb ramps
61.88	NARANJA DR	N	Copper Creek Dr	La Canada Dr	Oro Valley	0.22	No sidewalk, no curb ramps
57.68	NARANJA DR	S	La Canada Dr	La Cholla Bl	Oro Valley	0.98	No sidewalk, no curb ramps
56.22	NARANJA DR	S	Pomegranate Dr	Copper Creek Dr	Oro Valley	0.62	No sidewalk, no curb ramps
56.22	NARANJA DR	N	Pomegranate Dr	Copper Creek Dr	Oro Valley	0.61	No sidewalk, no curb ramps
55.78	NORTHERN AV	W	Calle Dadivoso	Magee Rd	Oro Valley	0.48	No sidewalk, no curb ramps
55.78	NORTHERN AV	E	Camino Cortaro	Magee Rd	Oro Valley	0.49	No sidewalk, no curb ramps
41.09	NORTHERN AV	W	Hardy Rd	Calle Dadivoso	Oro Valley	0.48	No sidewalk, no curb ramps
40.56	NORTHERN AV	E	Hardy Rd	Camino Cortaro	Oro Valley	0.49	No sidewalk, no curb ramps
76.39	ORACLE RD	W	1st Av	Greenock Dr	Oro Valley	0.73	No sidewalk, no curb ramps
76.21	ORACLE RD	E	1st Av	Greenock Dr	Oro Valley	0.73	No sidewalk, no curb ramps
66.88	ORACLE RD	E	Calle Concordia	Hardy Rd	Oro Valley	0.52	No sidewalk, no curb ramps
66.52	ORACLE RD	W	Calle Concordia	Hardy Rd	Oro Valley	0.52	No sidewalk, no curb ramps
69.25	ORACLE RD	E	Camino Cortaro	Magee Rd	Oro Valley	0.51	No sidewalk, no curb ramps
68.72	ORACLE RD	W	Camino Cortaro	Magee Rd	Oro Valley	0.51	No sidewalk, no curb ramps
43.85	ORACLE RD	W (N)	Camino Greenfield	Camino Cortaro	Oro Valley	0.25	No sidewalk, no curb ramps
43.85	ORACLE RD	E (N)	Camino Greenfield	Camino Cortaro	Oro Valley	0.26	No sidewalk, no curb ramps
73.56	ORACLE RD	E	Greenock Dr	Linda Vista Bl	Oro Valley	0.73	No sidewalk, no curb ramps
71.43	ORACLE RD	W	Greenock Dr	Linda Vista Bl	Oro Valley	0.75	No sidewalk, no curb ramps

56.15	ORACLE RD	E	Hardy Rd	Camino Greenfield	Oro Valley	0.27	No sidewalk, no curb ramps
55.62	ORACLE RD	W	Hardy Rd	Camino Greenfield	Oro Valley	0.26	No sidewalk, no curb ramps
66.48	ORACLE RD	E	Linda Vista Bl	Calle Concordia	Oro Valley	0.52	No sidewalk, no curb ramps
66.30	ORACLE RD	W	Linda Vista Bl	Calle Concordia	Oro Valley	0.51	No sidewalk, no curb ramps
93.72	ORACLE RD	E	Magee Rd	Ina Rd	Oro Valley / Pima County	1.00	No sidewalk, no curb ramps
93.01	ORACLE RD	W	Magee Rd	Ina Rd	Oro Valley / Pima County	1.00	No sidewalk, no curb ramps
56.21	ORACLE RD	W	Rancho Vistoso Bl	Tangerine Rd	Oro Valley	0.90	No sidewalk, no curb ramps
65.65	ORACLE RD	E	Tangerine Rd	1st Av	Oro Valley	2.31	No sidewalk, no curb ramps
65.65	ORACLE RD	W	Tangerine Rd	1st Av	Oro Valley	2.28	No sidewalk, no curb ramps
64.88	ORACLE RD	W	Vistoso Commerce	Rancho Vistoso Bl	Oro Valley	0.40	No sidewalk, no curb ramps
60.11	ORACLE RD	E	Vistoso Commerce	Rancho Vistoso Bl	Oro Valley	0.42	No sidewalk, no curb ramps
61.49	RANCHO VISTOSO BL	S (W)	Oracle Rd	Innovation Park Dr	Oro Valley	0.41	Partial Sidewalk, partial ramp access
66.31	TANGERINE RD	N	Innovation Park Dr	Rancho Vistoso Bl	Oro Valley	0.84	No sidewalk, no curb ramps
57.11	TANGERINE RD	N	Oracle Rd	Innovation Park Dr	Oro Valley	0.68	No sidewalk, no curb ramps

High Scoring Pedestrian Needs

Pascua Yaqui Sidewalk Segments



Pascua Yaqui Tribe

The Pascua Pueblo has identified pedestrian needs on two corridors. These include segments of Calle Torim and Camino de Oeste on the eastern edge. Major streets that connect to the pueblo, such as Tetakusim Rd east of Camino de Oeste and Mark Rd north of Los Reales are included in the list of Pima County high-scoring improvements. In total, six segments were identified totaling around two miles of needed pedestrian improvements.

Pascua Yaqui High-Scoring Pedestrian Needs – PAG Pedestrian Demand Model

Total Score	Street Name	Side of Road	From	To	Jurisdiction	Miles	Deficiencies
48.76	CALLE TORIM	S	Camino Cocoim	Sheridan Av	Pascua Yaqui Tribe	0.54	Partial sidewalks, partial ramp access
50.53	CALLE TORIM	S	Camino De Oeste	Camino Cocoim	Pascua Yaqui Tribe	0.47	Partial sidewalks, partial ramp access
57.24	CAMINO DE OESTE	W	Los Reales Rd	Tetakusim Rd	Pascua Yaqui Tribe	0.24	Partial sidewalks, partial ramp access
56.53	CAMINO DE OESTE	E	Los Reales Rd	Tetakusim Rd	Pascua Yaqui Tribe	0.24	Partial sidewalks, partial ramp access
50.53	CAMINO DE OESTE	W	Tetakusim Rd	Calle Torim	Pascua Yaqui Tribe	0.25	Partial sidewalks, partial ramp access
50.00	CAMINO DE OESTE	E	Tetakusim Rd	Calle Torim	Pascua Yaqui Tribe	0.26	Partial sidewalks, partial ramp access

Pima County

As noted in Section 2 of the Plan, Pima County has development a priority list for pedestrian improvements as part of its ADA transition plan and, in a separate process, for those roadways near school locations. Those lists are included here as County priorities in the first two tables in this section.

The third table lists the high-scoring segments in Pima County as identified through the PAG Pedestrian Demand Model. The model identified more than 200 high-need segments in the County totaling over 150 miles. These segments can be used to inform Priority 3 projects in the County's ADA Transition Plan. The majority of identified needs are in the parts of the County that are more urban in character, particularly those abutting City of Tucson. Western and rural Pima County was not considered in this analysis.

There is overlap of segments between the tables.

Pima County ADA Transition Plan Priority Two Projects: Planned ADA Sidewalk/Shared Use Path Projects

Planned ADA Sidewalks and Shared Use Paths	Sidewalk, Both Sides	Sidewalk on One Side with Paved Shoulders	Shared Use Path	Ramps (both sides)	Planned Construction Year	Status as of 2-14
La Cholla, Magee to Lambert			Westside		2013-14	Under Construction
Magee, Thornydale to Oracle		Southside			2013-14	Under Construction
Ruthrauff, Davis to La Cholla	x (ramps)			x	2014	Under Construction
Valencia Road, Alvernon to Kolb	x				2014-15	Under Constr. (Alvernon to Wilmot)

Campbell Avenue, Encantada to E. Table Mtn. Road	x				2015	Under Design
Coronado Elementary and Middle School pathway, Wilds Road to Twin Lakes; Twin Lakes to Golder Ranch Road					2014-15	Under Design
Esperanza, Abrego to La Canada	x				2014-15	Under Design
La Cholla, Ruthrauff to Wetmore		Westside			2014	Under Design
Mary Ann Cleveland, Nona Lane to Driscoll Mountain Drive			North side		2015	Under Design
Pantano Wash, Speedway to 5th Street			Eastside		2014-15	Under Design
Valencia Road, Ajo to Mark Road		Southside			2014	Under Design
Wetmore, 600 feet West of La Cholla to Romero	x				2014	Under Design
Silverbell, Grant to Ina		x	Eastside		2015	Planning
La Cholla Boulevard/Ina Road Intersection-Sidewalk Improvements to Bus Stop	x				2014	Not started
La Cholla, Lambert to Tangerine			Westside		2015	Not started

Pima County Identified School Sidewalk Needs

SCHOOL NAME & ADDRESS	ABUTTING ROAD(S)	Sidewalk Needed (ft.)	COMMENTS
OLD VAIL MIDDLE SCHOOL	COLOSSAL CAVE RD	900	500 ft on Northside of Colossal Cave RD between School driveways and 400 ft on Southside of Colossal Cave RD from existing SW to School crosswalk 900 ft Northside Mary Ann Cleveland WY between Long Tank DR and Driscoll Mt DR
13299 E. COLOSSAL CAVE RD.	MARY ANN CLEVELAND WY	900	
CHAPARRAL MIDDLE SCHOOL	ALVORD RD	800	Southside of Alvord Rd from Palo Verde RD to the existing sidewalk
3700 E. ALVORD RD.			
ACACIA ELEMENTARY SCHOOL	COLOSSAL CAVE RD	1350	Northside of Colossal Cave RD from Trotter Sister Dr to 250ft West of School
12955 E. COLOSSAL CAVE RD.			
VESEY ELEMENTARY SCHOOL	BUTTS RD	1200	Eastside of Butts Rd from center of school 600 ft north and 600 ft south
5005 S. BUTTS RD.			
JOHNSON PRIMARY SCHOOL	JOSEPH AV	1200	Westside of Joseph AV from center of school 600 ft North and 600 ft South
6060 S. JOSEPH AVE.			

SOUTHWEST ALTERNATI VE SCHOOLS	MARK RD	650	Eastside of Mark RD 650 ft North of School , 100 ft South of existing SW to Jefferey RD, 700 ft Northside of Jefferey RD
6855 S. MARK RD.	JEFFEREY RD	800	
LAWRENCE INTERMEDI ATE SCHOOL	JEFFREY RD	1450	Northside of Jeffery RD from eastside of school to Camino De Oeste
4850 W. JEFFREY RD.			
ROBINS ELEMENTARY SCHOOL	WILLEMITE DR	500	250 ft East and West of Willemite DR on the Southside of Sweetwater DR
3939 N. MAGNETITE LN	MAGNETITE LN		
GREEN FIELDS COUNTRY DAY SCHOOL	CAMINO DE LA TIERRA	1100	Eastside of Camino De La Tierra form the North side Of School south to Las Palmas DR
6000 N. CAMINO DE LA TIERRA			
MILLER ELEMENTARY SCHOOL	CMO DE LA TIERRA	250	Eastside of Camino De La Tierra 250ft between Avenida Isabel and Avenida Sombra, 150ft Calle Cisne and the existing sidewalk
6951 S. CAMINO DE LA TIERRA	CALLE CISNE	150	
WARREN ELEMENTARY SCHOOL	MILTON RD		Westside of Gunsight LN from the Existing sidewalk South to Bliby RD crosswalk
3505 W. MILTON RD.	GUNSIGHT LN	1325	
	SADDLE RIDGE LN		
WHITE ELEMENTARY SCHOOL	FORREST AV		550ft on the Southside of Canada ST between Westover AV and Forrest AV
2315 W. CANADA ST.	HOLLADAY ST		
	MIDVALE AV		
	CANADA ST	550	
MOUNTAIN VIEW HIGH SCHOOL	LINDA VISTA BLVD		Westside of Thornydale Rd from Linda Vista BL to Freer DR
3901 W. LINDA VISTA BLVD.	THRONYDALE RD	1250	
PISTOR MIDDLE SCHOOL	CARDINAL AV	2000	2000ft Eastside of Cardinal AV between Alaska ST and Drexel RD, 850ft Northside Canada ST between Cardinal AV and Hildreth AV, 625ft Westside Hildreth AV between Canada ST and Alaska ST, 600ft Southside Alaska ST between Cardinal AV and Hildreth AV
5455 S. CARDINAL AVE.	CANADA ST	850	
	HILDRETH AV	625	
	ALASKA ST	600	
VALENCIA MIDDLE SCHOOL	IRVINGTON RD	1600	School crosswalk exists on Cmo de Oeste. Install side walk (2500 feet) on the west side of Cmo de Oeste (Irvington Rd to Calle Don Miguel), and 1600 feet of sidewalks on the north side of Irvington Rd (Camino De Oeste to east side of school)
4400 W. IRVINGTON RD.	CMO DE OESTE	2500	
TUCSON HEBREW ACADEMY	RIVER RD	1400	South side of River Rd (Alvernon Way to Dodge Blvd)
3888 E RIVER RD			

HARELSON ELEMENTARY SCHOOL	CHAPALA DR		Eastside of Paseo Del Norte 600ft between Chapala DR and Harelson ST and 400ft on the West side of Paseo Del Norte between the School and Camino Desierto
826 W. CHAPALA DR.	PASEO DEL NORTE	1000	
CROSS MIDDLE SCHOOL	CHAPALA DR	3000	Northside of Chapala DR from existing Sidewalk in front of Harelson Elementary to Camino Desierto
1000 W. CHAPALA DR.			
EMILY GRAY JUNIOR HIGH SCHOOL	TANQUE VERDE RD	2000	1000 FT on the north side and 1000 FT on the south side of Tanque Verde Rd (Tanque Verde Loop Rd to Rebecca Ave) 500 feet on the east side of Tanque Verde Loop Rd (Tanque Verde Rd to 500 feet south of Tanque Verde loop Rd)
4201 N. MELPOMENE WAY	TANQUE VERDE LOOP RD	500	
CIENEGA HIGH SCHOOL	MARY ANN CLEVELAND WY	3300	Northside of Mary Ann Cleveland WY between Nona LN and Hope Camp DR
12775 E. MARY ANN CLEVELAND WAY			
AGUA CALIENTE SCHOOL	LIMBERLOST RD	2500	South side of Limberlost Rd (Melpomene Wy to Homestead Ave); Existing walking pathway next to bike lane
11420 E. LIMBERLOST			
HERMOSA MONTESSOR I CHARTER SC	FORT LOWELL ROAD	1200	North side of Ft Lowell Rd (Soldier Trail to east side of school)
12051 E. FORT LOWELL ROAD			
KHALSA MONTESSOR I SCHOOL	RIVER RD	1450	North side of River RD from Dodge BL to Alvernon WY
3701 E. RIVER RD.			
SAINT ELIZABETH ANN SETON	SHANNON RD	600	In front of school
8650 N. SHANNON RD.	STAR TRAILS DR		
SUN & SHIELD CHRISTIAN ACADEMY	AVRA VALLEY RD	600	600 feet on the south side of Avra Valley Rd (Seattle Ave to Spokane Ave) 500 feet on the west side of Spokane Ave (Avra Valley Rd to 500 feet south of Anway Rd)
8811 W. AVRA VALLEY RD.	SPOKANE AVE	500	
ROADRUNNER ELEMENTARY SCHOOL	CALLE CARMELA	1200	1200 feet on the south side of Calle Carmela (Paseo Alejandro to Anway Rd) 1200 feet on the west side of Anway Rd (Calle Carmela to Calle Cristobal)
16651 W. CALLE CARMELA	ANWAY RD	1200	
MESA VERDE ELEMENTARY SCHOOL	SAGE ST	700	Southside of Sage ST east of School to Date ST
1661 W. SAGE ST.	ROMERO AVE		

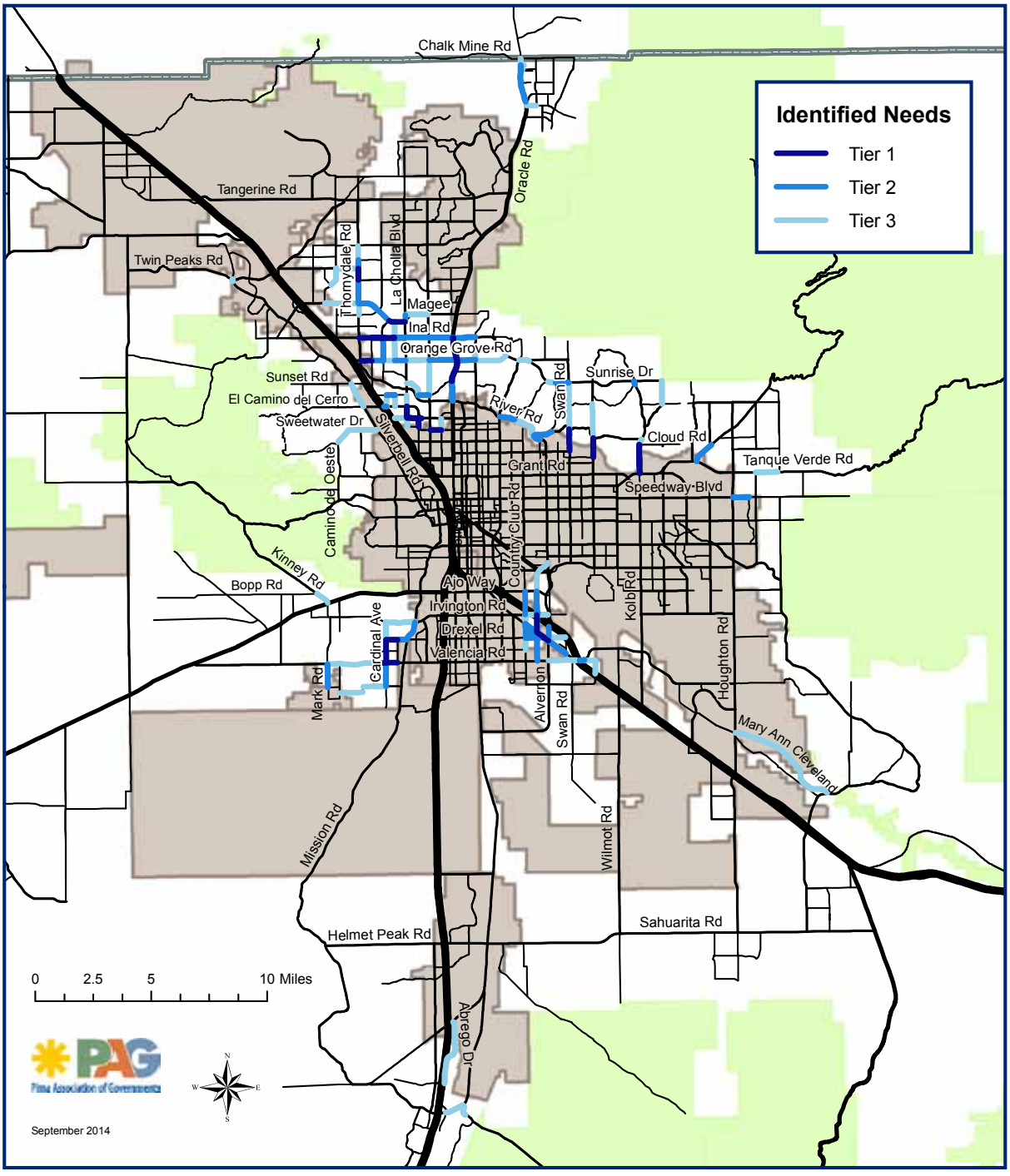
VALLEY VIEW PRESCHOOL	SUNRISE DR	850	Follow Sunrise DR from Campo Abierto to Skyline Dr and Skyline DR from Sunrise DR to Evans Mountain DR
3435 E SUNRISE DR	SKYLINE DR	850	
QUAIL RUN ELEMENTARY SCHOOL	CORTARO FARMS RD	1500	Pathway rural area
4600 W. CORTARO FARMS RD.			
WALKER ELEMENTARY SCHOOL	ORACLE JAYNES STATION RD	700	700 ft on Oracle Jaynes Station Rd from Hudson Dr to Roller Coaster RD and 200 ft from the crosswalk on Roller Coaster RD to West Roller Coaster RD
1750 W. ROLLER COASTER	ROLLER COASTER RD	200	
SUMMIT VIEW ELEMENTARY SCHOOL	SUMMIT ST	1300	1300 feet on the south side of Summit St (West side of park to Epperson Ln) 600 feet on the west side of Epperson Ln`(Summit St to 600' south)
1900 E. SUMMIT ST.	EPPERSON LN	600	
CANYON VIEW ELEMENTARY SCHOOL	SABINO CANYON RD	2500	Westside Sabino Canyon RD from Sunrise RD to Rudasill RD. Sidewalk combined with Espero Canyon Middle School
5725 N. SABINO CANYON			
CORONA FOOTHILLS	HOUGHTON RD	1000	East side of Houghton Rd (Forrest Feezor St to Camino Del Toro)
16701 S HOUGHTON RD	FORREST FEEZOR		
AJO SCHOOLS	AJO WELL NO. 1 ROAD (AJO AZ)	3000	Rural road; north side Ajo Well No. 1 Rd (State Hy 85 to Baseball park)
111 N WELL RD.			
SOPORI ELEMENTARY SCHOOL	ARIVACA ROAD	5280	Rural road; north side of Arivaca Rd (Tumacacoro Ranch Rd to Nogales Hy)
5000 W. ARIVACA RD.	VIA RANCHO CHAPARRITA		
CORONADO K-8 SCHOOL	WILDS RD	3000	Rural pathway on both sides of Wilds RD from School crosswalk to Twin Lakes DR
3401 E. WILDS RD.	ORACLE RD		
SABINO HIGH SCHOOL	BOWES RD	600	In front of school on Bowes RD
5000 N. BOWES RD.			
ASCENSION LUTHERAN SCHOOL	MAGEE RD	1600	1600 feet on the north side of Magee Rd (La Canada Dr to Cool Dr)
1220 W MAGEE RD			

CHAPEL IN THE HILLS	WESTOVER AV	400	400 feet on the east side of Westover Av (Canada St to 400' north) 600 feet on the north side of Canada St (Westover Av to Forrest Av)
5455 S WESTOVER AV	CANADA ST	600	
HENDRICKS ELEMENTARY	ORANGE GROVE RD	1500	1500 feet on the north side of OG (Cmo de la Tierra to Orange Blossom Ln) 600 feet on the west side of Cmo de la Tierra (north end of school to south end of bridge)
3400 W ORANGE GROVE RD	CAMINO DE LA TIERRA	600	
MANZANITA ELEMENTARY SCHOOL	MANZANITA AVE.		1300 ft on the west side of Campbell AV from Manzanita AV to Beningwood RD and 700 ft on the eastside of Campbell AV from Manzanita AV to Table Mountain RD
3000 E. MANZANITA AVE.	CAMPBELL RD	2000	
LAMB GATE CHRISTIAN SCHOOL	SWAN RD	500	Eastside of Swan RD 250ft North and South of the School driveway
4700 N SWAN RD			
COLLIER ELEMENTARY SCHOOL	BEAR CANYON RD	500	Eastside of Bear Canyon RD 500 ft north of school
3900 N. BEAR CANYON RD.			
CENTENNIAL ELEMENTARY SCHOOL	LA CHOLLA BL		North side Wetmore RD from drop-off entrance to the intersection of La Cholla BL to Wetmore RD
2200 W. WETMORE RD	WETMORE RD	400	
AL-HUDA ISLAKIC SCHOOL	RIVER RD	600	Southside River RD from Hacienda Del Sol RD to School driveway
2800 E RIVER RD			
KINO SCHOOL	FIRST AVE.	1650	Pathway
6625 N. FIRST AVE.			
SAINT ALBANS	OLD SABINO CANYON RD	500	500ft Southside of Old Sabino Canyon RD from Driveway to Sabino Canyon RD, 1000ft on the Westside of Sabino Canyon RD 500ft North and South of Old Sabino Canyon RD
3738 N OLD SABINO CANYON RD	SABINO CAYON RD	1000	
SKY ISLANDS	SABINO CANYON RD	1000	Westside of Sabino Canyon RD between Indian Ruins RD and the Bridge
3101 N SABINO CANYON RD			
ORANGE GROVE MIDDLE SCHOOL	ORANGE GROVE RD.	1900	Both sides of Orange Grove RD between Camino Padre Isidoro to the HAWK on Orange Grove
1911 E. ORANGE GROVE RD			

SAN XAVIER MISSION SCHOOL	SAN XAVIER RD	1000	Northside of San Xavier RD 500ft west of Little Nogales Dr and the East side of Little Nogales DR 500ft South of San Xavier RD
1980 W SAN XAVIER RD			
CONTINENTAL ELEMENTARY SCHOOL	WHITEHOUSE CANYON RD	1000	Northside of Whitehouse Canyon RD west of cattle guard
1991 E WHITEHOUSE CANYON RD			
HOMER DAVIS ELEMENTARY SCHOOL	ROMERO RD	1500	East side of Romero RD from Tucson City Limits to Wetmore RD
4250 N. ROMERO RD.			
ACCELERATED LEARNING LAB SCHOOLS	CAMINO DE OESTE	500	250 ft North and South of schools driveway on Camino De Oeste
5245 N. CAMINO DE OESTE			

High Scoring Pedestrian Needs

Pima County Sidewalk Segments



Pima County High-Scoring Pedestrian Needs – PAG Pedestrian Demand Model							
Total Score	Street Name	Side of Road	From	To	Jurisdiction	Miles	Deficiencies
62.65	1ST AV	W	Chula Vista Rd	Orange Grove Rd	Pima County	0.48	No sidewalk, No curb ramps
62.29	1ST AV	E	Chula Vista Rd	Orange Grove Rd	Pima County	0.47	No sidewalk, No curb ramps
42.32	ABREGO DR	W (N)	Nogales Hy	Esperanza Bl	Pima County	2.84	Partial sidewalk, partial ramp access
42.32	ABREGO DR	E (N)	Nogales Hy	Esperanza Bl	Pima County	2.86	Partial sidewalk, partial ramp access
69.27	ALVERNON	S	River Rd (NW)	Dodge Bl	Pima County	0.31	No sidewalk, barriers present
65.87	ALVERNON	N	River Rd (NW)	Dodge Bl	Pima County	0.29	No sidewalk
74.81	ALVERNON WY	E	I10 Exit 265 On Ramp	Drexel Rd	Pima County	0.46	Partial sidewalk, partial ramp access
58.50	AVNIDA DEL ORO	W	Pinto Ln	Stallion Ln	Pima County	0.20	No sidewalk, No curb ramps
58.14	AVNIDA DEL ORO	E	Pinto Ln	Stallion Ln	Pima County	0.18	No sidewalk, No curb ramps
67.24	BENSON HY	SW	Alvernon Wy	Belvedere Av	Pima County	0.92	No sidewalk, No curb ramps
67.06	BENSON HY	NW	Alvernon Wy	Belvedere Av	Pima County	0.92	Partial sidewalk, No curb ramps
71.44	BENSON HY	NW	Country Club Rd	Masterson Av	Pima County	0.35	No sidewalk, No curb ramps
71.09	BENSON HY	SW	Country Club Rd	Masterson Av	Pima County	0.34	No sidewalk, No curb ramps
79.27	BENSON HY	SW	Drexel Rd	Alvernon Way	Pima County	0.24	No sidewalk, No curb ramps, barriers present
76.04	BENSON HY	NW	Drexel Rd	Alvernon Way	Pima County	0.20	No sidewalk, No curb ramps
75.34	BENSON HY	SW	Masterson Av	Palo Verde Rd	Pima County	0.26	Partial sidewalk, No curb ramps
70.03	BENSON HY	NW	Masterson Av	Palo Verde Rd	Pima County	0.26	Partial sidewalk, No curb ramps
80.51	BENSON HY	NW	Palo Verde Rd	Drexel Rd	Pima County	0.36	No sidewalk, No curb ramps
74.10	BENSON HY	SW	Palo Verde Rd	Drexel Rd	Pima County	0.32	No sidewalk, partial ramp access
57.23	CAMINO DE OESTE	W	Linda Vista Bl	Bald Eagle Av	Pima County	0.78	Partial sidewalk, partial ramp access
57.05	CAMINO DE OESTE	E	Linda Vista Bl	Bald Eagle Av	Pima County	0.80	Partial sidewalk, partial ramp access
78.50	CARDINAL AV	W	Bilby Rd	Valencia Rd	Pima County	0.49	Partial sidewalk, No curb ramps, history of crashes
74.39	CARDINAL AV	E	Bilby Rd	Valencia Rd	Pima County	0.49	Partial sidewalk, partial ramp access, history of crashes
84.70	CARDINAL AV	E	Drexel Rd	Bilby Rd	Pima County	0.48	No sidewalk, No curb ramps, history of crashes
83.99	CARDINAL AV	W	Drexel Rd	Bilby Rd	Pima County	0.48	No sidewalk, No curb ramps, history of crashes
64.43	CARDINAL AV	W	Irvington Rd	Drexel Rd	Pima County	0.75	Partial sidewalk, No curb ramps
56.07	CARDINAL AV	E	Irvington Rd	Drexel Rd	Pima County	0.75	Partial sidewalk, partial ramp access
71.92	CARDINAL AV	E	Valencia Rd	Los Reales Rd	Pima County	0.98	No sidewalk, No curb ramps
66.74	CARDINAL AV	W	Valencia Rd	Los Reales Rd	Pima County	0.98	Partial sidewalk, partial ramp access
68.04	CATALINA HY	NE	Harrison Rd	Tanque Verde Rd	Pima County / Tucson	0.99	Partial sidewalk, partial ramp access
67.50	CATALINA HY	SE	Harrison Rd	Tanque Verde Rd	Pima County / Tucson	0.98	Partial sidewalk, partial ramp access

62.42	CONTINENTAL RD	N	Park Centre Av	Abrego Dr	Pima County	0.78	No sidewalk, No curb ramps
60.29	CONTINENTAL RD	S	Whitehouse Canyon Rd	Abrego Dr	Pima County	0.80	No sidewalk, No curb ramps
70.30	CORTARO FARMS RD	S	Magee Rd	Thornydale Rd	Pima County	0.94	No sidewalk, No curb ramps
70.65	CORTARO FARMS RD	N	Shannon Rd	Thornydale Rd	Pima County	0.95	No sidewalk, No curb ramps
60.30	CORTARO FARMS RD	N	Thornydale Rd	Camino de Oeste	Pima County / Marana	1.43	Partial sidewalk, partial ramp access
59.95	CORTARO FARMS RD	S	Thornydale Rd	Sandy Desert Tr	Pima County / Marana	1.43	Partial sidewalk, partial ramp access
70.10	COUNTRY CLUB RD	E	Ajo Wy	Irvington Rd	Pima County / Tucson	1.00	Partial sidewalk, partial ramp access
70.33	COUNTRY CLUB RD	E	Benson Hy	Drexel Rd	Pima County	0.57	No sidewalk, No curb ramps
63.60	COUNTRY CLUB RD	E	Drexel Rd	Bilby Rd	Pima County	0.53	No sidewalk, No curb ramps
59.49	COUNTRY CLUB RD	E	Irvington Rd	Benson Hy	Pima County	0.38	Partial sidewalk, partial ramp access
57.34	CRAYCROFT RD	E	Calle Barril	River Rd	Pima County	1.47	No sidewalk, No curb ramps
63.45	CRAYCROFT RD	E	Littletown Rd	Benson Hy (I10 Frontage)	Pima County	0.56	Partial sidewalk, partial ramp access, barriers present
62.43	CRAYCROFT RD	W	Littletown Rd	Benson Hy (I10 Frontage)	Pima County	0.55	No sidewalk, No curb ramps, barriers present
86.65	CRAYCROFT RD	E	River Rd	Fort Lowell Rd	Pima County / Tucson	0.82	No sidewalk, No curb ramps
80.06	CRAYCROFT RD	W	River Rd	Fort Lowell Rd	Pima County / Tucson	0.82	Partial sidewalk, partial ramp access
67.64	CURTIS RD	S	Kain Av	Davis Av	Pima County	0.36	No sidewalk, No curb ramps
67.46	CURTIS RD	N	Kain Av	Davis Av	Pima County	0.37	No sidewalk, No curb ramps
59.91	DAVIS AV	W	Curtis Rd	Ruthrauff Rd	Pima County	0.48	No sidewalk, No curb ramps
59.20	DAVIS AV	E	Curtis Rd	Ruthrauff Rd	Pima County	0.48	Partial sidewalk, partial ramp access, barriers present
74.07	DODGE BL	E	River Rd	TJCC Parking Lot	Pima County	0.11	No sidewalk, No curb ramps
72.30	DODGE BL	W	River Rd	TJCC Parking Lot	Pima County	0.10	No sidewalk, No curb ramps
56.55	DREXEL RD	N	Belvedere Av	Alvernon Wy	Pima County	0.72	Partial sidewalk, No curb ramps
56.19	DREXEL RD	S	Belvedere Av	Alvernon Wy	Pima County	0.71	Partial sidewalk, No curb ramps
74.22	DREXEL RD	N	Benson Hy	Palo Verde	Pima County	0.27	No sidewalk, No curb ramps
72.27	DREXEL RD	S	Benson Hy	Palo Verde	Pima County	0.29	No sidewalk, No curb ramps
73.87	DREXEL RD	S	Massterson Av	Country Club Rd	Pima County	0.24	No sidewalk, No curb ramps
73.87	DREXEL RD	N	Masterson Av	Country Club Rd	Pima County	0.24	No sidewalk, No curb ramps
67.90	DREXEL RD	S	Mission Rd	Westover Av	Pima County	0.41	No sidewalk, No curb ramps
67.19	DREXEL RD	N	Mission Rd	Westover Av	Pima County	0.39	No sidewalk, No curb ramps
73.34	DREXEL RD	S	Palo Verde	Masterson Av	Pima County	0.24	No sidewalk, No curb ramps
71.92	DREXEL RD	N	Palo Verde	Masterson Av	Pima County	0.24	No sidewalk, No curb ramps
79.41	DREXEL RD	S	Westover Av	Cardinal Av	Pima County	0.49	No sidewalk, No curb ramps
73.74	DREXEL RD	N	Westover Av	Cardinal Av	Pima County	0.49	No sidewalk, No curb ramps
60.60	FAIRVIEW AV	E	Wetmore Rd	Roger Rd	Pima County	0.48	No sidewalk, No curb ramps, barriers present
60.07	FAIRVIEW AV	W	Wetmore Rd	Roger Rd	Pima County	0.48	No sidewalk, No curb ramps, barriers present
57.19	GOLDER RANCH DR	N	Twin Lakes Dr	Oracle Rd	Pima County	0.42	No sidewalk, No curb ramps
68.03	INA RD	S	1st Av	Oracle Rd	Pima County	0.96	No sidewalk, partial ramp access
85.55	INA RD	S	Camino De La Tierra	Thornydale Rd	Pima County / Marana	0.51	Partial sidewalk

68.56	INA RD	N	Christie Dr	Oracle Rd	Pima County	0.96	No sidewalk, partial ramp access
66.19	INA RD	N	La Canada Dr	La Cholla Bl	Pima County	1.01	Partial sidewalk, partial ramp access
62.82	INA RD	S	La Canada Dr	La Cholla Bl	Pima County	1.01	Partial sidewalk, partial ramp access
73.34	INA RD	N	La Cholla Bl	Mona Lisa Rd	Pima County	0.44	Partial sidewalk, partial ramp access
71.04	INA RD	S	La Cholla Bl	Mona Lisa Rd	Pima County	0.45	Partial sidewalk, partial ramp access
82.58	INA RD	N	Mona Lisa Rd	Shannon Rd	Pima County	0.50	Partial sidewalk, partial ramp access
82.58	INA RD	S	Mona Lisa Rd	Shannon Rd	Pima County	0.49	Partial sidewalk, partial ramp access
69.33	INA RD	N	Oracle Rd	La Canada Dr	Pima County	1.01	Partial sidewalk, partial ramp access
69.33	INA RD	S	Oracle Rd	La Canada Dr	Pima County	1.01	Partial sidewalk, partial ramp access
90.37	INA RD	N	Shannon Rd	Camino De La Tierra	Pima County	0.47	Partial sidewalk, partial ramp access
89.13	INA RD	S	Shannon Rd	Camino De La Tierra	Pima County	0.47	Partial sidewalk, partial ramp access
60.70	IRVINGTON RD	S	Alvernon Wy	Palo Verde Rd	Pima County	0.47	No sidewalk, No curb ramps
59.99	IRVINGTON RD	N	Alvernon Wy	Palo Verde Rd	Pima County	0.46	Partial sidewalk, No curb ramps
64.89	IRVINGTON RD	S	Mission Rd	Cardinal Av	Pima County	1.26	No sidewalk, No curb ramps
64.89	IRVINGTON RD	N	Mission Rd	Cardinal Av	Pima County	1.27	No sidewalk, No curb ramps
62.78	IRVINGTON RD	N	Palo Verde Rd	Country Club Rd	Pima County	0.49	Partial sidewalk, partial ramp access
56.54	IRVINGTON RD	S	Palo Verde Rd	Country Club Rd	Pima County	0.49	Partial sidewalk
61.44	KAIN AV	E	Curtis Rd	Ruthrauff Rd	Pima County	0.48	No sidewalk, No curb ramps
58.96	KAIN AV	W	Curtis Rd	Ruthrauff Rd	Pima County	0.48	No sidewalk, No curb ramps
56.63	KINNEY RD	SW	Bopp Rd	Ajo Hy	Pima County	0.63	No sidewalk, No curb ramps
74.22	KOLB RD	W	Sunrise Dr	Territory Dr	Pima County	0.16	No sidewalk, No curb ramps
72.45	KOLB RD	E	Sunrise Dr	Territory Dr	Pima County	0.16	No sidewalk, No curb ramps
59.76	LA CANADA DR	W	Orange Grove Rd	Roller Coaster Rd	Pima County	1.50	No sidewalk, No curb ramps
58.52	LA CANADA DR	E	Orange Grove Rd	Roller Coaster Rd	Pima County	1.50	No sidewalk, No curb ramps
56.01	LA CHOLLA BL	W	Curtis Rd	Ruthrauff Rd	Pima County	0.47	
69.06	LA CHOLLA BL	E	Magee Rd (N)	Magee Rd (S)	Pima County	0.31	No sidewalk, No curb ramps
79.37	LA CHOLLA BL	W	Ruthrauff Rd	Wetmore Rd	Pima County	0.49	Partial sidewalk, No curb ramps
77.60	LA CHOLLA BL	E	Ruthrauff Rd	Wetmore Rd	Pima County	0.48	No sidewalk, No curb ramps
62.03	LA CHOLLA BL	W	Wetmore Rd	Gardner Ln	Pima County	0.36	No sidewalk, No curb ramps
62.03	LA CHOLLA BL	E	Wetmore Rd	Gardner Ln	Pima County	0.36	No sidewalk, No curb ramps
62.00	LINDA VISTA BL	S	Thornydale Rd	Camino De Oeste	Pima County	0.94	No sidewalk, No curb ramps
61.29	LINDA VISTA BL	N	Thornydale Rd	Camino De Oeste	Pima County	0.94	No sidewalk, No curb ramps
56.86	LITTLETOWN RD	N	Craycroft Rd	Valencia Rd	Pima County	0.47	Partial sidewalk, partial ramp access
56.17	LOS REALES RD	N	Camino De La Tierra	Sorrel Ln	Pima County	0.48	No sidewalk, No curb ramps, history of crashes
61.65	LOS REALES RD	N	Cardinal Av	Camino De La Tierra	Pima County	0.48	No sidewalk, No curb ramps, history of crashes
56.48	LOS REALES RD	S	Cardinal Av	Camino De La Tierra	Pima County	0.49	Partial sidewalk, partial ramp access, history of crashes
62.29	MAGEE RD	N	La Canada Dr	La Cholla Bl	Pima County	0.98	No sidewalk, No curb ramps
60.35	MAGEE RD	S	La Canada Dr	La Cholla Bl	Pima County	0.98	No sidewalk, No curb ramps

76.40	MAGEE RD	N	La Cholla Bl	Mona Lisa Rd	Pima County	0.44	Partial sidewalk, partial ramp access
87.55	MAGEE RD	N	Mona Lisa Rd	Tuscany Dr	Pima County	0.25	No sidewalk, No curb ramps
63.96	MAGEE RD	N (E)	Tuscany Dr	Shannon Rd / Cortaro Farms Rd	Pima County	0.60	Partial sidewalk, partial ramp access
68.43	MARK RD	E	Valencia Rd	Los Reales Rd	Pima County	0.99	Partial sidewalk, No curb ramps
67.37	MARK RD	W	Valencia Rd	Los Reales Rd	Pima County	1.00	No sidewalk, No curb ramps
50.91	MARY ANN CLEVELAND	N	Colossal Cave Rd	Houghton Rd	Pima County / Tucson	5.06	No sidewalk, No curb ramps
50.56	MARY ANN CLEVELAND	S	Colossal Cave Rd	Houghton Rd	Pima County / Tucson	5.04	No sidewalk, No curb ramps
68.63	MASTERSON AV	E	Benson Hy	Drexel Rd	Pima County	0.38	No sidewalk, No curb ramps
66.15	MASTERSON AV	W	Benson Hy	Drexel Rd	Pima County	0.38	No sidewalk, No curb ramps
72.60	MISSION RD	W	Irvington Rd	Drexel Rd	Pima County	0.85	No sidewalk, No curb ramps
62.96	MONA LISA RD	W	Ina Rd	Orange Grove Rd	Pima County	0.95	No sidewalk, No curb ramps
62.79	MONA LISA RD	E	Ina Rd	Orange Grove Rd	Pima County	0.95	No sidewalk, No curb ramps
62.88	MONA LISA RD	E	Magee Rd	Ina Rd	Pima County	0.66	Partial sidewalk, partial ramp access
61.28	MONA LISA RD	W	Magee Rd	Ina Rd	Pima County	0.66	Partial sidewalk, partial ramp access
64.63	ORACLE JAYNES STATN	S	Sunset Rd	Roller Coaster Rd	Pima County	0.65	No sidewalk, No curb ramps
64.27	ORACLE JAYNES STATN	NE(E)	Sunset Rd	Roller Coaster Rd	Pima County	0.65	No sidewalk, No curb ramps
61.71	ORACLE RD	W	Eagle Crest Ranch Bl (County Line)	Pinto Ln	Pima County	0.29	No sidewalk, No curb ramps
60.65	ORACLE RD	E	Eagle Crest Ranch Bl (County Line)	Pinto Ln	Pima County	0.28	No sidewalk, No curb ramps
99.07	ORACLE RD	E	Ina Rd	Orange Grove Rd	Pima County	0.98	Partial sidewalk, partial ramp access, history of crashes
98.36	ORACLE RD	W	Ina Rd	Orange Grove Rd	Pima County	0.99	Partial sidewalk, partial ramp access, history of crashes
90.89	ORACLE RD	E	Orange Grove Rd	Rudasill Rd	Pima County	0.49	Partial sidewalk, partial ramp access, history of crashes
90.19	ORACLE RD	W	Orange Grove Rd	Rudasill Rd	Pima County	0.48	Partial sidewalk, partial ramp access, history of crashes
67.42	ORACLE RD	W	Pinto Ln	Hawser St	Pima County	1.60	No sidewalk, No curb ramps
67.42	ORACLE RD	E	Pinto Ln	Hawser St	Pima County	1.59	No sidewalk, No curb ramps
72.49	ORACLE RD	E	Roller Coaster Rd	River Rd	Pima County / Tucson	0.85	Partial sidewalk, partial ramp access, history of crashes
67.53	ORACLE RD	W	Roller Coaster Rd	River Rd	Pima County / Tucson	0.85	Partial sidewalk, partial ramp access, history of crashes
79.27	ORACLE RD	W	Rudasill Rd	Roller Coaster Rd	Pima County	0.41	No sidewalk, No curb ramps
78.20	ORACLE RD	E	Rudasill Rd	Roller Coaster Rd	Pima County	0.42	No sidewalk, No curb ramps
74.81	ORANGE GROVE RD	N	1st Av	Oracle Rd	Pima County	0.77	Partial sidewalk, partial ramp access
72.34	ORANGE GROVE RD	S	1st Av	Oracle Rd	Pima County	0.77	Partial sidewalk, partial ramp access
87.19	ORANGE GROVE RD	S	Camino De La Tierra	River Rd	Pima County / Marana	0.48	Partial sidewalk, partial ramp access
56.94	ORANGE GROVE RD	S	La Canada Dr	La Cholla Bl	Pima County	0.97	Partial sidewalk, partial ramp access
56.58	ORANGE GROVE RD	N	La Canada Dr	La Cholla Bl	Pima County	0.97	Partial sidewalk, partial ramp access
72.38	ORANGE GROVE RD	S	La Cholla Bl	Mona Lisa Rd	Pima County	0.47	Partial sidewalk, partial ramp access
64.59	ORANGE GROVE RD	S	Mona Lisa Rd	Shannon Rd	Pima County	0.48	No sidewalk, No curb ramps
70.08	ORANGE GROVE RD	N	Oracle Rd	La Canada Dr	Pima County	1.17	Partial sidewalk, partial ramp access
69.73	ORANGE GROVE RD	S	Oracle Rd	La Canada Dr	Pima County	1.17	Partial sidewalk, partial ramp access

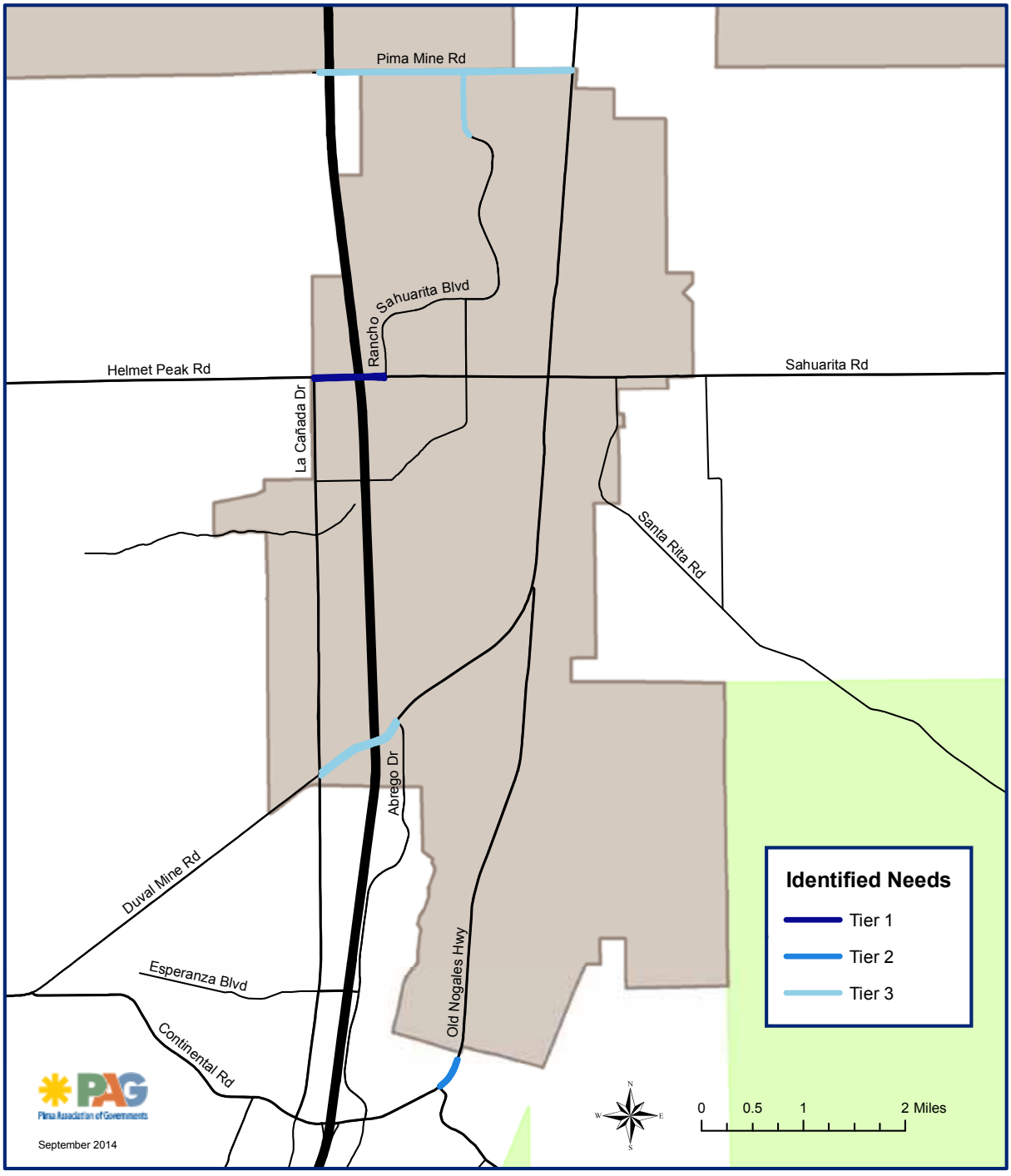
74.66	ORANGE GROVE RD	S	Shannon Rd	Camino De La Tierra	Pima County	0.47	No sidewalk, No curb ramps
58.52	ORANGE GROVE RD	S (E)	Skyline Dr	1st Av	Pima County	1.37	No sidewalk, No curb ramps
75.79	PALO VERDE RD	W	Ajo Wy	Irvington Rd	Pima County / Tucson	1.00	No sidewalk, No curb ramps
65.12	PALO VERDE RD	E	Ajo Wy	Irvington Rd	Pima County / Tucson	1.01	Partial sidewalk, partial ramp access
62.78	PALO VERDE RD	E	Alvernon Wy	Ajo Wy	Pima County	1.40	Partial sidewalk, barriers present
75.74	PALO VERDE RD	W	Benson Hy	Drexel Rd	Pima County	0.21	No sidewalk, No curb ramps
74.86	PALO VERDE RD	E	Benson Hy	Drexel Rd	Pima County	0.19	No sidewalk, No curb ramps
74.85	PALO VERDE RD	W	Drexel Rd	Valencia Rd	Pima County / Tucson	0.99	Partial sidewalk, partial ramp access, history of crashes
69.72	PALO VERDE RD	E	Drexel Rd	Valencia Rd	Pima County / Tucson	0.99	Partial sidewalk, partial ramp access, history of crashes
77.73	PALO VERDE RD	W	Irvington Rd	Benson Hy	Pima County	0.73	No sidewalk, No curb ramps, history of crashes
70.07	PALO VERDE RD	E	Irvington Rd	Benson Hy	Pima County	0.75	Partial sidewalk, partial ramp access, history of crashes
62.04	PINTO LN	N	Avenida De La Canada	Avenida Del Oro	Pima County	0.05	No sidewalk, No curb ramps
60.80	PINTO LN	S	Avenida De La Canada		Pima County	0.05	No sidewalk, No curb ramps
63.45	PINTO LN	N	Avenida Del Oro	Oracle Rd	Pima County	0.07	No sidewalk, No curb ramps
62.92	PINTO LN	S	Avenida Del Oro	Oracle Rd	Pima County	0.06	No sidewalk, No curb ramps
74.04	RIVER RD	S	Dodge Bl	Alvernon Wy	Pima County	0.26	No sidewalk, No curb ramps
69.44	RIVER RD	N	Dodge Bl	Alvernon Wy	Pima County	0.27	No sidewalk, No curb ramps
62.19	RIVER RD	W (S)	Alvernon Wy	Hacienda Del Sol Rd	Pima County	1.22	No sidewalk, partial ramp access
60.96	RIVER RD	E (N)	Alvernon Wy	Hacienda Del Sol Rd	Pima County	1.20	No sidewalk, partial ramp access
68.35	RIVER RD	N	Hacienda Del Sol Rd	Campbell Av	Pima County / Tucson	0.66	Partial sidewalk
73.69	RIVER RD	S	Pontatoc Rd	Dodge Bl	Pima County	0.52	No sidewalk, No curb ramps
72.45	RIVER RD	N	Pontatoc Rd	Dodge Bl	Pima County	0.54	No sidewalk, No curb ramps
80.77	ROGER RD		Fairview Av	Flowing Wells Rd	Pima County / Tucson	0.47	No sidewalk, No curb ramps
68.16	ROGER RD	S	Fairview Av	Flowing Wells Rd	Pima County / Tucson	0.47	Partial sidewalk, partial ramp access
70.47	ROLLER COASTER RD	N	La Canada Dr	Oracle Jaynes Station	Pima County	0.47	No sidewalk, No curb ramps
69.41	ROLLER COASTER RD	S	La Canada Dr	Oracle Jaynes Station	Pima County	0.48	No sidewalk, No curb ramps
81.62	ROMERO RD	E	Wemore Rd	Gardner Ln	Pima County	0.37	Partial sidewalk, partial ramp access
79.50	ROMERO RD	W	Wetmore Rd	Gardner Ln	Pima County	0.36	Partial sidewalk, partial ramp access
67.67	RUTHRAUFF RD	N	Davis Av	I10 Frontage Rd	Pima County	0.11	Partial sidewalk, partial ramp access
70.86	RUTHRAUFF RD	S	Highway Dr	I10 Frontage Rd	Pima County	0.09	Partial sidewalk, partial ramp access
85.24	SABINO CANYON RD	W	Cloud Rd	Tanque Verde Rd	Pima County / Tucson	1.24	No sidewalk, No curb ramps
83.60	SABINO CANYON RD	E	Cloud Rd	Tanque Verde Rd	Pima County / Tucson	1.22	Partial sidewalk, partial ramp access
60.46	SABINO CANYON RD	E	Knollwood Dr	Cloud Rd	Pima County	0.24	No sidewalk, No curb ramps
60.81	SABINO CANYON RD	W	River Rd	Cloud Rd	Pima County	0.23	No sidewalk, No curb ramps
58.86	SABINO CANYON RD	W	Sunrise Dr	Snyder Rd	Pima County	0.99	No sidewalk, No curb ramps, history of crashes
58.86	SABINO CANYON RD	E	Sunrise Dr	Snyder Rd	Pima County	0.99	No sidewalk, No curb ramps, history of crashes
67.55	SHANNON RD	W	Ina Rd	Orange Grove Rd	Pima County	0.96	No sidewalk, No curb ramps

67.19	SHANNON RD	E	Ina Rd	Orange Grove Rd	Pima County	0.96	No sidewalk, No curb ramps
62.82	SILVERBELL RD	S	Scenic Dr / Twin Peaks Rd	Twin Peaks Rd	Pima County / Marana	0.08	No sidewalk, No curb ramps
63.00	SILVERBELL RD	N	Silverbell Rd / Twin Peaks Rd	Twin Peaks Rd	Pima County / Marana	0.09	No sidewalk, No curb ramps
61.58	SILVERBELL RD	S	Sunset Rd	El Camino Del Cerro	Pima County / Tucson	1.11	No sidewalk, No curb ramps, barriers present
60.51	SILVERBELL RD	NE	Sunset Rd	El Camino Del Cerro	Pima County / Tucson	1.12	No sidewalk, No curb ramps, barriers present
59.00	SKYLINE DR	S	Sunrise Dr / Skyline Dr	Campbell Av	Pima County	0.44	Partial sidewalk, partial ramp access
57.41	SKYLINE DR	N	Sunrise Dr / Skyline Dr	Campbell Av	Pima County	0.44	Partial sidewalk, partial ramp access
69.54	SPEEDWAY BL	N	Ridgeside Dr	Houghton Rd	Pima County	0.70	No sidewalk, No curb ramps
67.24	SPEEDWAY BL	S	Ridgeside Dr	Houghton Rd	Pima County	0.69	No sidewalk, No curb ramps
61.35	SUNRISE DR	S	Pontatoc Rd	Hacienda Del Sol	Pima County	0.33	No sidewalk, No curb ramps
56.52	SUNRISE DR	N	Pontatoc Rd	Hacienda Del Sol	Pima County	0.33	Partial sidewalk, partial ramp access
72.50	SUNRISE DR	N	Swan Rd	Pontatoc Rd	Pima County	0.57	No sidewalk, No curb ramps
68.03	SUNRISE DR	S	Swan Rd	Pontatoc Rd	Pima County	0.56	Partial sidewalk, partial ramp access
59.14	SUNSET RD	N	Oracle Jaynes Station Rd	La Cholla Bl	Pima County	0.18	No sidewalk, No curb ramps
56.04	SWAN RD	E	Calle Barril	River Rd	Pima County	1.13	No sidewalk, No curb ramps
79.77	SWAN RD	W	River Rd	Camp Lowell Dr	Pima County / Tucson	0.95	Partial sidewalk, partial ramp access
68.80	SWAN RD	E	River Rd	Camp Lowell Dr	Pima County / Tucson	0.93	Partial sidewalk, partial ramp access
59.40	SWAN RD	E	Sunrise Dr	Calle Barril	Pima County	0.86	No sidewalk, No curb ramps
59.22	SWAN RD	W	Sunrise Dr	Calle Barrill	Pima County	0.85	No sidewalk, No curb ramps
57.86	SWEETWATER DR	S(NE)	El Moraga Dr	Camino De Oeste	Pima County	1.21	No sidewalk, No curb ramps
56.97	SWEETWATER DR	N(NW)	El Moraga Dr	Camino De Oeste	Pima County	1.23	No sidewalk, No curb ramps
60.69	SWEETWATER DR	N	Silverbell Rd	El Moraga Dr	Pima County	0.69	No sidewalk, No curb ramps
56.44	SWEETWATER DR	S	Silverbell Rd	El Moraga Dr	Pima County	0.69	No sidewalk, No curb ramps
59.94	TANQUE VERDE RD	N	Soldier Tr	Tanque Verde Loop Rd	Pima County	0.94	No sidewalk, No curb ramps
59.76	TANQUE VERDE RD	S	Soldier Tr	Tanque Verde Loop Rd	Pima County	0.94	No sidewalk, No curb ramps
56.05	TETAKUSIM RD	S	Sorrel Ln	Camino De Oeste	Pima County	1.00	No sidewalk, No curb ramps, history of crashes
75.57	THORNYDALE RD	W	Cactus Canyon Ps	Linda Vista Bl	Pima County	0.37	No sidewalk, No curb ramps
75.04	THORNYDALE RD	E	Cactus Canyon Ps	Linda Vista Bl	Pima County	0.36	No sidewalk, No curb ramps
61.01	THORNYDALE RD	E	Cortaro Farms Rd	Magee Rd	Pima County	0.48	Partial sidewalk, partial ramp access
56.14	THORNYDALE RD	W	Lambert Ln	Cactus Canyon Ps	Pima County	0.61	No sidewalk, No curb ramps
79.81	THORNYDALE RD	W	Linda Vista Bl	Overton Rd	Pima County	0.48	No sidewalk, No curb ramps
78.22	THORNYDALE RD	E	Linda Vista Bl	Overton Rd	Pima County	0.48	No sidewalk, No curb ramps
70.61	THORNYDALE RD	E	Overton Rd	Cortaro Farms Rd	Pima County	0.98	Partial sidewalk, No curb ramps
65.26	THORNYDALE RD	W	Overton Rd	Cortaro Farms Rd	Pima County	0.98	Partial sidewalk, partial ramp access
57.16	VALENCIA RD	N	Benson Hy	Alvernon Wy	Pima County	1.01	Partial sidewalk, partial ramp access
57.16	VALENCIA RD	N	Camino De La Tierra	Camino De Oeste	Pima County	1.49	Partial sidewalk, partial ramp access
61.54	VALENCIA RD	N	Camino De Oeste	Mark Rd	Pima County	0.52	Partial sidewalk, partial ramp access

81.41	VALENCIA RD	N	Cardinal Av	Camino De La Tierra	Pima County	0.48	Partial sidewalk, partial ramp access
57.81	VALENCIA RD	N	I10 Exit 267 Off Ramp	Benson Hy	Pima County	0.16	No sidewalk, No curb ramps
58.16	VALENCIA RD	S	I10 Exit 267 On Ramp	Swan Rd	Pima County	0.14	No sidewalk, No curb ramps
68.60	VALENCIA RD	N	Littletown Rd	I10 Exit 267 On Ramp	Pima County	0.21	No sidewalk, No curb ramps
67.36	VALENCIA RD	S	Littletown Rd	I10 Exit 267 Off Ramp	Pima County	0.20	Partial sidewalk, No curb ramps
78.33	VALENCIA RD	N	Westover Av	Cardinal Av	Pima County	0.49	Partial sidewalk, partial ramp access, history of crashes
87.17	WETMORE RD	S	end of road	Romero Rd	Pima County	0.14	Partial sidewalk, partial ramp access, barriers present
62.08	WETMORE RD	N	La Cholla Bl	Highway Dr	Pima County	0.53	No sidewalk, No curb ramps
58.67	WETMORE RD	S	La Cholla Bl	Highway Dr	Pima County	0.54	Partial sidewalk, partial ramp access
79.35	WETMORE RD	S	Romero Rd	La Cholla Bl	Pima County	0.48	Partial sidewalk, No curb ramps, history of crashes
77.41	WETMORE RD	N	Romero Rd	La Cholla Bl	Pima County	0.48	Partial sidewalk, No curb ramps, history of crashes
62.49	WHITEHOUSE CANYON RD	W (S)	Continental Rd	Campbell Rd	Pima County	0.49	No sidewalk, No curb ramps
62.49	WHITEHOUSE CANYON RD	E (N)	Old Nogales Hy	Campbell Rd	Pima County	0.47	No sidewalk, No curb ramps

High Scoring Pedestrian Needs

Sahuarita Sidewalk Segments



Sahuarita

Given the relatively small number arterial and collector classified roadways, recent roadway and pedestrian improvements, and the largely suburban and rural character of the town, Sahuarita only has a few identified high-scoring pedestrian needs. Like Oro Valley and Marana, most residential subdivisions and commercial developments in Sahuarita contain complete, accessible, and high-quality pedestrian facilities.

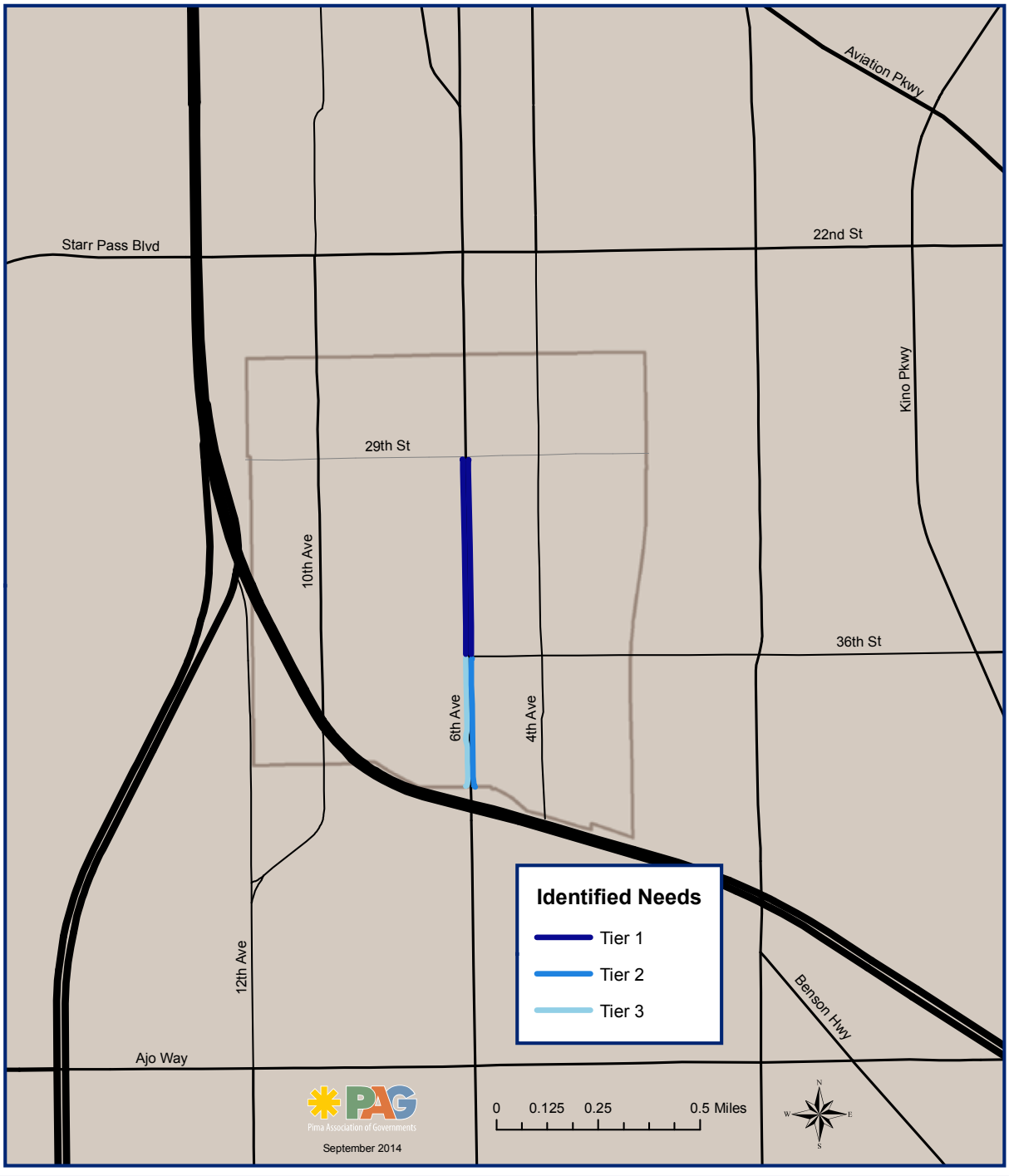
The Pedestrian Demand Model identified 15 high-scoring segments, most of which would fill gaps and provide connections to commercial centers from residential areas. Some of these are through areas more rural and character, which will likely have pedestrian facilities installed as part of the development process.

Sahuarita High-Scoring Pedestrian Needs – PAG Pedestrian Demand Model

Total Score	Street Name	Side of Road	From	To	Jurisdiction	Miles	Deficiencies
43.41	DUVAL MINE RD	NE	Abrego Dr	La Canada Dr	Sahuarita	0.91	Partial sidewalk, partial ramp access
43.05	DUVAL MINE RD	SE	Abrego Dr	La Canada Dr	Sahuarita	0.93	Partial sidewalk, partial ramp access
50.73	OLD NOGALES HY	W	Park Center Ave (N)	Park Center Av (S)	Sahuarita/Pima County	0.33	No sidewalk, no curb ramps
50.38	OLD NOGALES HY	E	Park Center Ave (N)	Whitehouse Canyon Rd	Sahuarita/Pima County	0.33	No sidewalk, no curb ramps
43.65	PIMA MINE RD	N	Nogales Hy	Rancho Sahuarita Bl	Sahuarita	1.07	No sidewalk, no curb ramps
43.48	PIMA MINE RD	S	Nogales Hy	Rancho Sahuarita Bl	Sahuarita	1.06	No sidewalk, no curb ramps
46.31	PIMA MINE RD	S	Rancho Sahuarita Bl	I19 Exit 80 Off Ramp (W)	Sahuarita / Pima County	1.42	No sidewalk, no curb ramps
46.31	PIMA MINE RD	N	Rancho Sahuarita Bl	I19 Exit 80 Off Ramp (W)	Sahuarita / Pima County	1.42	No sidewalk, no curb ramps
41.15	RANCHO SAHUARITA	E	Pima Mine Rd	S Avenida del Aguacate	Sahuarita	0.64	Partial sidewalk, partial ramp access
61.53	SAHUARITA RD	N	Rancho Sahuarita Bl	La Canada Dr	Sahuarita	0.70	No sidewalk, no curb ramps
59.58	SAHUARITA RD	S	Rancho Sahuarita Bl	La Canada Dr	Sahuarita	0.69	No sidewalk, no curb ramps

High Scoring Pedestrian Needs

South Tucson Sidewalk Segments



South Tucson

The City of South Tucson has a mostly complete and accessible sidewalk network. The major corridors through the city –6th Ave, 4th Ave, 10th Ave, 29th St, and 36th St – have full sidewalks and curb ramps at intersections. 6th Ave features 8 foot plus sidewalks, and South 4th Ave provides a regional example of pedestrian-friendly design with wide sidewalks and a landscaped curving roadway alignment to slow traffic.

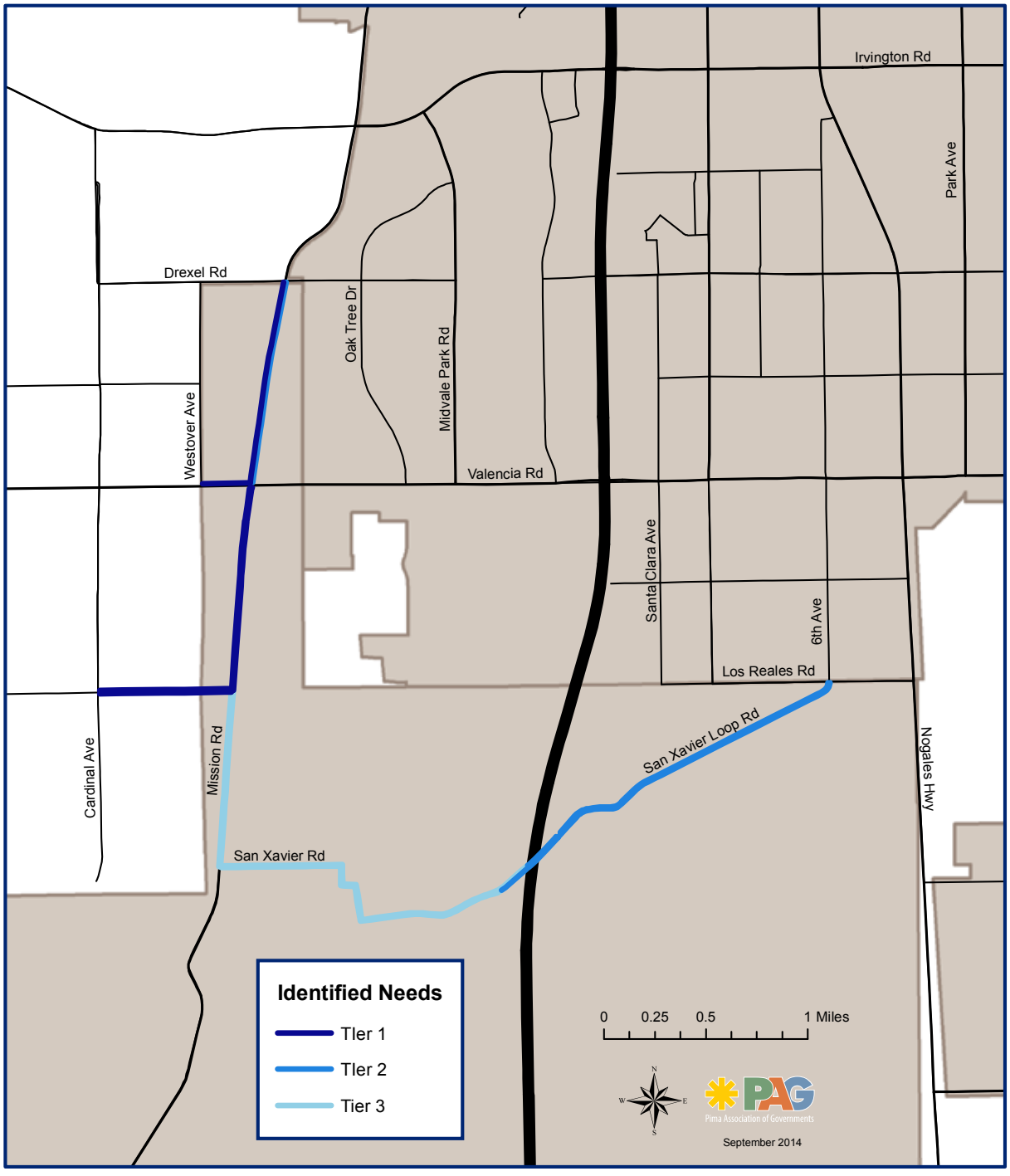
South Tucson's primary identified issue is a history of a high number of pedestrian crashes of 6th Ave between 29th St and the I-10 on-ramp.

South Tucson High-Scoring Pedestrian Needs – PAG Pedestrian Demand Model

Total Score	Street Name	Side of Road	From	To	Jurisdiction	Miles	Deficiencies
85.42	6TH AV	E	29th St	36th St	So. Tucson	0.48	History of crashes
83.65	6TH AV	W	29th St	36th St	So. Tucson	0.48	History of crashes
73.28	6TH AV	E	36th St	Benson Hy	So. Tucson	0.32	History of crashes
71.69	6TH AV	W	36th St	I10 Exit 261 On Ramp	So. Tucson	0.32	History of crashes

High Scoring Pedestrian Needs

Tohono O'odham Nation Sidewalk Segments



Tohono O'odham Nation San Xavier District

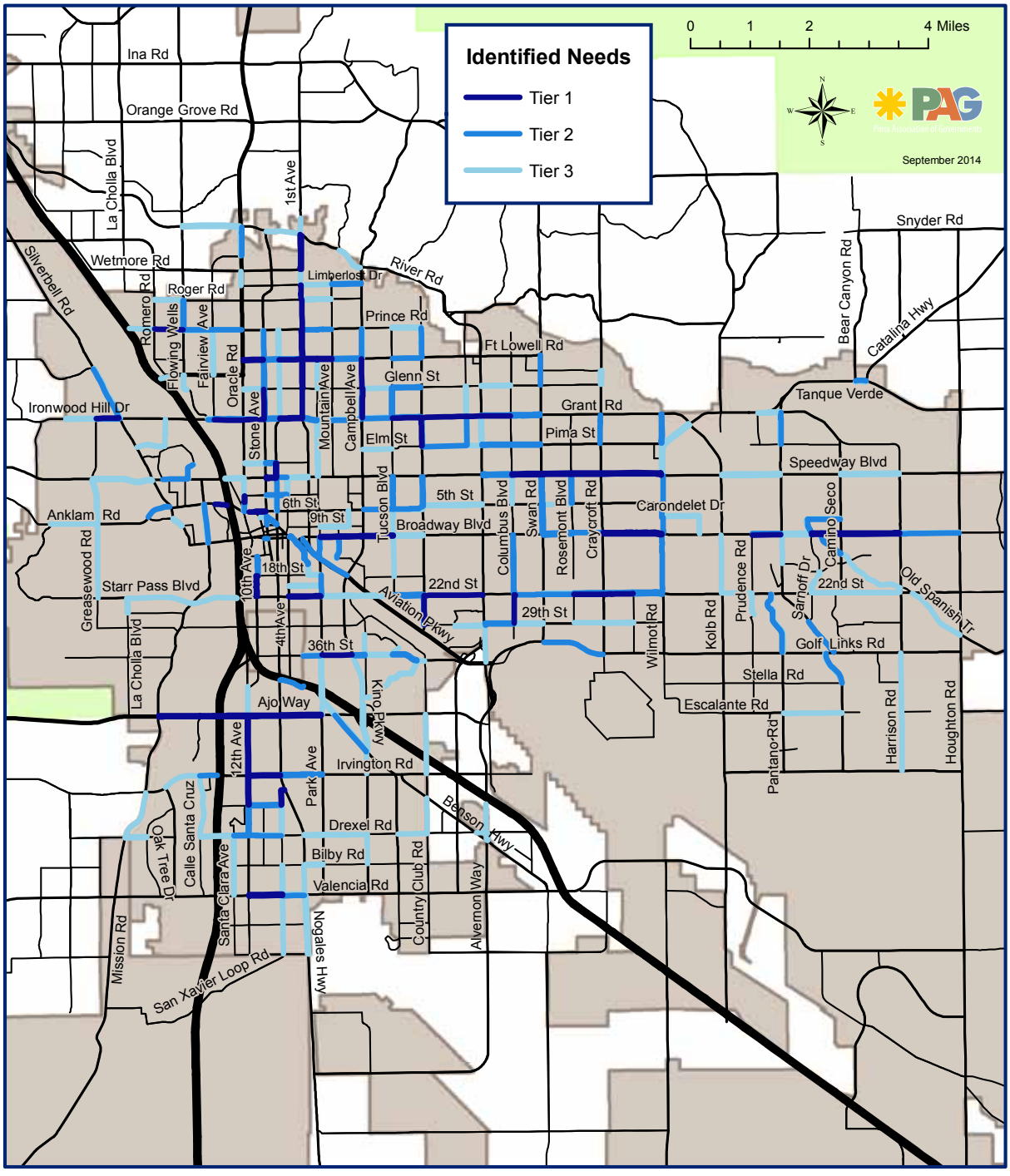
The Tohono O'odham Nation San Xavier District lacks complete and accessible pedestrian facilities on any of its major roadways. Creating a safe and accessible pedestrian network in the District is particularly important given its high rate of diabetes, low rate of car ownership, and income levels. The PAG Pedestrian Demand Model identifies 15 segments totaling nearly 14.5 miles of pedestrian needs. Given the more rural character of some of these segments, such as Mission Rd, wide paved shoulders or shared-use or pedestrian paths may be the appropriate solution.

Tohono O'odham Nation High-Scoring Pedestrian Needs – PAG Pedestrian Demand Model

Total Score	Street Name	Side of Road	From	To	Jurisdiction	Miles	Deficiencies
60.16	LOS REALES RD	N	Mission Rd	Cardinal Av	Tohono O'Odham Nation San Xavier District / Pima County	0.65	No sidewalk, no ramp access
59.27	LOS REALES RD	S	Mission Rd	Cardinal Av	Tohono O'Odham Nation San Xavier District / Pima County	0.65	No sidewalk, no ramp access
59.28	MISSION RD	W	Drexel Rd	Valencia Rd	Tohono O'Odham Nation San Xavier District	1.00	No sidewalk, no ramp access
53.75	MISSION RD	E	Drexel Rd	Valencia Rd	Tohono O'Odham Nation San Xavier District	1.00	Partial sidewalk, partial ramp access
49.50	MISSION RD	W	Los Reales Rd	San Xavier Rd	Tohono O'Odham San Xavier District Nation	0.86	No sidewalk, no ramp access
49.32	MISSION RD	E	Los Reales Rd	San Xavier Rd	Tohono O'Odham Nation San Xavier District	0.86	No sidewalk, no ramp access
58.39	MISSION RD	E	Valencia Rd	Los Reales Rd	Tohono O'Odham Nation San Xavier District	1.00	No sidewalk, no ramp access
57.86	MISSION RD	W	Valencia Rd	Los Reales Rd	Tohono O'Odham Nation San Xavier District	0.99	No sidewalk, no ramp access
52.66	SAN XAVIER LOOP RD	S	I19 Exit 92 Off Ramp	I19 Exit 92 On Ramp	Tohono O'Odham Nation San Xavier District	0.39	No sidewalk, no ramp access, history of crashes
52.49	SAN XAVIER LOOP RD	N	I19 Exit 92 On Ramp	I19 Exit 92 Off Ramp	Tohono O'Odham Nation San Xavier District	0.22	No sidewalk, no ramp access, history of crashes
55.91	SAN XAVIER LOOP RD	N	Los Reales Rd	I19 Exit 92 On Ramp	Tohono O'Odham Nation San Xavier District	1.55	No sidewalk, no ramp access, barriers present
55.91	SAN XAVIER LOOP RD	S	Los Reales Rd	I19 Exit 92 On Ramp	Tohono O'Odham Nation San Xavier District	1.57	No sidewalk, no ramp access, barriers present
48.35	SAN XAVIER LOOP RD	S	I19 Exit 92 On Ramp	Mission Rd	Tohono O'Odham Nation San Xavier District	1.63	No sidewalk, no ramp access
46.58	SAN XAVIER LOOP RD	N	I19 Exit 92 Off Ramp	Mission Rd	Tohono O'Odham Nation San Xavier District	1.82	No sidewalk, no ramp access
67.71	VALENCIA RD	N	Mission Rd	Westover Av	Tohono O'Odham Nation San Xavier District	0.24	Partial sidewalk, partial ramp access, history of crashes

High Scoring Pedestrian Needs

Tucson Sidewalk Segments



City of Tucson

The City of Tucson has emerging pedestrian districts and other areas where development patterns and high street connectivity lend themselves to becoming more walkable. However, there is significant need for pedestrian improvements along the arterial and collector road network, as well as elsewhere. The PAG Pedestrian Demand Model identified over 400 high-scoring sidewalk or roadside segments on this network in need of improvement, totaling over 200 miles of pedestrian facilities (measured as a segment). Some of these needs will be addressed as part of major roadway projects, such as the Grant Road Improvement Project and 22nd Street Corridor Improvement Project, while others will need to be funded, designed, and constructed as stand-alone pedestrian improvements.

City of Tucson High-Scoring Pedestrian Needs – PAG Pedestrian Demand Model

Total Score	Street Name	Side of Road	From	To	Jurisdiction	Miles	Deficiencies
108.52	10TH AV	W	18th St	22nd St	Tucson	0.35	Partial Sidewalk, partial ramp access
102.68	10TH AV	E	18th St	22nd St	Tucson	0.35	Partial Sidewalk, partial ramp access
69.97	12TH AV	E	10th Av	Ajo Wy	Tucson	0.48	barriers present
100.46	12TH AV	E	Ajo Wy	Irvington Rd	Tucson	0.99	Partial Sidewalk, barriers present, history of crashes
100.11	12TH AV	W	Ajo Wy	Irvington Rd	Tucson	0.99	Partial Sidewalk, barriers present, history of crashes
99.27	12TH AV	E	Irvington Rd	Nebraska St	Tucson	0.49	Partial Sidewalk, partial ramp access, barriers present, history of crashes
98.91	12TH AV	W	Irvington Rd	Nebraska St	Tucson	0.49	Partial Sidewalk, partial ramp access, barriers present, history of crashes
88.03	12TH AV	E	Nebraska St	Drexel Rd	Tucson	0.31	Partial Sidewalk, history of crashes
86.96	12TH AV	W	Nebraska St	Drexel Rd	Tucson	0.3	Partial Sidewalk, history of crashes
75.78	18TH ST	N	Park Av	Euclid Av	Tucson	0.19	Partial Sidewalk, partial ramp access, barriers present
74.89	18TH ST	S	Park Av	Euclid Av	Tucson	0.19	Partial Sidewalk, partial ramp access, barriers present
74.64	1ST AV	W	Foothills Dr	River Rd	Tucson / Pima County	0.25	Partial Sidewalk, partial ramp access
97.62	1ST AV	E	Fort Lowell Rd	Glenn St	Tucson	0.48	Partial Sidewalk, partial ramp access, history of crashes
92.09	1ST AV	W	Fort Lowell Rd	Glenn St	Tucson	0.48	Partial Sidewalk, history of crashes
96.38	1ST AV	W	Glenn St	Grant Rd	Tucson	0.49	Partial Sidewalk, barriers present, history of crashes
93.73	1ST AV	W	Limberlost Dr	Roger Rd	Tucson	0.24	No Sidewalk, partial ramp access, history of crashes
106.52	1ST AV	E	Prince Rd	Fort Lowell Rd	Tucson	0.48	Partial Sidewalk, history of crashes
105.28	1ST AV	W	Prince Rd	Fort Lowell Rd	Tucson	0.49	Partial Sidewalk, history of crashes
92.51	1ST AV	E	River Rd	Wetmore Rd	Tucson	0.57	Partial Sidewalk, barriers present
91.63	1ST AV	W	River Rd	Wetmore Rd	Tucson	0.58	Partial Sidewalk, barriers present
98.68	1ST AV	E	Roger Rd	Prince Rd	Tucson	0.49	Partial Sidewalk, partial ramp access, history of crashes
69.09	1ST AV	W	Wetmore Rd	Limberlost Dr	Tucson	0.24	barriers present

71.31	20TH ST	S	Park Av	4th Av	Tucson	0.53	Partial Sidewalk, partial ramp access
71.31	20TH ST	N	Park Av	4th Av	Tucson	0.53	Partial Sidewalk, partial ramp access
93.5	22ND ST	S	Alvernon Wy	Country Club Rd	Tucson	0.99	Partial Sidewalk, history of crashes
76.58	22ND ST	N	Camino Seco (W)	Sarnoff Dr	Tucson	0.48	Partial Sidewalk
76.34	22ND ST	N	Cherry Av	Kino Pw	Tucson	0.08	No Sidewalk, no curb ramps
77.04	22ND ST	S	Cherrybell Sv	Kino Pw	Tucson	0.08	No Sidewalk, no curb ramps
86.74	22ND ST	S	Country Club Rd	Tucson Bl	Tucson	0.48	Partial Sidewalk
83.38	22ND ST	N	Country Club Rd	Tucson Bl	Tucson	0.48	Partial Sidewalk
89.3	22ND ST	N	Craycroft Rd	Rosemont Av	Tucson	0.49	Partial Sidewalk, partial ramp access, history of crashes
70.7	22ND ST	N	Harrison Rd	Camino Seco (E)	Tucson	0.99	Partial Sidewalk
71.65	22ND ST	N	Kino Pw	Park Av	Tucson	0.36	Partial Sidewalk
69.35	22ND ST	S	Kino Pw	Park Av	Tucson	0.36	Partial Sidewalk
107.17	22ND ST	N	Park Av	4th Av	Tucson	0.54	Partial Sidewalk, partial ramp access, barriers present, history of crashes
105.58	22ND ST	S	Park Av	4th Av	Tucson	0.53	Partial Sidewalk, partial ramp access, barriers present, history of crashes
76.74	22ND ST	N	Prudence Rd	Kolb Rd	Tucson	0.48	barriers present
84.17	22ND ST	S	Rosemont Av	Swan Rd	Tucson	0.49	Partial Sidewalk, barriers present, history of crashes
75.81	22ND ST	N	Rosemont Av	Swan Rd	Tucson	0.5	Partial Sidewalk, history of crashes
93.59	22ND ST	S	Sahuara Av	Craycroft Rd	Tucson	0.97	Partial Sidewalk, partial ramp access, barriers present, history of crashes
85.23	22ND ST	N	Sahuara Av	Craycroft Rd	Tucson	0.47	Partial Sidewalk, partial ramp access, history of crashes
84.53	22ND ST	S	Swan Rd	Columbus Bl	Tucson	0.48	barriers present
75.98	22ND ST	S	Tucson Bl	Cherrybell Sv	Tucson	0.73	Partial Sidewalk, partial ramp access
73.33	22ND ST	N	Tucson Bl	Cherry Av	Tucson	0.74	Partial Sidewalk, partial ramp access
85.05	22ND ST	S	Wilmot Rd	Sahuara Av	Tucson	0.49	Partial Sidewalk, partial ramp access, history of crashes
82.76	22ND ST	N	Wilmot Rd	Sahuara Av	Tucson	0.5	Partial Sidewalk, partial ramp access
82	29TH ST	N	Columbus Bl	Alvernon Wy	Tucson	0.48	barriers present, history of crashes
78.64	29TH ST	S	Columbus Bl	Alvernon Wy	Tucson	0.48	barriers present, history of crashes
69.62	29TH ST	N	Craycroft Rd	Rosemont Bl	Tucson	0.49	barriers present
72.9	29TH ST	S	Sahuara Av	Craycroft Rd	Tucson	0.49	Partial Sidewalk, partial ramp access
71.66	29TH ST	N	Sahuara Av	Craycroft Rd	Tucson	0.49	No Sidewalk, barriers present
68.55	29TH ST	N	Swan Rd	Columbus Bl	Tucson	0.48	barriers present, history of crashes
68.19	29TH ST	S	Swan Rd	Columbus Bl	Tucson	0.48	barriers present, history of crashes
76.62	32ND ST	N	Alvernon Wy	Palo Verde Av	Tucson	0.48	Partial Sidewalk, partial ramp access
73.65	32ND ST	S	Alvernon Wy	Palo Verde Av	Tucson	0.48	Partial Sidewalk, partial ramp access, barriers present
85.9	36TH ST	S	Campbell Av	Kino Pw	Tucson	0.18	No Sidewalk, no curb ramps
84.09	36TH ST	N	Campbell Av	Kino Pw	Tucson	0.19	Partial Sidewalk, partial ramp access
75.82	36TH ST	S	Country Club Rd	Pinal Vista	Tucson	0.12	No Sidewalk, no curb ramps
74.3	36TH ST	S	Forgeus Sv	Campbell Av	Tucson	0.44	Partial Sidewalk, partial ramp access

73.77	36TH ST	N	Forgeus Sv	Campbell Av	Tucson	0.44	Partial Sidewalk, partial ramp access
94.22	36TH ST	S	Kino Pw	Park Av	Tucson	0.51	No Sidewalk, no curb ramps
79.04	36TH ST	S	Park Av	Rail Road Tracks	Tucson	0.3	No Sidewalk, no curb ramps, barriers present
77.23	36TH ST	N	Park Av	Rail Road Tracks	Tucson	0.3	Partial Sidewalk, partial ramp access, barriers present
83.55	36TH ST	S	Pinal Vista	Forgeus Sv	Tucson	0.44	Partial Sidewalk, no curb ramps
82.13	36TH ST	N	Pinal Vista	Forgeous Sv	Tucson	0.43	Partial Sidewalk, no curb ramps
76.62	4TH AV	W	Speedway Bl	University Bl	Tucson	0.28	partial ramp access
72.9	4TH AV	E	Speedway Bl	University Bl	Tucson	0.28	partial ramp access
72.58	5TH ST	N	Alvernon Wy	Country Club Rd	Tucson	0.99	Partial Sidewalk, barriers present
70.46	5TH ST	S	Alvernon Wy	Country Club Rd	Tucson	0.99	Partial Sidewalk, barriers present
73.82	5TH ST	S	Rosemont Bl	Swan Rd	Tucson	0.48	Partial Sidewalk, barriers present
71.49	6TH AV	W	Bilby Rd	Valencia Rd	Tucson	0.48	No Sidewalk, partial ramp access
71.31	6TH AV	E	Bilby Rd	Valencia Rd	Tucson	0.48	No Sidewalk, partial ramp access
101.08	6TH AV	W	Drachman St	Speedway Bl	Tucson	0.24	Partial Sidewalk, partial ramp access
95.59	6TH AV	E	Drachman St	Speedway Bl	Tucson	0.24	Partial Sidewalk, partial ramp access
76.49	6TH AV	E	Fort Lowell Rd	Glenn St	Tucson	0.48	No Sidewalk, partial ramp access, barriers present
77.02	6TH AV	E	Glenn St	Grant Rd	Tucson	0.49	Partial Sidewalk, partial ramp access, barriers present
68.7	6TH AV	E	Nebraska St	Drexel Rd	Tucson	0.5	No Sidewalk, no curb ramps
68.52	6TH AV	W	Nebraska St	Drexel Rd	Tucson	0.5	No Sidewalk, no curb ramps
75.56	6TH AV	W	Prince Rd	Fort Lowell Rd	Tucson	0.48	Partial Sidewalk, partial ramp access
75.2	6TH AV	E	Prince Rd	Fort Lowell Rd	Tucson	0.48	Partial Sidewalk, partial ramp access
86.92	6TH AV	E	Speedway Bl	University Bl	Tucson	0.28	partial ramp access
94.72	6TH AV	W	Thoroughbred Rd	Nebraska St	Tucson	0.24	No Sidewalk, no curb ramps
93.48	6TH AV	E	Thoroughbred Rd	Nebraska St	Tucson	0.24	No Sidewalk, no curb ramps
85.67	6TH AV	E	University Bl	6th St	Tucson	0.26	no curb ramps
78.02	6TH AV	W	University Bl	6th St	Tucson	0.26	partial ramp access
69.27	6TH AV	W	Valencia Rd	Los Reales Rd	Tucson	0.98	No Sidewalk, no curb ramps, history of crashes
95.99	6TH ST	S	Church Av	Main Av	Tucson	0.09	Partial Sidewalk, partial ramp access, barriers present
81.61	6TH ST	N	Country Club Rd	Tucson Bl	Tucson	0.5	Partial Sidewalk
73.47	6TH ST	S	Country Club Rd	Tucson Bl	Tucson	0.52	Partial Sidewalk
94.75	6TH ST	N	Stone Av	Church Av	Tucson	0.17	Partial Sidewalk, partial ramp access, barriers present
94.04	6TH ST	S	Stone Av	Church Av	Tucson	0.17	Partial Sidewalk, partial ramp access, barriers present
81.61	6TH ST	N	Tucson Bl	Campbell Av	Tucson	0.49	Partial Sidewalk
77.15	9TH ST	S	Cherry Av	Highland Av	Tucson	0.16	Partial Sidewalk, partial ramp access
72.73	9TH ST	N	Cherry Av	Highland Av	Tucson	0.16	Partial Sidewalk, partial ramp access

75.03	9TH ST	N	Highland Av	Park Av	Tucson	0.3	Partial Sidewalk, partial ramp access
74.5	9TH ST	S	Highland Av	Park Av	Tucson	0.3	Partial Sidewalk, partial ramp access
98.7	AJO WY	N	12th Ave	Mission Rd	Tucson	1.5	Partial Sidewalk, partial ramp access, barriers present
98.7	AJO WY	S	12th Ave	Mission Rd	Tucson	1.5	Partial Sidewalk, partial ramp access, barriers present
100.28	AJO WY	S	6th Av	12th Av	Tucson	0.53	Partial Sidewalk, barriers present, history of crashes
96.17	AJO WY	N	6th Av	12th Av	Tucson	0.53	Partial Sidewalk, history of crashes
95.08	AJO WY	N	Park Av	6th Av	Tucson	0.69	Partial Sidewalk, partial ramp access, barriers present
93.62	AJO WY	S	Park Av	6th Av	Tucson	0.69	Partial Sidewalk, barriers present
69.27	ALVERNON WY	E	37th St	Golf Links Ram	Tucson	0.62	Partial Sidewalk, barriers present
77.87	ALVERNON WY	W	Drexel Rd	Benson Hy	Tucson	0.12	No Sidewalk, no curb ramps
76.27	ALVERNON WY	E	Drexel Rd	Benson Hy	Tucson	0.14	No Sidewalk, no curb ramps
75.87	ALVERNON WY	W	Grant Rd	Pima St	Tucson	0.48	barriers present
74.63	ALVERNON WY	E	Grant Rd	Pima St	Tucson	0.48	barriers present
74.11	ALVERNON WY	W	I10 Ramp	Drexel Rd	Tucson	0.47	Partial Sidewalk, partial ramp access
69.81	ANKLAM RD	N	Greasewood Rd	Daystar Mountain Dr	Tucson	0.78	Partial Sidewalk, partial ramp access
84.32	AVIATION PW	N (E)	Kino Pw	Broadway Bl	Tucson	0.99	No Sidewalk, no curb ramps, barriers present
78.65	BENSON HY	SW	6th Av	Benson Hy	Tucson	0.43	No Sidewalk, no curb ramps, barriers present
79.94	BENSON HY	SW	Ajo Wy	Campbell Av	Tucson	0.81	No Sidewalk, no curb ramps
76.22	BENSON HY	NW	Ajo Wy	Campbell Av	Tucson	0.77	No Sidewalk, no curb ramps
69.63	BENSON HY	NW	Park Av	Ajo Wy	Tucson	0.33	Partial Sidewalk, partial ramp access
69.63	BENSON HY	SW	Park Av	Ajo Wy	Tucson	0.29	Partial Sidewalk, partial ramp access
71	BILBY RD	S	Park Av	Nogales Hy	Tucson	0.3	Partial Sidewalk, partial ramp access, barriers present
70.29	BILBY RD	N	Park Av	Nogales Hy	Tucson	0.3	Partial Sidewalk, partial ramp access, barriers present
102.94	BROADWAY BL	N	Camino Seco	Old Spanish Tr	Tucson	0.32	Partial Sidewalk, partial ramp access, barriers present
97.41	BROADWAY BL	S	Camino Seco	Old Spanish Tr	Tucson	0.31	Partial Sidewalk, partial ramp access
93.51	BROADWAY BL	N	Campbell Av	Highland Av	Tucson	0.4	Partial Sidewalk, partial ramp access, barriers present
78.28	BROADWAY BL	S	Country Club Rd	Tucson Bl	Tucson	0.49	Partial Sidewalk, partial ramp access, barriers present
73.99	BROADWAY BL	N	Country Club Rd	Tucson Bl	Tucson	0.49	Partial Sidewalk, partial ramp access
86.26	BROADWAY BL	N	Craycroft Rd	Rosemont Bl	Tucson	0.48	Partial Sidewalk, barriers present
92.66	BROADWAY BL	S	Harrison Rd	Camino Seco	Tucson	0.98	Partial Sidewalk, partial ramp access, history of crashes
91.96	BROADWAY BL	N	Harrison Rd	Camino Seco	Tucson	0.98	Partial Sidewalk, partial ramp access, history of crashes
100.1	BROADWAY BL	N	Highland Av	Park Av	Tucson	0.3	Partial Sidewalk, partial ramp access, barriers present, history of crashes
99.39	BROADWAY BL	S	Highland Av	Park Av	Tucson	0.3	Partial Sidewalk, partial ramp access, barriers present, history of crashes
84.19	BROADWAY BL	S	Houghton Rd	Harrison Rd	Tucson	0.98	Partial Sidewalk, partial ramp access

76.41	BROADWAY BL	N	Houghton Rd	Harrison Rd	Tucson	0.97	Partial Sidewalk, partial ramp access
94.22	BROADWAY BL	S	Kino Pw	Highland Av	Tucson	0.39	Partial Sidewalk, partial ramp access, barriers present
98.34	BROADWAY BL	N	Old Spanish Tr	Sarnoff Dr	Tucson	0.17	Partial Sidewalk, partial ramp access, barriers present
91.92	BROADWAY BL	S	Old Spanish Tr	Sarnoff Dr	Tucson	0.16	Partial Sidewalk, partial ramp access
93.9	BROADWAY BL	S	Pantano Rd	Prudence Rd	Tucson	0.48	barriers present, history of crashes
84.88	BROADWAY BL	N	Pantano Rd	Prudence Rd	Tucson	0.48	barriers present, history of crashes
85.42	BROADWAY BL	S	Rosemont Bl	Swan Rd	Tucson	0.49	Partial Sidewalk, barriers present
81.48	BROADWAY BL	N	Rosemont Bl	Swan Rd	Tucson	0.49	Partial Sidewalk
73.51	BROADWAY BL	N	Sarnoff Dr	Pantano Rd	Tucson	0.47	barriers present
71.39	BROADWAY BL	S	Sarnoff Dr	Pantano Rd	Tucson	0.48	barriers present
87.65	BROADWAY BL	N	Stone Av	Church Av	Tucson	0.06	barriers present
92.09	BROADWAY BL	N	Tucson Bl	Campbell Av	Tucson	0.49	Partial Sidewalk, barriers present
91.91	BROADWAY BL	S	Tucson Bl	Kino Pw	Tucson	0.49	Partial Sidewalk, barriers present
101.9	BROADWAY BL	S	Wilmot Rd	Craycroft Rd	Tucson	0.98	Partial Sidewalk, barriers present, history of crashes
93.89	BROADWAY BL	N	Wilmot Rd	Craycorft Rd	Tucson	0.99	Partial Sidewalk, history of crashes
71	CALLE SANTA CRUZ	E	Irvington Rd	Drexel Rd	Tucson	1.02	Partial Sidewalk, partial ramp access
84.71	CAMINO SECO	E	Golf Links Rd	Stella Rd	Tucson	0.58	No Sidewalk, no curb ramps, barriers present
73.47	CAMINO SECO	W	Golf Links Rd	Stella Rd	Tucson	0.58	Partial Sidewalk, partial ramp access
77.19	CAMPBELL AV	W	31st St	36th St	Tucson	0.33	Partial Sidewalk, no curb ramps
76.09	CAMPBELL AV	W	Benson Hy	Irvington Rd	Tucson	0.37	barriers present, history of crashes
68.31	CAMPBELL AV	W	Drexel Rd	Bilby Rd	Tucson	0.49	Partial Sidewalk, barriers present
93.45	CAMPBELL AV	W	Fort Lowell Rd	Glenn St	Tucson	0.49	Partial Sidewalk, history of crashes
92.75	CAMPBELL AV	E	Glenn St	Grant Rd	Tucson	0.49	Partial Sidewalk, barriers present
90.1	CAMPBELL AV	W	Glenn St	Grant Rd	Tucson	0.49	Partial Sidewalk, barriers present
78.59	CAMPBELL AV	W	Prince Rd	Fort Lowell Rd	Tucson	0.49	Partial Sidewalk, partial ramp access
73.59	CAMPBELL AV	E	Prince Rd	Fort Lowell Rd	Tucson	0.49	Partial Sidewalk
69.36	CARONDELET DR	N	Jessica Av	Wilmot Rd	Tucson	0.61	Partial Sidewalk
67.95	CARONDELET DR	S	Jessica Av	Wilmot Rd	Tucson	0.6	Partial Sidewalk
74.5	CHERRY AV	E	6th St	9th St	Tucson	0.26	Partial Sidewalk, partial ramp access
70.6	CHERRY AV	W	6th St	9th St	Tucson	0.26	Partial Sidewalk, partial ramp access
97.55	COLUMBUS BL	E	22nd St	29th St	Tucson	0.48	Partial Sidewalk, partial ramp access
84.63	COLUMBUS BL	W	Broadway Bl	22nd St	Tucson	0.98	Partial Sidewalk, partial ramp access, barriers present
83.92	COLUMBUS BL	E	Broadway Bl	22nd St	Tucson	0.97	Partial Sidewalk, partial ramp access, barriers present
75.25	COLUMBUS BL	E	Speedway Bl	5th St	Tucson	0.49	Partial Sidewalk, barriers present

101.21	COUNTRY CLUB RD	E	22nd St	Silverlake Rd	Tucson	0.49	Partial Sidewalk, no curb ramps, barriers present
88.03	COUNTRY CLUB RD	W	22nd St	31st St	Tucson	0.49	Partial Sidewalk, partial ramp access
74.7	COUNTRY CLUB RD	W	Ajo Wy	Irvington Rd	Tucson	1	Partial Sidewalk, partial ramp access
68.56	COUNTRY CLUB RD	W	Benson Hy	Drexel Rd	Tucson	0.58	No Sidewalk, no curb ramps
100.16	COUNTRY CLUB RD	W	Grant Rd	Pima St	Tucson	0.48	Partial Sidewalk, partial ramp access, barriers present
90.38	COUNTRY CLUB RD	E	Grant Rd	Pima St	Tucson	0.48	Partial Sidewalk, partial ramp access
80.95	COUNTRY CLUB RD	E	Prince Rd	Fort Lowell Rd	Tucson	0.49	Partial Sidewalk, no curb ramps
78.12	COUNTRY CLUB RD	W	Prince Rd	Fort Lowell Rd	Tucson	0.48	Partial Sidewalk, no curb ramps
87.15	COUNTRY CLUB RD	W	Speedway Bl	6th St	Tucson	0.5	Partial Sidewalk, barriers present
86.62	COUNTRY CLUB RD	E	Speedway Bl	5th St	Tucson	0.49	Partial Sidewalk, barriers present
76.52	CRAYCROFT RD	W	Fort Lowell Rd	Glenn St	Tucson	0.23	Partial Sidewalk, partial ramp access
75.46	CRAYCROFT RD	E	Fort Lowell Rd	Glenn St	Tucson	0.23	No Sidewalk, partial ramp access
87.5	CRAYCROFT RD	W	Grant Rd	Pima St	Tucson	0.48	Partial Sidewalk
72.05	DODGE BL	E	Gelnn St	Grant Rd	Tucson	0.49	No Sidewalk, partial ramp access, history of crashes
72.76	DODGE BL	W	Glenn St	Grant Rd	Tucson	0.49	No Sidewalk, partial ramp access, history of crashes
79.32	DODGE BL	E	Grant Rd	Pima St	Tucson	0.48	No Sidewalk, partial ramp access, barriers present
69.36	DODGE BL	W	Grant Rd	Pima St	Tucson	0.48	Partial Sidewalk, partial ramp access
89.85	DRACHMAN ST	S	6th Av	Stone Av	Tucson	0.17	partial ramp access, barriers present
80.03	DRACHMAN ST	N	6th Av	Stone Av	Tucson	0.17	partial ramp access, barriers present
73.08	DRACHMAN ST	S	Stone Av	Main Av	Tucson	0.33	barriers present
70.96	DRACHMAN ST	N	Stone Av	Oracle Rd	Tucson	0.33	barriers present
69.94	DRAGOON ST	E	Grant Rd	Lester St	Tucson	0.45	Partial Sidewalk, partial ramp access, barriers present
90.69	DREXEL RD	N	12th Av	Santa Clara Av	Tucson	0.24	Partial Sidewalk, no curb ramps, barriers present
86.58	DREXEL RD	S	12th Av	Santa Clara Av	Tucson	0.24	No Sidewalk, no curb ramps
78.42	DREXEL RD	S	6th Av	12th Av	Tucson	0.55	Partial Sidewalk, partial ramp access
73.47	DREXEL RD	N	6th Av	12th Av	Tucson	0.55	Partial Sidewalk, partial ramp access
74.04	DREXEL RD	S	Alvernon Wy	Benson Hy	Tucson	0.16	No Sidewalk, no curb ramps
69.22	DREXEL RD	S	Campbell Av	Park Av	Tucson	0.73	Partial Sidewalk, partial ramp access
67.81	DREXEL RD	N	Campbell Av	Park Av	Tucson	0.73	Partial Sidewalk, partial ramp access
68.2	DREXEL RD	S	Country Club Rd	Tucson Bl	Tucson	0.49	No Sidewalk, no curb ramps
74.4	DREXEL RD	N	Oak Tree Dr	Mission Rd	Tucson	0.35	Partial Sidewalk, partial ramp access, barriers present
70.11	DREXEL RD	S	Oak Tree Dr	Mission Rd	Tucson	0.36	Partial Sidewalk, partial ramp access
72.5	DREXEL RD	S	Park Av	Nogales Hy	Tucson	0.31	Partial Sidewalk, no curb ramps, barriers present
69.22	DREXEL RD	N	Park Av	Nogales Hy	Tucson	0.32	Partial Sidewalk, partial ramp access

73.12	DREXEL RD	S	Santa Clara Av	Calle Santa Cruz	Tucson	0.55	No Sidewalk, no curb ramps
71.66	DREXEL RD	N	Santa Clara Av	Calle Santa Cruz	Tucson	0.56	Partial Sidewalk, barriers present
68.12	ELM ST	S	Tucson Bl	Campbell Av	Tucson	0.49	Partial Sidewalk, partial ramp access
69.27	ESCALANTE RD	N	Camino Seco	Pantano	Tucson	0.98	Partial Sidewalk, partial ramp access
77.06	EUCLID AV	W	16th St	18th St	Tucson	0.18	No Sidewalk, no curb ramps, barriers present
77.02	EUCLID AV	E	16th St	18th St	Tucson	0.17	No sidewalk, partial ramp access, barriers present
75.2	FAIRVIEW AV	E	Prince Rd	Miracle Mile	Tucson	0.74	Partial Sidewalk, partial ramp access
69.5	FAIRVIEW AV	W	Prince Rd	Miracle Mile	Tucson	0.74	Partial Sidewalk
71.74	FLOWING WELLS RD	W	Glenn St	Grant Rd	Tucson	0.29	No Sidewalk, no curb ramps
70.86	FLOWING WELLS RD	E	Glenn St	Grant Rd	Tucson	0.27	No Sidewalk, no curb ramps
82.77	FLOWING WELLS RD	E	Roger Rd	Prince Rd	Tucson	0.49	barriers present
82.06	FLOWING WELLS RD	W	Roger Rd	Prince Rd	Tucson	0.49	barriers present
69.19	FORGEUS SV	S	Menor Sv	36th St	Tucson	0.15	No Sidewalk, partial ramp access
94.15	FORT LOWELL RD	S	1st Av	6th Ave	Tucson	0.38	Partial Sidewalk, partial ramp access, barriers present
86.1	FORT LOWELL RD	N	1st Av	6th Ave	Tucson	0.38	Partial Sidewalk
79.02	FORT LOWELL RD	N	6th Ave	Stone Av	Tucson	0.24	Partial Sidewalk
78.66	FORT LOWELL RD	S	6th Ave	Stone Av	Tucson	0.24	Partial Sidewalk
87.91	FORT LOWELL RD	S	Campbell Av	Mountain Av	Tucson	0.49	Partial Sidewalk, partial ramp access
84.15	FORT LOWELL RD	N	Campbell Av	Mountain Av	Tucson	0.49	Partial Sidewalk
86.54	FORT LOWELL RD	S	Country Club Rd	Tucson Bl	Tucson	0.48	Partial Sidewalk, barriers present
97.86	FORT LOWELL RD	N	Mountain Av	Park Av	Tucson	0.25	Partial Sidewalk, partial ramp access, history of crashes
96.44	FORT LOWELL RD	S	Mountain Av	Park Av	Tucson	0.25	Partial Sidewalk, partial ramp access, history of crashes
106.88	FORT LOWELL RD	N	Park Av	1st Av	Tucson	0.24	Partial Sidewalk, partial ramp access, history of crashes
101.22	FORT LOWELL RD	S	Park Av	1st Av	Tucson	0.24	Partial Sidewalk, partial ramp access, history of crashes
102.28	FORT LOWELL RD	N	Stone Av	Oracle Rd	Tucson	0.34	Partial Sidewalk, partial ramp access, history of crashes
101.09	FORT LOWELL RD	S	Stone Av	Oracle Rd	Tucson	0.34	Partial Sidewalk, partial ramp access, barriers present, history of crashes
73.12	FRANKLIN ST	N	Stone Av	Church Av	Tucson	0.08	partial ramp access, barriers present
70.6	FRANKLIN ST	S	Stone Av	Church Av	Tucson	0.09	partial ramp access
74.4	GLENN ST	S	Columbus Bl	Alvernon Wy	Tucson	0.49	Partial Sidewalk, partial ramp access, barriers present, history of crashes
73.16	GLENN ST	N	Columbus Bl	Alvernon Wy	Tucson	0.49	Partial Sidewalk, partial ramp access, barriers present, history of crashes
81.27	GLENN ST	N	Country Club Rd	Tucson Bl	Tucson	0.48	Partial Sidewalk, barriers present
80.56	GLENN ST	S	Country Club Rd	Tucson Bl	Tucson	0.48	Partial Sidewalk, barriers present
76.44	GLENN ST	N	Stone Av	Oracle Rd	Tucson	0.34	Partial Sidewalk, barriers present
74.32	GLENN ST	S	Stone Av	Oracle Rd	Tucson	0.34	Partial Sidewalk, barriers present
77.86	GLENN ST	S	Tucson Bl	Campbell Av	Tucson	0.49	Partial Sidewalk, barriers present

82.81	GOLF LINKS RD	S	Craycroft Rd	Swan Rd	Tucson	1.04	No Sidewalk, no curb ramps, barriers present
78.37	GRANADA AV	E	Main Av	Saint Marys Rd	Tucson	0.14	barriers present
76.6	GRANADA AV	W	Main Av	Saint Marys Rd	Tucson	0.14	barriers present
78.37	GRANDE AV	E	Saint Marys Rd	Congress St	Tucson	0.65	barriers present
71.29	GRANDE AV	W	Saint Marys Rd	Congress St	Tucson	0.65	barriers present
98.86	GRANT RD	N	1st Av	6th Av	Tucson	0.38	Partial Sidewalk, barriers present, history of crashes
95.63	GRANT RD	S	1st Av	6th Av	Tucson	0.38	No Sidewalk, history of crashes
90.81	GRANT RD	S	6th Av	Stone Av	Tucson	0.23	Partial Sidewalk
86.92	GRANT RD	N	6th Av	Stone Av	Tucson	0.24	Partial Sidewalk
96.58	GRANT RD	S	Alvernon Wy	Dodge Bl	Tucson	0.24	Partial Sidewalk, history of crashes
80.64	GRANT RD	S	Campbell Av	Mountain Av	Tucson	0.47	Partial Sidewalk, partial ramp access, barriers present
68.52	GRANT RD	N	Campbell Av	Mountain Av	Tucson	0.48	Partial Sidewalk, barriers present
92.98	GRANT RD	S	Columbus Bl	Alvernon Wy	Tucson	0.48	Partial Sidewalk, barriers present
90.15	GRANT RD	N	Columbus Bl	Alvernon Wy	Tucson	0.48	Partial Sidewalk, barriers present
101.17	GRANT RD	S	Country Club Rd	Tucson Bl	Tucson	0.49	Partial Sidewalk, partial ramp access
82.05	GRANT RD	N	Country Club Rd	Tucson Bl	Tucson	0.49	barriers present
110.82	GRANT RD	S	Dodge Bl	Country Club Rd	Tucson	0.74	Partial Sidewalk, partial ramp access, barriers present, history of crashes
97.27	GRANT RD	S	Fairview Av	Oracle	Tucson	0.47	Partial Sidewalk, barriers present
88.38	GRANT RD	N	Fairview Av	Oracle	Tucson	0.48	Partial Sidewalk
78.96	GRANT RD	S	Fairview Av	Flowing Wells Rd	Tucson	0.1	Partial Sidewalk
75.77	GRANT RD	N	Fairview Av	Flowing Wells Rd	Tucson	0.1	No Sidewalk
69.93	GRANT RD	S	Mountain Av	Park Av	Tucson	0.24	No Sidewalk
69.75	GRANT RD	N	Mountain Av	Park Av	Tucson	0.24	No Sidewalk
87.1	GRANT RD	S	Park Av	Euclid Ave	Tucson	0.23	Partial Sidewalk
86.04	GRANT RD	N	Park Av	1st Av	Tucson	0.23	Partial Sidewalk
79.94	GRANT RD	S	Stone Av	Oracle Rd	Tucson	0.34	history of crashes
76.22	GRANT RD	N	Stone Av	Oracle Rd	Tucson	0.34	history of crashes
87.13	GRANT RD	S	Swan Rd	Columbus Bl	Tucson	0.49	Partial Sidewalk, history of crashes
85.89	GRANT RD	N	Swan Rd	Columbus Bl	Tucson	0.48	Partial Sidewalk, history of crashes
89.09	GRANT RD	S	Tucson Bl	Campbell Av	Tucson	0.49	Partial Sidewalk, barriers present
68.56	GRANT RD	N	Tucson Bl	Campbell Av	Tucson	0.49	barriers present
67.72	GREASEWOOD RD	E	Anklam Rd	Starr Pass Bl	Tucson	1.23	No Sidewalk, no curb ramps
70.38	GREASEWOOD RD	E	Speedway Bl	Anklam Rd	Tucson	0.75	No Sidewalk, no curb ramps
70.03	GREASEWOOD RD	W	Speedway Bl	Anklam Rd	Tucson	0.75	No Sidewalk, no curb ramps
76.4	HARRISON RD	W	Escalante Rd	Irvington Rd	Tucson	1.97	Partial Sidewalk, partial ramp access, barriers present
69.23	HIDALGO VISTA	W (N)	Pinal Vista	Campbell Av	Tucson	0.54	Partial Sidewalk, partial ramp access, barriers present
81.93	HIGHLAND AV	E	Broadway Bl	15th St	Tucson	0.36	Partial Sidewalk, partial ramp access
75.73	HIGHLAND AV	W	Broadway Bl	15th St	Tucson	0.37	Partial Sidewalk, partial ramp access
69.36	IRONWOOD HILL DR	S	Greasewood Rd	Shannon Rd	Tucson	0.5	No Sidewalk, no curb ramps
69.01	IRONWOOD HILL DR	N	Greasewood Rd	Shannon Rd	Tucson	0.51	No Sidewalk, no curb ramps
93.09	IRONWOOD HILL DR	N	Silverbell Rd	Greasewood Rd	Tucson	0.38	Partial Sidewalk, partial ramp access
85.83	IRONWOOD HILL DR	S	Silverbell Rd	Greasewood Rd	Tucson	0.39	Partial Sidewalk, partial ramp access
102.94	IRVINGTON RD	N	6th Av	12th Av	Tucson	0.53	barriers present, history of crashes

77.76	IRVINGTON RD	N	Calle Santa Cruz	Midvale Park Rd	Tucson	0.64	Partial Sidewalk, barriers present
83.47	IRVINGTON RD	N	I19 Exit 98 Off Ramp	Calle Santa Cruz	Tucson	0.29	No Sidewalk, no curb ramps
104.00	IRVINGTON RD	S	Nogales Hy	12th Av	Tucson	0.53	barriers present, history of crashes
87.55	IRVINGTON RD	S	Park Av	Nogales Hy	Tucson	0.69	Partial Sidewalk, barriers present
86.13	IRVINGTON RD	N	Park Av	6th Av	Tucson	0.69	Partial Sidewalk, barriers present
71.13	JESSICA AV	E	Carondelet Dr	Broadway Bl	Tucson	0.3	Partial Sidewalk, partial ramp access
73.2	KINO PW	W	36th St	I10 Ramp / Ajo	Tucson	0.86	Partial Sidewalk, partial ramp access, barriers present
75.92	KINO PW	E	I10 Ramp / Ajo Wy	Benson Hy	Tucson	0.77	Partial Sidewalk, partial ramp access, barriers present
75.21	KINO PW	W	I10 Ramp / Ajo Wy	Benson Hy	Tucson	0.76	Partial Sidewalk, partial ramp access, barriers present
74.26	KOLB RD	W	Broadway Bl	22nd St	Tucson	0.98	partial ramp access, history of crashes
69.36	LA CHOLLA BL	E	Starr Pass Bl	San Marcos Bl	Tucson	0.25	Partial Sidewalk, partial ramp access
68.88	LA CHOLLA BL	W	Starr Pass Bl	San Marcos Bl	Tucson	0.24	No Sidewalk, no curb ramps
73.96	LESTER ST	S	Dragoon St	Silverbell Rd	Tucson	0.48	Partial Sidewalk, partial ramp access
85.51	LIMBERLOST DR	N	Campbell Av	Mountain Av	Tucson	0.49	Partial Sidewalk, partial ramp access, barriers present
80.91	LIMBERLOST DR	S	Campbell Av	Mountain Av	Tucson	0.49	No Sidewalk, no curb ramps
69.05	LIMBERLOST DR	S	Mountain Av	1st Av	Tucson	0.49	Partial Sidewalk, partial ramp access, barriers present
90.12	MAIN AV	E	Cushing St	18th St	Tucson	0.32	Partial Sidewalk, partial ramp access, barriers present
82.99	MAIN AV	W	Cushing St	18th St	Tucson	0.34	Partial Sidewalk, partial ramp access
73.37	MAIN AV	W	Speedway Bl	University Bl	Tucson	0.28	Partial Sidewalk
93.28	MAIN AV	W	University Bl	Davis St	Tucson	0.11	Partial Sidewalk, partial ramp access, barriers present
92.4	MAIN AV	E	University Bl	Main Av	Tucson	0.11	Partial Sidewalk, partial ramp access, barriers present
68.61	MIRACLE MILE	S	Romero Rd	I10 Frontage Rd (E)	Tucson	0.21	No Sidewalk, no curb ramps
67.96	MISSION RD	E	Irvington Rd	Drexel Rd	Tucson	0.85	Partial Sidewalk, partial ramp access
87.64	NEBRASKA ST	N	6th Av	Liberty Av	Tucson	0.29	Partial Sidewalk, no curb ramps
86.4	NEBRASKA ST	S	6th Av	Liberty Av	Tucson	0.29	Partial Sidewalk, no curb ramps
84.81	NEBRASKA ST	S	Liberty Av	12th Av	Tucson	0.24	No Sidewalk, no curb ramps
80.16	NEBRASKA ST	N	Liberty Av	12th Av	Tucson	0.24	Partial Sidewalk, partial ramp access
69.01	NOGALES HY	W	Bilby Rd	Valencia Rd	Tucson	0.48	No Sidewalk, no curb ramps, barriers present
75.55	NOGALES HY	W	Valencia Rd	Los Reales Rd	Tucson	0.98	No Sidewalk, no curb ramps, barriers present
68.25	NOGALES HY	E	Valencia Rd	Los Reales Rd	Tucson	0.98	No Sidewalk, no curb ramps
68.17	OLD SPANISH TR	W	22nd St	Houghton Rd	Tucson	1.08	No Sidewalk, no curb ramps, barriers present
83.78	OLD SPANISH TR	E	Broadway Bl	Camino Seco	Tucson	0.46	Partial Sidewalk, no curb ramps
82.36	OLD SPANISH TR	W	Broadway Bl	Camino Seco	Tucson	0.48	No Sidewalk, no curb ramps
74.14	OLD SPANISH TR	W	Camino Seco	Harrison Rd	Tucson	1.21	No Sidewalk, no curb ramps, barriers present
81.35	ORACLE RD	E	River Rd	Auto Mall Dr	Tucson	0.47	Partial Sidewalk, partial ramp access, barriers present
72.23	ORACLE RD	W	River Rd	Auto Mall Dr	Tucson	0.48	Partial Sidewalk
68.69	ORACLE RD	W	Wetmore Rd	Limberlost Dr	Tucson	0.24	Partial Sidewalk
79.9	PANTANO PW	E	Sarnoff Dr	Golf Links Rd	Tucson	0.68	Partial Sidewalk
78.64	PANTANO RD	W	22nd St	Golf Links Rd	Tucson	1.08	Partial Sidewalk, partial ramp access, barriers present

73.81	PANTANO RD	E	22nd St	Golf Links Rd	Tucson	1.08	Partial Sidewalk, partial ramp access
72.31	PANTANO RD	E	Broadway Bl	Kenyon Dr	Tucson	0.48	barriers present, history of crashes
72.76	ROGER RD	N	Flowing Wells Rd	Romero Rd	Tucson / Pima County	0.48	Partial Sidewalk, partial ramp access
73.82	ROGER RD	N	Mountain Av	1st Av	Tucson	0.49	Partial Sidewalk, partial ramp access
70.64	ROGER RD	S	Mountain Av	1st Av	Tucson	0.49	Partial Sidewalk, partial ramp access
81.66	ROSEMONT BL	W	Speedway Bl	5th St	Tucson	0.48	Partial Sidewalk, no curb ramps
80.42	ROSEMONT BL	E	Speedway Bl	5th St	Tucson	0.48	Partial Sidewalk, no curb ramps
109.21	SAINT MARYS RD	S	Freeway (W)	Bonita Av	Tucson	0.21	Partial Sidewalk, partial ramp access
81.08	SAINT MARYS RD	N (W)	Silverbell Rd	Anklam Rd	Tucson	0.43	Partial Sidewalk, partial ramp access
69.72	SANTA CLARA AV	W	Drexel Rd	Valencia Rd	Tucson	1	Partial Sidewalk, partial ramp access
69.72	SANTA CLARA AV	E	Drexel Rd	Valencia Rd	Tucson	1	Partial Sidewalk, partial ramp access
72.81	SARNOFF DR	W	Kenyon Dr	22nd St	Tucson	0.39	Partial Sidewalk, partial ramp access, barriers present
68.88	SARNOFF DR	E	Kenyon Dr	22nd St	Tucson	0.39	Partial Sidewalk, no curb ramps
80.34	SARNOFF DR	E	Vicksburg St	Broadway Bl	Tucson	0.24	Partial Sidewalk, partial ramp access
77.86	SARNOFF DR	W	Vicksburg St	Broadway Bl	Tucson	0.26	Partial Sidewalk, partial ramp access
81.35	SILVERBELL RD	S	Goret Rd	Grant Rd	Tucson	0.93	Partial Sidewalk, partial ramp access, barriers present
76.53	SILVERBELL RD	NE	Goret Rd	Grant Rd	Tucson	0.94	Partial Sidewalk, partial ramp access
73.77	SILVERBELL RD	NE(E)	Silverbell Rd / Anklam Rd	Fresno St	Tucson	0.2	Partial Sidewalk, partial ramp access
73.77	SILVERBELL RD	S	Silverbell Rd / Anklam Rd	Fresno St	Tucson	0.18	Partial Sidewalk, partial ramp access
89.12	SPEEDWAY BL	N	4th Av	6th Av	Tucson	0.17	barriers present
99.74	SPEEDWAY BL	S	6th Av	Stone Av	Tucson	0.17	barriers present
98.5	SPEEDWAY BL	N	6th Av	Stone Av	Tucson	0.17	barriers present
87.44	SPEEDWAY BL	S	Columbus Bl	Alvernon Wy	Tucson	0.48	Partial Sidewalk
84.61	SPEEDWAY BL	N	Columbus Bl	Alvernon Wy	Tucson	0.48	Partial Sidewalk
106.73	SPEEDWAY BL	S	Craycroft Rd	Rosemont Bl	Tucson	0.48	Partial Sidewalk, partial ramp access, barriers present, history of crashes
104.26	SPEEDWAY BL	N	Craycroft Rd	Rosemont Bl	Tucson	0.49	Partial Sidewalk, partial ramp access, barriers present, history of crashes
74.04	SPEEDWAY BL	S	Euclid Av	4th Av	Tucson	0.35	barriers present
73.68	SPEEDWAY BL	N	Euclid Av	4th Av	Tucson	0.35	barriers present
75.38	SPEEDWAY BL	S	Harrison Rd	Camino Seco	Tucson	0.98	No Sidewalk, no curb ramps
71.27	SPEEDWAY BL	N	Harrison Rd	Camino Seco	Tucson	0.98	Partial Sidewalk, partial ramp access
69.26	SPEEDWAY BL	N	Main Av	I10 Frontage Rd (E)	Tucson	0.31	partial ramp access, barriers present
68.37	SPEEDWAY BL	S	Main Av	Freeway (E)	Tucson	0.31	partial ramp access, barriers present
72.14	SPEEDWAY BL	S	Pantano Rd	Kolb Rd	Tucson	0.98	barriers present
71.08	SPEEDWAY BL	N	Pantano Rd	Kolb Rd	Tucson	0.98	barriers present
83.02	SPEEDWAY BL	N	Riverview Bl	El Rio Dr	Tucson	0.42	barriers present
110.18	SPEEDWAY BL	N	Rosemont Bl	Swan Rd	Tucson	0.49	Partial Sidewalk, partial ramp access, barriers present, history of crashes

110.18	SPEEDWAY BL	S	Rosemont Bl	Swan Rd	Tucson	0.48	Partial Sidewalk, partial ramp access, barriers present, history of crashes
72.76	ROGER RD	N	Flowing Wells Rd	Romero Rd	Tucson / Pima County	0.48	Partial Sidewalk, partial ramp access
73.82	ROGER RD	N	Mountain Av	1st Av	Tucson	0.49	Partial Sidewalk, partial ramp access
70.64	ROGER RD	S	Mountain Av	1st Av	Tucson	0.49	Partial Sidewalk, partial ramp access
81.66	ROSEMONT BL	W	Speedway Bl	5th St	Tucson	0.48	Partial Sidewalk, no curb ramps
80.42	ROSEMONT BL	E	Speedway Bl	5th St	Tucson	0.48	Partial Sidewalk, no curb ramps
109.21	SAINT MARYS RD	S	Freeway (W)	Bonita Av	Tucson	0.21	Partial Sidewalk, partial ramp access
81.08	SAINT MARYS RD	N (W)	Silverbell Rd	Anklam Rd	Tucson	0.43	Partial Sidewalk, partial ramp access
69.72	SANTA CLARA AV	W	Drexel Rd	Valencia Rd	Tucson	1	Partial Sidewalk, partial ramp access
69.72	SANTA CLARA AV	E	Drexel Rd	Valencia Rd	Tucson	1	Partial Sidewalk, partial ramp access
72.81	SARNOFF DR	W	Kenyon Dr	22nd St	Tucson	0.39	Partial Sidewalk, partial ramp access, barriers present
68.88	SARNOFF DR	E	Kenyon Dr	22nd St	Tucson	0.39	Partial Sidewalk, no curb ramps
80.34	SARNOFF DR	E	Vicksburg St	Broadway Bl	Tucson	0.24	Partial Sidewalk, partial ramp access
77.86	SARNOFF DR	W	Vicksburg St	Broadway Bl	Tucson	0.26	Partial Sidewalk, partial ramp access
81.35	SILVERBELL RD	S	Goret Rd	Grant Rd	Tucson	0.93	Partial Sidewalk, partial ramp access, barriers present
76.53	SILVERBELL RD	NE	Goret Rd	Grant Rd	Tucson	0.94	Partial Sidewalk, partial ramp access
73.77	SILVERBELL RD	NE(E)	Silverbell Rd / Anklam Rd	Fresno St	Tucson	0.2	Partial Sidewalk, partial ramp access
73.77	SILVERBELL RD	S	Silverbell Rd / Anklam Rd	Fresno St	Tucson	0.18	Partial Sidewalk, partial ramp access
89.12	SPEEDWAY BL	N	4th Av	6th Av	Tucson	0.17	barriers present
99.74	SPEEDWAY BL	S	6th Av	Stone Av	Tucson	0.17	barriers present
98.5	SPEEDWAY BL	N	6th Av	Stone Av	Tucson	0.17	barriers present
87.44	SPEEDWAY BL	S	Columbus Bl	Alvernon Wy	Tucson	0.48	Partial Sidewalk
84.61	SPEEDWAY BL	N	Columbus Bl	Alvernon Wy	Tucson	0.48	Partial Sidewalk
106.73	SPEEDWAY BL	S	Craycroft Rd	Rosemont Bl	Tucson	0.48	Partial Sidewalk, partial ramp access, barriers present, history of crashes
104.26	SPEEDWAY BL	N	Craycroft Rd	Rosemont Bl	Tucson	0.49	Partial Sidewalk, partial ramp access, barriers present, history of crashes
74.04	SPEEDWAY BL	S	Euclid Av	4th Av	Tucson	0.35	barriers present
73.68	SPEEDWAY BL	N	Euclid Av	4th Av	Tucson	0.35	barriers present
75.38	SPEEDWAY BL	S	Harrison Rd	Camino Seco	Tucson	0.98	No Sidewalk, no curb ramps
71.27	SPEEDWAY BL	N	Harrison Rd	Camino Seco	Tucson	0.98	Partial Sidewalk, partial ramp access
69.26	SPEEDWAY BL	N	Main Av	I10 Frontage Rd (E)	Tucson	0.31	partial ramp access, barriers present
68.37	SPEEDWAY BL	S	Main Av	Freeway (E)	Tucson	0.31	partial ramp access, barriers present
72.14	SPEEDWAY BL	S	Pantano Rd	Kolb Rd	Tucson	0.98	barriers present
71.08	SPEEDWAY BL	N	Pantano Rd	Kolb Rd	Tucson	0.98	barriers present
83.02	SPEEDWAY BL	N	Riverview Bl	El Rio Dr	Tucson	0.42	barriers present
110.18	SPEEDWAY BL	N	Rosemont Bl	Swan Rd	Tucson	0.49	Partial Sidewalk, partial ramp access, barriers present, history of crashes

110.18	SPEEDWAY BL	S	Rosemont Bl	Swan Rd	Tucson	0.48	Partial Sidewalk, partial ramp access, barriers present, history of crashes
78.16	SPEEDWAY BL	N	Silverbell Rd	Greasewood Rd	Tucson	1	Partial Sidewalk, partial ramp access, history of crashes
75.68	SPEEDWAY BL	S	Silverbell Rd	Greasewood Rd	Tucson	1.01	Partial Sidewalk, partial ramp access, history of crashes
106.46	SPEEDWAY BL	S	Swan Rd	Columbus Bl	Tucson	0.49	Partial Sidewalk, partial ramp access, barriers present, history of crashes
105.93	SPEEDWAY BL	N	Swan Rd	Columbus Bl	Tucson	0.48	Partial Sidewalk, partial ramp access, barriers present, history of crashes
110.74	SPEEDWAY BL	N	Wilmot Rd	Craycroft Rd	Tucson	1	Partial Sidewalk, partial ramp access, barriers present, history of crashes
108.27	SPEEDWAY BL	S	Wilmot Rd	Craycroft Rd	Tucson	1.01	Partial Sidewalk, partial ramp access, barriers present, history of crashes
68.92	STARR PASS BL	S	Freeway (W)	La Cholla Bl	Tucson	1.88	Partial Sidewalk, partial ramp access
88.04	STONE AV	E	Fort Lowell Rd	Glenn St	Tucson	0.48	Partial Sidewalk, barriers present
87.86	STONE AV	W	Fort Lowell Rd	Glenn St	Tucson	0.48	Partial Sidewalk, barriers present
95.82	STONE AV	W	Glenn St	Grant Rd	Tucson	0.49	Partial Sidewalk, barriers present
89.58	STONE AV	E	Glenn St	Grant Rd	Tucson	0.49	Partial Sidewalk
90.5	STONE AV	E	Prince Rd	Fort Lowell Rd	Tucson	0.48	Partial Sidewalk, history of crashes
75.86	STONE AV	W	Prince Rd	Fort Lowell Rd	Tucson	0.48	barriers present, history of crashes
85.65	STONE AV	E	Toole Av	Alameda St	Tucson	0.13	barriers present
84.77	SWAN RD	W	5th St	Broadway Bl	Tucson	0.48	Partial Sidewalk, partial ramp access
80.65	SWAN RD	E	5th St	Broadway Bl	Tucson	0.48	Partial Sidewalk
81.14	SWAN RD	W	Camp Lowell Dr	Glenn St	Tucson	0.5	Partial Sidewalk
89.33	SWAN RD	W	Speedway Bl	5th St	Tucson	0.49	Partial Sidewalk, partial ramp access
82.2	SWAN RD	E	Speedway Bl	5th St	Tucson	0.49	Partial Sidewalk
84.59	TANQUE VERDE RD	N	Catalina Hy	Bear Canyon Rd	Tucson	0.17	No Sidewalk, no curb ramps
72.65	TANQUE VERDE RD	S	Catalina Hy	Bear Canyon Rd	Tucson	0.18	Partial Sidewalk
77.62	TANQUE VERDE RD	NW(N)	Grant Rd	Pima St	Tucson	0.53	barriers present, history of crashes
78.15	TANQUE VERDE RD	NE(S)	Kolb Rd	Pima St	Tucson	0.55	barriers present, history of crashes
97.19	THOROUGHBRED ST	S	Nogales Hy	6th Av	Tucson	0.06	No Sidewalk, no curb ramps
92.42	THOROUGHBRED ST	N	Nogales Hy	6th Av	Tucson	0.05	No Sidewalk, no curb ramps
80.91	TOOLE AV	N (E)	6th Av	Stone Av	Tucson	0.22	partial ramp access, barriers present
79.63	TOOLE AV	S (W)	6th Av / Alameda	Stone Av	Tucson	0.21	partial ramp access
83.39	TOOLE AV	E	Toole Av (Broadway Bl)	16th St	Tucson	0.61	Partial Sidewalk, partial ramp access, barriers present
79.67	TOOLE AV	W	Toole Av (Broadway Bl)	16th St	Tucson	0.58	Partial Sidewalk, partial ramp access, barriers present
69.36	TUCSON BL	W	6th St	Broadway Bl	Tucson	0.43	Partial Sidewalk, partial ramp access
68.12	TUCSON BL	E	6th St	Broadway Bl	Tucson	0.43	Partial Sidewalk, partial ramp access
69.23	TUCSON BL	W	Broadway Bl	Eastland St	Tucson	0.68	Partial Sidewalk, partial ramp access, barriers present
82.33	TUCSON BL	E	Glenn St	Grant Rd	Tucson	0.49	Partial Sidewalk, partial ramp access

80.73	TUCSON BL	W	Glenn St	Grant Rd	Tucson	0.49	Partial Sidewalk, partial ramp access
89.59	TUCSON BL	W	Speedway Bl	6th St	Tucson	0.55	Partial Sidewalk, partial ramp access
89.59	TUCSON BL	E	Speedway Bl	6th St	Tucson	0.55	Partial Sidewalk, partial ramp access
88.88	UNIVERSITY BL	N	4th Av	6th Av	Tucson	0.17	partial ramp access, barriers present
86.4	UNIVERSITY BL	S	4th Av	6th Av	Tucson	0.17	partial ramp access, barriers present
79.63	UNIVERSITY BL	N	6th Av	Stone Av	Tucson	0.17	partial ramp access
77.15	UNIVERSITY BL	S	6th Av	Stone Av	Tucson	0.17	partial ramp access
106.6	VALENCIA RD	S	6th Av	12th Av	Tucson	0.56	Partial Sidewalk, history of crashes
100.76	VALENCIA RD	N	6th Av	12th Av	Tucson	0.56	Partial Sidewalk, history of crashes
78.87	VALENCIA RD	S	Nogales Hy	6th Av	Tucson	0.36	No Sidewalk, no curb ramps
71.17	VALENCIA RD	N	Nogales Hy	6th Av	Tucson	0.36	Partial Sidewalk
78.96	VICKSBURG ST	S	Camino Seco	Sarnoff Dr	Tucson	0.54	Partial Sidewalk, partial ramp access, barriers present
73.83	VICKSBURG ST	N	Camino Seco	Sarnoff Dr	Tucson	0.55	Partial Sidewalk, partial ramp access, barriers present
81.48	WILMOT RD	W	5th St	Carondelet Dr	Tucson	0.24	barriers present
80.11	WILMOT RD	W	Broadway Bl	22nd St	Tucson	0.97	Partial Sidewalk, barriers present
78.65	WILMOT RD	E	Carondelet Dr	Broadway Bl	Tucson	0.26	Partial Sidewalk
88.37	WILMOT RD	W	Grant Rd	Pima St	Tucson	0.48	Partial Sidewalk, partial ramp access, history of crashes
80.01	WILMOT RD	E	Grant Rd	Pima St	Tucson	0.48	Partial Sidewalk, history of crashes
72.5	WILMOT RD	E	Pima St (Tanque Verde Rd)	Fairmount St	Tucson	0.49	barriers present
70.9	WILMOT RD	W	Pima St (Tanque Verde Rd)	Fairmount St	Tucson	0.49	barriers present
90.58	WILMOT RD	E	Speedway Bl	5th St	Tucson	0.45	Partial Sidewalk
75.42	WRIGHTSTOWN RD	S	Tanque Verde Rd	Pantano Rd	Tucson	0.37	Partial Sidewalk, partial ramp access
71.88	WRIGHTSTOWN RD	N	Tanque Verde Rd	Pantano Rd	Tucson	0.42	No Sidewalk, no curb ramps

Regional High-Scoring Pedestrian Needs

Finally, showing high-need segments at a regional scale, the model indicates where pedestrian demand is highest, but where facilities are deficient without regard for jurisdictional boundaries. The map includes the top 25th percentile high-scoring segments for the whole region. This is unlike the jurisdictional sections shown previously, which included the top 25th percentile within each jurisdiction independent of the others.

The regional perspective shows a clustering of high-need segments largely within the urban core on major roadways.

High Scoring Pedestrian Needs

Sidewalk Segments - Region