



University of Arizona Area Bicycle and Pedestrian Plan

Final Plan
August 2012

PREPARED BY:
Alta Planning + Design
Kimley-Horn and Associates, Inc.

PREPARED FOR:
Pima Association of Governments
The University of Arizona



Kimley-Horn
and Associates, Inc.



Table of Contents

1	Introduction.....	1
1.1	Project Overview.....	1
1.2	Plan Objectives.....	1
2	Background	3
2.1	Plan Study Area.....	3
2.2	Setting.....	3
3	Existing Plans and Policies	7
3.1	University of Arizona Plans and Policies.....	7
3.2	City of Tucson Plans and Policies	11
3.3	Other Regional Plans and Policies	17
3.4	State Policies	19
4	Existing Conditions	25
4.1	Existing Bicycle and Pedestrian Infrastructure	25
4.2	Existing End-of-Trip Facilities.....	35
4.3	Multi-Modal Connections	40
4.4	Collision and Safety Analysis	44
4.5	Education and Encouragement Programs	51
4.6	Past Expenditures	57
5	Needs Analysis	59
5.1	Public Outreach	59
5.2	Mode Share.....	65
5.3	Online Survey.....	66
5.4	Bicycle and Pedestrian Counts	71
5.5	Bikeway Gap Analysis.....	74
5.6	Pedestrian Deficiencies	79
6	Best Practices.....	81
6.1	Reduce Collision Risk.....	81
6.2	Improve Existing Infrastructure	82

6.3	Develop Design Guidelines	84
6.4	Increase Bicycle and Pedestrian Mode Share and Safety	85
6.5	Implementation.....	87
7	Zone 1 Recommended Improvements.....	89
8	Zone 2 Recommendations	111
8.1	Recommended Improvements	111
8.2	Estimated Costs	116
9	Zone 3 Recommendations.....	119
9.1	Recommended Improvements	119
9.2	Estimated Cost	124
10	Regional Programmatic Improvements.....	129
10.1	Education	129
10.2	Encouragement.....	132
10.3	Enforcement	134
10.4	Evaluation	135
11	Project Prioritization and Implementation.....	139
11.1	Project Prioritization.....	139
11.2	Phasing Plan	154
11.3	Funding Sources	160
11.4	Campus Bicycle and Pedestrian Advisory Committee Implementation.....	169
11.5	Policy Implications.....	171
	Appendices.....	173

List of Figures

Figure 2-1: University of Arizona Area Bicycle and Pedestrian Plan – Study Area.....	4
Figure 3-1: Modern Street Car Alignment.....	12
Figure 3-2: Grant Road Improvement Plan, Bicycle Boulevard Conceptual Routes.....	14
Figure 3-3: Tucson Planned Regional Low-Stress Bikeways (Bike Boulevards)	15
Figure 4-1: Bikeway Types in the University of Arizona Study Area	26
Figure 4-2: Existing Bicycle Facilities at the University of Arizona.....	28
Figure 4-3: Existing Bicycle Facilities in the City of Tucson and Pima County	29
Figure 4-4: Existing End-of-Trip Bicycle Facilities.....	36
Figure 4-5: Cat Tran Purple, Orange, and USA Routes	41
Figure 4-6: Cat Tran Teal and Green Routes	42
Figure 4-7: Cat Tran Night Cat Route	43
Figure 4-8: Existing Sun Tran Bus Routes.....	45
Figure 4-9: Reported Bicycle Crashes, 2007-2010	47
Figure 4-10: Reported Pedestrian Crashes, 2007-2010	48
Figure 5-1: Types of Bicyclists.....	59
Figure 5-2: Bike Audit Route.....	61
Figure 5-3: Distance of Employed Respondents from Job.....	67
Figure 5-4: Distance Respondents Live from Campus	67
Figure 5-5: Average Rating of Factors for Choosing Not to Bike	69
Figure 5-6: Average Rating of Factors for Choosing Not to Walk.....	70
Figure 5-7: Respondent Bicycle Route Preference.....	71
Figure 5-8: Bicycle and Pedestrian Count Locations, 2010	73
Figure 5-9: Bikeway Gaps in the University of Arizona Area.....	75
Figure 5-10: Bikeway Gaps at the University of Arizona.....	76
Figure 7-1: Zone 1 Recommended Improvements	90
Figure 8-1: Zone 2 Recommended Improvements	112
Figure 9-1: Zone 3 Recommended Improvements	121

List of Tables

Table 2-1: 2006-2010 Enrollment Data.....	3
Table 2-2: 2010-2011 Employee Headcounts.....	5
Table 3-1: University of Arizona Circulation Study Goals and Objectives.....	8
Table 3-2: Estimated Number of Off-Campus Students by Mode and Distance from Campus	9
Table 3-3: Bike Route With Striped Shoulder Policy	16
Table 3-4: Bicycle and Pedestrian Related Roadway Development Policies.....	16
Table 3-5: Relevant Title 28 Laws	19
Table 4-1: 20 Highest and Lowest Utilized Bicycle Parking Areas.....	35
Table 4-2: University of Arizona Existing Short-Term Bicycle Parking Inventory By Rack Type.....	37
Table 4-3: Bike Valet User Data, 2010-2012	38

Table 4-4: 2011 Short-Term Bicycle Parking Utilization Rate	38
Table 4-5: University of Arizona Long-Term Bicycle Parking	39
Table 4-6: 2011 Long-Term Bicycle Parking Utilization Rate	39
Table 4-7: Number of Campus Bicycle Lockers Per Location	39
Table 4-8: Total Number of Reported Bicycle and Pedestrian Crashes, 2007-2010.....	46
Table 4-9: Bicycle and Pedestrian Collisions by Severity, 2007-2010	46
Table 4-10: University of Arizona Bicycle Theft Data 2009-2011	49
Table 4-11: University of Arizona High Bicycle Theft Locations	49
Table 4-12: City of Tucson Bicycle Theft Data 2006-2010.....	50
Table 4-13: Non-Motorized Citations Fine Schedule	50
Table 4-14: Bicycle Station Services Data, 2010-2012.....	52
Table 4-15: CAT Wheels User Data, 2010-2012.....	53
Table 4-16: University of Arizona Bicycle Programs Expenses, 2006-2010.....	57
Table 5-1: Bike Audit Participant Comments.....	62
Table 5-2: Walk Audit Participant Comments	63
Table 5-3: Participants at Public Workshop.....	64
Table 5-4: Preferred Bicycle Facility Types	64
Table 5-5: Community Identified Bicycle Improvements.....	64
Table 5-6: Community Identified Pedestrian Improvements.....	65
Table 5-7: Percent of University of Arizona Employee Trips by Mode	66
Table 5-8: Respondent Awareness and Use of Bicycle-Related Services.....	68
Table 5-9: Spot Gaps	74
Table 5-10: Connection Gaps.....	77
Table 5-11: Lineal Gaps	78
Table 5-12: Corridor Gaps.....	78
Table 8-1: Cost of Zone 2 Improvements.....	116
Table 9-1: Mileage of Recommended Facilities.....	119
Table 9-2: Estimated Cost of Zone 3 Improvements.....	124
Table 11-1: Bicycle Project Prioritization Criteria	140
Table 11-2: Pedestrian Project Prioritization Criteria	141
Table 11-3: Prioritized Bicycle Projects	143
Table 11-4: Prioritized Pedestrian Projects	151
Table 11-5: Phasing of Bicycle Projects	154
Table 11-6: Phasing of Pedestrian Projects	159
Table 11-7: Funding Sources	162

1 Introduction

This chapter presents an overview of the University of Arizona Area Bicycle and Pedestrian Plan, as well as the project objectives.

1.1 Project Overview

The University of Arizona Area Bicycle and Pedestrian Plan aims to improve existing and future bicycle and pedestrian conditions for students, faculty, staff, and visitors. To achieve this goal, the plan looks to provide safe and attractive bikeway and walkway facilities and educate people on foot or bike to reduce the potential for conflicts. The University of Arizona Area Bicycle and Pedestrian Plan also intends on increasing the bicycle and pedestrian mode share to and from the University of Arizona. Currently, 40 percent of commuters that drive to campus live within five miles, presenting an opportunity to create a shift toward non-motorized transportation.

1.2 Plan Objectives

The University of Arizona Area Bicycle and Pedestrian Plan identifies five objectives to improve conditions:

- Reduce collision risk: Identify potential conflict points on campus and create solutions to better manage bicycle and pedestrian flow.
- Improve existing infrastructure: Identify strategies to develop and enhance the existing campus and area bicycle and pedestrian infrastructure with a focus on access, connectivity, and safety.
- Develop design standards: Define bikeway and pedestrian infrastructure standards to guide future development.
- Increase bicycle and pedestrian mode share and safety: Guide development of both marketing and education programs to increase mode share and safety.
- Implementation: Outline implementation strategies to help the University of Arizona, City of Tucson, and Pima Association of Governments carry out the specific recommended improvements and programs.

This page intentionally left blank.

2 Background

2.1 Plan Study Area

The study area is approximately a five mile radius around the campus and is shown in Figure 2-1. The study area is divided into four zones:

- Zone 1: On-campus, walkway and bikeway solutions
- Zone 2: Pedestrian-oriented treatments within one quarter-mile of campus
- Zone 3: Bikeway network improvement zone
- Zone 4: Regional programmatic improvements (education, encouragement, and enforcement strategies)

Each zone requires a different level of analysis in order to create a more cohesive and integrated bicycle and pedestrian network. The analysis and recommendations developed for Zone 1 will include the most detailed level of analysis and will focus on site-specific improvements. The analysis for Zones 2 and 3 will include more broad facility recommendations for improving bicycling and walking. The analysis for the Zone 4 improvements will not be site specific and will instead focus on providing comprehensive programmatic recommendations that focus on increasing walking and bicycling rates and promoting safe behavior.

2.2 Setting

Pima County, Arizona has a population of 980,623. The City of Tucson is the largest municipality in the County and has a population of 520,116¹ and is approximately 194.7 square miles. Tucson’s desert climate makes for mild winters with cold mornings and pleasant daytime temperatures. Summers are hot with highs of over 100 degrees, but mornings are often conducive for walking and riding, with temperatures in the 60s and 70s.

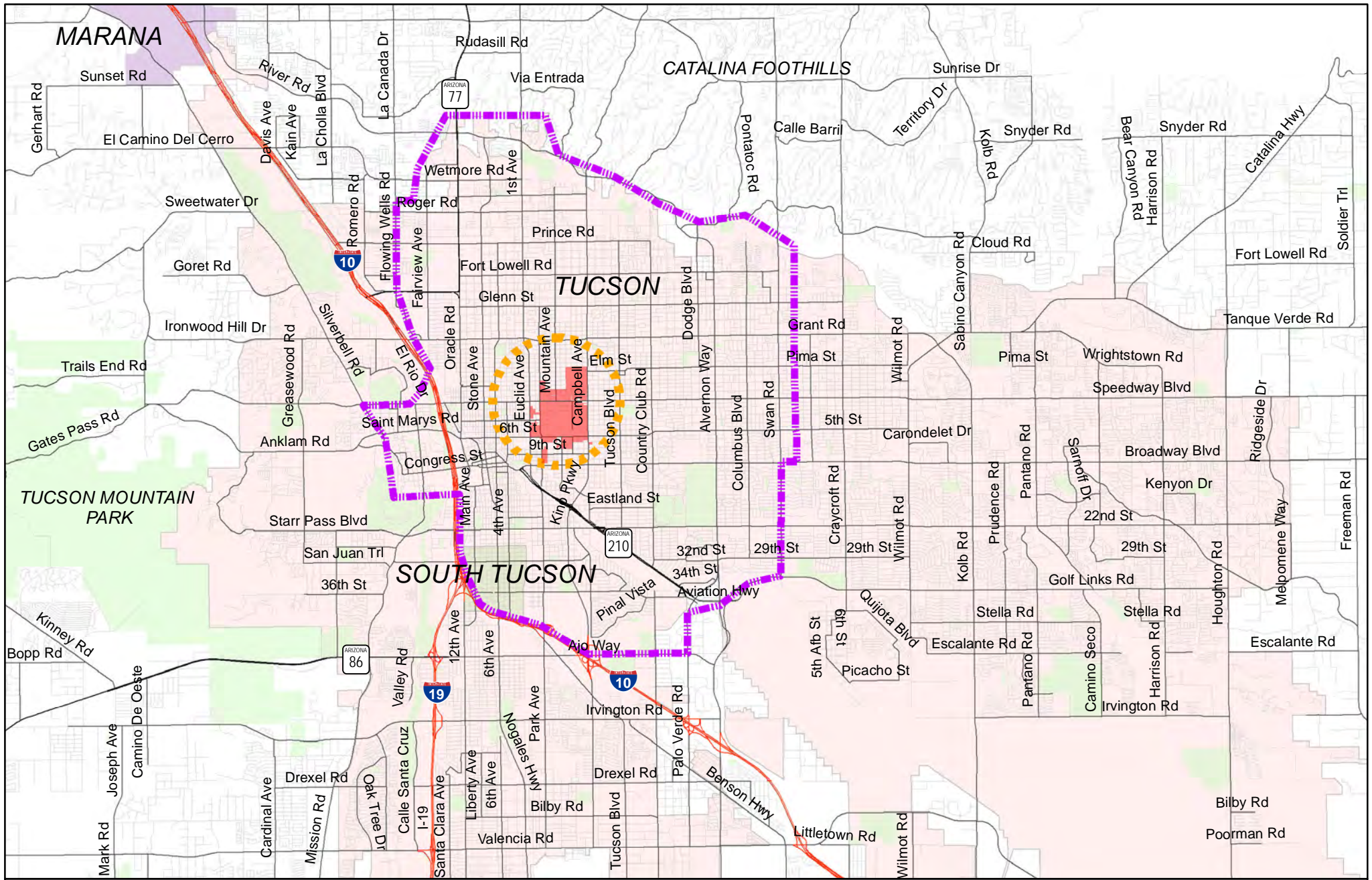
The University of Arizona is approximately 391 acres in size and is centrally located in Tucson. As of Fall 2010, the University of Arizona enrolled 39,086 students (Table 2-1), including 37,448 full time equivalent students, and 502,630 student credit hours. Between 2006 and 2010, the number of students enrolled at the University of Arizona increased by 6.2 percent.




Table 2-1: 2006-2010 Enrollment Data

Students	2006	2007	2008	2009	2010
Undergraduate	28,442	29,070	29,719	30,346	30,592
Graduate	7,112	6,870	6,962	6,989	6,991
First Professional	1,252	1,277	1,376	1,432	1,503
University Total	36,806	37,217	38,057	38,767	39,086
Percent Change from Previous Year	-0.6	1.1	2.3	1.8	0.8

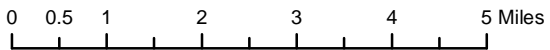
Source: University of Arizona Fact Book

¹ Source: U.S. Census Bureau, 2010 Census. Summary File 1, Tables P12, P13, and PCT12.



- Legend**
-  Zone 1: On-campus, engineering-focused solutions
 -  Zone 2: Pedestrian-oriented treatments within quarter-mile of campus
 -  Zone 3: Bikeway network improvement zone

University of Arizona Area Bicycle and Pedestrian Plan
Figure 2-1: University of Arizona Area Bicycle and Pedestrian Plan - Study Area



As of Fall 2010, the University of Arizona employed 14,834 individuals, including administrators, faculty, appointed staff, classified staff, and graduate assistants and associates (Table 2-2),

Table 2-2: 2010-2011 Employee Headcounts

Employees	Total	Full-Time	Full-Time Equivalent
Administrator	136	127	133
Faculty	2,802	2,160	2,418
Other Appointed	3,237	2,857	3,078
Classified Staff	5,599	4,276	4,853
Graduate Assistants and Associates	3,060	-	1,353
Total	14,834	9,420	11,834

Source: University of Arizona Fact Book

This page intentionally left blank.

3 Existing Plans and Policies

This chapter summarizes existing plans and policies from the University of Arizona, the City of Tucson, Pima County, and the Pima Association of Governments that are relevant to the University of Arizona Area Bicycle and Pedestrian Plan.

3.1 University of Arizona Plans and Policies

This section presents existing plans and policies related to bicycling and walking at the University of Arizona.

3.1.1 Comprehensive Campus Plan Update (2009)

The University of Arizona updated its 2003 Comprehensive Master Plan in 2009. The Plan Update is meant as a companion document to the 2003 Plan. The Update reflects changes to bicycle and pedestrian projects and open space projects, as well as new landscape, hardscape, and streetscape improvements. The 2009 Update aims to reduce auto/pedestrian conflicts at Fourth Street and Highland Avenue, and address conflicts between motor vehicles, bicycles, and pedestrians on Fourth Street east of Park Avenue due to heavy traffic. The Update proposes future closure to automobiles on Fourth Street, east of Park Avenue.

The 2009 Update notes several changes from the 2003 Comprehensive Master Plan, including the following proposed improvements:

- Mabel Street mall connects pedestrian and bicycle routes from the Warren Avenue mall through the Arizona Health Sciences Center (AHSC) to proposed trails in the perimeter greenway
- Helen Street blocks made pedestrian-friendly with landscape/streetscape (North Campus)
- Extension of Highland Avenue pedestrian route to connect with greenway/buffer (North Campus)
- A pedestrian bridge across Sixth Street is proposed east of Highland Avenue in the South Campus

Sustainability is also addressed in the Plan Update, which demonstrates UA's commitment toward meeting the President's Climate Commitment, signed by UA President Robert Shelton in 2007. The Plan Update includes a discussion of the Tucson Modern Streetcar project. The project will include treatments to bicycle and pedestrian routes that share the streetcar routes, as well as treatments at crossings on Second Street and around station areas.

3.1.2 Comprehensive Campus Plan (2003)

The 2003 Comprehensive Campus Plan highlights many efforts at improving walking and biking on and around the University of Arizona. To make the campus more pedestrian- and bicycle-oriented, the Plan recommends increasing connectivity of pedestrian paths, adding pedestrian amenities, and increasing wayfinding on bicycle and pedestrian routes to improve navigation.

The Plan also recommends reducing the number of cars on campus by increasing the utilization of bicycle facilities, continuing to improve and expand the regional bicycle path network, exploring development opportunities for faculty/staff housing near campus to encourage walking and biking to campus, and creating a travel demand management coordinator. The plan recommends that pedestrian and bicycle facilities on campus connect outward to the larger Tucson community.

The 2003 Comprehensive Campus Plan presents several policies, goals, and objectives related to bicycling and walking and can be found in **Appendix A**. Location-specific goals include:

- Create a pedestrian-and-bicycle friendly zone around Old Main (historic core)
- Remedy pedestrian/vehicular conflict along Second Street (historic core)
- Reduce pedestrian/bicycle conflict at the Main Mall

3.1.3 University of Arizona Circulation Study (1997)

The University Area Circulation Study presents a vision for campus circulation, including goals related to walking and bicycling, which are shown in **Table 3-1**.

Table 3-1: University of Arizona Circulation Study Goals and Objectives

Goals	Objectives
To provide a sense of order to [the] system of circulation and decision-making process	<ul style="list-style-type: none"> • By organizing interconnections between transportation elements at well-defined points • By restoring a more “traditional” campus image through landscape and streetscape features
To re-think typical travel behavior by considering the changing function of existing transportation system	<ul style="list-style-type: none"> • By balancing the needs of competing travel modes on roadways currently dominated by automobiles • With traffic calming on perimeter streets • Through use of dispersed, off-site parking to limit auto penetration of campus • With better pedestrian and bicycle enhancements at gateways on minor (“one quarter- mile” streets) to encourage travel, by pedestrians and bicyclists, from adjacent neighborhoods • Through pedestrian zones that control bicycle travel
To build aesthetic characteristics...based on land use, access, and desired effects	<ul style="list-style-type: none"> • Through design quality and consistency in the individual components of the system, such as bike paths or traffic calming • Through integration of plantings, public art and well-designed pedestrian facilities
To organize and orient bicycle travel to limit confusion	<ul style="list-style-type: none"> • By enhancing north/south travel along Highland Avenue (transitioning to Mountain Avenue) and east/west travel along University/Third Street • By providing bicycles with continuous convenient travel, clearly separating bicycle travel from pedestrian travel in pedestrian areas • Through providing continuous “bicycle boulevards” that incorporate continuity and strong visual cues for bicycle travel • By improving the security of bicycle storage and reducing its conflict with pedestrian zones.
Make pedestrian safety and comfort the highest priority	<ul style="list-style-type: none"> • By defining and differentiating on-campus pedestrian zones and pathways • By landscaping to increase shade coverage • By providing distinctive cues to make pedestrians more obvious to all wheeled traffic • By providing pedestrian amenities throughout the pedestrian system

Goals	Objectives
Develop an alternative mode street hierarchy	<ul style="list-style-type: none"> • That expands beyond the current traffic-only definitions for street function • That recognizes and balances auto/transit/bicycle and pedestrian use without domination by any mode • That fosters better orientation of all travelers within the campus

Source: University Area Circulation Study

3.1.4 University of Arizona Needs Assessment Study (2008)

The University of Arizona Needs Assessment Study assesses existing and short-term future travel demand to the campus, recommends travel demand management (TDM) measures for the University and the City of Tucson, and recommends future transportation projects to reduce auto travel to the campus. According to the Needs Assessment Study, 43 percent of drivers live within five miles of campus (Table 3-2). Given effective TDM strategies, some of the commuters within this subset may shift their commute mode to bicycling or walking based on their close proximity to the campus.

Table 3-2: Estimated Number of Off-Campus Students by Mode and Distance from Campus

Mode	Distance from Campus in Miles					Total	Percent
	0-1	1-2	2-5	5-8	8+		
Car	884	841	4,089	3,211	4,558	13,583	47.3 %
Bicycle	2,298	1,682	876	97	79	5,032	17.5 %
Walk	4,596	187	195	0	0	4,977	17.3 %
Sun Tran	88	280	1,266	584	236	2,454	8.5 %
Cat Tran	530	187	97	195	236	1,245	4.3 %
Apartment Shuttle	0	0	487	584	0	1,071	3.7 %
Motorcycle	0	187	97	0	79	363	1.3 %
Total	8,396	3,364	7,108	4,670	5,187	28,725	100.0 %
Percent	29.2 %	11.7 %	24.7 %	16.3 %	18.1 %	100.0 %	-

Source: University of Arizona Needs Assessment Study

Top recommended TDM measures related directly and indirectly to walking and biking include the following:

- Universal transit pass deployment
- Freshman packets should only contain information regarding alternative transportation modes
- Increase marketing of transportation alternatives to parents of incoming students
- No parking permits should be issued to students living on campus
- Prohibit freshmen from bringing cars to campus
- Ad campaign to increase awareness of alternative transportation modes available

Potential projects, programs and studies listed as potential candidates for the Pima Association of Governments' (PAG) Transportation Improvement Program are listed in the Needs Assessment Study. Projects related to walking and biking include the following:

- UA Neighborhoods Sidewalk Improvement Program
- UA Traffic Calming Study
- UA and Surrounding Neighborhoods Bicycle System Improvement Study
- New Pedestrian Hybrid Beacon (also known as HAWK signals) near the UA (Euclid/5th Street and Euclid/2nd Street)
- Multi-Modal Streetscape Design and Implementation (various locations)
- UA Planning Area Roadway Improvements
- Planning Area Traffic Safety Study

3.1.5 Previously-Proposed Bicycle/Pedestrian Improvements

The University has identified several proposed projects to improve walking and biking in and around the campus. These include:

- Extending the Olive Tunnel bike path to Helen Street
- Extending the existing Highland Avenue bike path to 2nd Street
- Installing a sidewalk from northeast side of the Koffler building to the south mall
- Installing a sidewalk on both sides of the center mall's north/south portion where there is an existing bike path
- Installing a sidewalk on the center mall's southern section where there is an existing bike path
- Installing a sidewalk on the center mall's southern section from the Krutch garden area to Old Main
- Constructing a shared use path on the west side under the Warren underpass as part of the Modern Streetcar project
- Reconfiguring the pedestrian crossing at Park Avenue and Sixth Street to incorporate a bicycle friendly north/south crossing as well
- Incorporating a bicycle crossing at Mountain Avenue and Helen Street with improved safety
- Incorporating a north/south bicycle crossing with improved safety at Olive Street and 2nd Street in relation to the Modern Streetcar Platform stop

The University of Arizona also has plans to expand the University Medical Center (UMC) and construct new office and research buildings in the northeast area of campus. There has also been discussion of additional private development in the area along Speedway Boulevard near Campbell Avenue.

The continued growth in this area has led to increased congestion. This is of concern not only to the University of Arizona, but also to surrounding neighborhoods. Recent construction, including the UMC parking structure and the Emergency Department and Bed Tower, has added more vehicle traffic to an already congested area.

To accommodate the UMC expansion plans, additional parking structures are planned on current surface lot locations. To date, plans have not been finalized. These projects present an ideal opportunity to integrate bicycle and pedestrian needs into the development plans.

3.2 City of Tucson Plans and Policies

This section presents existing plans and policies related to bicycling and walking in the City of Tucson.

3.2.1 Modern Streetcar

The Tucson Modern Streetcar is a nearly four mile rail system that will connect the University of Arizona to downtown, with stops at the Arizona Health Sciences Center, Main Gate Square, the 4th Avenue shopping district, and the Mercado District, a redevelopment area west of Interstate 10. The Tucson Modern Streetcar is scheduled to begin operations in 2013. The planned streetcar alignment is shown on **Figure 3-1**. The streetcar will include 18 stops, seven Modern Streetcar trains, and a maintenance and storage facility.

The Modern Streetcar is a track-based transit system that will operate within the same rights-of-way as other vehicles, pedestrians, and bicyclists. A significant consideration throughout the planning, design, and construction of the Modern Streetcar is the mitigation of the streetcar impacts to non-motorized roadway users, particularly on route segments shared by bicyclists and streetcars.

Warning signs and high-visibility crosswalks are planned at locations where pedestrian volumes are projected to increase. Planned bicycle considerations and accommodation include bike boxes, identification of appropriate rail crossing angles, directional pavement markings, and cross-bike markings at signalized crossings. Special warning signs were designed to illustrate potential conflicts and significant input was provided to the track and design team relating to changes in rail alignment and curb modifications. To accommodate bicycles along the streetcar route, the design includes reduced parking and provides bicycle lanes where feasible within the University of Arizona area; planned bicycle routes were rerouted in other locations.

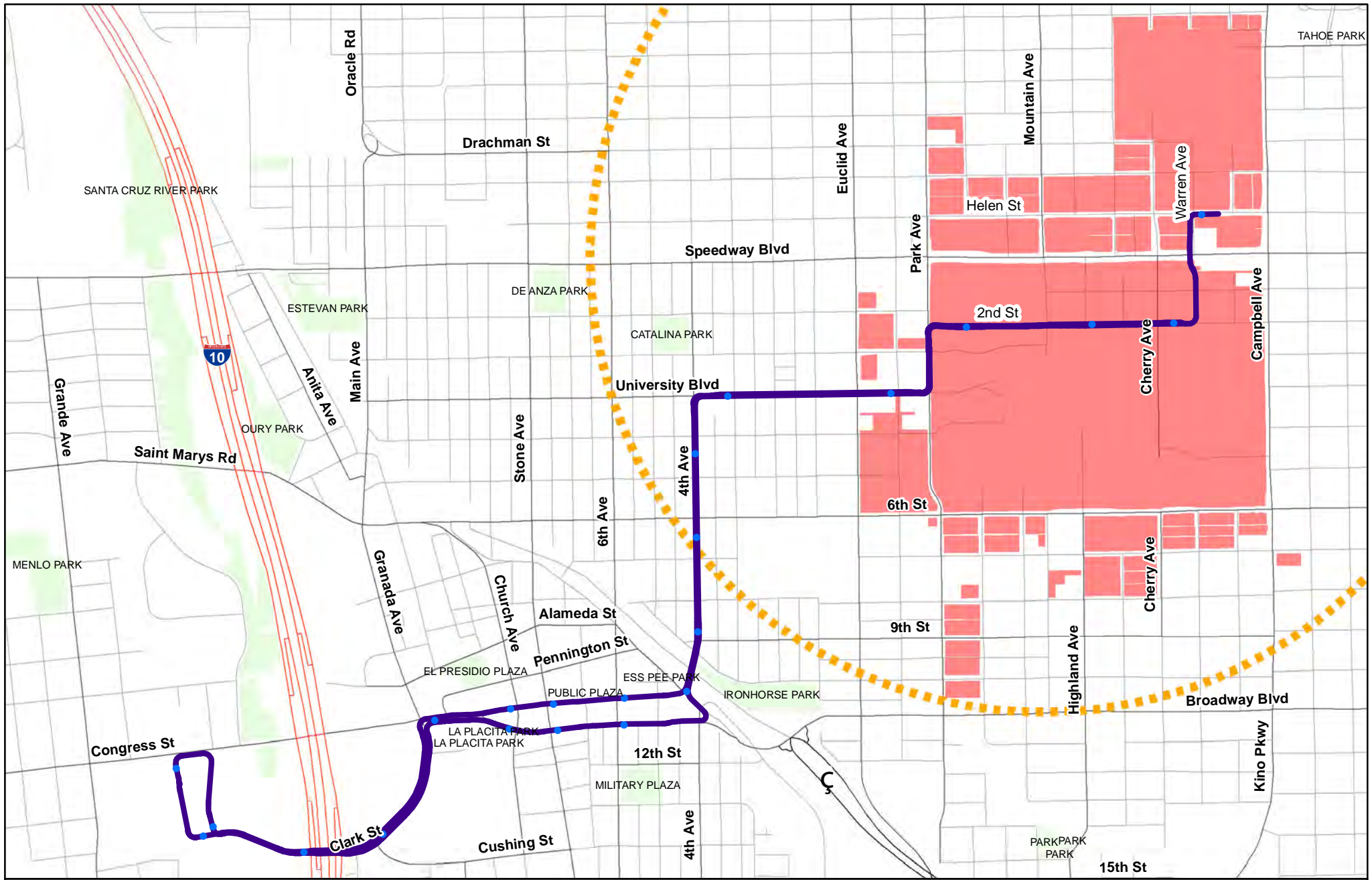
3.2.2 Grant Road Improvement Plan (2007)

Grant Road widening between Oracle Road and Swan Road (approximately 5 miles) was identified in the 2030 Pima Association of Governments (PAG) Regional Transportation Plan (RTP). Funding for the Grant Road Improvement Plan was authorized through the May 16, 2006 passage of the Regional Transportation Authority (RTA) 20 year, half-cent sales tax. Ballot language for the voter-approved RTA transportation improvement plan states that Grant Road between Oracle Road and Swan Road will be widened and reconstructed to six lanes including streetscape, bike lanes, and sidewalk improvements and future land use strategies for adjacent properties.

A Design Concept Report for the 5-mile corridor was completed in 2010. The Design Concept Report recommended that corridor reconstruction be completed in 5-segments. Design of the first segment (15th Ave to Stone Ave) was completed in 2011. The City will begin construction of this segment in 2012. The City will incrementally design and construct each remaining segment and anticipates that construction of the final segment will be completed in 2026.

The goal of the Grant Road Improvement Plan is to create a state-of-the-art multi-modal transportation corridor that integrates “best practices” for multi-modal access and design sensitivity within the unique context of Tucson’s Sonoran Desert region. Other goals include enhanced multi-modal travel efficiency and connectivity as well as transit and pedestrian-oriented redevelopment.

The ultimate design of the roadway will be one that provides convenient access for pedestrians, bicyclists, transit users, and vehicles. It should integrate pedestrian-oriented urban design opportunities with the

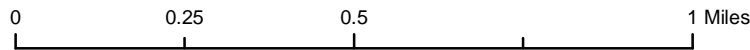


Legend

- Modern Streetcar Alignment
- Modern Streetcar Stations
- Zone 1: On-campus, engineering-focused solutions
- - - Zone 2: Pedestrian-oriented treatments

University of Arizona Area Bicycle and Pedestrian Plan

Figure 3-1: Modern Streetcar Alignment



roadway design. The road should be friendly to cross by foot and bike, and serve to better unify neighborhoods on either side of Grant Road.

Grant Road will include indirect left turn traffic signals. Indirect left turn signals are located 600-700 feet east and west of the intersection and will stop approaching traffic to allow U-turns into a designated right-turn lane. Drivers then return to the intersection to complete their turn. The indirect left turn treatments provide the opportunity to construct PEdestrian Light Control ActivatioN (PELICAN) pedestrian crossings at each indirect left turn turnaround. The PELICAN provides a two-stage crossing for pedestrians. The crossing incorporates the median island refuge between the two stages. A pedestrian presses a button to activate the first signal. When the traffic signal facing motorists turns red, a “WALK” signal prompts the pedestrian to proceed to the median. The pedestrian then walks a short distance along the median to activate the second signal. A second “WALK” indication appears when the traffic signal facing motorists turns red. The PELICAN uses a standard Red-Yellow-Green signal for motorists and remains green unless activated by a pedestrian.

PELICAN pedestrian crossings are associated with each indirect left turnaround (with exception to the indirect left turn east of 1st Avenue and west of Park Avenue). In addition, the Recommended Alignment includes stand-alone PELICANS (not associated with the indirect left turn) at the following locations:

- 4th Avenue
- East of Plumer Avenue
- Rita Avenue
- Ralph Avenue
- Between Freemont Avenue and Santa Rita Avenue.
- Forgeus Avenue
- Bryant Avenue
- Vine Avenue

To further improve accommodation for bicyclists along the corridor, Grant Road improvements will include an enhanced bicycle lane that is 6-feet wide with a 1-foot buffer stripe that separates the bicycle lane from the vehicle travel lane. In addition, two bicycle boulevards are proposed to run parallel to Grant Road to answer residents’ call for separation from faster moving motor vehicles. The bicycle boulevards incorporate features that prioritize bicycles over vehicular traffic including traffic calming, bicycle signage, pavement markers, signalized traffic control at intersections with arterials, and channelization. The proposed parallel bicycle boulevards are shown in Figure 3-2: (1) Copper/Flower Bicycle Blvd, and (2) Seneca Bicycle Blvd. The bicycle boulevards are proposed to extend from Fairview (western limit) to Rosemont (eastern limit).



Two bicycle boulevards are proposed parallel to Grant Road.

Figure 3-2: Grant Road Improvement Plan, Bicycle Boulevard Conceptual Routes



Source: Grant Road Improvement Plan

3.2.3 Bicycle Boulevard Plan

The City of Tucson created a map of planned bike boulevards, which are presented in Figure 3-3. Bicycle boulevards are shared facilities between bicyclists and motor vehicles, and are on streets with low traffic volumes, low speeds, and traffic calming. Bicycle boulevards have additional bicycle and pedestrian treatments to help users, such as wayfinding signage, pavement markings, and intersection treatments (for example, Toucan crossings). There are two existing bicycle boulevards near the study area: 4th Avenue/Fontana and 3rd Street. The City of Tucson is planning traffic calming improvements that will further prioritize bicycles over motor vehicles on 3rd Street. Proposed facilities in the University of Arizona Area Bicycle and Pedestrian Plan should be well coordinated with Tucson’s planned bike boulevards.

3.2.4 Tucson Bicycle Policies

The following policies in the City of Tucson Municipal Code are related to bicycling:

SEC. 5-1.

Bicycles parked on a public sidewalk or street must not hinder either pedestrian or vehicles, and must allow access to adjacent property. It shall be unlawful to park a bicycle upon any public sidewalk or street in a manner that substantially impedes pedestrian or vehicular traffic or obstructs access to public or private facilities.

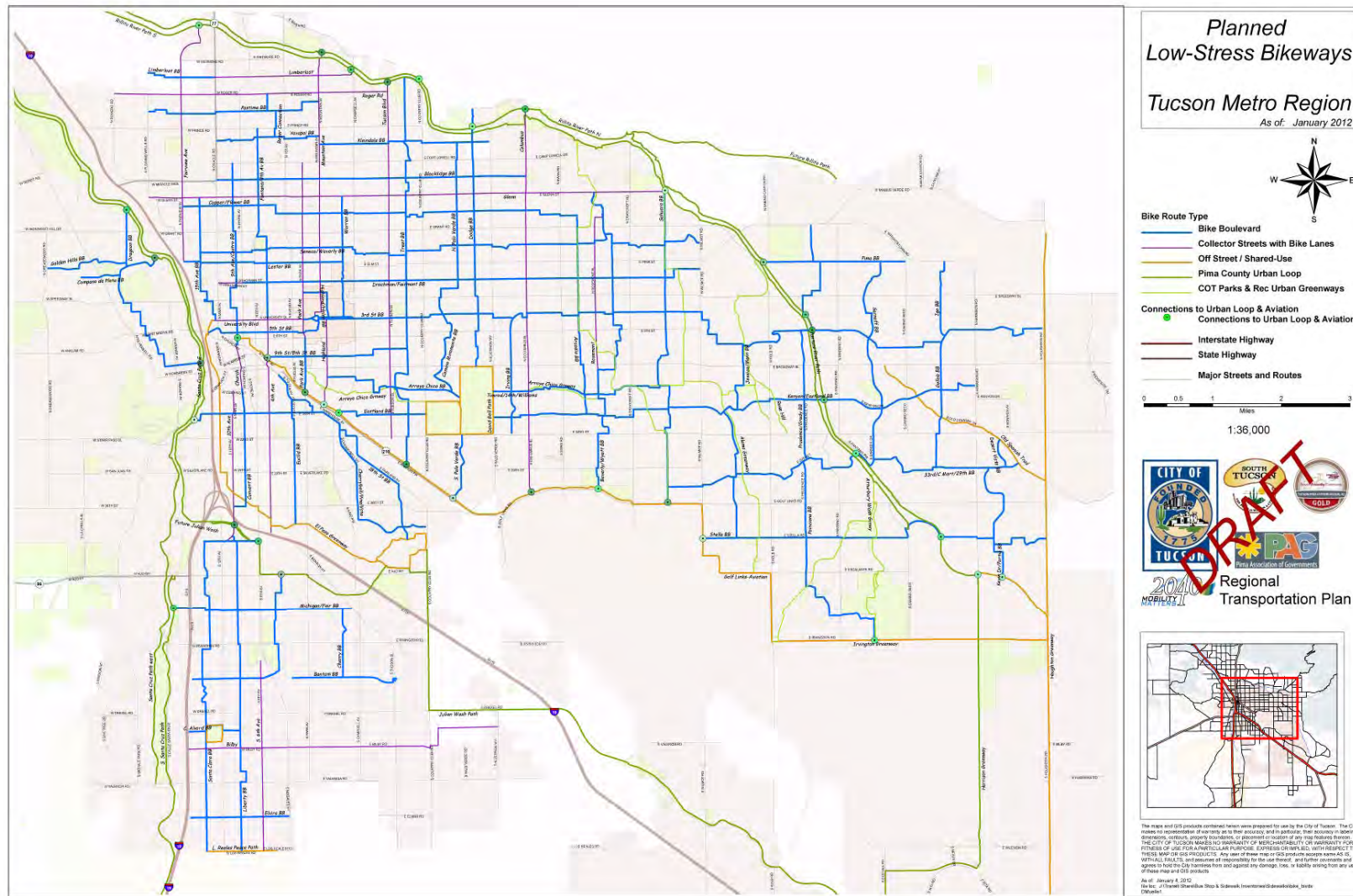
SEC.-2.

Riding on sidewalks, pedestrian paths, and through underpasses.

(A) It is unlawful to ride a bicycle on a sidewalk or pedestrian path unless a sign says it is permitted.

(B) It is unlawful to ride a bicycle through an underpass, when a sign is posted prohibiting bicycle riding there.

Figure 3-3: Tucson Planned Regional Low-Stress Bikeways (Bike Boulevards)



Source: City of Tucson

3.2.5 City of Tucson Bike Route with Striped Shoulder Policy

Table 3-3 shows the lane widths required for a bike lane with striped shoulder and adjacent vehicle travel lanes. In addition to what is presented in the table, the policy allows with director’s approval vehicle travel lanes to be reduced to 10 feet on roadways with a posted speed of 40 mph or less with no opposing traffic in adjacent lane, turn lanes to be reduced to nine feet, and bike lanes to be reduced below four feet in very constrained situations.

Table 3-3: Bike Route With Striped Shoulder Policy

	Bike Route with Striped Shoulder	Motor Vehicle Travel Lane
Standard Width	5	12
Reduced Width	4	11

3.2.6 City of Tucson Roadway Development Policies

Table 3-4 displays the bicycle and pedestrian related policies from Tucson’s Roadway Development Policies. These policies set the framework for what recommendations will be included in this plan.

Table 3-4: Bicycle and Pedestrian Related Roadway Development Policies

Roadway Development Policies
Bicycle Considerations
Bicycle facility improvements on major roadway projects shall utilize all appropriate AASHTO guidelines, Arizona Bicycle Facilities Design Guidelines, MUTCD, City of Tucson Development Standards, and City of Tucson/Pima County Standard Specifications and Details
To promote the use of the bicycle as an alternate mode of transportation, and to provide for bicyclist safety, major roadway projects shall be designed with outside vehicle lanes that accommodate five (5) foot wide on-street bicycle routes with painted edgelines when adequate right-of-way is available.
All major roadway projects involving the reconstruction of intersections shall provide for painted edgeline bicycle routes or additional outside vehicle lane width as a part of the intersection improvement when adequate right-of-way is available. Actuated signal detection or video camera detection will be provided so the bicyclist can actuate the traffic signal.
To provide bicyclists with safe and proficient access over or under major transportation corridors, all new or reconstructed roadway bridges and underpasses shall include bicycle routes with painted edgelines or multi-use emergency breakdown lanes to improve bicyclist as well as motorist safety.
Major roadway projects that will not provide additional vehicular capacity may utilize a reconfiguration of vehicle lanes to accommodate bicycle routes with painted edgelines. When average daily traffic does not warrant current vehicle lane configurations and bicycle traffic is heavy, consideration may be given to reducing the number of vehicle lanes to allow for the striping of bicycle routes with painted edgelines. Any reduction in roadway capacity as a result of a major roadway project should be carefully studied as to the impacts on other roadways and adjacent neighborhoods.
In order to provide continuity within the regional bikeway system, major roadway projects that intersect one or more of the four established regional bikeways (Mountain Avenue, Third Street, Liberty Avenue, and Arroyo Chico), future bikeways, or other designated bike routes, shall incorporate all available design techniques to ensure that bicyclists

Roadway Development Policies
are able to effectively and safely cross through, over, and under the newly constructed or reconstructed roadway.
Pedestrian Considerations
Pedestrian facility improvements on major roadway projects shall utilize all applicable City of Tucson Development Standards, City of Tucson/Pima County Standards and Details, and shall be compliant with the transportation and public accommodations provisions of the ADA.
All major roadway projects shall include sidewalks on both sides of the improved roadway section. When adequate right-of-way is available, consideration should be given to providing sidewalks of greater width than minimum Development Standard specifications. Consideration shall be given to extending sidewalks to local and regional activity centers up to one-quarter mile beyond the project limit, in order to create a convenient, safe, and attractive pedestrian network. In order to provide convenient pedestrian access between the improved roadway section and adjacent residential areas, isolation of pedestrians by cul-de-sacs shall be discouraged and separate path or trail access should be considered. Consideration may also be given to the utilization of alternative paving materials and designs, such as brick pavers and meandering sidewalks that enhance the overall aesthetic value of the project and complement existing urban design.
All major roadway projects involving the reconstruction of intersections shall include striped crosswalks and refuge islands to provide for safe and effective pedestrian travel. Design treatments such as textured crosswalks or raised crosswalks may also be considered for lower volume intersections to enhance pedestrian safety and increase motorist awareness of pedestrian activity. Pedestrian signal clearance timing shall be provided that allows the pedestrian to travel to a safe haven (refuge island or sidewalk) at four (4) feet per second, or less in areas of intense pedestrian activity or elderly population. Push buttons for pedestrian signal actuation shall be conveniently located at the intersection to allow for efficient and accessible operation. At intersections located on roadways with on-street parking, curb extensions may also be considered in order to reduce pedestrian crossing distance.
Mid-block pedestrian crossing facilities may also be considered in major roadway projects when major pedestrian trip generators are located adjacent to the roadway, or to provide a safe and visible connection between bus stops or a bus stop and residential or commercial areas. Mid-block crossings shall include crosswalks, refuge islands, and appropriate signage or pavement marking to clearly announce the upcoming crossing to motorists. Consideration shall be given to signalization or grade separation when warranted by safety or demand.
All new or reconstructed roadway bridges and underpasses shall include sidewalks or other pedestrian ways to provide pedestrian access over or under major transportation corridors.
In order to provide for pedestrian safety, promote walking as an alternate form of transportation, and increase motorist awareness of pedestrian travel, consideration shall be given to extending sidewalks through intersection-style access driveways to adjacent private properties.
In consideration of Tucson's summer climate and the distances pedestrians must travel between land uses and bus stops, major roadway projects shall include pedestrian amenities. Such amenities may include, but not be limited to, benches trash cans, bus shelters, drought tolerant landscaping, shade trees, awnings, and water fountains.

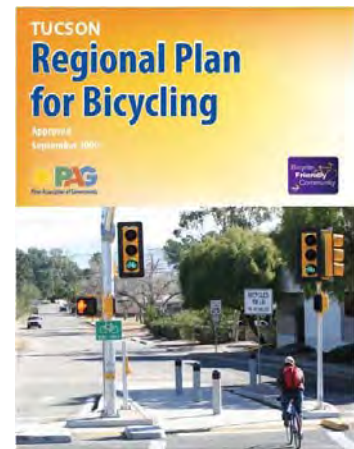
3.3 Other Regional Plans and Policies

This section presents existing plans and policies related to bicycling and walking in Pima County and produced by the Pima Association of Governments.

3.3.1 Tucson Regional Plan for Bicycling (2009)

The Tucson Regional Plan for Bicycling has a vision of providing for and facilitating more and safer bicycle travel on a region-wide basis. Accomplishing this vision will allow bicyclists to ride to activity areas, transit stops, schools, parks, natural resources, and employment areas, using a safer, continuous, and connected system of bikeways. The plan has four goals, which are listed below. Detailed corresponding actions to the goals are presented in Appendix C.

- Goal 1 - Education: Educate all road users, especially bicyclists and motorists, on legal, predictable and safe behavior.
- Goal 2 - Enforcement: Establish and implement targeted enforcement of specific traffic laws on bicyclists and motorists, based on the documented, most frequent bicyclist-motorist crashes.
- Goal 3 - Engineering: Plan, design, construct and maintain bicycle facilities that meet or exceed accepted standards and guidelines.
- Goal 4 - Encouragement: Encourage increased use of bicycles for transportation and recreation; support organized events, which often have substantive beneficial economic impacts.



Tucson Regional Plan for Bicycling

3.3.2 2040 Regional Transportation Plan (2010)

The goal of the 2040 Regional Transportation Plan (RTP) is to increase mobility and accessibility for all travel modes throughout the region. The plan proposes more than 200 miles of bicycle lanes (two-way), a network of bicycle boulevards, and shared-use paths to be constructed over the 30-year term, as well as expanded bicycle safety outreach programs, bicycle and pedestrian signage and stenciling, adult bicycle safety education, and Safe Routes to School programs. The Plan also proposes improvements to sidewalks, ADA facilities, and other pedestrian projects to link key destinations and services. Goals of the plan that support bicycling and walking include:

- Multi-modal Choices: Develop a comprehensive transportation system that supports a balanced mix of travel choices
- Efficiency, Mobility and Accessibility: Promote an efficient, linked system of rail lines, interstate freeways, major streets, public transit, bikeways, and pedestrian paths that enhance accessibility and the movement of people and goods
- Safety: Enhance safety for bicyclists, pedestrians, transit riders, wheelchair users, children and the driving public.
- Environment: Enhance environmental stewardship through protection of natural and human resources and creation or preservation of aesthetic amenities and the unique identities of the region's varied communities.



2040 RTP

3.3.3 Regional Pedestrian Plan (2000)

The Pima Association of Governments completed the Regional Pedestrian Plan in 2000. The plan’s vision is to provide a more accessible and safe pedestrian environment in the Tucson Region. The goals of the plan are listed below. A complete table of corresponding objectives and policies can be found in Appendix B.

- Educate officials and the public to be aware of pedestrian issues, and encourage walking.
- Promote the development and design of pedestrian facilities that are direct, safe, comfortable, interesting, and provide continuity.
- Improve pedestrian visibility and safety.
- Promote the enhancement, improvement and maintenance of the regional pedestrian system.
- Identify and secure funding sources to implement pedestrian programs and projects.

3.3.4 PAG Regional Sidewalk Inventory Project (2011)

The sidewalk inventory assessed the regional pedestrian network of the Tucson Region along its major arterial and collector roadways. The project purpose included three objectives:

- Inventory pedestrian walkways along major arterial and collector roadways
- Study and summarize the design characteristics of pedestrian infrastructure, as provided by the Americans with Disability Act (ADA) and the U.S. Access Board and identify the types of improvements that could be made in the Tucson region.
- Identify gaps and deficiencies in the pedestrian network along with a prioritized list of pedestrian improvement projects for each jurisdiction that can be used as a guide for the continued improvement of the pedestrian network.

Key findings of the inventory relevant to this plan include the following:

- Sidewalk gaps and other barriers are often located in areas of the region that were developed prior to the 1980s.
- Sidewalks are generally provided in newer residential areas with four or more dwelling units per acre.
- Less dense residential areas have fewer sidewalks.

3.4 State Policies

This section presents existing plans and policies related to bicycling and walking in the State of Arizona.

3.4.1 Arizona Transportation Laws (Title 28)

Table 3-5 shows Arizona Transportation Laws (Title 28) that are related to bicycle and walking and relevant to this plan.

Table 3-5: Relevant Title 28 Laws

Section	Description
Relevant Pedestrian Laws	
28-791. Pedestrians subject to traffic rules	A. Pedestrians are subject to traffic control signals at intersections as provided in section 28-645 unless required by local ordinance to comply strictly with the signals. At

Section	Description
	<p>all places other than intersections, pedestrians are accorded the privileges and are subject to the restrictions stated in this article.</p> <p>B. A local authority may require by ordinance that pedestrians strictly comply with the directions of an official traffic control signal and may prohibit by ordinance pedestrians from crossing a roadway in a business district or crossing a designated highway except in a crosswalk.</p>
28-792. Right-of-way at crosswalk	<p>A. Except as provided in section 28-793, subsection B, if traffic control signals are not in place or are not in operation, the driver of a vehicle shall yield the right-of-way, slowing down or stopping if need be in order to yield, to a pedestrian crossing the roadway within a crosswalk when the pedestrian is on the half of the roadway on which the vehicle is traveling or when the pedestrian is approaching so closely from the opposite half of the roadway as to be in danger. A pedestrian shall not suddenly leave any curb or other place of safety and walk or run into the path of a vehicle that is so close that it is impossible for the driver to yield.</p> <p>B. If a vehicle is stopped at a marked crosswalk or at an unmarked crosswalk at an intersection to permit a pedestrian to cross the roadway, the driver of another vehicle approaching from the rear shall not overtake and pass the stopped vehicle.</p>
28-793. Crossing at other than crosswalk	<p>A. A pedestrian crossing a roadway at any point other than within a marked crosswalk or within an unmarked crosswalk at an intersection shall yield the right-of-way to all vehicles on the roadway.</p> <p>B. A pedestrian crossing a roadway at a point where a pedestrian tunnel or overhead pedestrian crossing has been provided shall yield the right-of-way to all vehicles on the roadway.</p> <p>C. Between adjacent intersections at which traffic control signals are in operation, pedestrians shall not cross at any place except in a marked crosswalk.</p>
28-795. Pedestrians to use right half of crosswalk	Pedestrians shall move expeditiously, when practicable, on the right half of crosswalks.
28-796. Pedestrian on roadways	<p>A. If sidewalks are provided, a pedestrian shall not walk along and on an adjacent roadway.</p> <p>B. If sidewalks are not provided, a pedestrian walking along and on a highway shall walk when practicable only on the left side of the roadway or its shoulder facing traffic that may approach from the opposite direction.</p> <p>C. A person shall not stand in a roadway for the purpose of soliciting a ride from the driver of a vehicle.</p>
Relevant Bicycle Laws	
28-812. Applicability of traffic laws to bicycle riders	A person riding a bicycle on a roadway or on a shoulder adjoining a roadway is granted all of the rights and is subject to all of the duties applicable to the driver of a vehicle by this chapter and chapters 4 and 5 of this title, except special rules in this article and except provisions of this chapter and chapters 4 and 5 of this title that by their nature can have no application.
28-815. Riding on roadway	A. A person riding a bicycle on a roadway at less than the normal speed of traffic at the

Section	Description
and bicycle path; bicycle path usage	<p>time and place and under the conditions then existing shall ride as close as practicable to the right-hand curb or edge of the roadway, except under any of the following situations:</p> <ol style="list-style-type: none"> 1. If overtaking and passing another bicycle or vehicle proceeding in the same direction. 2. If preparing for a left turn at an intersection or into a private road or driveway. 3. If reasonably necessary to avoid conditions, including fixed or moving objects, parked or moving vehicles, bicycles, pedestrians, animals or surface hazards. 4. If the lane in which the person is operating the bicycle is too narrow for a bicycle and a vehicle to travel safely side by side within the lane. <p>B. Persons riding bicycles on a roadway shall not ride more than two abreast except on paths or parts of roadways set aside for the exclusive use of bicycles.</p> <p>C. A path or lane that is designated as a bicycle path or lane by state or local authorities is for the exclusive use of bicycles even though other uses are permitted pursuant to subsection D or are otherwise permitted by state or local authorities.</p> <p>D. A person shall not operate, stop, park or leave standing a vehicle in a path or lane designated as a bicycle path or lane by a state or local authority except in the case of emergency or for crossing the path or lane to gain access to a public or private road or driveway.</p> <p>E. Subsection D does not prohibit the use of the path or lane by the appropriate local authority.</p>

3.4.2 Arizona Bicycle Policies²

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

- a) Include provisions for bicycle travel in all new major construction and major reconstruction projects on the state highway system. New bridge and roadway widening projects are normally considered as being within the scope of major construction or major reconstruction. Pavement preservation, minor and spot improvement projects are not included; existing widths for bicycles will be maintained. The scoping documents for new construction and reconstruction will define the parameters for inclusion of bicycle travel.
- b) Utilize the AASHTO Guide for the Development of Bicycle Facilities as the design guide for roadway features to accommodate bicycles.
- c) Utilize the Manual on Uniform Traffic Control Devices. Part 9 as adopted in accordance with ARS 28-641 for design of traffic controls for bicycle facilities.

² <http://www.azbikeped.org/images/MGT01-2%20Bike%20Policy.pdf>

- d) Provide shared roadway cross-section templates as a minimum condition with new major construction and major reconstruction projects, regardless of the presence of a shared use path.
- e) Consider, as a part of major new construction and major reconstruction in urban areas, wide curb lanes up to 15' in width (exclusive of gutter pan) and placement of a stripe at the vehicle lane edge where appropriate. This decision will be made on a project basis weighing such factors as location, vehicular traffic, grades, anticipated bicycle usage, and right of way availability.
- f) Consider bicycle lanes for inclusion with major new construction or major reconstruction when: 1) incremental costs for construction and maintenance are funded by a local agency AND 2) the bicycle lane is included as a part of a bicycle facilities plan adopted by a local agency.
- g) As a part of major new construction and major reconstruction, ADOT will fund and construct at-grade or grade separated (including bridges) street or roadway crossings of state highway system roadways to meet cross section templates accommodating bicyclists that have been adopted as standard by the local agency. The limits of construction are determined on a project-by-project basis, are normally within the ADOT right of way, and may include appropriate transitions to existing roadways outside of ADOT right of way.
- h) Accommodate shared use paths within the ADOT right of way when the facilities are: 1) designed and located in accordance with accepted criteria for a proper and safe facility AND 2) funded and properly maintained by the local agency.
- i) Utilize the ADOT Traffic Engineering PGP # 1030 to designate route sections where bicycle traffic is prohibited on fully access-controlled State Highways.
- j) Utilize the ADOT Traffic Engineering PGP # 480 for placement of longitudinal rumble strips on State Highways.
- k) Use pavement surfacing materials that provide reasonably smooth surfaces on travel lanes and shoulders in conjunction with paving projects.
- l) Evaluate and consider the impacts of bicyclists when restriping roadways in conjunction with new construction, reconstruction, pavement preservation and minor spot improvement projects.
- m) Utilize Intergovernmental Agreements to define funding and maintenance responsibilities with local governments for bicycle facilities within State highway right-of-way.

It is ADOT's Policy not to:

- a) Reduce existing travel lane widths to accommodate bicycle traffic unless supported by a traffic study. Concurrence by the State Traffic Engineer and the Assistant Engineer, Roadway Engineering Group are required.
- b) Sign or designate bikeways on any roadways on the State Highway System or roads on State-owned right of way without concurrence of the District Engineer and State Bicycle Coordinator.
- c) Sign or designate sidewalks as bicycle routes or bikeways.
- d) Use transportation enhancement funds for maintenance of bicycle facilities.

Pima Association of Governments and University of Arizona
University of Arizona Area Bicycle and Pedestrian Plan

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

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

This page intentionally left blank.

4 Existing Conditions

This chapter presents the existing conditions in the University of Arizona Bicycle and Pedestrian Plan area. It is organized into the following sections:

- Existing Bicycle and Pedestrian Infrastructure
- Existing End-of-Trip Facilities
- Multi-Modal Connections
- Collision and Safety Analysis
- Education and Encouragement Programs

4.1 Existing Bicycle and Pedestrian Infrastructure

This section describes existing bicycle and pedestrian infrastructure in and around the University of Arizona.

4.1.1 Bicycle Infrastructure

Figure 4-1 displays the existing types of bikeways in the study area, which includes bicycle paths, shared use paths, bus/bike lanes, bike routes, and bike boulevards. Figure 4-2 shows existing bicycle infrastructure at the University of Arizona and Figure 4-3 shows existing and proposed bicycle infrastructure in the City of Tucson as a whole.

Bicycle Paths

Bicycle paths are paved facilities intended for exclusive use by bicyclists and can be constructed in roadway right-of-way or can have exclusive right-of-way off-street, such as in utility corridors. Bicycle paths are beneficial to a bicycle network because they provide an alternative for bicyclists that do not feel comfortable riding with automobile traffic. Bicycle paths at the University of Arizona are located in the central portion of the campus.



U of A Bicycle Path

Shared-Use Paths

Shared-use paths are paved facilities used by bicyclists, pedestrians, equestrians, and those using other non-motorized modes of transportation. Similar to bicycle paths, these facilities can be constructed in roadway right-of-way or can have exclusive right-of-way off-street. Shared-use paths are generally slower moving than bicycle paths and other facility types because they are shared among a variety of users (e.g., faster moving cyclists and slower moving pedestrians). There are 89.9 miles of shared-use paths in the study area, including Zone 1 through Zone 3.



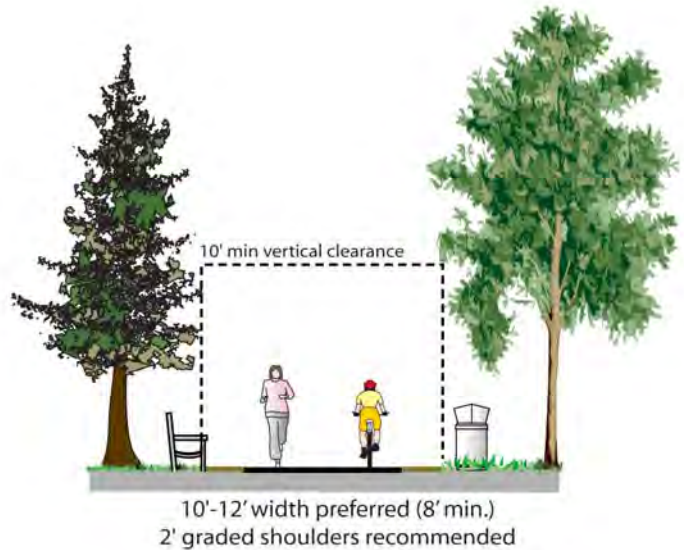
U of A Shared-Use Path

Figure 4-1: Bikeway Types in the University of Arizona Study Area

Bike Path / Shared-Use Path

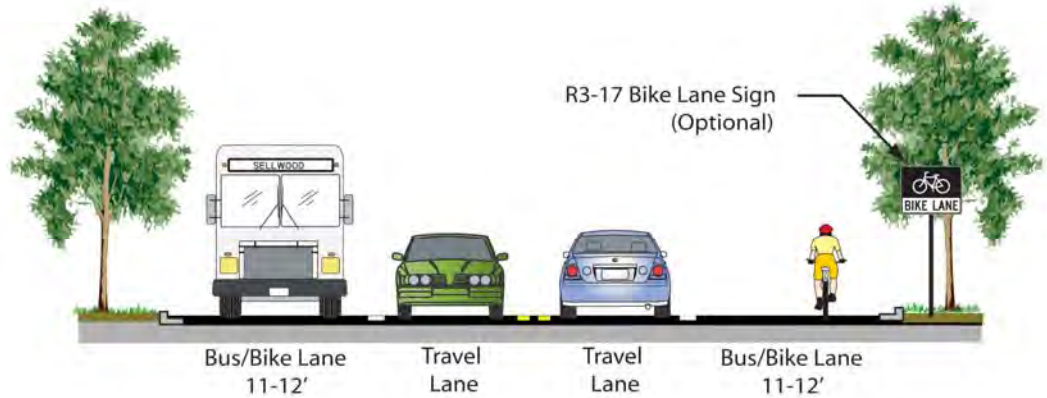


Provides completely separated right-of-way for exclusive use by bicycles (and sometimes pedestrians) with cross-flow minimized.



Bike/Bus Lane

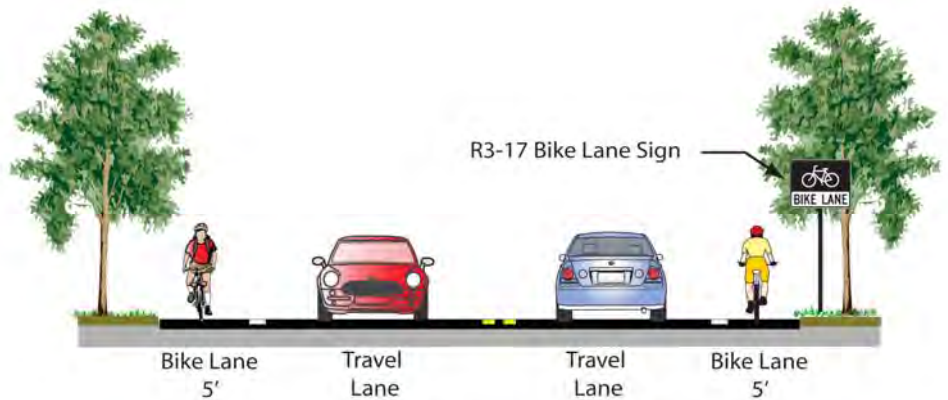
Provides striped lane for one-way bike travel on a street or highway. Can be shared with buses.



Bike Lane



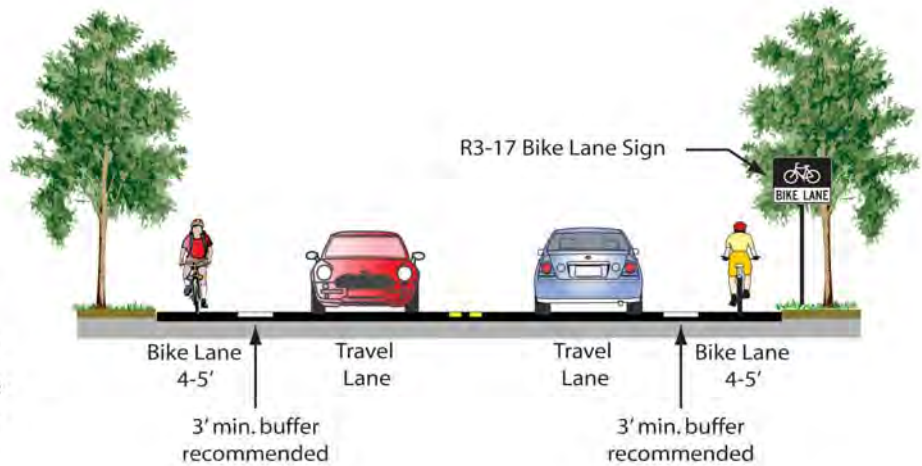
Provides an exclusive lane for bicycle travel on a roadway shared with motor vehicles, typically on collector streets and arterial roads with up to six travel lanes.



Buffered Bike Lane



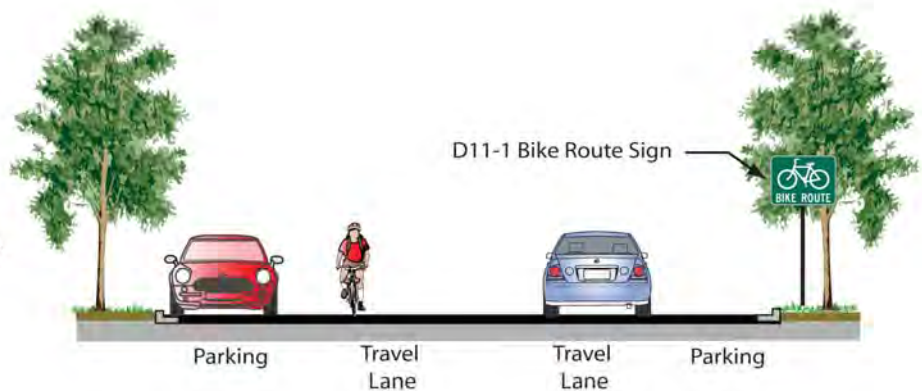
Provides an exclusive lane for bicycle travel on a roadway shared with motor vehicles with an additional buffered space either between the bike lane and vehicle travel lane or between the bike lane and parking lane where parking turnover is high.



Bike Route



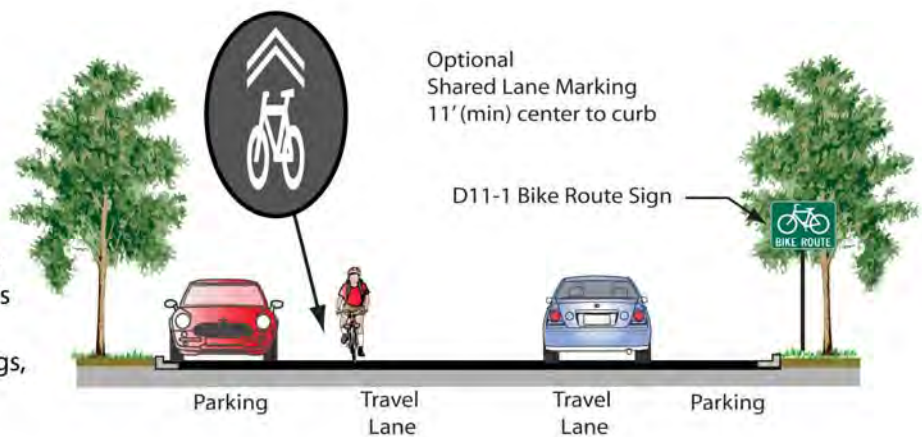
Provides for shared-use with motor vehicles, typically on lower volume roadways.

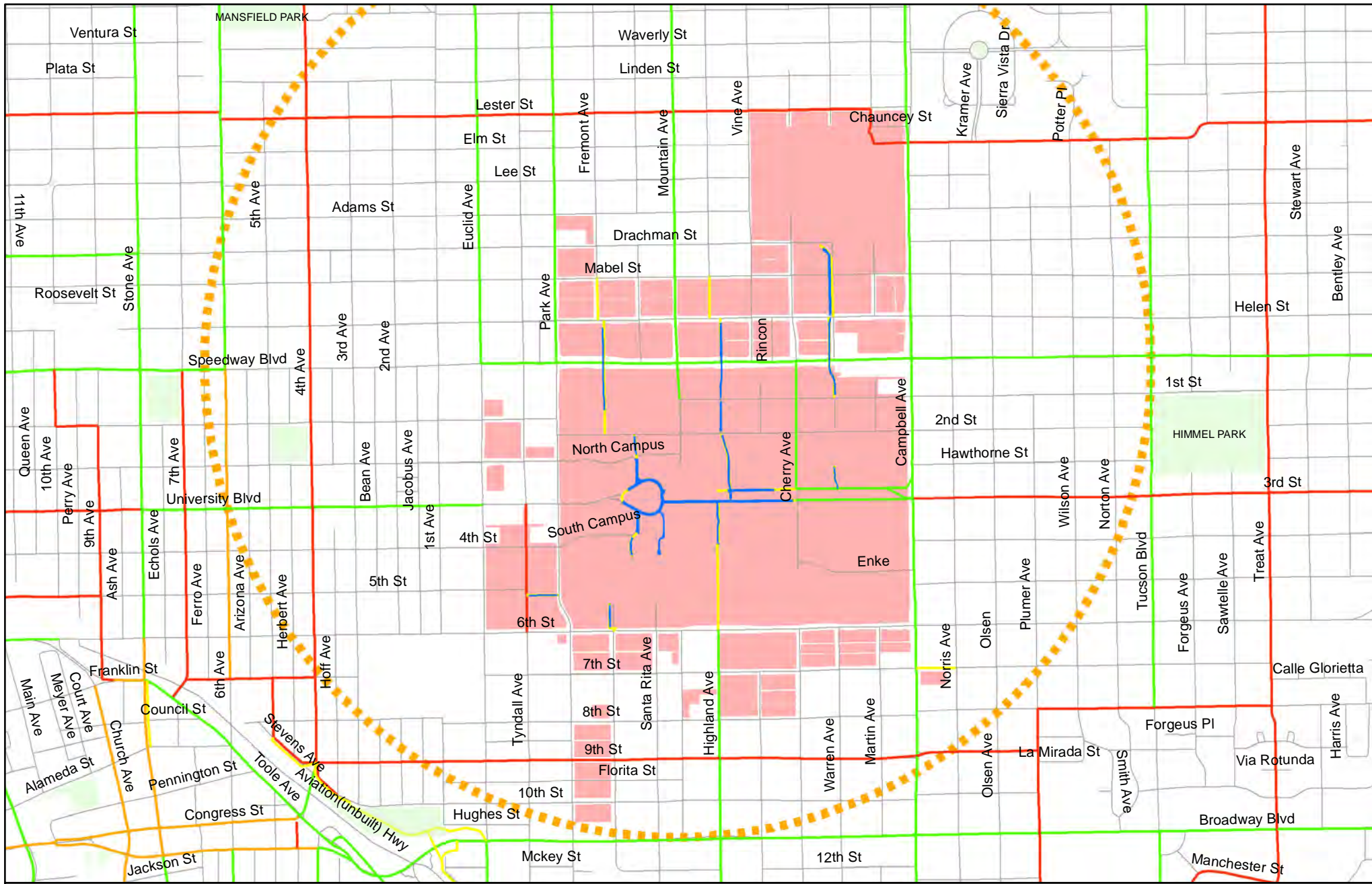


Bike Boulevard



Provides for shared-use with motor vehicles, typically on lower volume roadways. Bike Boulevards are a type of bike route with additional traffic calming, markings, and improvements.

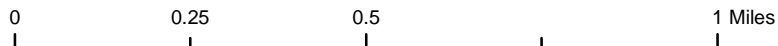


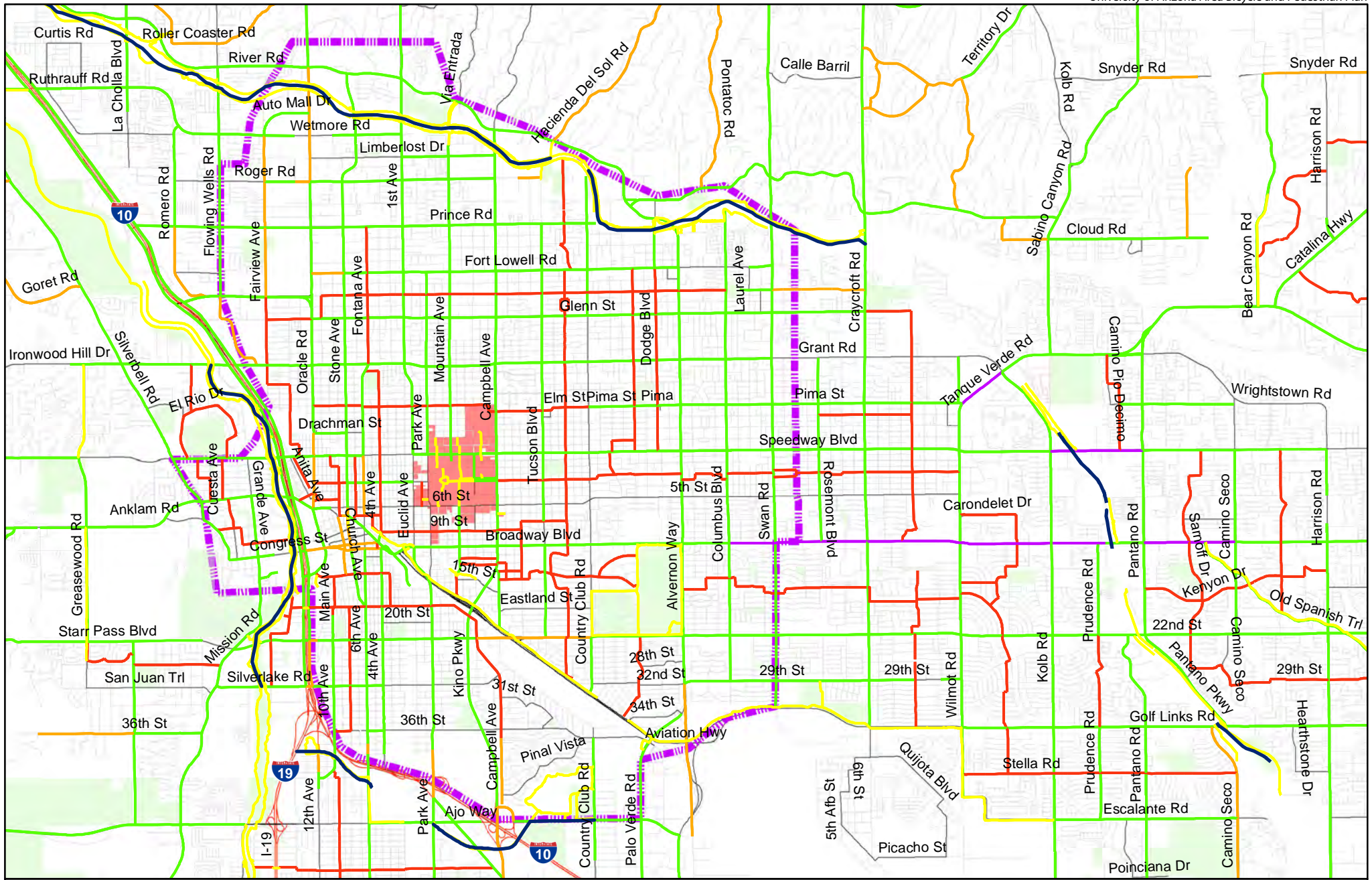


Legend

- Zone 1: On-campus, engineering-focused solutions
- Zone 2: Pedestrian-oriented treatments
- UA Bike Path
- Bike Route
- Bike Route with Striped Shoulder
- Key Connecting Streets
- Shared-use Path

University of Arizona Area Bicycle and Pedestrian Plan
Figure 4-2: Existing Bicycle Facilities at the University of Arizona





- Legend**
- Zone 1: On-campus, engineering-focused solutions
 - Zone 3: Bikeway network improvement zone
 - The Loop - Completed facility
 - Bike Route
 - Bike Route with Striped Shoulder
 - Key Connecting Streets
 - Bus/Bike Lane
 - Shared-use Path

University of Arizona Area Bicycle and Pedestrian Plan

Figure 4-3: Existing Bicycle Facilities in the City of Tucson and Pima County



Shared-use paths on the University of Arizona campus also provide grade-separated crossings of Speedway Boulevard at three locations: Olive Road, Highland Avenue, and Warren Avenue. These crossings minimize the barrier posed by Speedway Boulevard and enhance non-motorized connectivity between the campus's northern and central areas.

As shown on Figure 4-3, the Loop is approximately a 55 mile system of shared use paths being developed that will encircle metropolitan Tucson and provide connections to the broader regional bicycle and pedestrian system. The Loop will have links to Marana and Oro Valley, for Pima County residents and visitors on foot, bikes, skates and horses, as well as connect the Rillito River Park, the Santa Cruz River Park, the Julian Wash Greenway, the Harrison Greenway and the Pantano River Park. The Loop will connect to parks, trails, bus and bike routes, workplaces, schools, restaurants, hotels and motels, shopping areas, and sports and entertainment venues. Where there is available space, the Loop will have two separate adjacent paths, one paved and the other a more soft material to accommodate a variety of users. There are plans to incorporate landscaping, signage and public art elements into the Loop. Over 38 percent of the metropolitan population lives within one mile of The Loop. To date, over 52 miles of the Loop is either in place or under design or construction, with an anticipated completion date for the entire project by 2015. The Loop provides tremendous opportunities to link the University of Arizona study area with the broader Tucson region by establishing seamless connections with existing and future on-street bikeways.

Bus/Bike Lane

Bus/bike lanes are travel lanes for exclusive use by buses, bicycles, and right-turning vehicles. When a bicyclist is in the bus/bike lane, buses are expected to move into the nearest travel lane to pass the bicyclist at a safe and adequate distance. A white solid line is used to separate bicycles and buses from other traffic while pavement markings inform users of the space. At intersections, the bus lane is used as a right turn lane with signage that says 'public buses and bikes exempt'. 6.9 miles of bus/bike lanes are present in the study area (Zones 1 through 3), all of which are located in the City of Tucson.

Bike Routes

Bike routes share the right-of-way between vehicles and bicyclists with signage. These facilities are typically recommended for streets with relatively low traffic speeds (25 mph or less) and lower volumes (<3,000 ADT) such that less experienced bicyclists will feel comfortable bicycling with



Bus/Bike Lane



Bike Route with Shared Lane Marking



Bike Route with Striped Shoulder

mixed traffic. Both the University of Arizona and City of Tucson have bike routes in their existing networks. The network of bike routes in Tucson identifies residential streets as bike routes to provide connectivity, continuity and coverage for bicyclists.

Some bike routes in the study area have striped shoulders, in which the shoulders effectively function as a bike lane. These are located on streets with higher traffic volumes and speeds of 25 mph or more. The shoulders range from approximately 4 to 10 feet wide. There are 92.2 miles of bike routes in the study area (Zones 1 through 3) and an additional 314.4 miles of bike routes with striped shoulders.

Bike Boulevards

Another bikeway type found in the study area is commonly known as a “Bike Boulevard,” which is a Bike Route on a local road that prioritizes pedestrians, neighborhood traffic, and bicycles, and discourages cut-through traffic. Bike boulevards include a wide range of treatment options including the following:

- Wayfinding signage
- Pavement markings
- Traffic calming (bulb-outs, traffic diverters, chicanes, speed humps)
- High visibility pedestrian crosswalks
- Bicycle detectors at intersections
- Bicycle crossing signals (such as a Bike HAWK, discussed below)

The City of Tucson is experimenting with modifying the HAWK signal to better accommodate bicyclists at busy crossing locations. Supplemental treatments include wayfinding and pavement markings to guide cyclists to the preferred crossing position, separate pedestrian and bicycle crosswalks, and flexible bollards to clarify motorist and bicycle space within the roadway. The first ‘bike HAWK’ was installed as a pilot at 3rd Street and Swan Ave and the city is evaluating the effectiveness of the modifications. The City of Tucson plans on installing additional bike HAWKs if the pilot location continues to go well.

Existing bike boulevards in the study area include 3rd Street and 4th Avenue/Fontana Avenue. They differ from other Bike Routes in the study area as they have crossing treatments, which help bicyclists travel across major arterials, and they have pavement markings and wayfinding signs. Other Bike Routes in the area may not have intersection crossing treatments at arterial streets to assist bicyclists in crossing the street.

Key Connecting Streets

Key connecting streets are those identified by Pima County that provide connectivity on popular recreational or commuting routes. Key connecting streets are likely most appropriate for experienced riders. There are 29.6 miles of key connecting streets in the study area.

Intersection Treatments

There are several types of intersection treatments used in the study area to improve the bicycling environment. To help bicyclists cross intersections, there are push-button bicycle detection, video detectors, and signals. Push-buttons allow



Colored bike lane at the intersection
of 4th Avenue and Toole

bicyclists to trigger the signal by pushing a mounted button. Video detectors trigger the signal when a bicyclist (or other vehicle) is detected via video software. Signage accompanies both methods of detection to help inform bicyclists how to trigger the signal. HAWK, pelican, and toucan signals can assist with bicycle and pedestrian crossing, and are discussed in detail in the following section. These treatments are used in a variety of locations throughout Tucson, such as Speedway Boulevard at 4th Avenue, and Grant Road at 6th Avenue.

Bike boxes in the study area are designated zones at the start of traffic lanes at signalized intersections that allow bicyclists to get ahead of queuing traffic during the red signal phase. By providing a designated space for bicyclists, they can help bicyclists turn left at intersections by allowing an easier transition across travel lanes. A bike box exists at the intersection of 6th Street and Highland Avenue (on the U of A campus's south side). This bike box was installed to give bicyclists a head-start because the south leg of the intersection is very narrow and it is a shared lane situation; it gives bicycles a chance to claim the lane. See Chapter 6 for more information about bike boxes.

Colored lanes at intersections make bicyclists more visible to motorists and can help prevent “right hook” collisions, during which a motorist turns right in front of a bicyclist. Colored lanes can also highlight the right for bicyclists to be on the road by making a more visible space for them.

Wayfinding

Wayfinding signage directs bicyclists to major destinations, such as downtown areas, commercial centers, and transit hubs. Existing wayfinding signage in the study area helps bicyclists navigate to the bicycle underpasses, as well as other important local destinations. Key routes, such as Mountain Avenue and University Boulevard, also have wayfinding signage.

4.1.2 Pedestrian Infrastructure

This section describes existing pedestrian infrastructure in and around the University of Arizona.

Shared-Use Paths

As mentioned previously, shared-use paths are paved right-of-way for exclusive use by bicyclists, pedestrians, equestrians, and those using non-motorized modes of transportation. See section 4.1.1 for more information. The University of Arizona, the City of Tucson, and Pima County all have shared-use paths.

Where pedestrians must cross bike paths or shared-use paths at the University of Arizona, there are “Look” pavement markings to remind pedestrians to watch for opposing bicycle traffic. These conflict locations are also often painted a different color or have a different striping pattern to delineate the crossing zone.



“Look” pavement marking

Sidewalks and Walkways

Sidewalks are intended for exclusive use by pedestrians, typically adjacent to the street and physically separated from motor vehicle traffic. By separating pedestrians from vehicular traffic, safety can be increased due to reduced conflicts between the two modes. In the City of Tucson, bicyclists are prohibited from riding

on the sidewalk unless signing indicates otherwise. In these cases, bicyclists are still required to yield to the pedestrians.

Sidewalks often accommodate a number of activities and can be divided into one or several zones, based on the activities that occur along the sidewalk. Sidewalk zones in residential areas typically include a landscape zone and a through zone for pedestrian travel. Sidewalks in commercial and retail areas usually include a planter/furniture zone, through zone, and frontage zone for uses such as congregating or outdoor seating for restaurants. Sidewalks in mixed use areas often include a planter/furniture zone or landscape strip, through zone, and frontage zone.

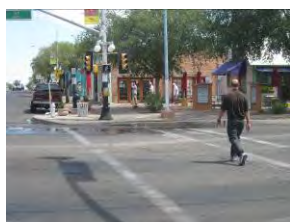
The Americans with Disabilities Act requires a minimum 4 foot wide sidewalk. There are approximately 1,000 miles of sidewalks (counting both sides of the street) in the study area on arterial and collector streets.

Walkways are the term that the University of Arizona uses for any paved surface that provides a place for pedestrians to walk, including sidewalks and plazas.

Crossings

Crosswalks are a legal extension of the sidewalk and provide guidance for pedestrians who are crossing roadways by defining and delineating their path-of-travel. Crosswalks are not required to be marked. However, crosswalk markings alert motorists of a pedestrian crossing point. Marked crosswalks in the study area are located at both intersections and midblock, and are in several forms, including transverse (parallel line) crosswalks and continental (ladder) crosswalks. It is City of Tucson policy to use High-Visibility crosswalk markings on two-to-three lane roads at uncontrolled crossings and at HAWK pedestrian beacons (discussed in the following section). At signalized crossings, two transverse 12-in white stripes are used.

At some marked crosswalks, there are additional treatments, such as decorative paving materials and raised crosswalks. Decorative paving material, such as pavers or colored concrete, further differentiates the crossing zone from the remainder of the street. Raised crosswalks may increase the visibility of pedestrians and may reduce motor vehicle speeds.



Transverse Crosswalks



Continental (Ladder)
Crosswalks



Decorative Pavers



Raised Crosswalk

Curb ramps ease the transition between a sidewalk and street by creating a "bridge" between the curb height and ground level. Curb ramps provide street and sidewalk access to pedestrians using wheelchairs and strollers. Current ADA standards require curb ramps wherever an accessible route crosses a curb.³ Curb ramp

³ Per ADAAG (Americans with Disabilities Act Accessibility Guidelines), an accessible route is a continuous unobstructed path connecting all accessible elements and spaces of a building or facility, including parking access aisles, curb ramps, crosswalks at vehicular ways, walks, ramps, and lifts.

types at street corners in the study area include diagonal and perpendicular ramps. Perpendicular ramps are preferable because they direct pedestrians to the correct alignment of the crosswalk.

The ADA requires curb ramps to have some sort of tactile strip that is a contrasting color from the pavement. Textured ramps are curb ramps with an applied texture to improve access for persons with disabilities and help visually impaired persons locate where to cross the street. Truncated domes, also known as detectable warning strips, are placed on curb ramps to help visually impaired pedestrians better detect the boundary between the sidewalk and the road.



Truncated Dome

To ensure that the region meets ADA standards, Pima County initiated an ADA transition plan effort in 2009. This will create a continuous program to address the ADA requirements along the pedestrian facilities maintained by the Pima County Department of Transportation (PCDOT). In 2012, the City of Tucson also began developing an ADA Transition Plan to help guide improvements.

Pedestrian Signals

The study area has three types of pedestrian signals: Pedestrian hybrid beacon (also known as HAWK signals), pelican signals, and toucan signals. The pedestrian hybrid beacon is a pedestrian beacon that stays dark until activated by a pedestrian, after which the overhanging lights will flash yellow. The overhanging lights then turn solid yellow followed by solid red, at which point pedestrians are shown a walk indication. To transition back to automobile right-of-way, the beacons flash red of the main street and show a flashing don't walk sign to the pedestrians with a countdown. The City of Tucson pioneered the use of the pedestrian hybrid beacon. Pelican signals use a two-stage crossing. The signal remains green on the main street until activated by a pedestrian, at which point it switches to a red signal and informs pedestrians to walk into a center median. The pedestrian must activate a second button to cross the second portion of the main street. Toucan signals are a third type of pedestrian signal but are also for bicycles, as well. There is a designated area for bicyclists and a designated area for pedestrians; both activate the light by pushing a button. Toucan signals can also improve bicycle and pedestrian transportation by reducing cut-through traffic and vehicle volumes on highly traveled bike/pedestrian routes as the median limits the number of turning movements onto a road that motorists can make.



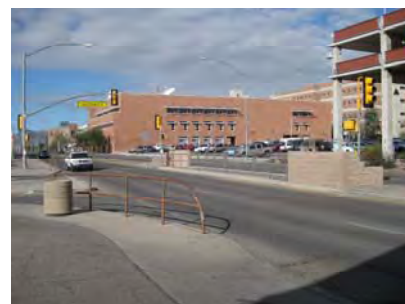
HAWK Signal



Toucan Signal

Wayfinding

The study area has various types of wayfinding signage to help orient pedestrians. As discussed in section 4.1.1, there is wayfinding signage to direct both pedestrians and bicyclists to the grade-separated crossings



Pelican Signal

and other destinations. Signage unique to each neighborhood also supplement conventional street name signs to better orient all transportation users.

4.2 Existing End-of-Trip Facilities

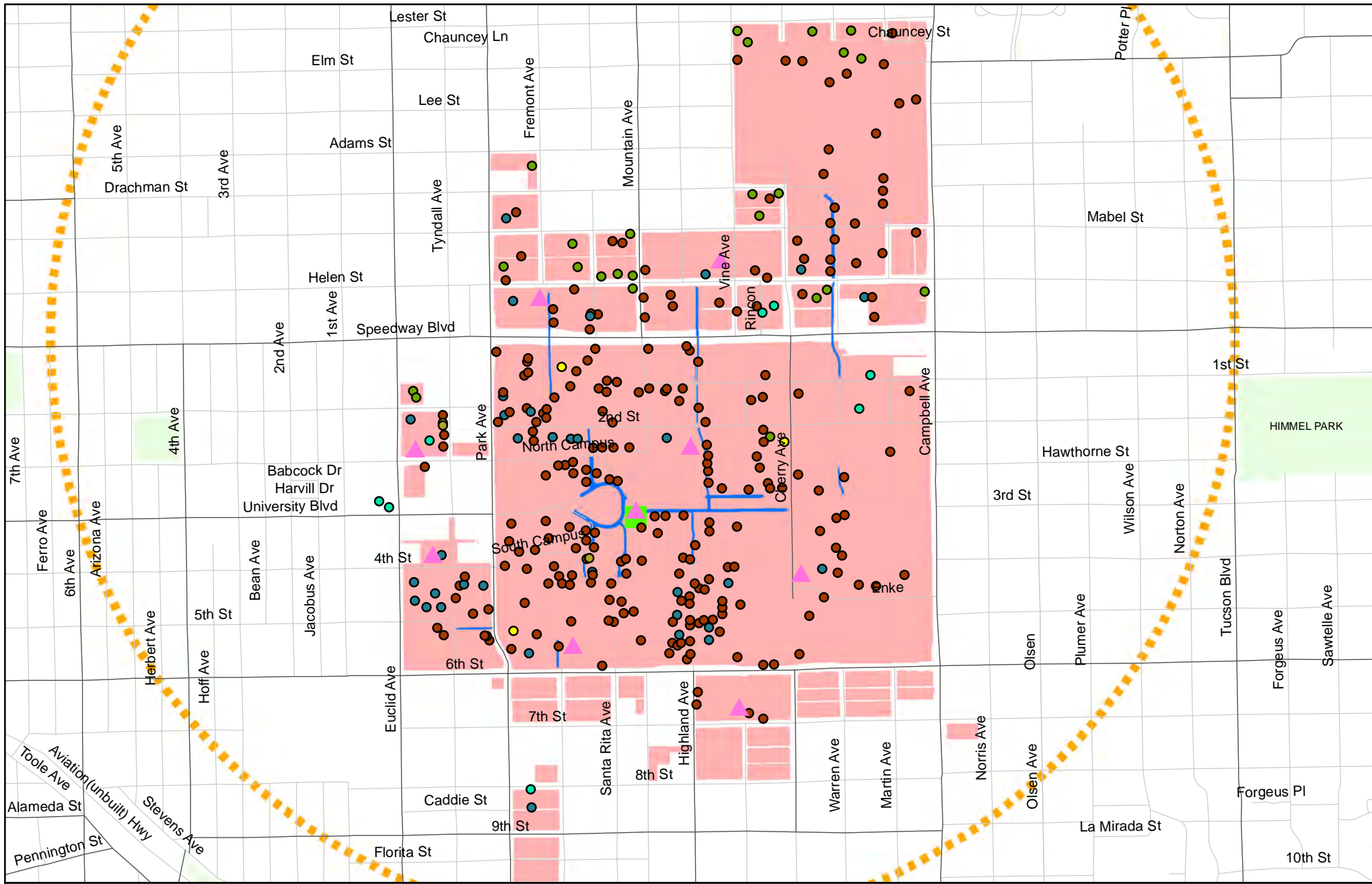
Convenient and secure end-of-trip facilities are a key part of a bicycle network because bicyclists need a place to store their bicycles upon arriving at their destination. The University of Arizona conducted a bicycle parking inventory in Spring, 2011 to improve the distribution of end-of-trip facilities for bicyclists, determine the condition of existing facilities, develop maps of bicycle parking facilities to guide operations, and collect data on bicycle utilization on campus. Table 4-1 shows the 20 highest and lowest utilized locations at the University of Arizona. The highest utilized sites have at least an 80 percent utilization rate. The lowest utilized locations have a 13 percent utilization rate or lower. Short- and long-term bicycle parking is discussed in the following sections.

Table 4-1: 20 Highest and Lowest Utilized Bicycle Parking Areas

20 Highest Utilized Parking Areas	20 Lowest Utilized Parking Areas
Yavapai (S Courtyard) – Enclosure	Udall Center Annex and Library (NE)
Bio Sciences East (NE)	Enrollment Management Systems Group (N)
Graham-Greenlee (W)	Transitional Office Building (NW)
Babcock Hall E (SW) – Enclosure	Native American Research and Training Program (East)
Stadium (NW)	Corleone Center (NW)
Bio Sciences East (NE)	Corleone Apartments (SE)
Keating Bioresearch (S) - Enclosure	Nursing (East)
La Aldea - Bike Room	UMC - Anesthesiology (S)
Cochise (S)	Rodgers Roundtree Hall (NE)
Yavapai (N)	Steward Observatory Expansion (NW)
Pharmacy (W)	Tyndall Garage (S)
Shantz (East)	Shantz (S)
Yavapai (N)	Computer Center Information Technology (NE)
McClelland (SW)	Main Gate Garage (N)
Meinel (S)	Facilities Management Renovation Services (W)
Schafer Center for Creative Photography (NE)	Comstock (East)
Kaibab Hall (W Courtyard) - Enclosure	University Teaching Center (East)
Villa del Puente (Courtyard) - Enclosure	McKale Center (SW)
La Paz (N)	Family and Consumer Science (S)
Art (W)	Centennial (East)

4.2.1 Short-Term Bicycle Parking

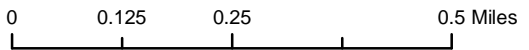
Short-term bicycle parking facilities include racks which permit the locking of the bicycle frame and at least one wheel to the rack, as well as support the bicycle in a stable position without damage to wheels, frame, or components. Short-term bicycle parking is intended for bicyclists seeking storage during the day. Bicycle racks provide a high level of convenience and moderate level of security. Figure 4-4 shows the existing end-of-trip facilities on the University of Arizona campus.



Legend

- Zone 1: On-campus, engineering-focused solutions
- Zone 2: Pedestrian-oriented treatments
- UA Bike Path
- Bike Share
- Bike Valet
- Block
- Enclosure
- Inverted-U
- Post
- Ribbon
- Wheel

University of Arizona Area Bicycle and Pedestrian Plan
Figure 4-4: Existing End-of-Trip Bicycle Facilities



Based on the bicycle parking inventory results, 84 percent of bicycle parking at the University of Arizona is short-term bicycle parking. There are 1,425 bicycle racks on the main campus, providing 9,699 bicycle parking spaces, as shown in Table 4-2. The majority of bicycle racks consist of the Inverted-U style rack (almost 97%), although the University also provides block/post, wheel, and ribbon style racks. Block/Post racks have been phased out of the bike parking facilities with the increase use of inverted U-racks. About one-fourth of the bicycle racks on campus are covered by shade.



Inverted U



Block/Post



Wheel



Ribbon

Table 4-2: University of Arizona Existing Short-Term Bicycle Parking Inventory By Rack Type

Type	Number of Spaces	Percentage of Total
Inverted U	9,370	96.6 %
Block/Post	82	0.9 %
Wheel	184	1.9 %
Ribbon	63	0.6 %
Total	9,699	100 %
Shaded Parking	2,388	24.6 %

Source: Bicycle Parking Inventory and Survey Report

Bike Valet

The University of Arizona’s Department of Parking and Transportation Services offers free valet bicycle parking in front of the Nugent Building for students and employees who ride their bikes to the campus. The valet began in September 2010 and provides 150 long-term bicycle parking spaces. The valet is open Monday through Friday from 8:00 a.m. to 6:00 p.m., excluding University holidays. Bicyclists must register their bikes before they are permitted to use the service.

Table 4-3 displays the increase in use of the bike valet between fiscal year 2010-2011 and fiscal year 2011-2012. In the one year period, the amount of bicycles parked at the valet increased by 75 percent.



University of Arizona Bike Valet

Table 4-3: Bike Valet User Data, 2010-2012

Year to Date	Bicycles Parked
Fiscal Year 2010-2011	6,451
Fiscal Year 2010-2011	11,282
Percent Increase	75%

Source: University of Arizona

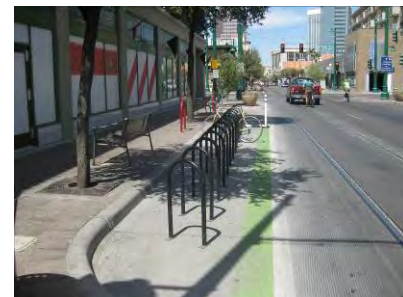
According to the bicycle parking survey results, the bike rack utilization rate on campus is approximately 43 percent. Table 4-4 shows the utilization rate by rack type. Inverted-U racks have the highest utilization rate, while Block/Post racks have the lowest. The utilization rate is calculated by dividing the number of parked bicycles at each rack type by the total rack capacity.

Table 4-4: 2011 Short-Term Bicycle Parking Utilization Rate

Type	Utilization Rate
Inverted-U	43 %
Block/Post	25 %
Wheel	38 %
Ribbon	41 %

Source: Bicycle Parking Inventory and Survey Report

The City of Tucson also has several “bike corrals,” which are on-street parking spaces that have been converted to bicycle parking spaces by installing bicycle racks on the street. Bike corrals are often installed in high-activity areas where the demand for bicycle parking is high and opportunities for installing bike racks on the sidewalk are limited (e.g., in a downtown or commercial district).



Bike Corral

4.2.2 Long-Term Bicycle Parking

Long-term bicycle parking facilities include lockable, enclosed spaces that protect the entire bicycle, its components, and its accessories against theft and inclement weather, such as rain and fog. Long-term parking facilities are more expensive to provide than short-term facilities but are significantly more secure. Long-term parking is provided at the University through lockers, enclosures, and bicycle rooms. Figure 4-4 shows locations of existing long-term end-of-trip facilities on the University of Arizona campus.⁴

Based on the bicycle parking inventory results, 14 percent of bicycle parking at the University of Arizona consists of long-term parking. The combination of long-term parking types provides 1,712 bicycle parking spaces, as shown in Table 4-5. The majority of long-term bicycle parking spaces is provided through residence hall enclosures.

⁴ There is no spatial data available for locations of bike lockers and bicycle rooms.

Table 4-5: University of Arizona Long-Term Bicycle Parking

Type	Number of Spaces	Percentage of Total
Lockers	362	21.1 %
Residence Halls Enclosures	1,075	62.8 %
Other Enclosures ⁵	28	1.6 %
Garage Enclosures	192	11.2 %
Bike Rooms	55	3.3 %
Total	1,712	100 %
Shaded Parking	385	22.4 %

Source: Bicycle Parking Inventory and Survey Report

Table 4-6 shows the utilization rate by type of long-term bicycle parking. Residence Halls Enclosures have the highest utilization rate, while Garage Enclosures have the lowest. The inventory excluded bicycle lockers.

Table 4-6: 2011 Long-Term Bicycle Parking Utilization Rate

Type	Utilization Rate
Residence Halls Enclosures	61 %
Bike Rooms	41 %
Garage Enclosures	16 %

Source: Bicycle Parking Inventory and Survey Report

Bicycle Lockers

The University of Arizona leases bicycle lockers on campus for \$90 annually. Table 4-7 shows the number of bicycle lockers at each location on the campus. As of November 2010, 84 percent of the available lockers are rented.

Table 4-7: Number of Campus Bicycle Lockers Per Location

Location	Amount
AHSC (located near the bus stop on Drachman Circle)	16 lockers
AHSC - Pharmacy	10 lockers
Bio Sciences East Bldg	8 lockers
Bio West Bldg. N.E. side	22 lockers
Cherry Garage	12 lockers
Comstock Bldg. N.E. side	12 lockers
Harshbarger	12 lockers
Keating Bldg. N.E. side	10 lockers
Life Sciences Bldg	12 lockers
Lot 3039	12 lockers
McClelland Bldg.	14 lockers
Nugent Bldg S.E. side	12 lockers

⁵ Other Enclosures includes three enclosures independently maintained/managed by campus departments.

Location	Amount
Chavez Bldg. S.E. Side	10 lockers
Psychology Bldg.	14 lockers
Sixth Street Garage on west end	18 lockers
Total	178 lockers

Source: University of Arizona

Bicycle Enclosures

The University of Arizona’s Department of Parking and Transportation Services provides secure bicycle enclosures in garages and at residence halls that are gated with a keyless entry system. Each enclosure is covered to protect bicycles from inclement weather and has individual assigned bicycle parking spaces. The Main Gate Garage bicycle enclosures have free-standing metal parking stanchions with attached security cables. All other bicycle enclosures provide bicycle racks. Bicyclists must bring their own lock to secure bicycles in assigned space and be provided a personalized entry code. Bicycles enclosures are available for rent for \$35 annually.

Bike Rooms

Bike rooms are locked rooms located inside of buildings that act as dedicated storage space for bicycles. They typically have rows of bicycle racks and can only be accessed by code or key. The University of Arizona has started putting bike rooms in new dorms.

Shower Facilities

Access to shower facilities can increase bicycle mode share as it gives commuters a place to clean up after commuting by bicycle. There are two locations at the University of Arizona where students and faculty are permitted to shower. These include Bear Down Gym (16 male and 16 female showers) and the Recreation Center (22 male and 22 female showers).

4.2.3 Bicycle Parking Restrictions

Bicycles are not permitted to be parked at the following locations:

- In any University building
- Against a tree, plant, or bush
- Against a signpost, meter, fence, pipe, or railing
- On a ramp, stairway, or public seating fixture

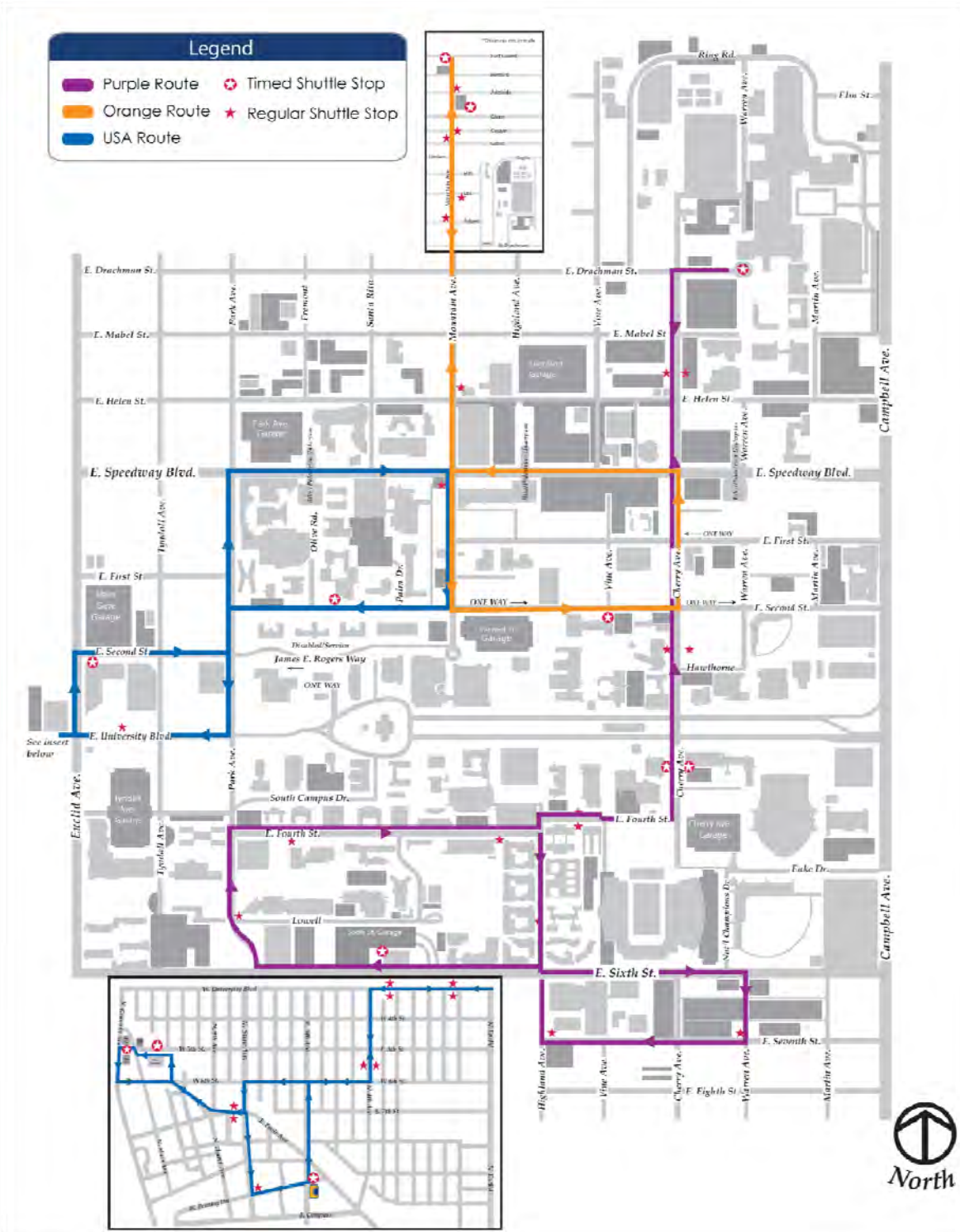
Not allowing bicycles inside of buildings can discourage people from riding to the campus. Not all buildings have secure long-term parking within close proximity and some bicyclists do not feel comfortable parking their bicycles where they cannot see them for long periods of time.

4.3 Multi-Modal Connections

4.3.1 Cat Tran

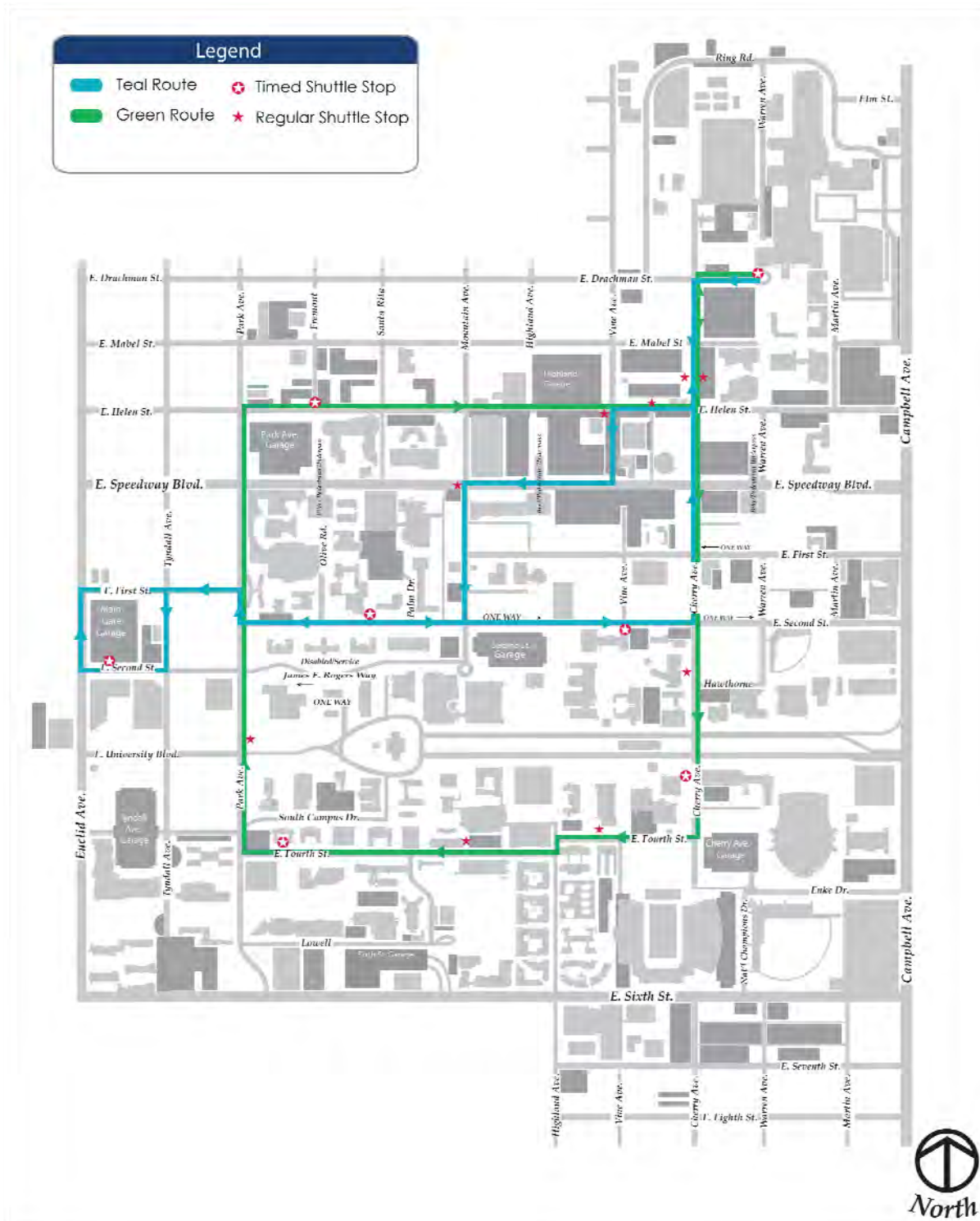
The University operates a campus shuttle service on five fixed routes and one night route, which are shown in Figure 4-5 through Figure 4-7. The shuttle is free for students and connects to six off-campus Park and Ride

Figure 4-5: Cat Tran Purple, Orange, and USA Routes



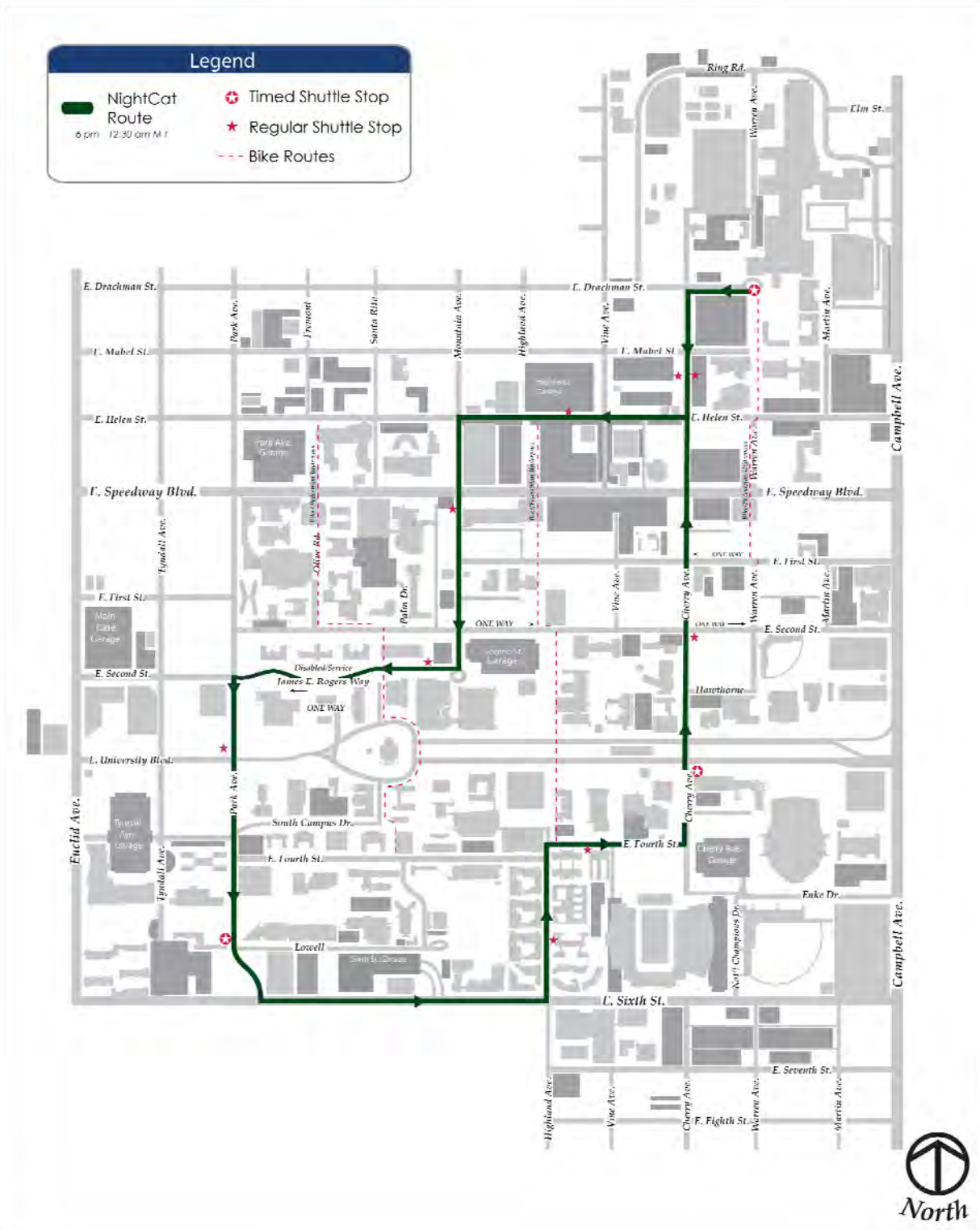
Source: University of Arizona

Figure 4-6: Cat Tran Teal and Green Routes



Source: University of Arizona

Figure 4-7: Cat Tran Night Cat Route



Source: University of Arizona

Lots. The shuttle operates Monday through Friday on the five daytime routes from 6:30 am to 6:30 pm and on the night route from 6:00 pm to 12:30 am. There are no bike racks on Cat Tran vehicles.

4.3.2 Sun Tran

The City of Tucson operates the Sun Tran transit service, which consists of 40 fixed routes and 240 coaches. Figure 4-8 displays Sun Tran routes that pass through the University of Arizona.

The City of Tucson and the University of Arizona offer the “U-Pass program” in which the University will pay up to 40 percent of the cost of transportation on Sun Tran for University of Arizona students, faculty and staff.

All Sun Tran buses are equipped with bike racks on the front bumper that can carry up to two bicycles. Bikes are not allowed inside buses, unless they are fold-up styles. The Sun Tran website provides instructions on how to load bicycles into the racks.

Sun Tran also provides bicycle lockers for rent at the locations listed below. Bicycle lockers cost \$30 for six months.

- Golf Links/Kolb Park & Ride
- Mission/Ajo
- Speedway/Harrison Park & Ride
- Tanque Verde/Sabino Canyon
- Catalina Hwy/Tanque Verde

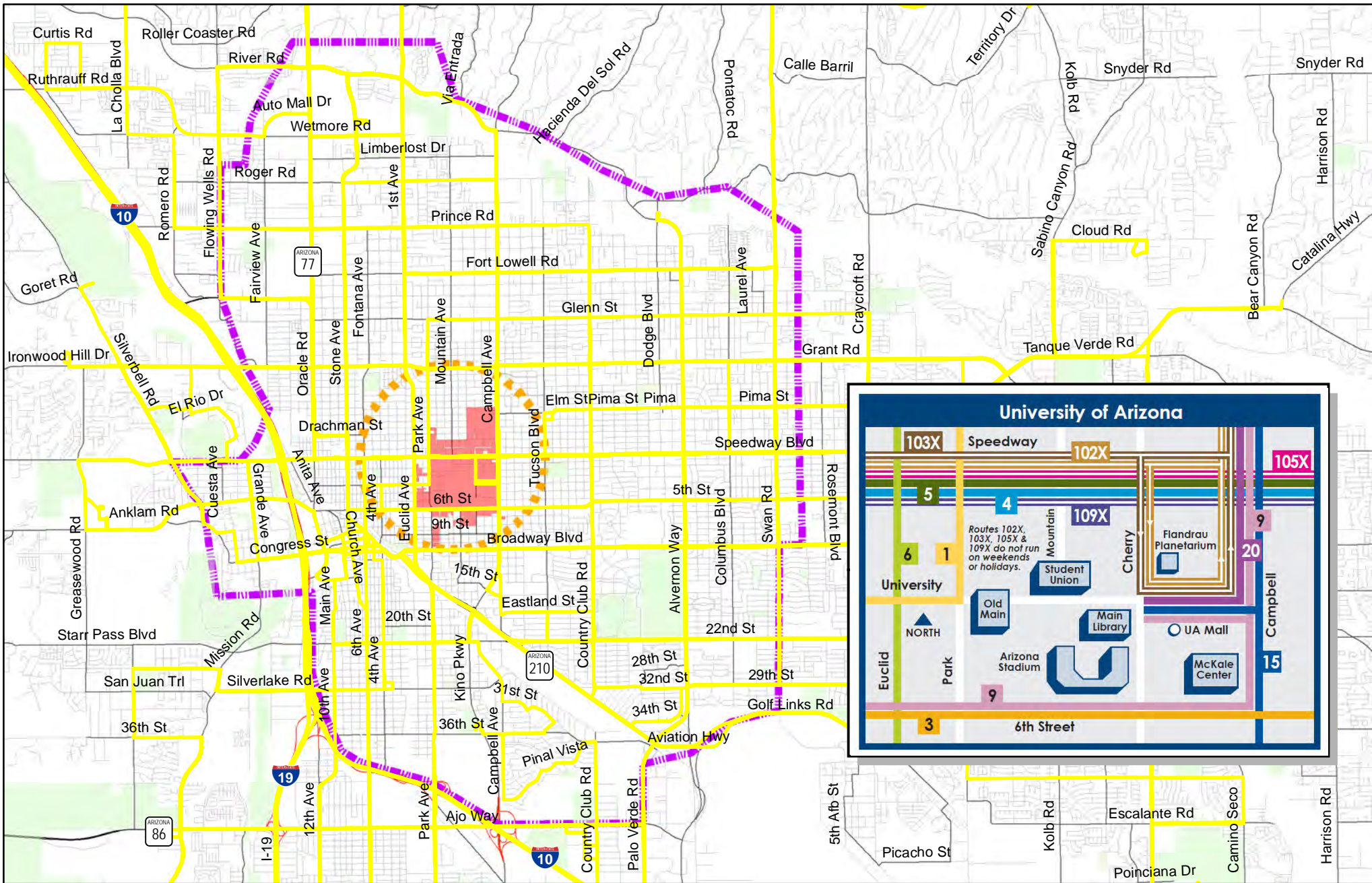
4.3.3 Car Share

The University of Arizona recently implemented a car share program in which members can rent cars for an hourly or daily fee. Hertz On Demand provides the car sharing service, which is open 24 hours a day and seven days a week. Users must register online with Hertz on Demand to reserve a car at one of several locations listed below. Once at the desired location, users swipe a card to unlock the doors of the car. The key is waiting inside of the vehicle and ready to be driven.





- Olive Road across from Coconino Hall
- Apache/Santa Cruz Halls
- Second Street Garage
- Sixth Street Garage
- Tyndall Avenue Garage

4.4 Collision and Safety Analysis

Safety is a major concern for both existing and potential bicyclists and pedestrians. Safety not only concerns bicyclists and pedestrians, but for those who do not bike and walk, perceived lack of safety is one of the most frequently cited reasons for not bicycling or walking. Identifying collision sites can draw attention to locations which may be in need of improved safety treatments, particularly if multiple collisions occur at the same location. This section presents bicycle and pedestrian collision data, bicycle theft data, and existing enforcement strategies.



Legend

-  Zone 1: On-campus, engineering-focused solutions
-  Zone 2: Pedestrian-oriented treatments
-  Zone 3: Bikeway network improvement zone
-  Bus Routes

University of Arizona Area Bicycle and Pedestrian Plan
Figure 4-8: Existing Sun Tran Bus Routes



4.4.1 Collision Data

Table 4-8 shows the total number of reported bicycle and pedestrian crashes in the project study area (through the programmatic improvements zone) between 2007 and 2010, which is also shown in Figure 4-9 and Figure 4-10. This analysis area extends beyond Zone 3 in order to include additional areas of the Tucson region. The highest number of reported bicycle crashes occurred in 2008, although the number of crashes has varied by year. Reported pedestrian collisions consistently decreased from 2007 through 2010. Many bicycle and pedestrian collisions are never reported to police, so this data presents a subset of all bicycle and pedestrian collisions in the area. Since not all collisions are reported, there are challenges in collecting crash data that display the true conditions of a location.

Table 4-8: Total Number of Reported Bicycle and Pedestrian Crashes, 2007-2010

Year	Bicycle Crashes	Pedestrian Crashes
2007	294	223
2008	306	223
2009	233	212
2010	250	190
Total	1,083	848

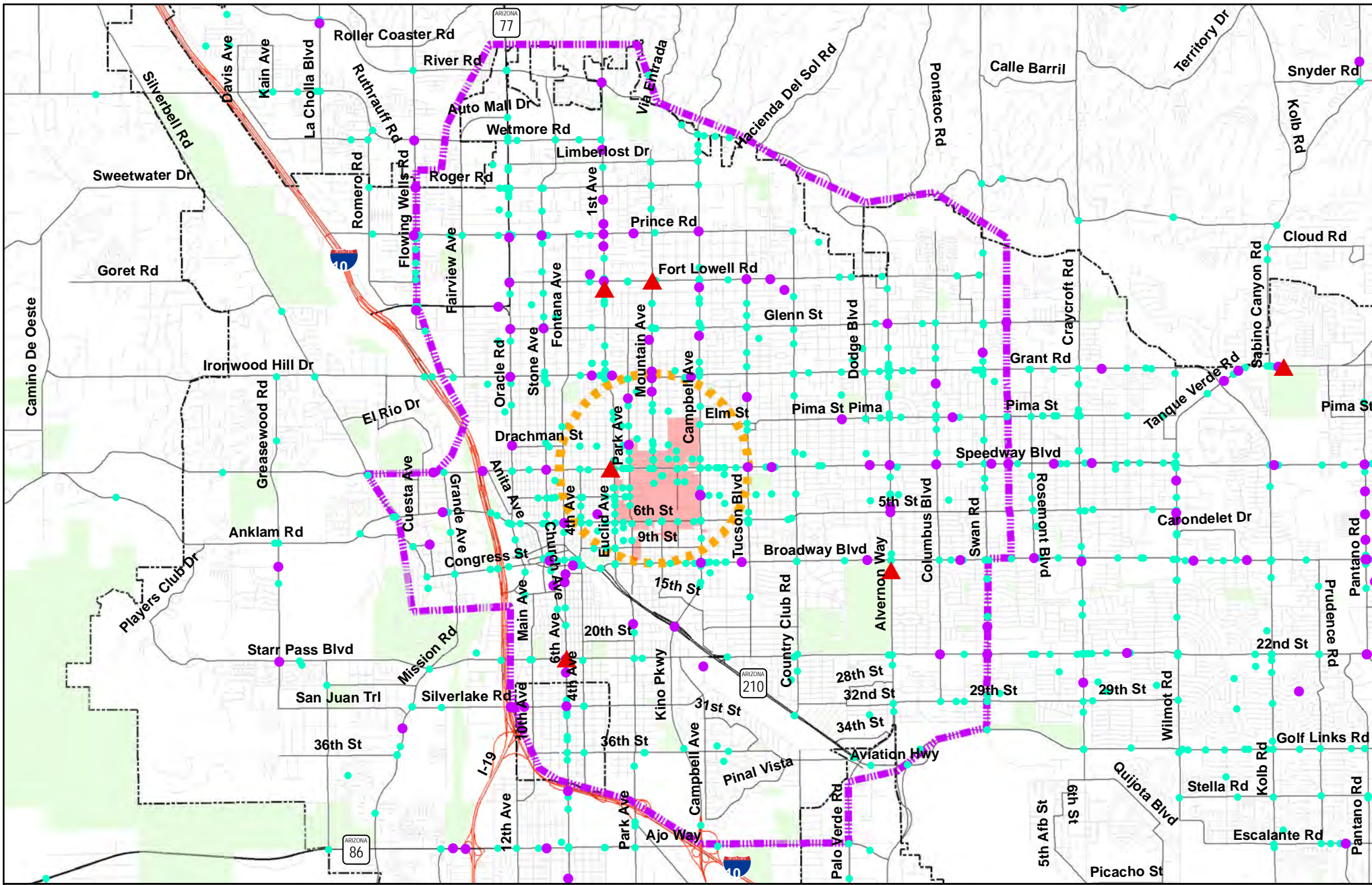
Source: ADOT Statewide Bicycle and Pedestrian Plan (2011)

Table 4-9 presents the total number of bicycle and pedestrian collisions in the study area (through the programmatic improvements zone) by severity of injury. The majority of collisions were non-incapacitating injury collisions.







Table 4-9: Bicycle and Pedestrian Collisions by Severity, 2007-2010

Injury Severity	Total Collisions	Percent of Total
Bicycle Collisions		
No Injury	143	13.2 %
Possible Injury	228	21.1 %
Non Incapacitating Injury	571	52.7 %
Incapacitating Injury	130	12.0 %
Fatal	11	1.0 %
Total	1,083	100 %
Pedestrian Collisions		
No Injury	63	7.4 %
Possible Injury	168	19.8 %
Non Incapacitating Injury	353	41.6 %
Incapacitating Injury	218	25.7 %
Fatal	46	5.5 %
Total	848	100 %

Source: ADOT Statewide Bicycle and Pedestrian Plan (2011)



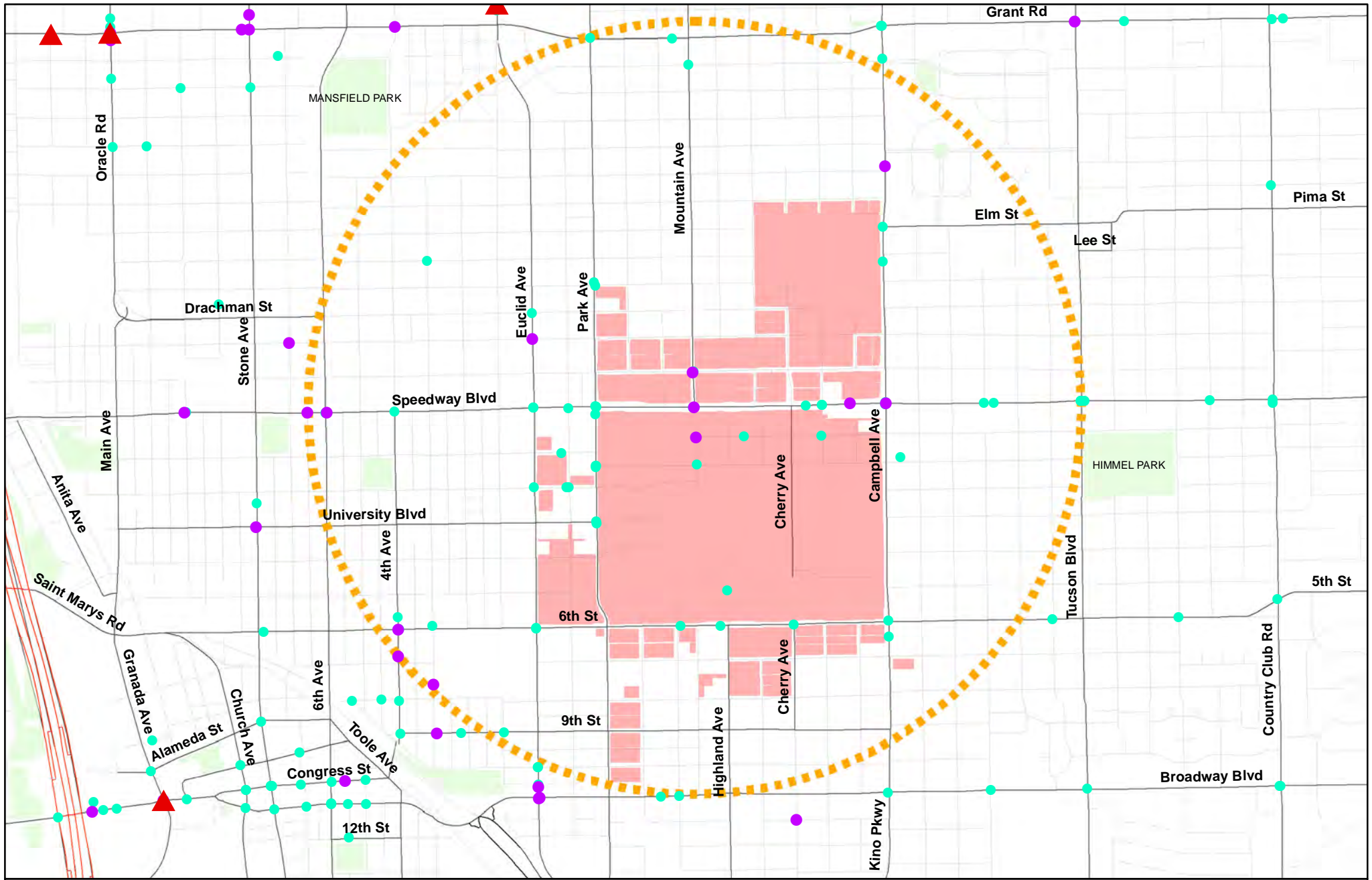
Legend

-  Zone 1: On-campus, engineering-focused solutions
 -  Zone 2: Pedestrian-oriented treatments
 -  Zone 3: Bikeway network improvement zone
 -  Fatal
 -  Incapacitating Injury
 -  Other
- Bicycle - Vehicle Crashes 2007-2010

University of Arizona Area Bicycle and Pedestrian Plan

Figure 4-9: Reported Bicycle Crashes 2007-2010



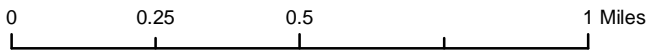


Legend

- Zone 1: On-campus, engineering-focused solutions
- Zone 2: Pedestrian-oriented treatments
- Fatal
- Incapacitating Injury
- Other

University of Arizona Area Bicycle and Pedestrian Plan

Figure 4-10: Reported Pedestrian Crashes, 2007-2010



Approximately 69 percent of bicycle and pedestrian collisions occurred during daylight and another 25 percent occurred during the dark. The remaining collisions occurred during dusk or dawn. This suggests there are more people walking and biking during the day, but that there may be problems with visibility of bicyclists and pedestrians at night. Also, approximately 84 percent of bicycle and pedestrian collisions occurred on a clear day and 12 percent occurred on a cloudy day.

4.4.2 Bicycle Theft

Bicycle theft is a common issue, especially on university campuses. Table 4-10 displays reported bicycle theft data at the University of Arizona from 2009-2011. In 2011, there were 197 fewer reported thefts than in 2009. It is important to note that many bicycle thefts go unreported, so the data presented below likely underreports the actual bicycle thefts on the University of Arizona campus.

Table 4-10: University of Arizona Bicycle Theft Data 2009-2011

Year	Number of Bicycles Stolen
2009	422
2010	385
2011	225
Total	1,032

Source: University of Arizona

The top 10 campus locations that experienced high numbers of bicycles stolen are presented in Table 4-11. In both 2009 and 2010, the location with the highest number of reported bicycle thefts was at the Student Rec Center, followed by the Main Library and McClelland Hall. The Main Library and Manzanita Hall had the highest theft in 2011. According to the U of A Bike Theft Mapping report, 2011 theft levels have dropped to 2006 levels while experiencing an increase in student population, which can be attributed to new bike theft prevention programs sponsored by the University of Arizona Parking and Transportation Services.

Table 4-11: University of Arizona High Bicycle Theft Locations

Location	2009 Reported Thefts	2010 Reported Thefts	2011 Reported Thefts	Total Reported Thefts
Student Rec Center	32	24	8	64
Main Library	24	20	9	53
McClelland Hall	17	8	1	26
Harvill	12	9	8	29
Manzanita Hall	15	15	9	39
Music	9	12	2	23
Modern Languages	13	8	3	24
Skyview Apartments	9	11	7	27
Student Union	5	4	2	11
AME	11	6	1	18

Source: University of Arizona

Table 4-12 shows reported bicycle theft in the City of Tucson between 2006 and 2010. Over the five year period, bicycle theft has declined by about 25 percent.

Table 4-12: City of Tucson Bicycle Theft Data 2006-2010

Year	Number of Bicycles Reported Stolen
2006	825
2007	701
2008	666
2009	618
2010	614
Total	3,424

Source: Tucson Police Department

4.4.3 Enforcement

4.4.3.1 University of Arizona Bicycle and Pedestrian Regulations

On the University of Arizona campus, Arizona Law Enforcement Officers can enforce all applicable Arizona state laws regarding traffic control devices and rules of the road and can issue moving violations. Violations of the University of Arizona Parking and Traffic Regulations are subject to citations. Table 4-13 outlines the regulations for which bicyclists and pedestrians can receive citations and the cost of each citation. As shown in the table, bicyclists can be cited for riding in any place where bicycles are prohibited by regulation or by sign, including on sidewalks. The University requires bicycles to be walked in the locations listed below. When bicyclists dismount they are subject to the same regulations as pedestrians.

- The Student Union Memorial Center Canyon Walkways
- The Alumni Plaza Area
- Krutch Garden Pedestrian Walkways
- The North Mall Area (just south of the Student Union) between Bear Down Bike Path and Old Main Circle
- Bio Sciences West/Gould Simpson Walkway (N/S)

Table 4-13: Non-Motorized Citations Fine Schedule

Code	Amount	Description
V2A	\$20	Parking in any University building
V2B	\$25	Blocking/parking on any ramp; vehicle subject to immediate impound.
V2C	\$50	Subsequent offenses of V2B
V2D	\$25	Riding on a pedestrian walkway, sidewalk or restricted area
V2E	\$40	Riding a bicycle without lighting equipment in operation between sunset and sunrise
V2F	\$25	Impoundment (Lock/removal)
V2H	\$25	Blocking and/or parking on wheelchair access ways
V2I	\$50	Subsequent offenses of V2H
V2K	\$25	Parking in or blocking fire lanes, exits/entrances to university buildings., emergency

Code	Amount	Description
		safety devices
V2M	\$40	Riding a vehicle in the opposite direction of traffic or traffic signs
V2O	\$20	Other violations of The University Non-Motorized regulations
V2P	\$1.00/day	Storage Fee - Fees begin to accrue three calendar days after impoundment
V2Q	\$20	Locking a bicycle to another thereby preventing its use
V2T	\$25	Walking in a bicycle lane, bicycle route, or jaywalking
V2W	None	Warning
V2X	\$61	Failure to stop at a stop sign

Source: University of Arizona

The University of Arizona permits golf carts to be driven in bike lanes outside of the roadway. Motorized bicycles are permitted to use bike lanes, paths, or routes on campus as long as the motor is not being used, speed is maintained at 15 miles per hour or below, and they comply with the University’s parking and traffic regulations.



Bicycle Dismount Zone

4.4.3.2 Bicycle Diversion Classes

The University of Arizona and the City of Tucson offer bicycle diversion classes, which allow bicyclists ticketed for traffic violations to attend the class in lieu of paying a fine. Diversion classes are offered on Saturdays and last four hours. Content of the diversion classes includes traffic laws and how to operate a bicycle. There is a classroom portion and a riding portion. The riding lesson includes learning parking lot “skills” that teach safe riding. Participants are required to take a test upon completion of the class. Bicycle diversion classes are provided and paid for by Pima County as a service to Pima County, the City of Tucson, and the University of Arizona.

4.5 Education and Encouragement Programs

This section presents existing education and encouragement programs administered by the University of Arizona, City of Tucson, Pima County and PAG.

4.5.1 University of Arizona

4.5.1.1 Bicycle Registration

The University of Arizona offers a free, voluntary bicycle registration program. Registered bicycles are provided a unique identification number, which is placed on the bicycle and may help to prevent theft. If registered bicycles are stolen, the police have a number to trace the bike back to the owner. If a bicyclist has registered his/her bicycle with the University and loses the key to his/her bike lock, Parking and Transportation Services will remove the lock for free rather than the \$15.00 price for unregistered bicycles.

4.5.1.2 Bicycle Friendly University

The League of American Bicyclists designated the University of Arizona as a silver level Bicycle Friendly University in the Spring of 2011. Highlights of the University's application that led to its silver level designation include valet bicycle parking, the expansion of CAT Wheels (see section 4.5.1.5 for details about the program), the dedication of University staff to bicycling issues, a high percentage of bicycle commuting, and bike/pedestrian-only underpasses. The League of American Bicyclists provided the University of Arizona with several recommended measures to improve bicycling on campus, including formalizing an incentive program for students who commute by bicycle, drafting a comprehensive bike plan, and increasing the amount of secure bicycle parking on campus.



4.5.1.3 Campus Bicycle Station

The University of Arizona has a campus bicycle station in front of the Science Library at which students and employees can obtain bicycle lights and bells, as well as receive bicycle related services at no cost. The bicycle station is open on Tuesdays, Wednesdays, and Thursdays from 9 am to 1 pm. Services are performed through a collaborative arrangement with Parking and Transportation and the Pima County Bicycle Ambassador Program which provides experienced bicyclists and include:

- Bicycle registration
- Bicycle maintenance assistance – Brake/seat/handlebar/chain/cable adjustment, tire pump, flat tire assistance, and tools
- Bicycle related material – Maps, brochures, flyers, and event information
- Bicycle safety class information

Table 4-14 shows the change in bicyclists using the services offered at the bicycle station between fiscal year 2010-2011 and fiscal year 2011-2012. In the one year period, all of the services used increased. Roaming bike ambassador handouts had the highest increase in use as this was a new addition to the bike station in January 2012. The roaming bicycle ambassadors work out of the bicycle station and distribute information throughout campus. They also provide education on bicycle safety and assist as needed students/staff at bicycle parking areas. This outreach has been successful in educating and helping students/staff with bicycle safety and informing them of the UA bike programs and services.

Table 4-14: Bicycle Station Services Data, 2010-2012

Year to Date	Fiscal Year 2010 –2011	Fiscal Year 2011 –2012	Percent Increase
Flat Repairs	441	1,124	155%
Mechanical Fixes	1,002	1,447	44%
Bike Registrations	1,203	1,536	28%
Bike Lights Given Out	365	393	8%
Bike Bells Given Out	389	603	55%
Information/Questions	261	547	110%

Year to Date	Fiscal Year 2010 –2011	Fiscal Year 2011 –2012	Percent Increase
Roaming Bike Ambassador Handouts	0	1,801	1000%

Source: University of Arizona

4.5.1.4 Dero Fixit Bike Repair Stands

The Dero Fixit Bike Repair Stands include tools for basic bike repairs and maintenance, such as changing a flat and adjusting brakes/derailleurs. Tools and an air pump are attached to the stand. To make repairs, a bicyclist can hang the bike from the hanger arms so that the pedals and wheels spin freely. The University of Arizona currently has two stations on campus at the northwest side of the Koffler Building and at the southwest side of the AHSC Library. There are plans to install three additional stands for Fall 2012 at the following locations: Southwest side of the Park Student Union, west side of the Harvill Building, and in the Likens/Santa Cruz dorm area.

4.5.1.5 Bike Share

The University of Arizona provides a free bike share program called “CAT Wheels” in which students and employees can check out a bike for 24 hours. There are over 50 total bikes. Bike share stations are located at the following sites:

- Sixth Street Garage: 7:30 a.m. – 4 a.m., Monday through Friday
- Tyndall Avenue Garage: 7:30 a.m. – 4 a.m., Monday through Friday
- Main Gate Garage: 7:30 a.m. – 4 a.m., Monday through Friday
- M-F Park Ave. Garage: 7:30 a.m. – 4 a.m., Monday through Friday
- Highland Garage: 7:30 a.m. – 4 a.m., Monday through Friday
- Second Street Garage: 7:30 a.m. – 4 a.m., Monday through Friday
- Cherry Avenue Garage: 7:30 a.m. – 4 a.m., Monday through Friday
- Campus Recreation Outdoor Adventure Center: 10:00 a.m. – 4 a.m., Monday through Friday
- Bike Valet Station (Nugent Building): 8:00 a.m. – 4 a.m., Monday through Friday

Table 4-15 displays the change in use of CAT wheels between fiscal year 2010-2011 and fiscal year 2011-2012. Within one year, the amount of bicycles checked out increased by 256 percent.

Table 4-15: CAT Wheels User Data, 2010-2012

Year to Date	Bicycles Rented
Fiscal Year 2010-2011	1,075
Fiscal Year 2011-2012	3,830
Percent Increase	256%

Source: University of Arizona

4.5.1.6 University of Arizona Police Department

The University of Arizona Police Department (UAPD) conducts a Bicycle Safety and Education Campaign. This campaign involved educating community members on bicycle traffic laws, bicycle safety, and how to prevent bicycle theft. Throughout September, officers and volunteers intercepted bicyclists at campus

locations and provided them with a “Share the Road” guide with information on how to share the road with motorists (see section 4.5.2.4 for more information on the guide). In October of 2011, UAPD also began increased enforcement on bicycle traffic violations.

4.5.1.7 Maintenance Programs

The University of Arizona’s Parking and Transportation Services field operations section annually conducts maintenance on bike facilities, including restriping. Sidewalk repair and street sweeping is handled by Facilities Management.

4.5.1.8 Campus Bike Map

The University of Arizona has a campus bicycle map that highlights bike paths/routes, bicycle parking areas, and other bicycle resources, such as laws and safety information. The map is available both online and in print form and can be picked up at the University’s Bicycle Station and the Parking and Transportation Services office.

4.5.1.9 Bike to School Day

The University of Arizona holds a Bike to School Day on the mall during which it encourages students and employees to walk and bike to campus. At the mall there are bicycle giveaways and events, including free bike registration with a free bike light kit and free bike bell (while supplies last), free minor bike repairs/tune-ups, free nutritional bars from Clif Bar, free maps, brochures, and expertise from Trek Bicycle shop and UA Cycling Club.

4.5.1.10 Employee Bike to Work Program

As part of the Employee Bike to Work program, faculty and staff at the University of Arizona are permitted to use locker and shower facilities at no cost at the Campus Recreation Center if they bicycle to work. Lockers and showers are open between the hours of 6am and 10am, Monday through Friday.

4.5.2 City of Tucson / Pima County / PAG

4.5.2.1 Bike Box Brochure

The City of Tucson promotes the use of its bike box on Highland Avenue at 6th Street by distributing a pamphlet that outlines why the City installed the bike box and how motorists and bicyclists should use the facility.

4.5.2.2 Safe Routes to School Program

Pima County coordinates a regional program to create safe routes for children to walk or bike to school, and to educate them about walking and bicycling safety. The Safe Routes to School (SR2S) program is funded by a federal grant and is matched with funds from the county and city. The program goals are to encourage children to increase their physical activity and decrease traffic collisions involving children.



Bike Box Brochure

In addition to teaching children, the SR2S program encourages parents, teachers, school staff, transportation officials, law-enforcement officers, and school district officials to detect student travel patterns and create safe routes for students to use while walking or bicycling to school. Facility improvements, such as the installation of bicycle racks or curb ramps, are being identified. Training programs will be instituted for teachers and school staff, along with improved police enforcement methods.

4.5.2.3 Pima Region Middle School Bicycle and Pedestrian Education Program

Pima County offers free bicycle education classes to children through the Pima Region Middle School Bicycle and Pedestrian Education Program. At classes, children learn basic road riding and safety skills. The classes provide students with free helmets, bike pumps, U-locks, lights, and other important equipment. A goal of the program is to provide bicycle pavement markings and signage around schools to increase safety.

4.5.2.4 Share the Road Guide

Pima County publishes a Share the Road Guide in English and Spanish to illustrate how bicyclists and motorists can legally and safely share the road. The guide also includes graphics that illustrate hazard avoidance, lane positioning guidance, and proper equipment.

4.5.2.5 Sharing the Road with Pedestrians

Pima County and the Arizona Department of Transportation publish a Share the Road Guide to show how pedestrians and motorists can legally and safely share the road. The guide also includes graphics that illustrate proper crossing, awareness, and interactions with transit vehicles.

4.5.2.6 Bicycle Ambassadors Program

In 2008, Pima County began a Bicycle Ambassadors Program that is funded by Surface Transportation Program funds through the Federal Highway Administration and a local match and in-kind staff provided by Pima County. The program reaches out to bicyclists to provide education through over 40 ambassadors. The following list presents highlights of the program's accomplishments:

- Bicycle safety courses taught by League of American Bicyclists Certified Instructors (LCI)
- Distribution of safety class schedules, bike maps and Share the Road Guides at community events
- Distribution of helmets and helmet fittings through community outreach and rodeos
- Bike rodeos and kids bike safety classes for scout troops, Boys and Girl's Clubs, and schools
- Women's bicycle mechanics classes and a general mechanics classes
- The Bike Booth on the University of Arizona campus for minor bike adjustments, bike registrations and outreach materials
- Outreach on bike pathways

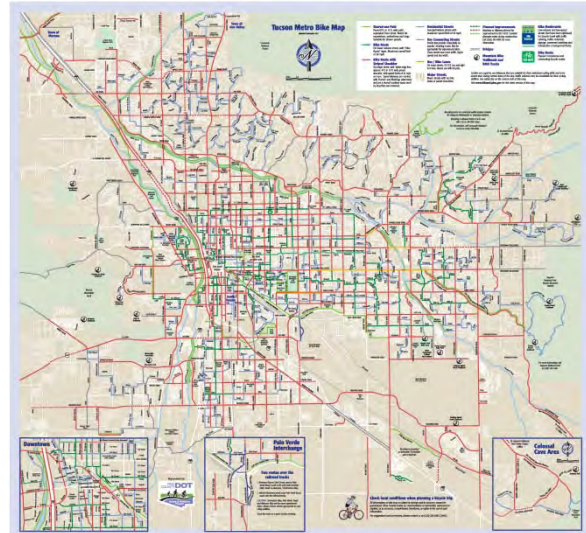
Pima County pays for the costs for Bike Ambassadors who staff the bike station. The County also provides free regional bike maps, share the road guides, bike class schedules, etc. In 2012 the County is also providing "roaming" Bike Ambassadors, who travel around the campus to assist people and hand out free safety information. The Ambassadors have also assisted UAPD with safety outreach and will continue to do so as PD requests.

4.5.2.7 PAG Travel Reduction Program

The Pima Association of Governments has a Travel Reduction Program that is mandatory for employers with more than 100 full-time equivalent employees at a single or contiguous worksite. The program requires employers to provide incentives to their employees to commute to work by alternative transportation, including walking and biking.

4.5.2.8 Tucson Metro Bike Map

Pima County produces a bike map for the Tucson metropolitan area and posts it on their website. The map is also available with a reduced file size so that it can be viewed on mobile devices. The map is available both in print form and online.



Tucson Metropolitan Bike Map

4.5.2.9 Tucson Bike Fest

Tucson Bike Fest is a program of the City of Tucson in collaboration with Pima County and Pima Association of Governments. In recent years (2011 and 2012) the City of Tucson hired the local non-profit Living Streets Alliance to coordinate Bike Fest. Every April there is a series of events offered to celebrate bicycling. Events include bike racks and tours, bike rodeos, and bike races.

As part of Bike Fest, Living Streets Alliance hosts an annual Cyclovia event. Cyclovia Tucson is an annual car-free event that closes selected streets to cars so that people can walk, skate, run, bicycle, and socialize with their neighbors.

4.5.2.10 Commuter Challenge

Every April, in coordination with Bike Fest, PAG collaborates with the City of Tucson to organize a commuter challenge to encourage residents to bike to work. The City offers prizes, including free bikes, for those that log the minimum number of bicycle trips to work required by the challenge.

4.5.2.11 Bike 2 Work Week

As part of Bike Fest, the City of Tucson organizes Bike 2 Work Week during which businesses in the Tucson area host Bike to Work Stations with giveaways, discounts, bike tune-ups, and other bike-related items. There are also bike breakfasts, happy hours, and yoga classes to encourage riding.

4.5.2.12 PAG Bike Buddy Matching Program

As part of the PAG Rideshare program for commuters, there is bike buddy matching services. Employees can enter their starting and ending points to locate others interested in sharing the ride.

4.5.2.13 PAG Guaranteed Ride Home Program

Pima Association of Governments and Sun Tran provide a Guaranteed Ride Home (GRH) for regular alternative transportation commuters in the event of an emergency. To qualify for GRH, participants must

commute by carpooling, vanpooling, biking, riding the bus, or walking at least twice a week. All participants must live and work in Pima County. Each registrant can use up to four vouchers every 12 months.

Qualifying emergencies include the following:

- Personal or family illness
- Personal or family emergency
- Unexpected overtime
- Left without a ride because carpool or vanpool driver had an emergency

4.6 Past Expenditures

Table 4-16 presents the expenses that the University of Arizona has spent on its bicycle program for the years 2006-2010. Expenses include but are not limited to educational training, field supplies, and printing.

Table 4-16: University of Arizona Bicycle Programs Expenses, 2006-2010

Year	Expenses
2006	\$13,447
2007	\$38,208
2008	\$52,891
2009	\$167,723
2010	\$42,789
Total	\$315,058

Source: University of Arizona

This page intentionally left blank.

5 Needs Analysis

This chapter describes the needs of bicyclists and pedestrians in the University of Arizona study area. A summary of public input, as well as mode share data is presented for University of Arizona staff and faculty between 2004 and 2010 to provide an assessment of existing commuting patterns. This chapter also summarizes online survey data to determine needs of commuters and analyzes bicycle and pedestrian count data to identify areas that would benefit from pedestrian/bicycle facility improvements. Finally, this chapter presents gaps and deficiencies in the bicycle and pedestrian networks.

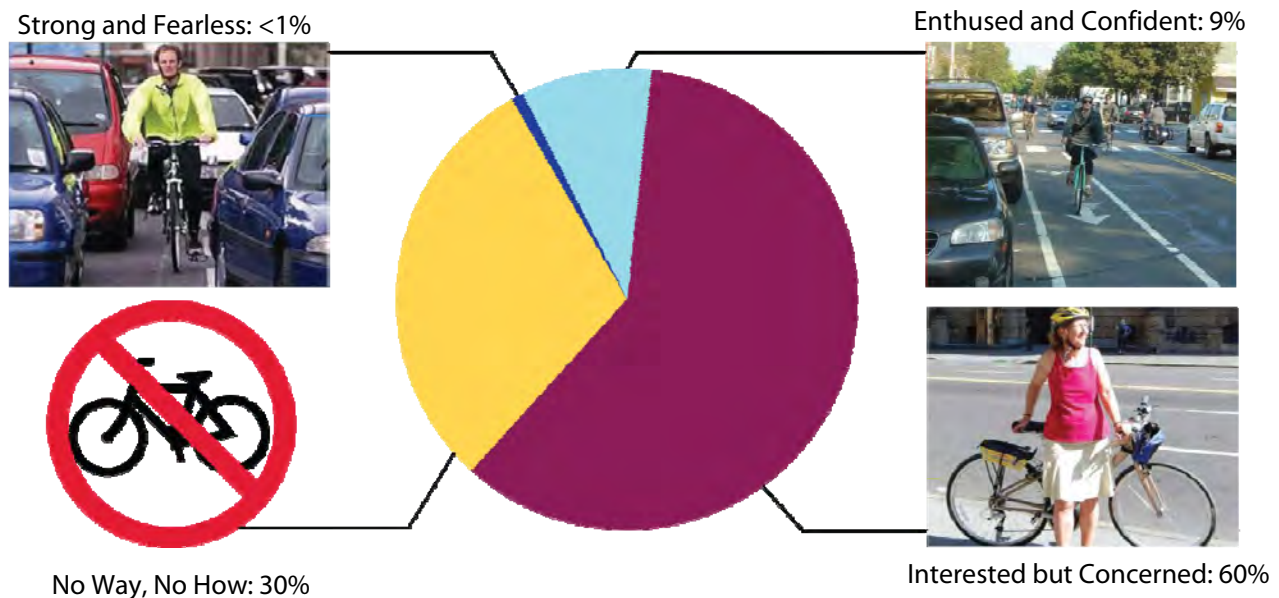
5.1 Public Outreach

Obtaining input from the public is an important part of the planning process. It highlights the needs of bicyclists and pedestrians so that they are addressed in the plan recommendations.

5.1.1 Types of Bicyclists

It is crucial in the public outreach process to solicit input from all types of bicyclists (or potential bicyclists) in order to plan a network that maximizes potential. Figure 5-1 shows a classification system that is based on numerous surveys, focus groups, and real-life experience in many of the nation's most bicycle friendly cities.⁶ It will be in the upcoming update to the 1999 AASHTO *Guide for the Development of Bicycle Facilities*, and addresses Americans' 'varying attitudes' towards bicycling.

Figure 5-1: Types of Bicyclists



As illustrated, less than one percent of Americans are *Strong and Fearless* and will ride anywhere regardless of roadway conditions, weather, or the availability of bicycle facilities. The strong and fearless can ride at

⁶ Roger Geller, Bicycle Coordinator, City of Portland Office of Transportation, "Four Types of Cyclists" (<http://www.portlandonline.com/transportation/index.cfm?a=264746&c=44597>)

assertive speeds, prefer direct routes, and will typically choose roadway connections – including those shared with vehicles – over separate bikeway facilities such as bicycle paths. This group will be less affected by this plan than the others.

Approximately six to nine percent of Americans fall under the category of *Enthusied and Confident* bicyclists who respond very quickly when bikeways, including bike lanes, low traffic streets, or multi-use pathways are provided. They will deviate from a more direct route in favor of a preferred facility type. This group includes commuters, recreationalists, racers, and utilitarian bicyclists.

Approximately 60 percent of the population can be categorized as *Interested but Concerned* and represents those who do not currently ride a bicycle regularly, in large part due to perceived safety risks from riding with traffic. These individuals will only ride if excellent bikeway facilities are provided, along with route finding assistance and encouragement/education programs. This plan will affect the Interested but Concerned group the most, as it will recommend the facilities and programs that should encourage them to ride or ride more often.

Approximately 30 percent of Americans are not interested in bicycling. They are referred to in the diagram as *No Way, No How*. Some people in this group may eventually consider bicycling and may progress to one of the user types above.

5.1.2 Audits

The project team held biking and walking “audits,” or field tours, to solicit input on problems and opportunities.

Bike Audit

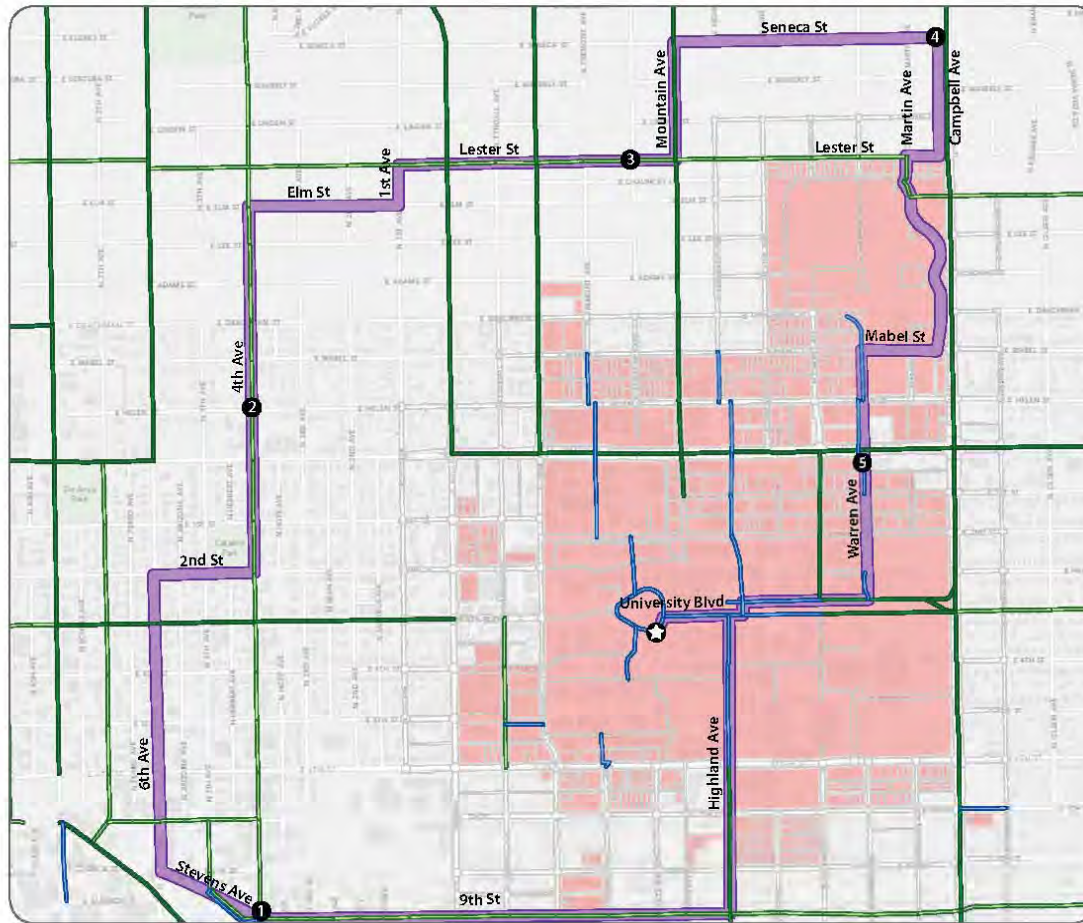
In January 2012, the project team held a bike audit, which consisted of an approximately six mile bicycle ride through the University of Arizona and adjacent neighborhoods. The bike audit route is shown in Figure 5-2. Participants stopped at five locations along the route to discuss improvement opportunities. 13 total people participated.

Overall, bike audit participants noted that the areas along the route were in need of better facilities. Many of the segments had facilities, though all participants noted gaps in the network. The most appealing streets were those with low traffic volumes and residential streets with traffic calming. Participants also enjoyed riding on the bike boulevards due to the pavement



Bike audit participants discussed potential bicycle network improvements

Figure 5-2: Bike Audit Route



Bike Audit Route:

- Meet at the Bike Valet on the U of A Mall
- Head east on University Blvd. (U of A Mall)
- South on bicycle path (next to Science Engineering Library)
- Continue south on Highland Ave. at end of path
- West on 9th St.

STOP 1 at 9th St. and 4th Ave. (NE corner)

- Continue west on 9th St., which becomes Stevens Ave.
- Continue west on bicycle/pedestrian path to 6th Ave.
- North on 6th Ave.
- East on 2nd St.
- North on 4th Ave.

STOP 2 at 4th Ave. and Helen St. (SE corner)

- Continue north on 4th Ave.
- East on Elm St.
- North on 1st Ave.
- East on Lester St.

STOP 3 at Lester St. and Santa Rita Ave. (SE corner)

- Continue east on Lester St.
- North on Mountain Ave.
- East on Seneca St.

STOP 4 at Seneca St. and Campbell Ave. frontage road (SE corner)

- South on Campbell Ave. frontage road
- West on Lester St.
- South on Martin Ave.
- South on Ring Rd.
- West on Mabel St.
- Continue west on bicycle/pedestrian path west of Martin Ave.
- South on Warren Ave. bicycle path

STOP 5 on Warren Ave. bicycle path south of Speedway Blvd. underpass

- Continue south on Warren Ave.
- Continue south on bicycle path south of Hawthorne St.
- West on University Blvd. (U of A Mall) to Bike Valet

markings and signage that highlight to motorists the presence of bicyclists. Audit attendees noted that they preferred intersection treatments to help with crossings, including bike boxes and pedestrian hybrid beacons (HAWK).

Audit participants highlighted many areas along the route that needed improvement. Potential improvement locations and suggestions are presented in Table 5-1.

Table 5-1: Bike Audit Participant Comments

Comments
Crossing Euclid is challenging (the HAWKs do not have bicycle actuation)
Pavement quality needs to be addressed on 9 th Street and 4 th Avenue
Make 9 th Street bicycle-friendly and change parking
Prioritize bicycles on Highland; bike lanes next to the dorms
Traffic circle at 9th and Park
Additional bike facilities on Toole Avenue; reduce parking
6th Avenue underpass (specifically south side) is challenging
6th Avenue has fast moving traffic and no bike facilities
Close the gap on Toole Avenue
Crossing Park Avenue is challenging because of high speeds and lack of crossing treatments
Lack of bike lanes
More trees for shade
Riding through UMC is challenging because of driveways and traffic
The entrance road to AHSC needs improvements
There should be more wayfinding

Walk Audit

The project team held a walk audit on January 25th from 4-6 pm and on January 26th from 2-4 pm. The walk audits were led by international livability expert Dan Burden and allowed attendees to provide input on how to improve the pedestrian environment at and around the University of Arizona. Approximately 20 people participated.

Connectivity, aesthetics, and safety (particularly high vehicular speeds and a lack of adequate crossings on high-volume streets) were among the most concerning issues. Audit participants found some sidewalks to be discontinuous and inhospitable to pedestrians, especially on Broadway Boulevard between N. Fremont Ave and N. Park Ave. Attendees also expressed a need for traffic calming solutions and automatic walk phases to improve access and keep pedestrians safe. Participants felt most safe with wide sidewalks, well landscaped corridors providing shade and aesthetics, and enhanced crossing treatments, such as a pedestrian hybrid beacon (HAWK) on Park Avenue and Broadway Boulevard.



Dan Burden conducted two walk audits as part of the public outreach process.

Audit participants discussed the potential for on-campus improvements, including road diets, as well as treatments to reduce bicyclist speeds and improve pedestrian access. Attendees suggested that policies be set to restrict university vehicles from driving in restricted areas up to 10 minutes after class break to improve safety. Attendees also suggested that there may be additional opportunities to fund pedestrian improvements through increased parking fees, as this is currently how the University funds bicycle and pedestrian improvements. According to walk audit participants, current parking fees are well below average in comparison to other PAC-12 schools.

Walk auditors noted several areas that needed improvements, as listed in Table 5-2.

Table 5-2: Walk Audit Participant Comments

Comments
Install 'hitching posts' for bicycles to balance while stopped at the bike/ped crossing on 2nd Street/Highland
Install stairs from Speedway Boulevard to the Olive tunnel (currently, pedestrians are required to walk a considerable distance to access the Olive Road tunnel from Speedway Boulevard)
Consider a round-a-bout at Mountain Avenue and Helen Street
Expand the sidewalk along University Boulevard to 8 feet to reflect the campus area minimum for sidewalk width
Implement a two- or four-way stop at 2nd Street and Highland Avenue so pedestrian and bicycles are not required to stop prior to crossing 2nd Street
Improve the Highland Avenue path north of 2nd Street to a landscaped pedestrian/bicycle walkway (this is currently being discussed by U of A)
Consider a lagging left turn phase to give the pedestrian advance time to cross the street before vehicle left turns at Mountain Avenue and Speedway Boulevard
Reduce the lane widths to 10 feet on Mountain Avenue
Provide better contrast between the driveway openings and sidewalks on Helen Street (and elsewhere); extend the sidewalks across the driveway openings
Install 'cattle shoots' at the pedestrian/bicycle underpass at Speedway to reduce bicycle speeds
Reduce Speedway Boulevard to four lanes through campus

5.1.3 Public Workshop

The project team held a public workshop on January 26, 2012 from 10:00 am to 1:00 pm to solicit input from the community. The workshop was "open house" style and asked participants to vote with workshop currency dots on various types of bicycle and pedestrian improvements. Some comments were provided via email. This section discusses the public input received.

Workshop Votes

As presented in this chapter, there are four main categories of bicyclists. Table 5-3 shows the self-identified groups of attendees, approximately three-fourths of which considered themselves to be enthused and confident bicyclists. The other one-fourth considered themselves to be strong and fearless. The rate of 'strong and fearless' and 'enthused and confident' who attended the workshop is higher than the average national distribution; this is a common result in a bicycle planning effort since most people who attend workshops tend to be experienced bicyclists.

Table 5-3: Participants at Public Workshop

Type of Cyclist	Number	Percent
Strong and Fearless	3	23%
Enthused and Confident	10	77%
Interested but Concerned	0	0%
No Way, No How	0	0%

Table 5-4 shows a ranking of the types of bicycle facility types from a specific list that workshop participants would like to see. The top requested facility type was bike boulevards, followed by shared-use paths. This suggests that workshop participants have a preference for low-stress facilities that provide a safer and more comfortable experience for bicyclists by slowing vehicle traffic (bike boulevard) or separating bicycles from motor vehicles (shared-use paths or cycle tracks). The public noted that they would also like to see innovative facilities, including buffered bike lanes and colored bikeways.

Table 5-4: Preferred Bicycle Facility Types

Facility Type	Number	Percent
Bicycle Boulevard	16	62%
Shared-Use Paths	6	23%
Bikes Lanes	4	15%
Signed Shared Roadway	0	0%

Workshop participants also voted on education and encouragement programs from a specific list, and ranked the following as top priorities:

- Campus bicycle and pedestrian advisory committee
- Campus car-free event
- Education programs
- Commuter benefit program

Community Identified Improvements

Participants provided input on existing bicycle facilities and where improvements are needed. Table 5-5 presents their comments.

Table 5-5: Community Identified Bicycle Improvements

Comments
There is confusion with how pedestrians and bikes should get across Helen Street through the Warren Avenue underpass (the intersection of Helen Street and Warren Avenue)
Helen Street should be closed at several spots
There are conflicts at the intersection of Mountain Avenue and Helen Street
Park Avenue can be very dangerous for pedestrians/bikes and needs improved facilities/pavement, especially at the intersection of Park Avenue and 6th Street
Cherry Avenue needs lights under the stadium for bike traffic

Comments
The intersection of 4th Street and Cherry Avenue is confusing for motor vehicles and bikes
Improve and maintain pavement on Cherry Avenue (south of 6th Street), Elm Street between Campbell and Country Club, Speedway Boulevard, and Park Avenue
The pavement surface along University Boulevard can be slippery to ride on when it rains
Remove the bicycling restriction on Mabel Street through the AHSC
Improve safety at Speedway Boulevard and Helen Street
Improve 6th Street between Park Avenue and Highland Avenue; Highland Avenue between Speedway Boulevard and Helen Street; Drachman Street; Mountain Avenue; Euclid Avenue between 6th Street and University Boulevard; and Seneca Street between 4th Avenue and Euclid Avenue
Bicycle boulevards on Treat Avenue, University Boulevard, Seneca Street, 5th Street, and 27th Street
Warren Avenue from 1st Street (exiting the underpass, heading south) to 3rd Street is particularly dangerous; would benefit from 4 way stops or if the stop signs were turned to allow the N/S traffic (bikes) the right-of-way

Workshop participants also provided input on existing pedestrian facilities and where they thought improvements are needed. Table 5-6 presents their comments.

Table 5-6: Community Identified Pedestrian Improvements

Comments
Ring Road South of Adams Street is missing a sidewalk on the East side so pedestrians must cross the exits of the parking garage
More traffic calming on campus, including narrower streets, chicanes, bulb outs, etc.
It is difficult to navigate around campus as a pedestrian because of bike, vehicle, pedestrian, and skateboard conflicts, and bicyclists travel at high speeds
Improve pedestrian conditions along 5th Street and 6th Street, especially East of Campbell Avenue
There is very poor drainage at 5th Street and Euclid Avenue - Flooding at the pedestrian refuge makes it unusable
Slow traffic at Euclid Avenue and 6th Street, and Campbell Avenue and Speedway Boulevard
Need safer crossings on 6th Street between Fremont Avenue and Highland Avenue
Complete missing sidewalks
Create a 5 mph speed limit in the mall

5.2 Mode Share

Determining University of Arizona student and employee commute mode is important for planning for network facilities and end-of-trip facilities.

Table 5-7 displays University employee mode share data for the years 2004, 2005, 2007, and 2010.⁷ Since 2004, the percent of employees bicycling to campus has increased by almost one percent and the percent of employees walking to the University has remained relatively constant. It is also important to note that the percent of employees driving alone to work has decreased by 2.5 percentage points while there has been an

⁷ Data is not available for the years 2006, 2008, and 2009. Student data is not available.

increase in bicycling, transit use, and teleworking, which suggests a shift in behavior toward alternative modes of transportation.

Table 5-7: Percent of University of Arizona Employee Trips by Mode

Category	2004	2005	2007	2010
Bicycling	8.2	7.6	7.9	9.0
Walking	3.8	3.5	3.4	3.6
Drive alone	69.8	68.1	67.7	67.3
Carpool/Vanpool	11.6	13.2	11.9	9.7
Bus	4.2	4.9	4.8	5.2
Telework	1.3	1.7	2.9	4.3
Compressed work week	1.0	1.0	1.4	0.9

Source: University of Arizona

5.3 Online Survey

In 2010, the University of Arizona’s Parking and Transportation Services marketing division initiated an online survey to capture mobility data in the study area. Parking and Transportation Services advertised the survey to the University of Arizona through articles in several local news sources, in the Daily Wildcat, through University department and club listserves, and on websites, such as the UA Environment Portal and TucsonVelo.com. The marketing division also contacted neighborhood associations and posted a notice on Neighborhood Link to publicize the survey to residents living downtown or west of Interstate 10. The survey was open from December 1, 2010 through January 14, 2011.

A total of 1,105 people responded to the online survey. Forty-one percent of respondents were University of Arizona students, 38 percent were faculty/staff, and 21 percent were Tucson residents. Almost 97 percent of respondents reported that they travel to or through the University of Arizona campus by bicycling, walking, driving or taking transit regularly or on occasion.

5.3.1 Respondent Background

Of the 1,105 respondents, approximately 60 percent were female and 40 percent were male. Approximately one-half of respondents were between the ages of 16 and 34 years old.

Figure 5-3 shows the distance that employed respondents live from their jobs and Figure 5-4 presents the distance that student respondents live from campus. Approximately two-thirds of employed respondents live within five miles of their jobs and over three-fourths of student respondents live within five miles of campus. This creates great opportunities for walking and biking to school and work.

Table 5-8 displays existing bicycle-related services and facilities provided at the University of Arizona and the percentage of respondents that have not heard of, have heard of, and have used each. The top services that respondents have not heard of are the Cat Wheels Bike Share and the UA Employee Bike to Work Program. The top services that respondents have heard of are the UA Bike Valet and the UA bicycle lockers. The top service that respondents use is the UA Bike Registration program.

Figure 5-3: Distance of Employed Respondents from Job

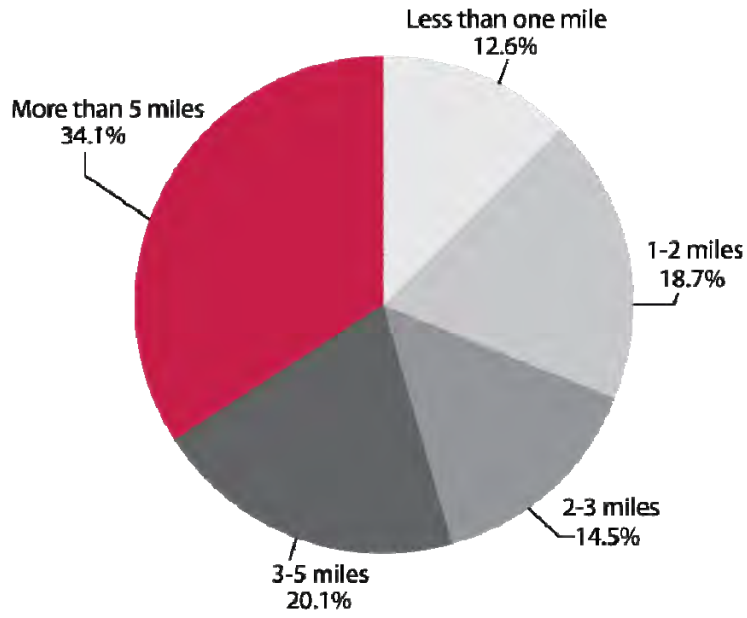


Figure 5-4: Distance Respondents Live from Campus

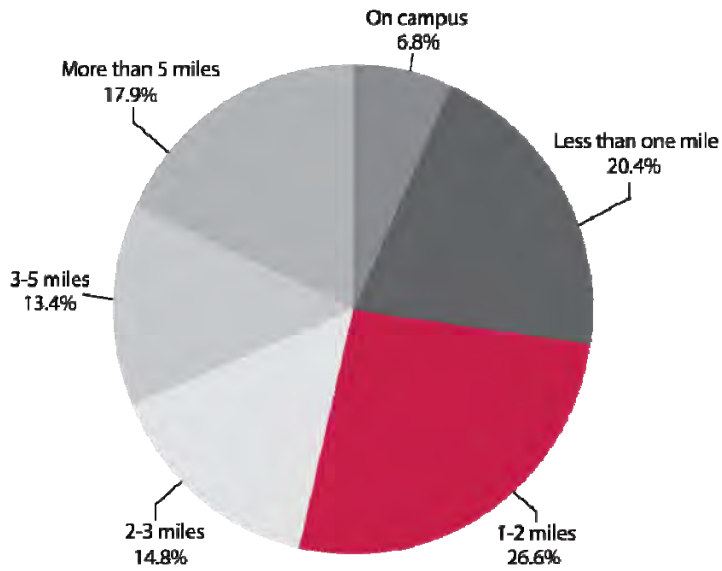


Table 5-8: Respondent Awareness and Use of Bicycle-Related Services

Services	Have Not Heard Of	Have Heard Of	Have Used
PAG Rideshare Guaranteed ride home	58.6%	40.1%	1.3%
UA Emergency Ride Home	54.9%	44.0%	1.1%
Cat Wheels Bike Share	74.3%	24.8%	0.9%
UA Bike Valet	33.8%	61.8%	4.4%
Free Bike Safety Classes	53.4%	42.3%	4.3%
UA Bike Station	62.4%	31.6%	6.0%
UA Bike Registration	23.3%	53.8%	23.0%
Connect by Hertz	59.3%	38.0%	2.7%
UA Employee Bike to Work Program	74.2%	24.4%	1.3%
UA Bicycle lockers	36.3%	59.4%	4.3%
UA Bicycle enclosures	42.2%	54.0%	3.9%

5.3.2 Respondent Reasons for Walking and Biking

Based on the survey results, traveling to school or work represented the top reasons that respondents bike and walk to/through the University of Arizona daily. Almost 30 percent of respondents bike to/through the University every day to go to work or school. Just under one-fourth of respondents walk to the University every day for school and approximately 21 percent of respondents walk to/through campus every day for work.

Respondents commented that the most motivational reasons for riding their bikes are health and wellness benefits. Respondents also reported that personal enjoyment and ease/practicality were reasons that motivated them to ride. Respondents commented that the most motivational reason for walking is the ease and practicality.

Figure 5-5 shows the average rating of factors that contribute to respondents' decisions not to ride more. The top reasons that influence respondents' decisions not to bike are time, weather (e.g., too hot or cold), and distance from destinations. Inadequate facilities and unsafe roads also contribute to respondents not riding more.

Figure 5-5: Average Rating of Factors for Choosing Not to Bike

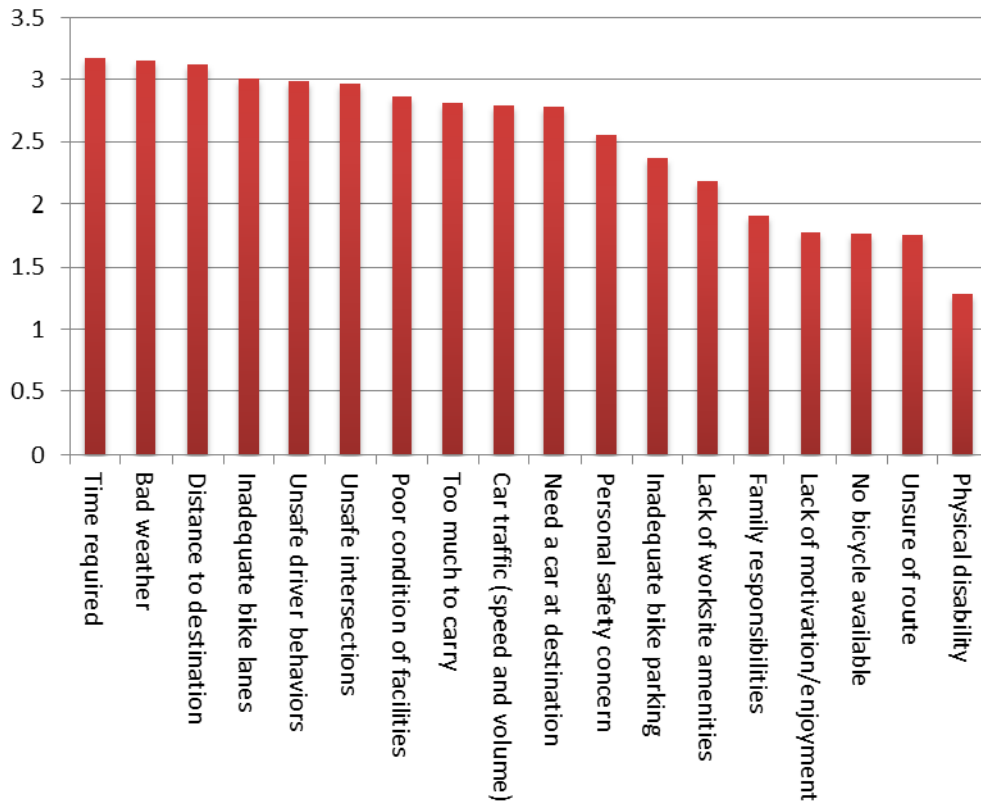
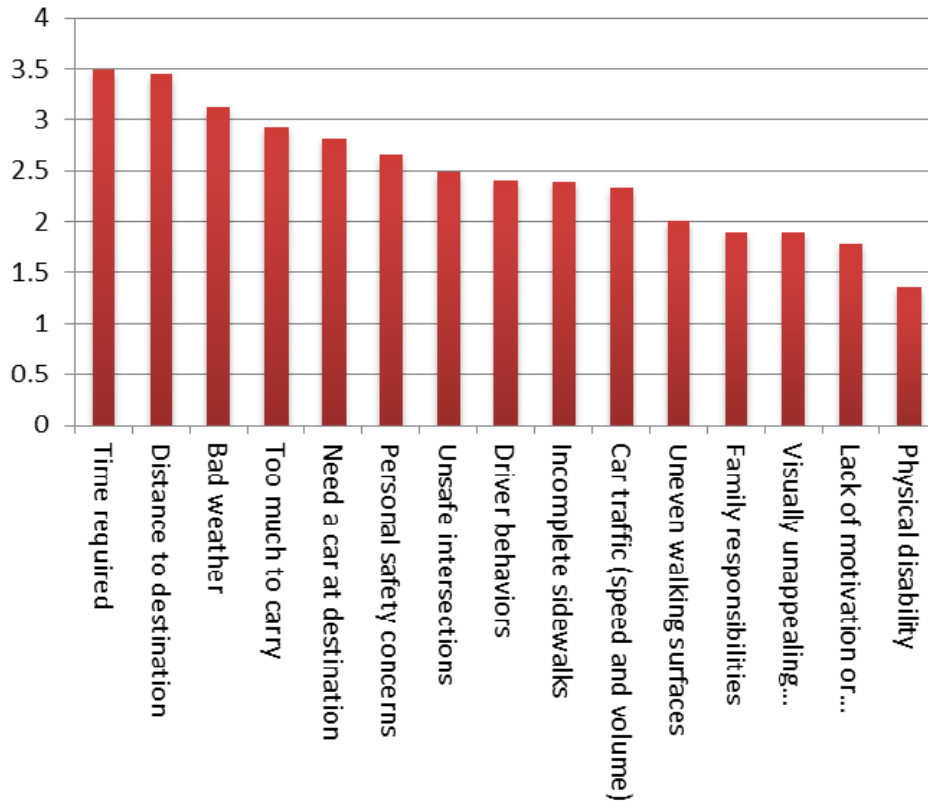


Figure 5-6 shows the average rating of factors that contribute to respondents' decisions not to walk more. The top reasons that influence respondents' decisions not to walk are the same as those that discourage people from bicycling more often.

Figure 5-6: Average Rating of Factors for Choosing Not to Walk

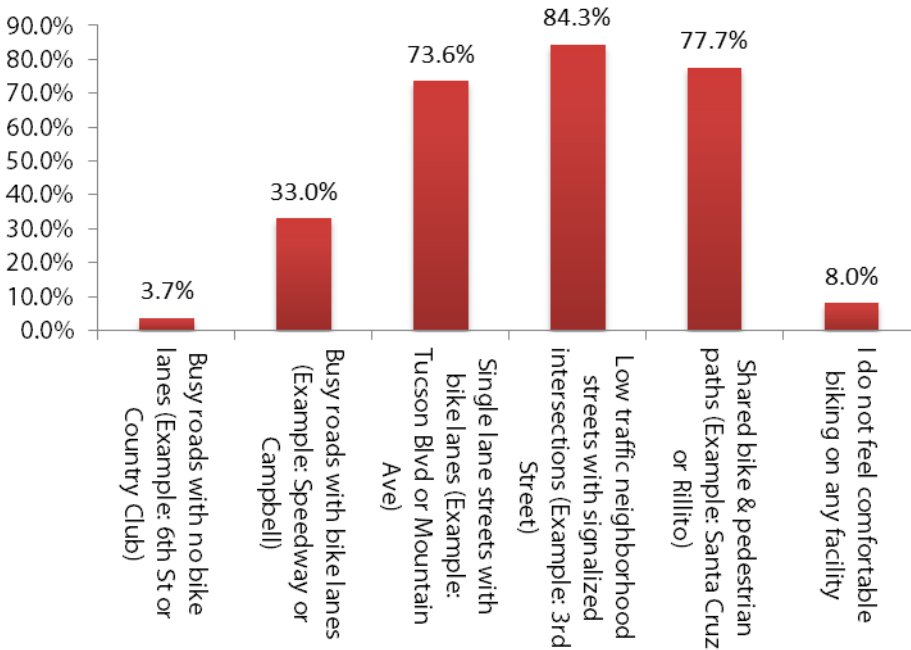


5.3.3 Bicycle Facilities, Programs, and Policies

Figure 5-7 below presents on the relationship between bicycle facility type and user comfort. The highest number of respondents reported that they feel comfortable biking on low traffic neighborhood streets with signalized intersections. Respondents also commented that they feel comfortable riding on shared bicycle and pedestrian paths, as well as single lane streets with bike lanes.

When asked which facilities, programs, and policies they thought would support bicycling at and around the University of Arizona, respondents ranked better quality road surface/maintenance, additional bike lanes, and improved intersection crossings and street lighting as the most important. Respondents ranked improved street lighting, complete and well-maintained sidewalks, additional street trees for shade, and improved intersection crossings as the most important ways to support walking at and around the campus.

Figure 5-7: Respondent Bicycle Route Preference



5.4 Bicycle and Pedestrian Counts

To fully comprehend existing conditions in the University of Arizona study area, it is important to understand the number of non-motorized users and the patterns in which they interact with the existing roadway network. This section presents bicycle and pedestrian count data for the University of Arizona and surrounding area.

The Pima Association of Governments (PAG) conducted bicycle and pedestrian counts in the Tucson Metropolitan Region, including on the University of Arizona campus, in 2010. This was the third year the agency counted bicyclists and the first year the agency counted pedestrians. PAG conducted the count in order to document conditions and trends in bicycling and walking, to better plan the non-motorized network, analyze crash data, and to measure the effectiveness of travel demand management programs.

Jurisdictional staff, regional staff, and community volunteers counted the number of bicyclists and pedestrians at 98 locations (primarily at intersection), nine of which were located on the University of Arizona campus. Counters observed each location for two hours during one morning weekday peak period and for two hours during one afternoon weekday peak period, which totaled to four hours per site. The morning peak was

Appendix Item 3- Data Collection Sheet

Count Sheet

Date: _____ Location: _____

HOUR	APPROACH DIRECTION	COUNT	INDICATE GENDER IF FEMALE		INDICATE AGE IF +18		WEARING HELMET	WRONG WAY SIGN	BIKING ON SIDEWALK	PEDESTRIANS
			F	M	18-24	25+				
:00	NB									
	SB									
	EB									
	WB									
:15	NB									
	SB									
	EB									
	WB									
:30	NB									
	SB									
	EB									
	WB									
:45	NB									
	SB									
	EB									
	WB									

Observations: Construction, etc.

Motorized Bicycles:

Bicycle and Pedestrian Count Sheet

observed from 7:00 to 9:00 a.m. and the afternoon peak was counted from 4:00 to 6:00 p.m. unless a site had unique conditions which required observation at another time. Counters also observed weekend morning counts on either the Saturday or Sunday during the count period from 7:00 a.m. to 10:00 a.m.

Selected count locations were based on estimated existing bicycling activity, as well as geographic distribution. The 98 count locations were grouped into six categories to conduct a geographic analysis. These areas included:

- University of Arizona
- Downtown
- Urban Core
- North & Northwest
- Green Valley/Sahuarita
- Eastside

5.4.1 Bicycle Count Analysis

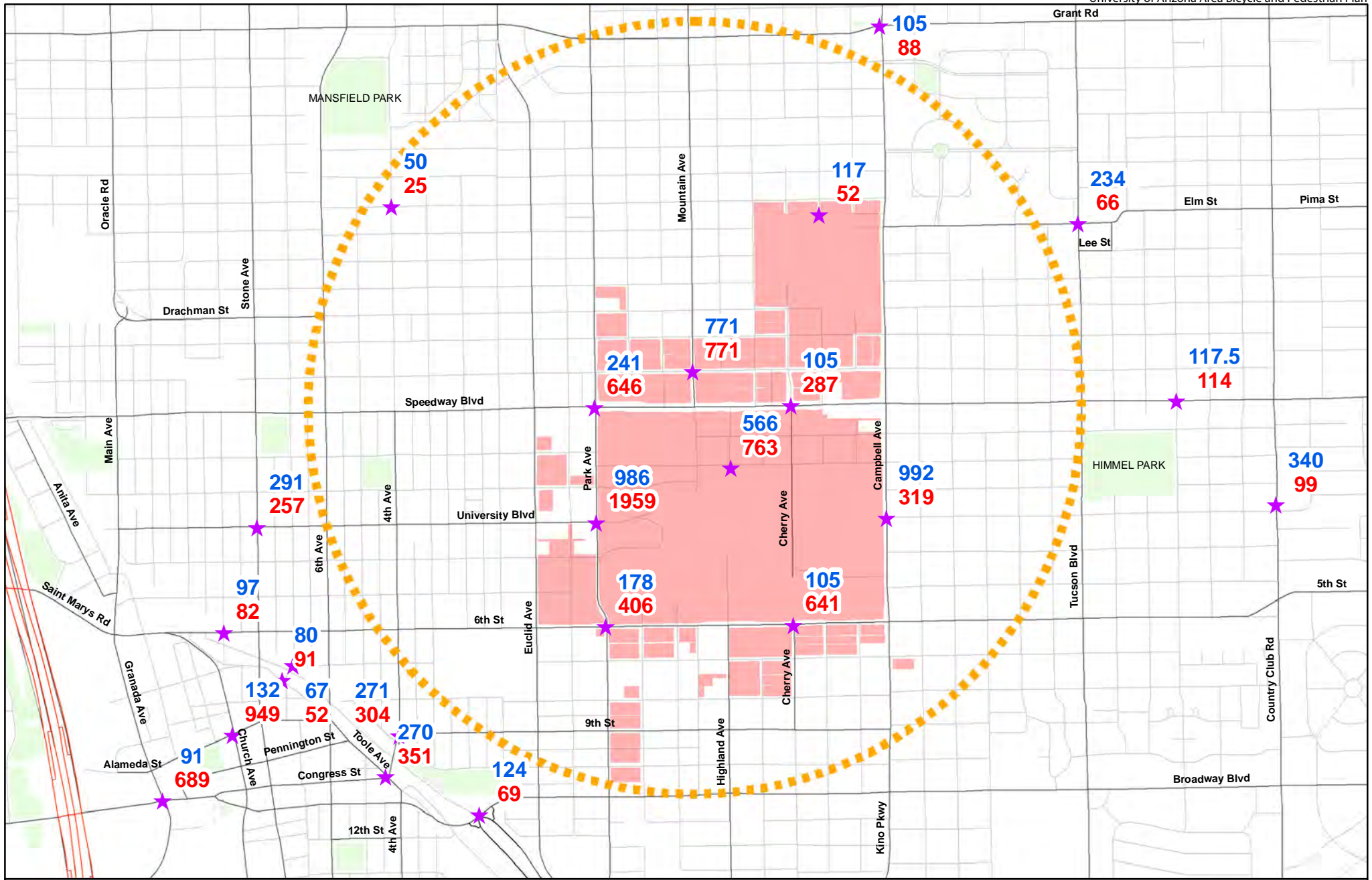
The 2010 bicycle count observed 12,057 total bicyclists throughout Pima County. Approximately 28 percent of bicyclists counted were female and approximately 72 percent of bicyclists were male, which translates to a 2.6:1 ratio of male to female bicyclists. The age group with the highest number of bicyclists was 18-65, which included 92.5 percent of bicyclists counted. 3.3 percent of bicyclists counted were below 18 years old and 4.1 percent of bicyclists were above 65 years old.

Helmet use was observed on 51.6 percent of bicyclists. Although this percent is high as compared to many areas in the United States, it is lower than other bike friendly cities. The City of Portland, Oregon, for example, has 77 percent helmet usage.⁸ 3.2 percent of bicyclists observed were riding the wrong way in the street and 5.8 percent of bicyclists were riding on the sidewalk.




Appendix D shows complete bicycle count data and Figure 5-8 displays bicycle count data by location in the study area. The locations at the University of Arizona experienced a higher amount of bicyclists as compared to other locations in Pima County. Downtown and urban core locations also experienced a higher number of bicyclists. This is consistent with the pedestrian count data presented in the following section. Count locations with the highest recorded bicycle volumes include:

- 3rd Street / Campbell Avenue: 992 bicyclists (UA)
- University Boulevard / Park Avenue: 986 bicyclists (UA)
- Helen Street / Mountain Avenue: 771 bicyclists (UA)
- 2nd Street / Highland Avenue: 556 bicyclists (UA)
- Old Spanish Trail / Freeman Road: 487 bicyclists (East)

⁸ Portland Bicycle Count Report 2010: <http://www.portlandonline.com/transportation/index.cfm?c=44671&a=327783>



Legend

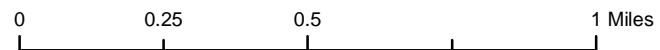
-  Zone 1: On-campus, engineering-focused solutions
-  Zone 2: Pedestrian-oriented treatments
-  Count Locations
- Bicycle Counts**
- Pedestrian Counts**

University of Arizona Area Bicycle and Pedestrian Plan

Figure 5-8: Bicycle and Pedestrian Count Locations, 2010



Counts were collected from 7-9 AM and 4-6 PM in October 2010.



In addition to the number of bicyclists, the study captured the following bicyclist attribute data:

- Gender
- Approximate age
- Helmet usage
- Sidewalk riding
- One-way riding

5.4.2 Pedestrian Count Analysis

The 2010 pedestrian count observed 14,369 total pedestrians. Appendix E shows complete pedestrian count data and Figure 5-8 displays pedestrian count data by location in the study area. The locations at the University of Arizona experienced a higher amount of pedestrian activity as compared to other locations in Pima County. Downtown and urban core locations also experienced a high number of pedestrians. Locations with the highest recorded pedestrian volumes include:

- University Boulevard / Park Avenue: 1,959 pedestrians (UA)
- Alameda Street / Church Avenue: 949 pedestrians (Downtown)
- Helen Street / Mountain Avenue: 771 pedestrians (UA)
- 2nd Street / Highland Avenue: 763 (UA)
- Congress Street / Granada Avenue: 689 (Downtown)

5.5 Bikeway Gap Analysis

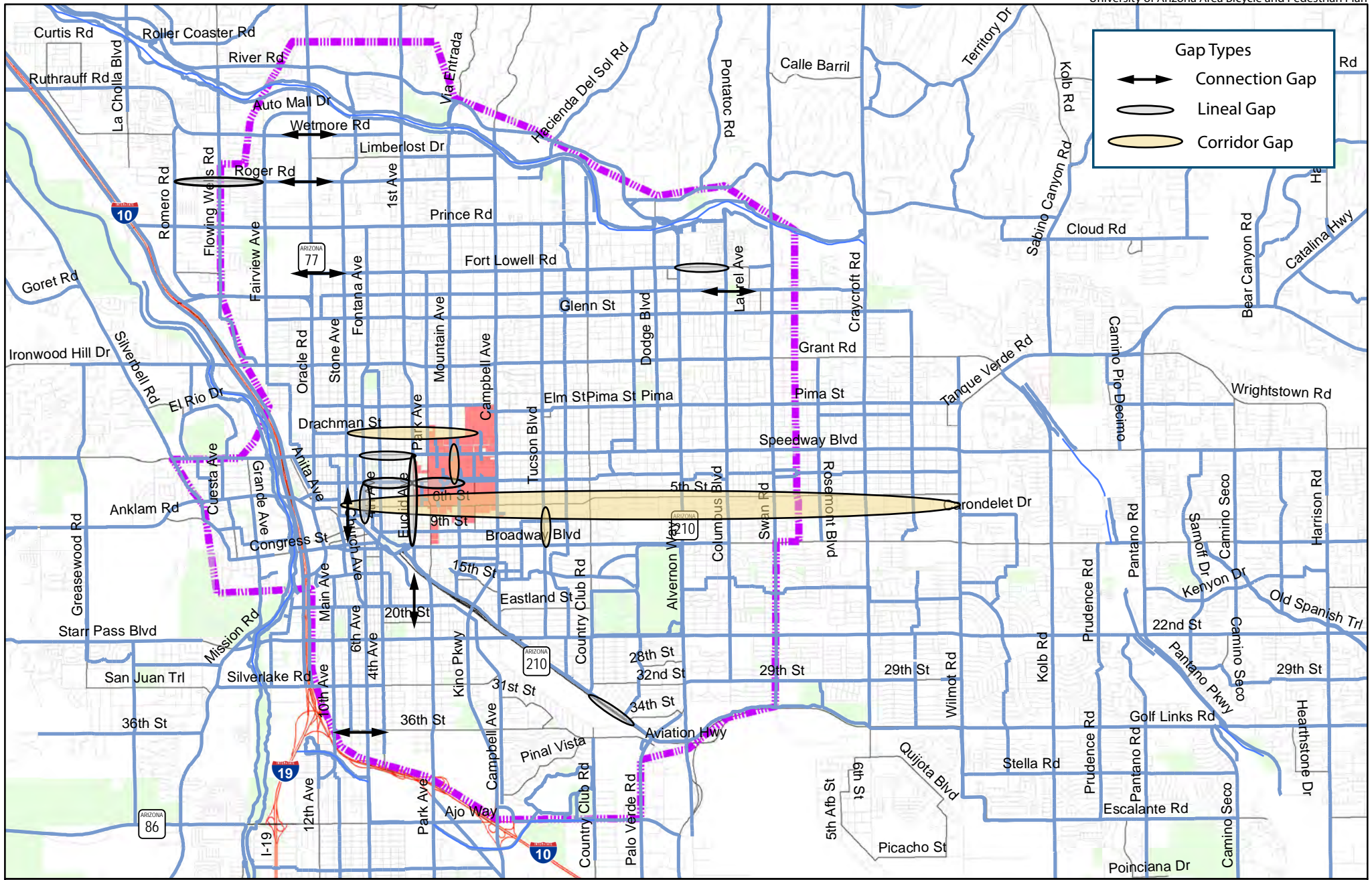
Bikeway gaps exist in various forms, ranging from short “missing links” on a specific street or path corridor, to larger geographic areas with few or no bicycle facilities at all. This section classifies bikeway gaps in the University of Arizona Area bikeway network improvement zone (Zone 1 through Zone 3) into four main categories, which are discussed below. Figure 5-9 displays the gaps in the University of Arizona Area bikeway network and Figure 5-10 shows the bikeway gaps at the University of Arizona.

5.5.1 Spot Gaps

Spot gaps refer to point-specific locations lacking dedicated bicycle facilities or other treatments to accommodate safer and comfortable bicycle travel. Spot gaps primarily include intersections and other vehicle/bicycle conflict areas posing challenges for riders. Examples include bike lanes on a major street “dropping” to make way for right turn lanes at intersections, or a lack of intersection crossing treatments for bicyclists on a route or path as they approach a major street. Spot gaps within the University of Arizona Area bikeway network improvement zone are presented in Table 5-9 (gaps with a * reference those on-campus).

Table 5-9: Spot Gaps

Location
Speedway Boulevard and Tyndall Avenue
Speedway Boulevard and Mountain Avenue*
Speedway Boulevard and Cherry Avenue*
University Boulevard between Santa Rita Avenue and Highland Avenue*



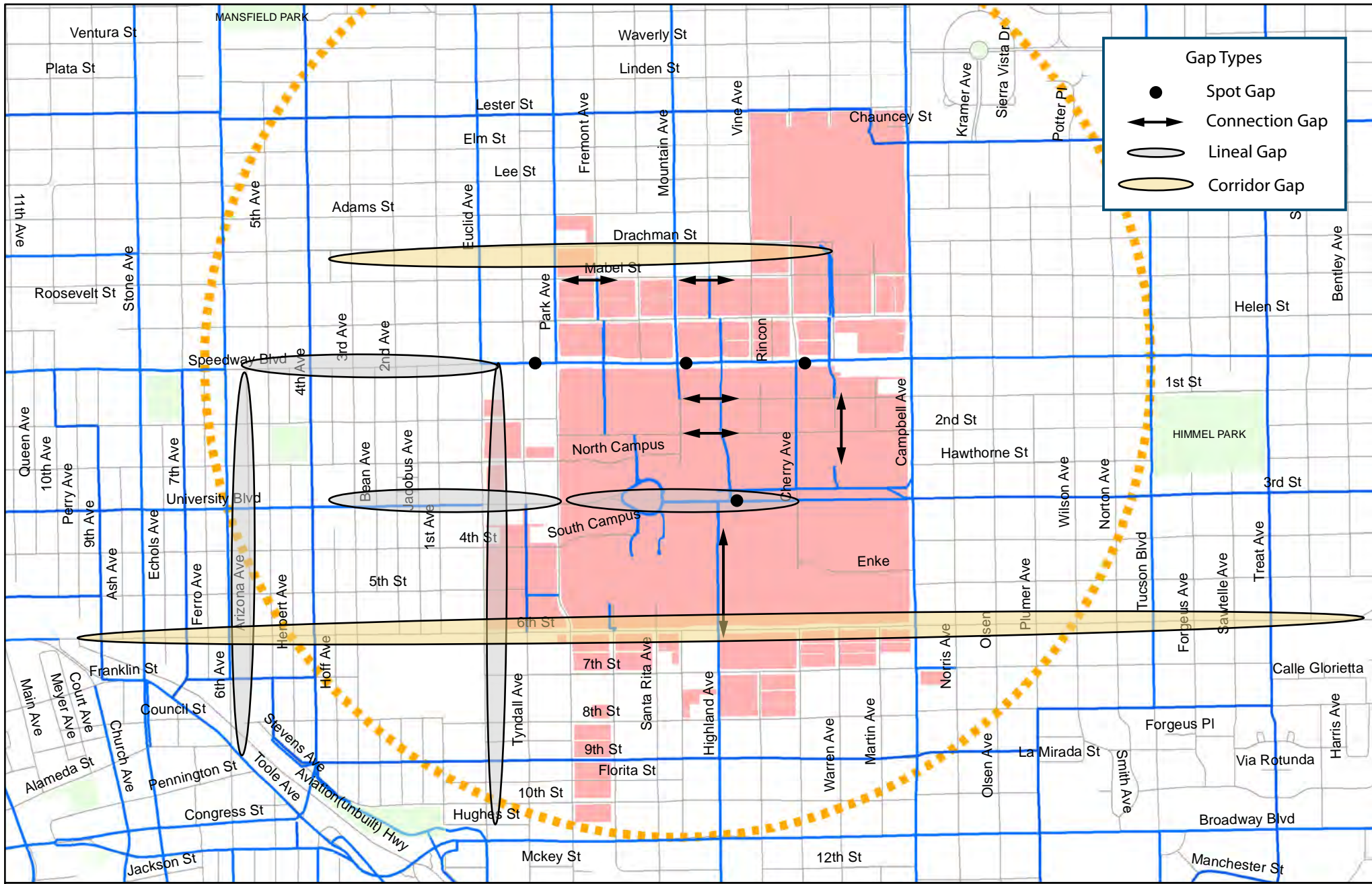
Gap Types

- ↔ Connection Gap
- Lineal Gap
- Corridor Gap

- Legend**
- Zone 1: On-campus, engineering-focused solutions
 - Zone 3: Bikeway network improvement zone
 - Existing bikeways

University of Arizona Area Bicycle and Pedestrian Plan
Figure 5-9: Bikeway Gaps in the University of Arizona Area





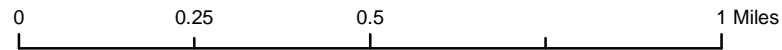
Gap Types

- Spot Gap
- ↔ Connection Gap
- Lineal Gap
- Corridor Gap

Legend

- Zone 1: On-campus, engineering-focused solutions
- Zone 2: Pedestrian-oriented treatments
- Existing bikeways

University of Arizona Area Bicycle and Pedestrian Plan
Figure 5-10: Bikeway Gaps at the University of Arizona



Several intersections along Speedway Boulevard, for example, have spot gaps where striped shoulders must be shared with right-turning vehicles due to constrained rights-of-way. There is also a spot gap on an on-campus north-south bike path running along the west side of the Science Engineering Library (Highland Avenue – Santa Rita Avenue). The path crosses University Boulevard where bicyclists must jog east (on the building’s north side) in order to pick up another bike path continuing north. There is no clear transition from the bike path south of University Boulevard to the bike path north of University Boulevard.

5.5.2 Connection Gaps

Connection gaps are missing segments (less than ½ mile) on a clearly defined and otherwise well-connected bikeway. Major barriers standing between bicyclist destinations and clearly defined routes also represent connection gaps. Examples include bike lanes on a major street “dropping” for several blocks to make way for on-street parking; a discontinuous off-street path; or a freeway standing between a major bicycle route and a school. Connection gaps within the University of Arizona Area bikeway network improvement zone are presented in Table 5-10.

Table 5-10: Connection Gaps

Street	From	To	Length (mi)
1 st Street*	Mountain Avenue	Highland Avenue	0.2
2 nd Street*	Mountain Avenue	Highland Avenue	0.2
36 th Street	6 th Avenue	4 th Avenue	0.2
Blacklidge Drive	Columbus Boulevard	Fort Lowell Road	0.2
Fort Lowell Road	Oracle Road	Stone Avenue	0.4
Highland Avenue*	4 th Street	6 th Street	0.2
Mabel Street*	Park Avenue	Fremont Avenue	0.1
Mabel Street*	Mountain Avenue	Highland Avenue	0.1
Mountain Avenue*	North Campus Drive	University Boulevard	0.1
Roger Road	Commanche	Oracle Road	0.4
Stone Avenue	6 th Street	Tool Avenue	0.1
Toole Avenue	16 th Street	20 th Street	0.4
Tucson Blvd	8 th Street	Broadway Boulevard	0.3
Warren Avenue*	1 st Street	Existing bike path	0.2
Wetmore Road	Wetmore Road	Neffson Drive	0.4

*On-campus

Connection gaps are concentrated on the University of Arizona campus and on the east side of the bikeway network improvement zone. Connection gaps on campus are primarily due to the fragmented network of shared-use paths and bike paths, while connection gaps outside of the university are gaps between bike routes with striped shoulders.

5.5.3 Lineal Gaps

Similar to connection gaps, lineal gaps are ½- to one-mile long missing link segments on a clearly defined and otherwise well-connected bikeway. Lineal gaps within the University of Arizona Area bikeway network improvement zone are presented in Table 5-11.

Table 5-11: Lineal Gaps

Street	From	To	Length (mi)
4 th Avenue (planned shared lane with streetcar)	University Boulevard	9 th Street	0.5
Aviation Bikeway	Existing path (north)	Existing path (south)	0.8
Euclid Avenue	Speedway Boulevard	Broadway Boulevard	1.0
Fort Lowell Road	Alvernon Way	Laurel Avenue	0.8
Roger Road	Romero Road	Fairview Avenue	1.0
Speedway Boulevard	Arizona Avenue	Euclid Avenue	0.5
University Boulevard	4 th Avenue	Park Avenue	0.5
University Boulevard*	Park Avenue	Cherry Avenue	0.5

*On-campus

Lineal gaps are primarily located at and adjacent to the University of Arizona. They are present between streets where bike routes with striped shoulders and shared-use/bike paths drop.

5.5.4 Corridor Gaps

On clearly defined and otherwise well-connected bikeways, corridor gaps are missing links longer than one mile. These gaps will sometimes encompass an entire street corridor where bicycle facilities are desired but do not currently exist. Corridor gaps within the University of Arizona Area bikeway network improvement zone are presented in Table 5-12.

Table 5-12: Corridor Gaps

Street	From	To	Length (mi)
6 th Street	Church Avenue	Wilmot Road	6.9
36 th Street	2 nd Avenue	Palo Verde Road	2.8
Drachman Street	Stone Avenue	Warren Avenue	1.4

Since the University of Arizona campus has a relatively small geographic footprint, the corridor gaps are primarily located in the surrounding City of Tucson. However, the majority of corridor gaps are located within close proximity to the university campus.

5.5.5 Bike Boulevard Network Gaps

In addition to a comprehensive network analysis, it is important to look at gaps in the bike boulevard network. This is because experienced riders will typically ride regardless of facility type, but less-experienced riders may not choose to ride if the bikeway network does not have well-connected facilities with low vehicle

volumes. The City of Tucson is working to establish a grid network of bicycle boulevards to give a comprehensive, connected system of low-volume alternatives to ride on allowing less-experienced riders to seamlessly travel throughout the city. The 2009 Regional Bicycle Plan Update identifies over 40 streets and 150 miles to be turned into bicycle boulevards. In its current configuration, all gaps in the City's planned bicycle boulevard network are corridor gaps where connections between bike boulevards are absent. Much of the city could be considered a bicycle boulevard corridor gap as only ten miles of bicycle boulevards have been constructed.

5.6 Pedestrian Deficiencies

Based upon a review of existing data, this section presents an initial assessment of the deficiencies in the pedestrian network in the pedestrian network improvement zone (Zone 1 and Zone 2) in the University of Arizona study area.

5.6.1 Sidewalks

Though the University of Arizona study area has sidewalks along a significant portion of its streets, there are sidewalks missing in some locations in the pedestrian network improvement zone.

5.6.2 Curb Ramps

Similar to sidewalks, there are locations in the pedestrian network improvement zone that are missing textured ramps and truncated domes at intersections.

5.6.3 Challenging Crossings

Wide arterials are often challenging for pedestrians to cross, especially for persons with disabilities, often due to longer crossing distances and minimal crossing treatments such as signals. Signals do not always allocate enough time for pedestrians to finish crossing before the signal changes. Arterials such as Speedway Boulevard and 6th Street present several challenging crossings adjacent to the University of Arizona campus. However, the City of Tucson has installed a variety of pedestrian-activated signals and beacons on these roads and others to improve the pedestrian crossing environment.

This page intentionally left blank.

6 Best Practices

This chapter presents best practices in achieving the five objectives of the University of Arizona Area Bicycle and Pedestrian Plan outlined in **Chapter 1**. This chapter is organized into the following sections:

- Reduce Collision Risk
- Improve Existing Infrastructure
- Develop Design Standards
- Increase Bicycle and Pedestrian Mode Share and Safety
- Implementation

6.1 Reduce Collision Risk

There are a significant amount of best practices in reducing collision risk already in place in the University of Arizona study area, such as bike boulevards and bike boxes. This section presents additional best practices for reducing the risk of collisions involving bicyclists and pedestrians.

6.1.1 Separation of Modes

When different modes share the same space, there is an increased potential for conflicts. Separating modes provides each user type its own space and therefore reduces the potential for collisions. Paths for non-motorized transportation use, known as shared-use paths, should provide separated zones for bicycles and pedestrians especially in high-use areas such as a campus setting. Facilities should be clearly marked using signage and markings so bicyclists and pedestrians can easily determine where they should be within the facility. When pedestrian facilities are provided by sidewalks, adjacent bicycle facilities should be provided to discourage riding on the sidewalks.



Separation of Modes

6.1.2 Colored Conflict Zones

Locations where different modes cross paths have the potential for conflicts. Painting these conflict zones with colored paint can highlight the locations to increase awareness that the area is shared by multiple modes and reduce the risk of collisions. Examples of potential sites for colored conflict zones include, but are not limited to, the following:

- Where shared-use paths cross roads or other paths
- Across intersections
- Across turning conflict areas
- Driveways



Colored Conflict Zone

6.1.3 Leading Pedestrian Intervals

A leading pedestrian interval occurs when pedestrians are given the “Walk” sign several seconds before motor vehicles traveling in the same direction are given a green light. This allows pedestrians to get a head start on

crossing before vehicles begin turning. Leading pedestrian intervals are typically installed to reduce conflicts with pedestrians and turning vehicles sharing the same right-of-way.

6.1.4 Pedestrian Signals

Pedestrian signals are pedestrian activated signals at unsignalized intersections or midblock crossings. When pedestrians activate the signal, motor vehicles see a red light or flashing light and are required to stop for pedestrians. Examples of pedestrian signals include those seen in Tucson, including pedestrian hybrid beacons (also known as HAWK signals), pelican signals, and toucan signals (see section 4.1.2 for more details). Pedestrian signals can increase the visibility of pedestrians to motorists and allow for more convenient crossings.

6.2 Improve Existing Infrastructure

Many best practices in infrastructure can already be seen in the University of Arizona study area, such as an extensive network of shared-use paths. This section presents additional best practices for improving existing bicycle and pedestrian infrastructure.

6.2.1 Connectivity of Facilities

Providing a continuous network of bicycle and pedestrian facilities allows users to reach their destinations in a safer and more efficient manner. When bicyclists or pedestrians can navigate a network without gaps, their experiences are generally more positive, which increases the likelihood that they will commute by biking or walking in the future.

A well-connected bicycle network involves bicycle facilities that do not “drop” and leave bicyclists unexpectedly without a designated facility. The bicycle network should have a mix of facilities for riders of various types (e.g., more- versus less-confident). For example, bicycle lanes are more appropriate for experienced users, while bicycle boulevards (low volume streets with traffic calming) are often better for less experienced bicyclists.

A well-connected pedestrian network has a continuous network of sidewalks, paths, and crossings enabling a person to walk to their destinations without having to walk in the street with vehicular traffic. The network should be compliant with ADA standards, such as by having curb ramps at intersections to improve access for persons with disabilities.



Connectivity of Bike Facilities



Connectivity of Pedestrian Facilities

6.2.2 Intersection Treatments

Intersections have increased conflicts due to the multi-modal nature of the space. Providing intersection treatments can highlight the presence of bicyclists and pedestrians, thereby potentially improving user comfort and safety.

Intersection crossing markings guide bicyclists through the intersection by highlighting their intended path and providing a clear boundary between the paths of bicyclists traveling through the intersection and motor vehicles traveling either straight or executing a turn. Markings can be provided in a variety of forms, including a line of shared lane markings, chevrons, or colored pavement.

Bike boxes are designated zones at the start of traffic lanes at signalized intersections that allow bicyclists to get ahead of queuing traffic during the red signal phase. By providing a designated space for bicyclists, they can help bicyclists turn left at intersections by allowing an easier transition across travel lanes. Since bike boxes are typically delineated with color to improve visibility, they can reduce the risk of a “right hook” from motorists turning right in front of approaching bicyclists. Pedestrians also receive potential benefits from the installation of bike boxes because they reduce vehicles encroaching into the crosswalk.



Intersection Crossing Markings



Bike Box



Bicycle detection



Median Refuge Island

Bicycle detection at intersections allows bicyclists to trigger a traffic signal without the presence of motor vehicles. This helps to reduce delay in bicycle travel and increase safety by reducing the need to run red lights. Bicycle detection should be provided in conjunction with signage or pavement markings to clearly inform bicyclists how to detect the signal. Methods of bicycle detection include in-pavement loops, video, microwave, or push buttons.

Bike roundabouts, such as those at the University of California, Santa Barbara and the University of California, Davis are appropriate at intersections with high volumes of bicyclists. Bike roundabouts can clarify user interactions, which reduces the risk of collisions by lowering potential conflicts.



Bike Roundabout in Austin, TX

Median refuge islands provide a protected space for pedestrians and bicyclists in the middle of the road to allow the user to focus on crossing traffic in two phases and wait for acceptable gaps in traffic. Median refuge islands reduce conflicts because they minimize exposure of bicyclists and pedestrians to motor vehicles.

High visibility continental crosswalks can increase motorists’ awareness of pedestrians crossing. Advance yield lines placed prior to crosswalks at uncontrolled intersections can encourage motorists to yield to pedestrians more quickly, and improve sight distance for all users. Flashing beacons and in-pavement flashers at crosswalks (a type of flashing beacon) can also alert motorists to the presence of pedestrians crossing and increase yielding.



High Visibility Crosswalk



Flashing Beacons



In-Pavement Flashers



Advance Yield Line

6.2.3 On-Street Facilities

While shared-use paths provide a bicycling and walking environment with few motor vehicle conflicts, it is important to have an on-street network to complement off-street facilities. On-street facilities, including bicycle lanes, bicycle routes, bike boulevards, and cycle tracks, can accommodate a wider variety of bicycling abilities. On-street facilities can also provide greater connectivity and access to key destinations.



Cycle Track

6.3 Develop Design Guidelines

This section presents best practices for creating design standards for bicycle and pedestrian amenities.

6.3.1 Bicycle Facilities

When developing design standards for bicycle facilities, it is important to reference existing design guidance, such as the American Association of State Highway and Transportation Officials' (AASHTO) Guide for the Development of Bicycle Facilities, which will provide guidance on items including recommended width, placement of pavement markings, and signage location. The Manual on Uniform Traffic Control Devices (MUTCD) also provides guidance on type and placement of signage and markings.

Since existing standards for bicycle facilities are limited, guidance can also be found in the National Association of City Transportation Officials' (NACTO) Urban Bikeway Design Guide. NACTO's guide provides information about the typical application of bicycle facilities, required and recommended features, detailed design guidance for siting of facilities, and maintenance requirements. This information is presented for a wide variety of innovative facilities, intersection treatments, signals, signage, and markings.

The Association of Pedestrian and Bicycle Professionals' (APBP) Bicycle Parking Guidelines includes guidelines for placement, amount, and type of short-term bicycle parking.

6.3.2 Pedestrian Facilities

Design standards for pedestrian facilities should be consistent with the Americans with Disabilities Act, which has detailed requirements for providing access to persons with disabilities. Guidelines include information such as sidewalk width, curb ramps, and signage. AASHTO also publishes the Guide for the Planning, Design, and Operation of Pedestrian Facilities, which should be used as a reference when creating pedestrian design standards.

6.4 Increase Bicycle and Pedestrian Mode Share and Safety

There are a significant amount of programmatic best practices already in place in the University of Arizona study area, such as a campus bicycle station and a bike share program. This section presents best practices for increasing the proportion of bicycle and pedestrian commuters, as well as improving the safety of commuting by biking and walking.

6.4.1 Education Programs

Most bicyclists do not receive comprehensive instruction on safe and effective bicycling techniques, laws, or bicycle maintenance. Bike skills training courses are an excellent way to improve both bicyclist confidence and safety. The League of American Bicyclists (LAB) developed a comprehensive bicycle skills curriculum which is considered the national standard for those seeking to improve their on-bike skills. The classes available include bicycle safety checks and basic maintenance, basic and advanced on-road skills, commuting, and driver education.⁹ There are currently 25 League Certified Instructors (LCI) in Tucson that are certified by the LAB to teach bicycle safety courses.

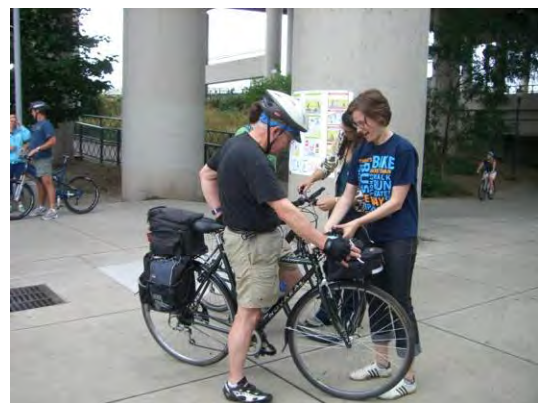


Bicycles on transit

A common statement from bicyclists is that they do not know how to combine their bicycle trips with transit, whether it is because they are not familiar with how to use bicycle racks on buses or they do not know which transit vehicles accommodate bicycles. Educational campaigns can teach bicyclists how to combine their trips with transit. Campaigns can include informational pamphlets, such as bicycle rack instructions and transit maps, being distributed at community/campus events and providing sample bike racks and bicycles.

6.4.2 Bicycle/Pedestrian Orientation

A Bicycle/Pedestrian Orientation for all incoming students at the beginning of each school year can introduce bicycling and walking on/around campus to freshmen and transfer students, and offer a refresher to returning students. A variety of outreach methods and materials can address important topics such as rights and responsibilities, when and where not to bicycle on campus, proper security measures, etc.



Bicycle lights can be sold at a Bicycle/Pedestrian Orientation

A Bicycle/Pedestrian Orientation should include:

- Distribution of information to incoming and returning students at the beginning of the year through school information packets, including the location and rules of bicycle dismount zones, locations of bike parking, instructions on how to properly lock your bicycle, how to share the road with cars, etc.

⁹ Additional program information is available online at www.bikeleague.org/programs/education/courses.php.

- Bike repair clinics and other activities advertised through flyers, email, bulletin boards, and campus newsletters
- Information tabling at campus events and prominent locations
- Promotion of the University of Arizona bicycling website, a resource for all bicycling related information on campus
- At-cost or low-cost bike lights and helmets sold at tabling events and through the campus bookstore
- Distribution of free promotional items promoting safe and courteous bicycling and walking on campus

A “bike/walk buddy” program can also be implemented to match current bicycling students with interested students. This can be a simple program where students wear a sticker that says “I bike/walk to school, ask me how,” or a more elaborate program that matches bike/walk buddies with interested students who live in their neighborhood for mentoring.

6.4.3 Commuter Benefit Program

Bike to Work Day is celebrated in Tucson as part of “Bike Month” every April. Jurisdictions throughout the United States hold events to encourage new people to ride bicycles and existing riders to continue to commute by bicycle. Throughout the day or week, agencies hold events to encourage people to participate in the program, such as free breakfast to bicyclists at several stations throughout their jurisdictions.

A Bicycle Commuter Campaign encourages people to commute by bicycle and to make the general public aware that bicycling is a practical mode of transportation. San Luis Obispo Regional Rideshare in California, for example, organizes the “Commute for Cash Challenge” every October as part of “Rideshare Month” in which commuters log the miles that they commute using alternative transportation for a chance to win prizes.¹⁰

A rewards program for commuters who regularly commute via alternative transportation can contribute to consistent commuting by biking and walking. Commuters can log their trips year-round to receive benefits for walking or biking to school/work, such as gift certificates, cash payouts, or free biking and walking accessories.

Since a lack of proper equipment can be a barrier to biking and walking, accessory giveaways may encourage people to commute using these modes. Giveaways can be held at campus events, community fairs, and student orientations. Accessories can include helmets, bike lights, reflective gear, and pedometers.

6.4.4 Safety Media Campaigns

A high-profile marketing campaign that highlights bicyclist safety is an important part of helping all road users – including both motorists and bicyclists – understand their roles and responsibilities on campus roads. This type of high-profile campaign is an effective way to raise the profile of bicycling



An effective media campaign can promote safety

¹⁰ <http://www.rideshare.org/CommuteforCashChallenge2010.aspx>

and improve safety for bicyclists, pedestrians, and motorists (including staff who drive on campus as part of their work).

A well-produced safety campaign will be memorable and effective and include clean, clear graphics in a variety of media, such as print or audio/video advertisements, the distribution of free promotional items, and email or in-person outreach. This type of campaign is particularly effective when kicked off in conjunction with other bicycling events or at the beginning of each academic term. Types of safety media campaigns can include bike light campaigns, helmet campaigns, share the road/path campaigns, and safe crossing campaigns.

6.4.5 Campus Car-Free Events

Usually held on a weekend day, car-free events temporarily close streets to cars and open them up to people walking, bicycling, dancing, hula hooping, skateboarding, playing games, and so on. These events (often called *ciclovias*) have been very successful internationally and are rapidly becoming popular in cities across the United States. The City of Tucson has a “Ciclovía” during which streets are annually closed to motorized traffic. Car-free events on campus highlight the ease and convenience of walking and biking to school.



A Ciclovía will promote bicycling on campus.

6.5 Implementation

In addition to the existing best practices in place at the University of Arizona, such as the bike ambassadors program, this section presents best practices in implementing and monitoring bicycle and pedestrian facilities and programs.

6.5.1 Campus Bicycle and Pedestrian Program Coordinator

A number of universities around the country staff a part- or full-time Bicycle and Pedestrian Program Coordinator position. In addition to supporting existing programs, such as bicycle parking provision and education activities, job duties for the person assuming these responsibilities include the following:

- Monitoring facility planning, design, and construction that may impact bicycling and walking
- Staffing bicycle and pedestrian advisory committee meetings
- Coordinating the implementation of projects and programs
- Identifying new projects and programs that would improve the university’s bicycling and walking environment and improve safety for bicyclists, pedestrians, and motorists
- Coordinating evaluation of projects and programs, such as bicycle and pedestrian counts
- Pursuing funding sources for project and program implementation

6.5.2 Campus Bicycle and Pedestrian Advisory Committee

Many local governments have an official Bicycle or Pedestrian Advisory Committee made of citizen volunteers, appointed by City Council or the appropriate body, to advise on bicycling and walking issues. An advisory committee composed of students, faculty, and staff can address bicycling issues on campus and establish an institution’s commitment to making bicycling and walking safer.

The charges of the campus bicycle and pedestrian advisory committee should include some or all of the following:

- Review and provide input on campus facility planning and design as it affects bicycling and walking (e.g., streets, intersections, signals, and parking facilities)
- Participate in the development, implementation, and evaluation of transportation studies and plans
- Provide a formal liaison between university, faculty, staff, and students
- Develop and monitor goals and indices related to bicycling on campus
- Promote safe and courteous bicycling on campus

Because committee members are typically volunteers, it is essential to have strong staffing to support the committee in order for it to be successful. A university staff person (e.g. a Bicycle and Pedestrian Coordinator) should be formally assigned to the committee and should take charge of managing the recruitment process, appointing members, managing agendas and minutes, scheduling meetings, bringing agency issues to the committee, and reporting back to the university about the committee’s recommendations and findings. This person can also attend the City’s Bicycle Advisory Committee meetings, including the Downtown/University subcommittee meetings.

6.5.3 Automated Bicycle and Pedestrian Counters

Bicycle and pedestrian counts act as a mechanism for tracking bicycling and walking trends over time and for evaluating the impact of bicycle and pedestrian projects, policies, and programs. Automated counters can increase the amount of data collected by consistently counting year-round. Information such as peak time of day and weather effects on bicycling and walking can be analyzed from data obtained through automated counters. Automated counters that publicly display the number of people biking and walking can be a way to encourage more people to bike and walk, as well.



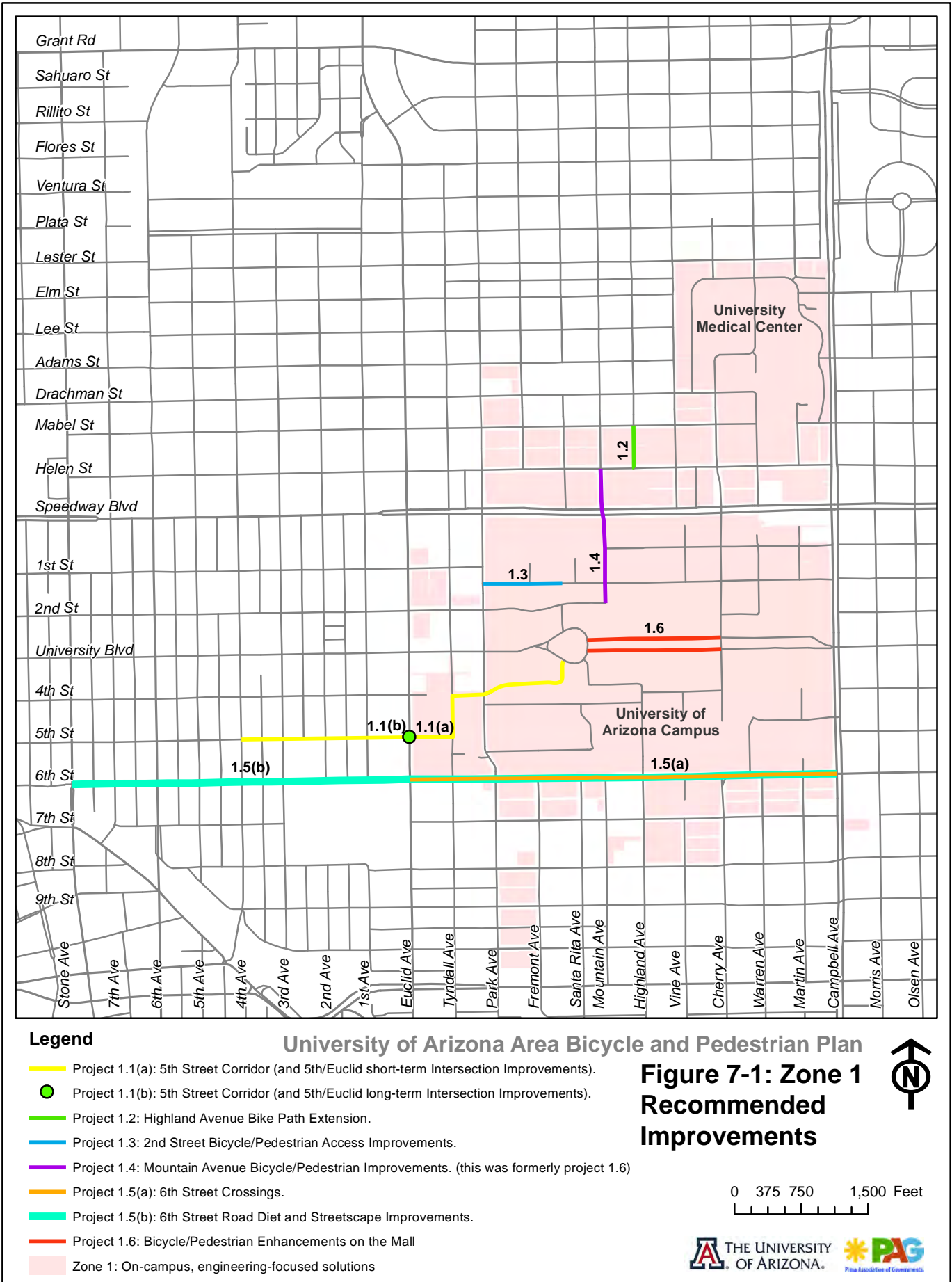
Automated counter

7 Zone 1 Recommended Improvements

This chapter presents the recommended improvements for Zone 1 (shown in Figure 7-1). As displayed in Figure 2-1, Zone 1 is comprised by the University of Arizona campus. Recommended improvements are based on a detailed analysis of site-specific improvements for six high priority locations. These locations were selected by considering input from staff of the University of Arizona, City of Tucson, Pima Association of Governments, and through the public outreach process.

The six high priority Zone 1 locations are listed below. Detailed project information and concept designs can be found in the following pages. Additional discussion of the improvement types presented in these projects can be found in Chapter 8 and Chapter 9.

- Project 1.1 (a): 5th Street Corridor (and 5th Street/Euclid Avenue Short-Term Intersection Improvements)
- Project 1.1 (b): 5th Street Corridor (and 5th Street/Euclid Avenue Long-Term Intersection Improvements)
- Project 1.2: Highland Avenue Bike Path Extension
- Project 1.3: 2nd Street Bicycle/Pedestrian Access Improvements
- Project 1.4: Mountain Avenue Bicycle/Pedestrian Improvements
- Project 1.5 (a): 6th Street Crossings
- Project 1.5 (b): 6th Street Road Diet and Streetscape Improvements
- Project 1.6: Bicycle/Pedestrian Enhancements on the Mall



Project 1.1 (a): 5th Street Corridor (and 5th Street/Euclid Avenue Short-Term Intersection Improvements)

Project Description

The 5th Street corridor yields potential to serve as a major western portal into the University of Arizona campus. West of Euclid Avenue, the corridor is predominantly residential in character (in addition to two nearby schools) with relatively low vehicle volumes and speeds, and traffic calming devices to provide a comfortable bicycling environment. The corridor also yields potential to serve as a broader east-west cycling route linking Downtown Tucson with the University of Arizona and the eastern Tucson region. The importance of 5th Street as a bicycling route will become even more important upon installation of streetcar tracks on the nearby University Boulevard corridor.

East of Euclid Avenue, 5th Street provides access to on-campus student housing. The lack of a full street connection between Euclid and Tyndall avenues results in low vehicle volumes, making the corridor potentially attractive for pedestrian and bicycle use. Opportunities exist to formalize a full east-west bicycle/pedestrian connection on this segment, streamlining non-motorized access onto campus. Continuing east, opportunities exist to further enhance on-campus and regional walkway/bikeway connections via Tyndall Avenue, 4th Street and South Campus Drive.

Pedestrian and bicyclist crossings of Euclid Avenue represent the most challenging element of this corridor. The Euclid Avenue cross-section includes four vehicle travel lanes (two in each direction) plus a center turn lane. A median/pedestrian refuge island in the center turn lane restricts vehicle left turns from Euclid Avenue, while motorists are restricted to right-in/right-out movements on the 5th Street approaches. A crosswalk traverses the intersection's south leg, however the markings are faded and the absence of high-visibility markings and signage creates challenging crossings for pedestrians and cyclists alike.

Proposed Improvements

This project would create a continuous bicycle/pedestrian corridor between 4th Avenue and the University Mall. The project would also include short-term improvements to the 5th Street/Euclid Avenue intersection (a separate project sheet describes proposed long-term enhancements for this intersection). Key improvements include:

- Bicycle Boulevard treatments on 5th Street between 4th and Euclid avenues
- 5th Street/Euclid Avenue improvements:
 - Yield markings and advance warning signage on Euclid Avenue approaches
 - High-visibility crosswalks on all intersection legs
 - Replacement of gate on 5th Street (immediately east of Euclid Avenue) with removable bollards
- Gateway feature on 5th Street immediately east of Euclid Avenue
- Bicycle/pedestrian path linking 5th Street's eastern terminus with existing traffic circle immediately west of Tyndall Avenue
- Shared lane markings on traffic circle immediately west of Tyndall Avenue
- Shared lane markings on Tyndall Avenue (between traffic circle near 5th Street and 4th Street)
- Shared lane markings on 4th Street (between Tyndall and Park avenues)
- Shared lane markings on South Campus Drive (between Park Avenue and University Boulevard)

Cost Estimate

\$100,000



There is an existing pedestrian refuge island and traffic diverter on Euclid Avenue at 5th Street

Concept Graphics

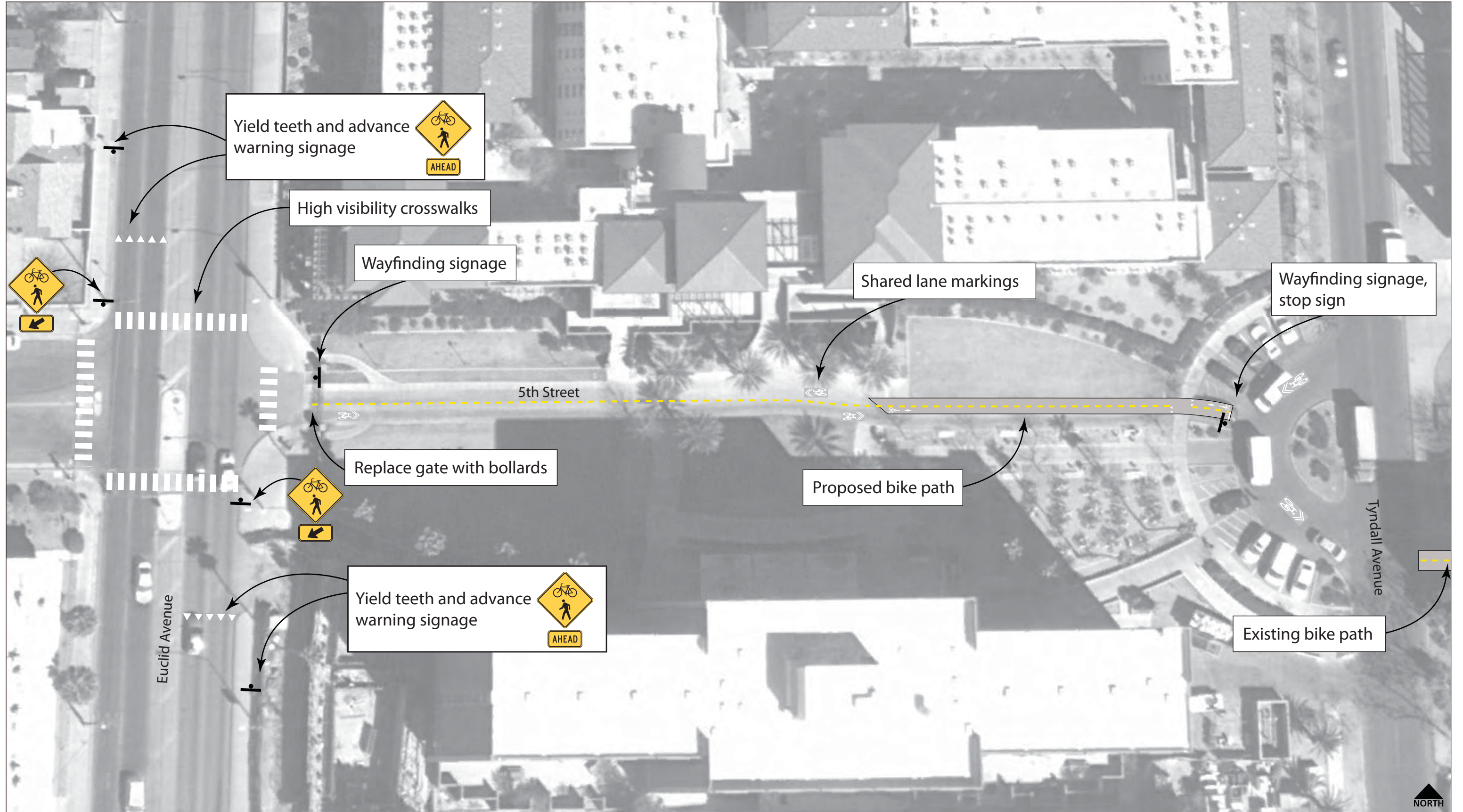


Photosimulation of the intersection of 5th Street and Euclid Avenue with proposed improvements

Concept Graphics for Short-Term Improvements



Concept Graphics for Short-Term Improvements



This page intentionally left blank.

Project 1.1 (b): 5th Street Corridor (and 5th Street/Euclid Avenue Long-Term Intersection Improvements)

Project Description

This project would implement long-term improvements to enhance the 5th Street corridor, with emphasis on the 5th Street/Euclid Avenue intersection. Establishing seamless non-motorized crossings of Euclid Avenue would further strengthen the 5th Street corridor's role as a key local and regional walkway and bikeway.



To access 5th Street east of Euclid Avenue, bicyclists ride through the pedestrian refuge island

Proposed Improvements

A Toucan crossing is proposed as a long-term measure to improve pedestrian and bicyclist crossings at the 5th Street/Euclid Avenue intersection. Toucan crossings, successfully used throughout the Tucson region, provide a dedicated space for bicyclists and pedestrians in a center median, free from conflicts with motorists. The signal is actuated by separate push buttons for pedestrians and for bicyclists, which are placed to be easily accessible by both user types. This configuration would maintain existing vehicle turning movement restrictions on both 5th Street and Euclid Avenue. Key improvements include:

- Remove existing center median on Euclid Avenue
- Toucan signal with center median on 5th Street approaches
- Remove existing crosswalk traversing Euclid Avenue, and replace with realigned crosswalk
- Signage and pavement markings downstream from the Toucan signal on 5th Street for bicyclist transitions to the roadway
- Wayfinding signage on 5th Street approaches
- Reconstruct driveway on intersection's east leg

Cost Estimate

\$375,000

Concept Graphics

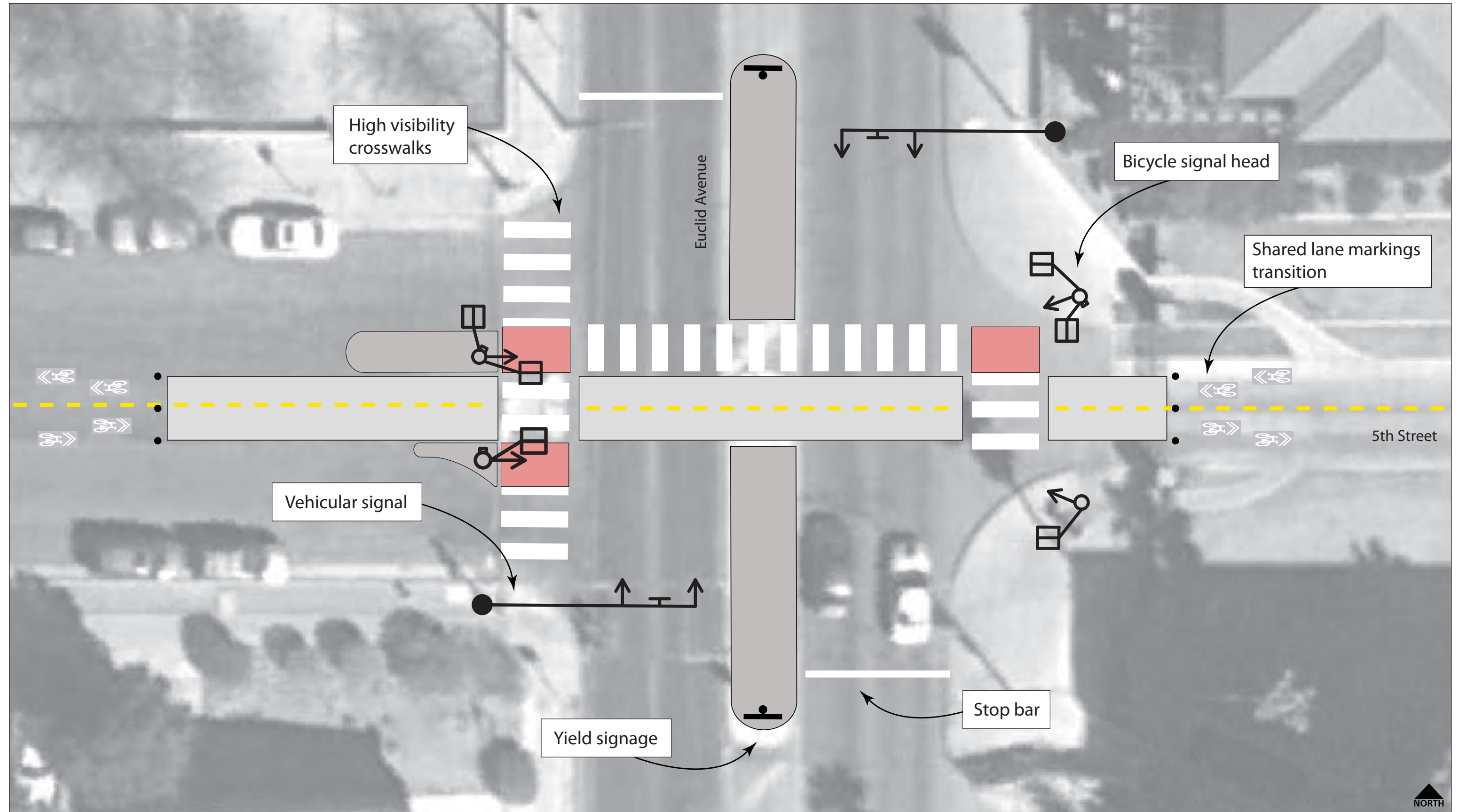


Example toucan crossing in Tucson



Wayfinding markings, striping, and signage at toucan crossing

Concept Graphics for Long-Term Improvements



Project 1.2: Highland Avenue Bike Path Extension (Mabel Street to Helen Street)

Project Description

This segment of Highland Avenue between Mabel Street and Helen Street is not accessible by bicycle in its existing condition. Highland Avenue terminates at Mabel Street to the north and begins again south of Helen Street as a bike path. Bicyclists currently must access the University from the north by Mountain Avenue and cut across Helen Street to access the existing path. Both of these streets experience fairly high levels of vehicle congestion, which increases the risk of potential conflicts between bicyclists and motorists.

There is undeveloped land along the west side of the Highland Avenue parking garage, located between Mabel Street and Helen Street. This undeveloped land provides opportunity for improvements with fewer associated costs.



The area to the west of the Highland Avenue garage is currently undeveloped

Proposed Improvements

Constructing a bike path along the west side of the Highland Avenue parking garage will provide continuous north-south bicycle access and would reduce congestion at Mountain Avenue and Helen Street. U of A students for sustainability established a community garden near the Mabel/Highland intersection, and the garden is currently operational. The proposed path would go around the garden. Wayfinding signage will direct users to the access points at the existing and future bike path segments. Signage and advance yield markings will encourage drivers to yield to those crossing to and from the bike paths.

List of improvements:

- Construct/stripe bike path with adjacent pedestrian walkway
- Stripe yield markings on Mabel Street and Helen Street
- Stripe high visibility continental crosswalks on Mabel Street and Helen Street
- Install MUTCD W11-1 and W16-7 signage at eastbound and westbound approaches to crosswalks
- Install wayfinding signage at northern and southern ends of proposed bike path
- Install shared lane markings on Helen Street between the existing and proposed bike path segments



Highland Avenue terminates at Mabel Street

Cost Estimate

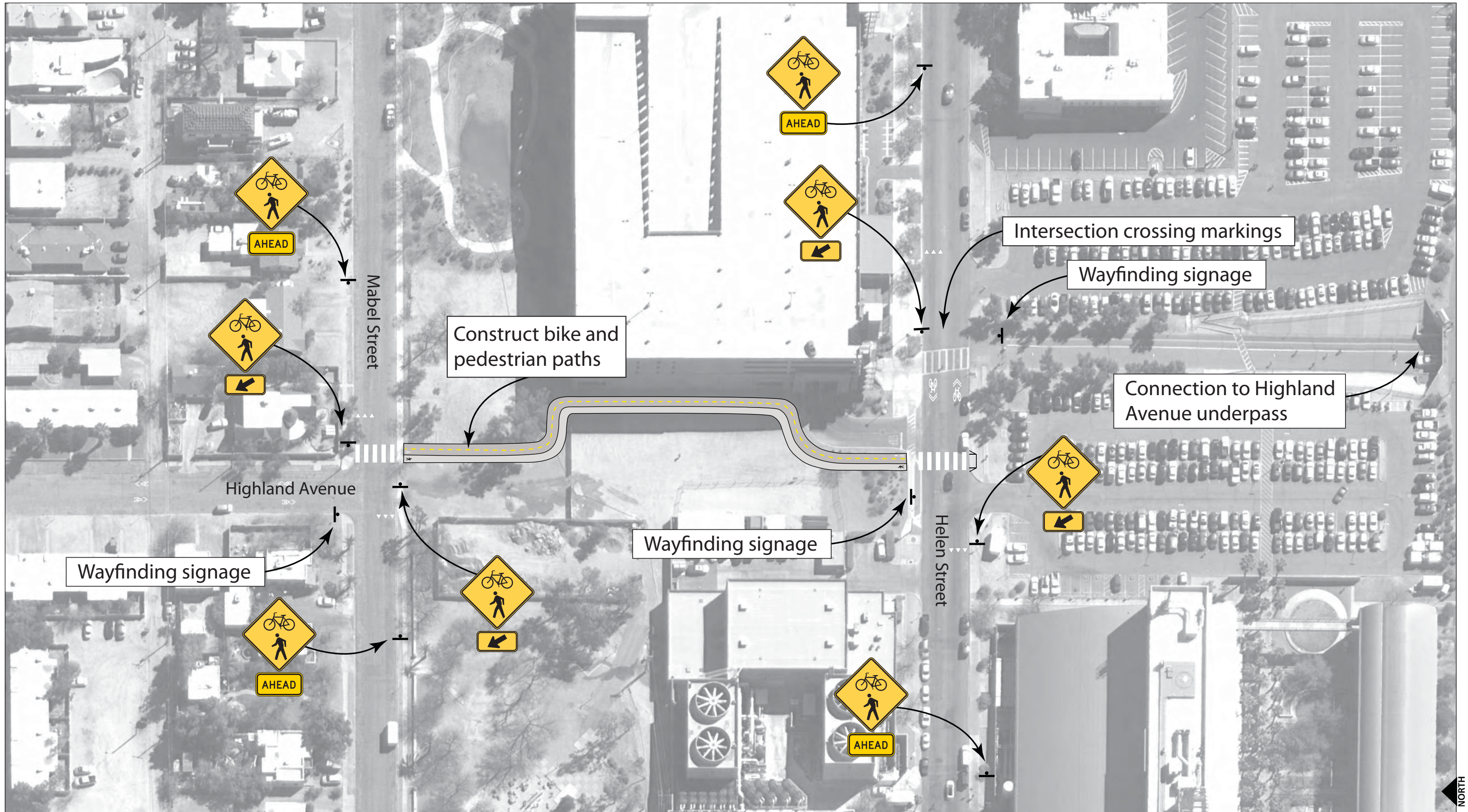
\$36,000

Concept Graphics



Wayfinding signage will direct bicyclists to the continuation of the bike path

Concept Graphics



Project 1.3: 2nd Street Bicycle/Pedestrian Access Improvements

Project Description

2nd Street through the University of Arizona is the future alignment for the Modern Streetcar, which is a nearly four-mile rail system that will provide transit access to the campus and surrounding areas, including the Arizona Health Sciences Center, the 4th Avenue shopping district, downtown Tucson, Main Gate Square, and the Mercado District. The Modern Streetcar is a track-based transit system that will operate within the same right-of-way as other vehicles, pedestrians, and bicyclists. Upon implementation, the intersection of 2nd Street at Park Avenue will become signalized, and a combination of bike lanes and shared lane markings will be installed on 2nd Street.

Since the streetcar will operate at-grade, there is the potential for increased conflicts with bicyclists and pedestrians due to the mixing of modes. The 2nd Street corridor has no existing bicycle facilities. Pedestrian facilities include sidewalks, transverse crosswalks, and high visibility continental crosswalks.

There is an existing service road immediately south of 2nd Street that runs parallel to the future Modern Streetcar alignment. It is currently open to service vehicle traffic and has no bicycle facilities.



There is an existing service road south of 2nd Street that runs parallel to the Modern Streetcar alignment

Proposed Improvements

Converting the alley immediately south of 2nd Street to a two-way cycle track (bicycle-only path) will allow bicycle access without conflicts with the Modern Streetcar. Bicyclists that are more comfortable with riding in traffic can remain on 2nd Street and use the planned bike lanes and shared lane markings. The proposed cycle track will connect with the existing Harshbroeager bike path to the east, and to Park Avenue to the west via James Rogers Way. The short segment of James Rogers Way immediately east of Park Avenue would be re-stripped with an eastbound contra-flow bike lane to establish seamless links with the surrounding bikeway network. The 2nd Street cycle track would also include connections to the Olive Road Bike Path.

Curb extensions on Olive Road will shorten the crossing distance for pedestrians accessing the train platform. High visibility crosswalks and bike crossings will alert drivers of people crossing 2nd Street.

List of improvements:

- Construct cycle track on service road immediately south of 2nd Street
- Install eastbound contra-flow bike lane on James Rogers Way immediately east of Park Avenue
- Install high-visibility bicycle/pedestrian crossings on 2nd Street at Olive Road and at Harshbroeager Path
- Install curb extensions on Olive road at 2nd Street
- Relocate bike parking to the north end of the bicycle crossing
- Install “bicycles and service vehicles only” signage at the entrance to the cycle track

Cost Estimate

\$847,000

Concept Graphics

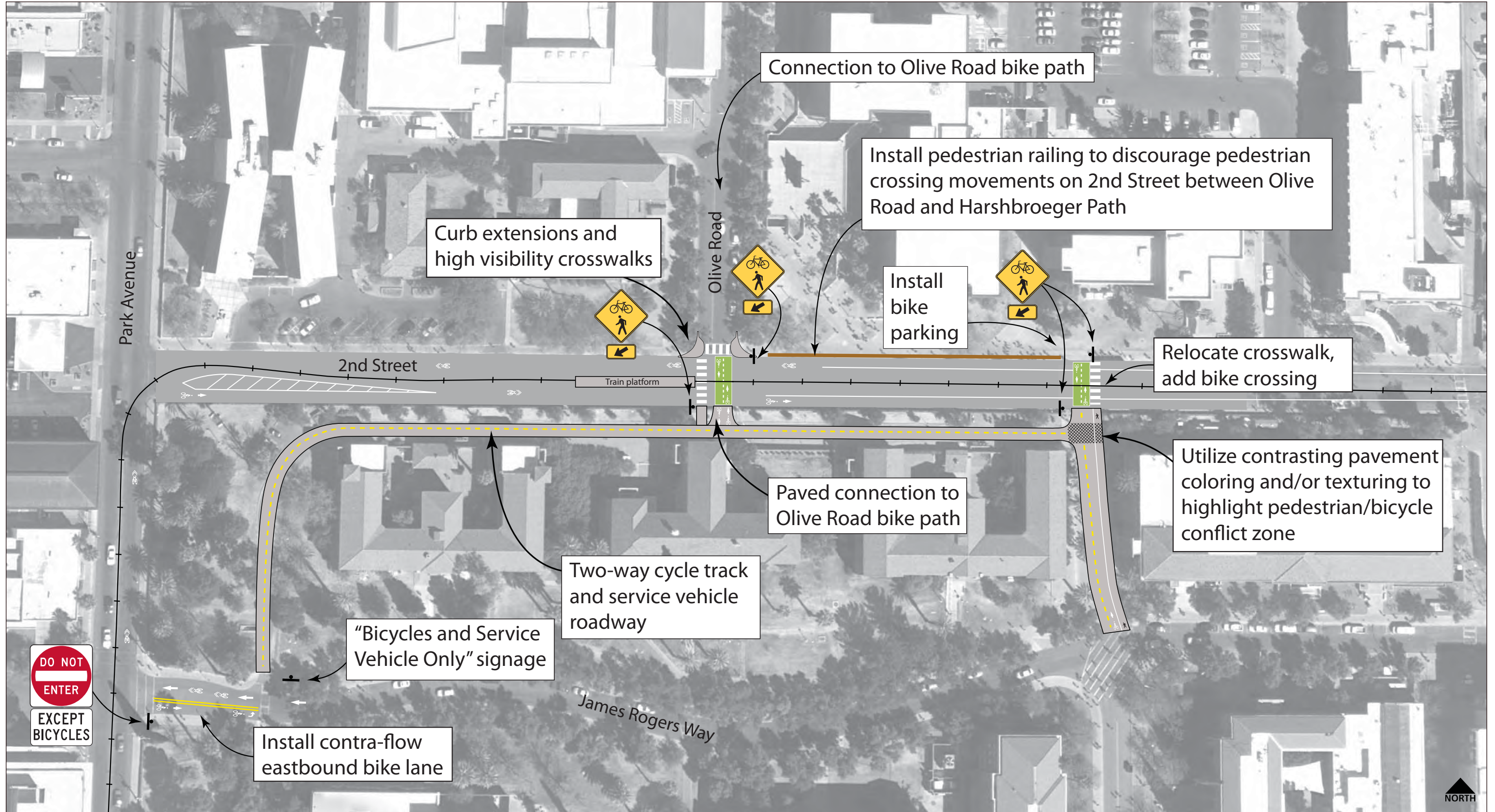


Curb extensions will allow pedestrians to better see the approaching streetcar



Photosimulation of a cycle track on the service road south of 2nd Street

Concept Graphics



Project 1.4: Mountain Avenue Bicycle/Pedestrian Improvements

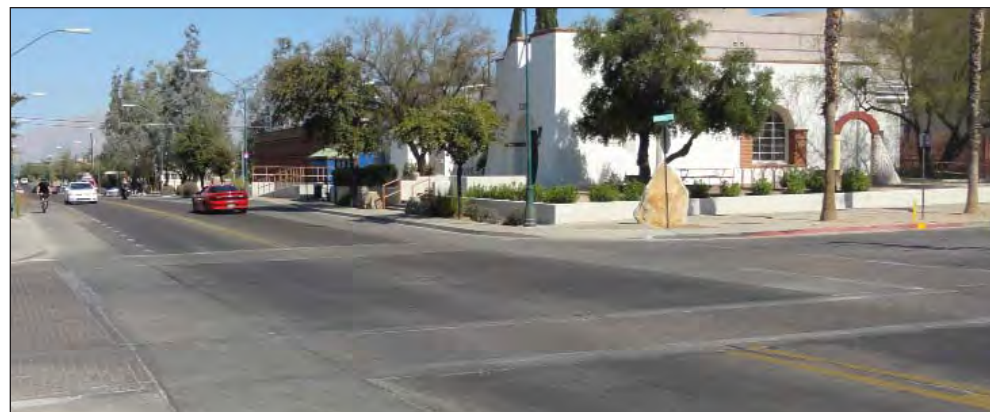
Project Description

Mountain Avenue is a major portal to the University of Arizona campus from the north. The corridor provides access to many academic buildings and connects to a pedestrian pathway intersecting the Mall. A campus shuttle also utilizes Mountain Avenue.

Buffered bike lanes exist on Mountain Avenue north of Helen Street while conventional bike lanes exist between Helen Street and Speedway Boulevard. Separated bicycle facilities do not exist on Mountain Avenue south of Speedway Boulevard, forcing bicyclists to share the road with vehicular traffic. These conditions can create conflicts during congested periods.

Non-motorized users experience challenging conditions at the Mountain Avenue/Helen Street intersection. Specific issues include difficult bicyclist/pedestrian crossings of Mountain Avenue (often due to limited gaps in the traffic stream during peak periods), and conflicts between bicyclists/pedestrians with motorists executing turns at high speeds. This intersection also accommodates heavy southbound bicycle left turn movements, as many riders use Helen Street to access other campus portals (e.g., the Highland Avenue path).

The Speedway Boulevard cross-section includes three lanes of traffic in each direction with center medians/left turn pockets. With a 35 mile-per-hour posted speed, Speedway Boulevard functions as a highway with high volumes of vehicles traveling at higher speeds. Because of its considerable width, it can be challenging for pedestrians to cross in the allotted time provided by the signal, especially for persons with disabilities. Several reported pedestrian-vehicle collisions have occurred on Speedway Boulevard since 2007.



There are existing bike lanes on Mountain Avenue north of Speedway Boulevard

Proposed Improvements

A variety of options exist for enhancing bicycle/pedestrian travel along and across the Mountain Avenue corridor between Helen and 2nd streets, described below:

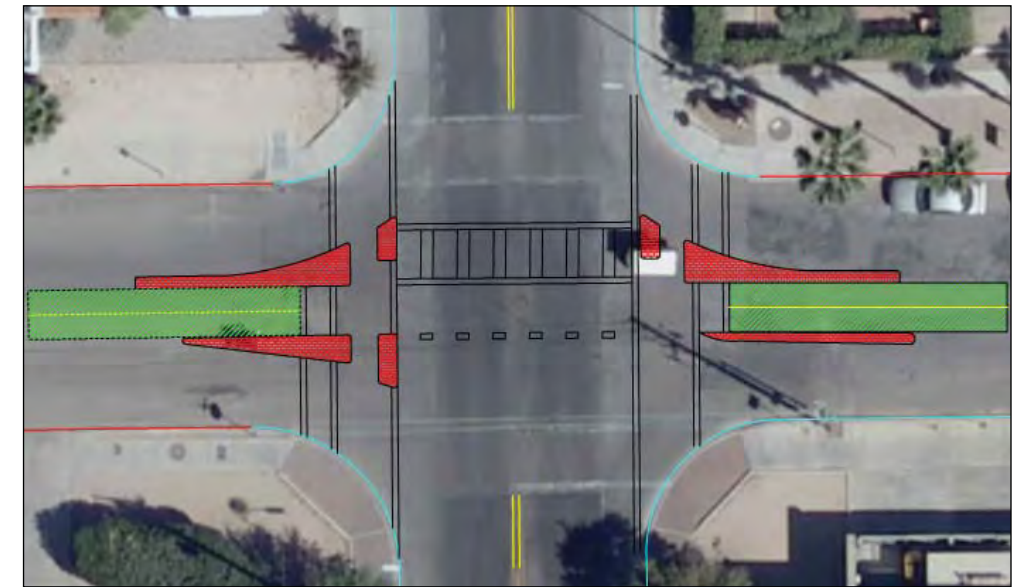
- Mountain Avenue/Helen Street intersection:
 - ◊ Though constrained in width, the intersection could potentially accommodate a mini traffic circle to reduce vehicle turning speeds and simplify bicycle left turn movements. Mountable curbs would be necessary to maintain truck and emergency vehicle access through the intersection. Additional potential improvements include high-visibility crosswalks and advanced warning signage.
 - ◊ Alternatively, an unsignalized Toucan crossing could reduce motorized/non-motorized user conflicts by restricting some vehicle movements onto and off of Mountain Avenue. This treatment also yields potential to reduce vehicle cut-through traffic on the Helen Street corridor.
 - ◊ Lamp wattage improvements to increase visibility of all transportation users during nighttime conditions
- Mountain Avenue/Speedway Boulevard intersection:
 - ◊ Dashed green bike lane on the southbound approach to visually cue through bicyclists and right-turning motorists of this conflict zone
 - ◊ High-visibility crosswalks
 - ◊ Modify signal timing to include a Leading Pedestrian Interval
 - ◊ Improve median islands on Speedway Boulevard approaches
- Mountain Avenue south of Speedway Boulevard: “Green-backed” shared lane markings to heighten the awareness of bicyclists sharing the road with motorists.

Further analysis is necessary to determine the appropriate measures for this corridor. It is recommended that the City of Tucson and University of Arizona jointly conduct a road safety assessment to determine the appropriate treatments to address challenging walking and bicycling conditions along this important corridor.

Cost Estimate

Dependent on improvement types ultimately selected

Concept Graphics

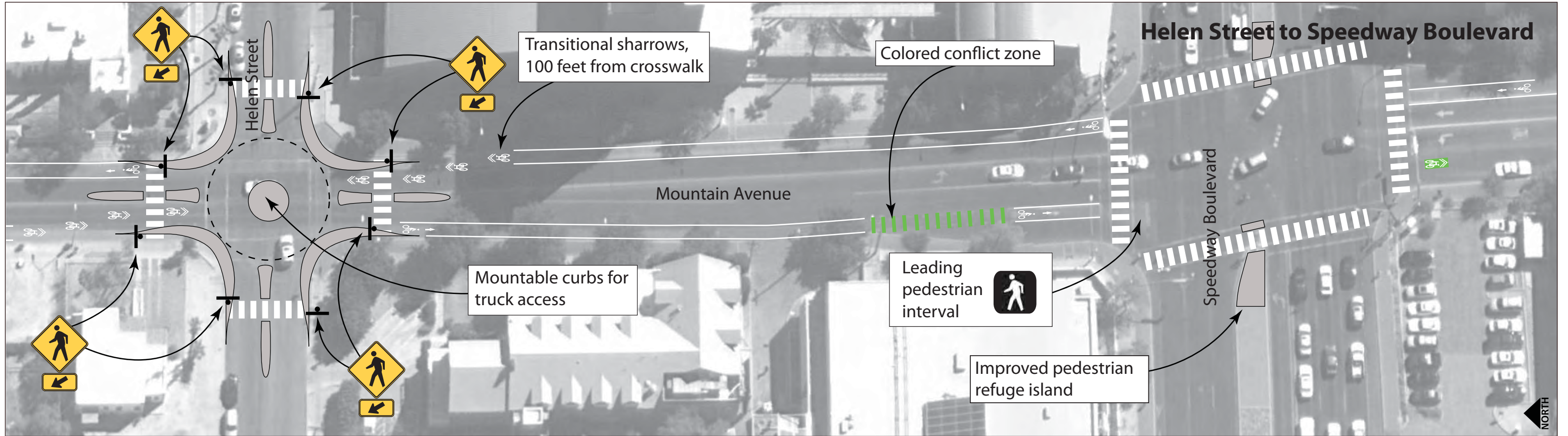


Concept drawing depicting an unsignalized Toucan crossing on Mountain Avenue at Helen Street



Photosimulation of the traffic circle on Mountain Avenue at Helen Street

Concept Graphics



Project 1.5 (a) : 6th Street Crossings at Tyndall Avenue, Park Avenue, Fremont Avenue, Santa Rita Avenue, and Cherry Avenue

Project Description

6th Street is a four lane road with a center turn lane and runs along the southern boundary of the University of Arizona. The street has a posted speed limit of 30 miles per hour. Pedestrians and bicyclists must cross 6th Street to access several key destinations in the southern portion of the campus. These include numerous residence halls, the stadium, the Highland Quad, and the recreation center which is located on the south side of 6th Street.

6th Street as a whole provides challenging crossings for both bicyclists and pedestrians. Uncontrolled intersections at Tyndall Avenue and Santa Rita Avenue do not have marked crosswalks or signage to alert motorists to yield to crossing pedestrians. Bicyclists and pedestrians often have difficulty crossing 6th Street due to the lack of acceptable gaps in traffic.

Signalized intersections at Park Avenue and Cherry Avenue have wide curb radii that allow for motorists to conduct turning movements at higher speeds. At Fremont Avenue, pedestrians often do not comply with the existing crosswalk configuration due to its circuitous routing.

Proposed Improvements

Providing high visibility crosswalks, flashing beacons, and in-pavement flashing lights at uncontrolled intersections on 6th Street will help in the short-term to alert motorists to the presence of people crossing and remind drivers to yield. Advance yield markings will encourage motorists to stop prior to the crosswalk. These improvements will help bicyclists crossing 6th Street, as well.

Installing curb extensions and removing porkchop islands at some intersections on 6th Street will create a more pedestrian-friendly environment through shorter crossing distances, reduced motorist speeds, and fewer bicycle/pedestrian/motor vehicle conflicts. Reconfiguring the crosswalk at Fremont Avenue will increase pedestrian compliance and thus improve safety.

List of improvements:

6th Street at Tyndall Avenue

- Install toucan signal on Tyndall Avenue at 6th Street
- Stripe wayfinding signage/markings at toucan approaches
- Stripe high visibility continental crosswalks on the north, east, and southern legs
- Implement motorist right-in, right-out configurations on Tyndall Avenue

6th Street at Park Avenue

- Remove existing porkchop islands at northbound and southbound approaches
- Install curb extensions at northwest and northeast corners
- Reduce curb radius on southeast corner
- Relocate traffic signal poles
- Restripe northbound and southbound approaches
- Stripe high visibility continental crosswalks on all legs

6th Street at Fremont Avenue

- Replace Pelican crossing with a conventional signalized pedestrian crossing
- Construct bike path (with transitional ramps and pavement markings) on west side of Fremont Avenue

6th Street at Santa Rita Avenue

- Stripe high visibility continental crosswalks on north and west legs
- Stripe yield markings on eastbound / westbound approaches
- Install RRFBs and MUTCD W11-2 \ W16-7p signage at eastern crosswalk traversing 6th Street
- Construct pedestrian refuge island
- Install in-pavement flashing lights at crosswalk traversing 6th Street (optional)

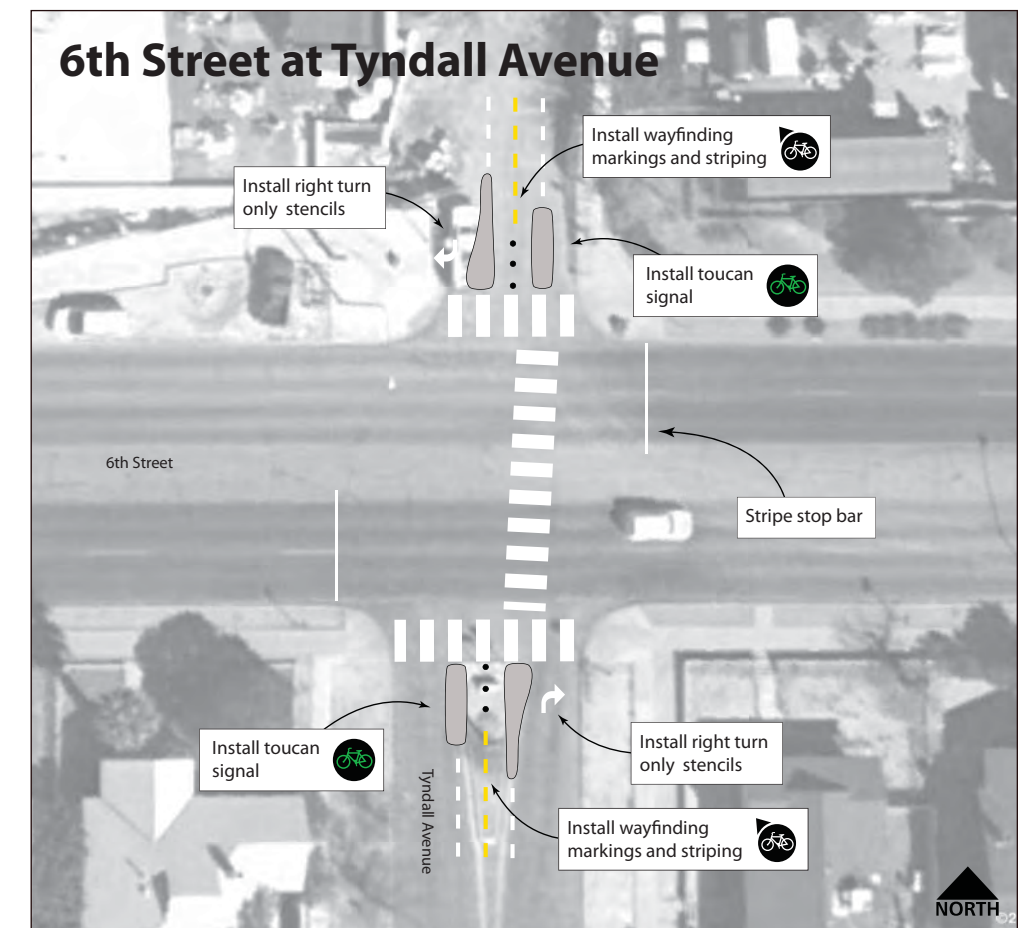
6th Street at Cherry Avenue

- Remove existing porkchop island and crosswalk
- Reduce curb radius on southeast corner
- Relocate traffic signals
- Reconstruct fence on northern side of 6th Street
- Stripe high visibility continental crosswalks on the western and southern legs
- Restripe northbound approach

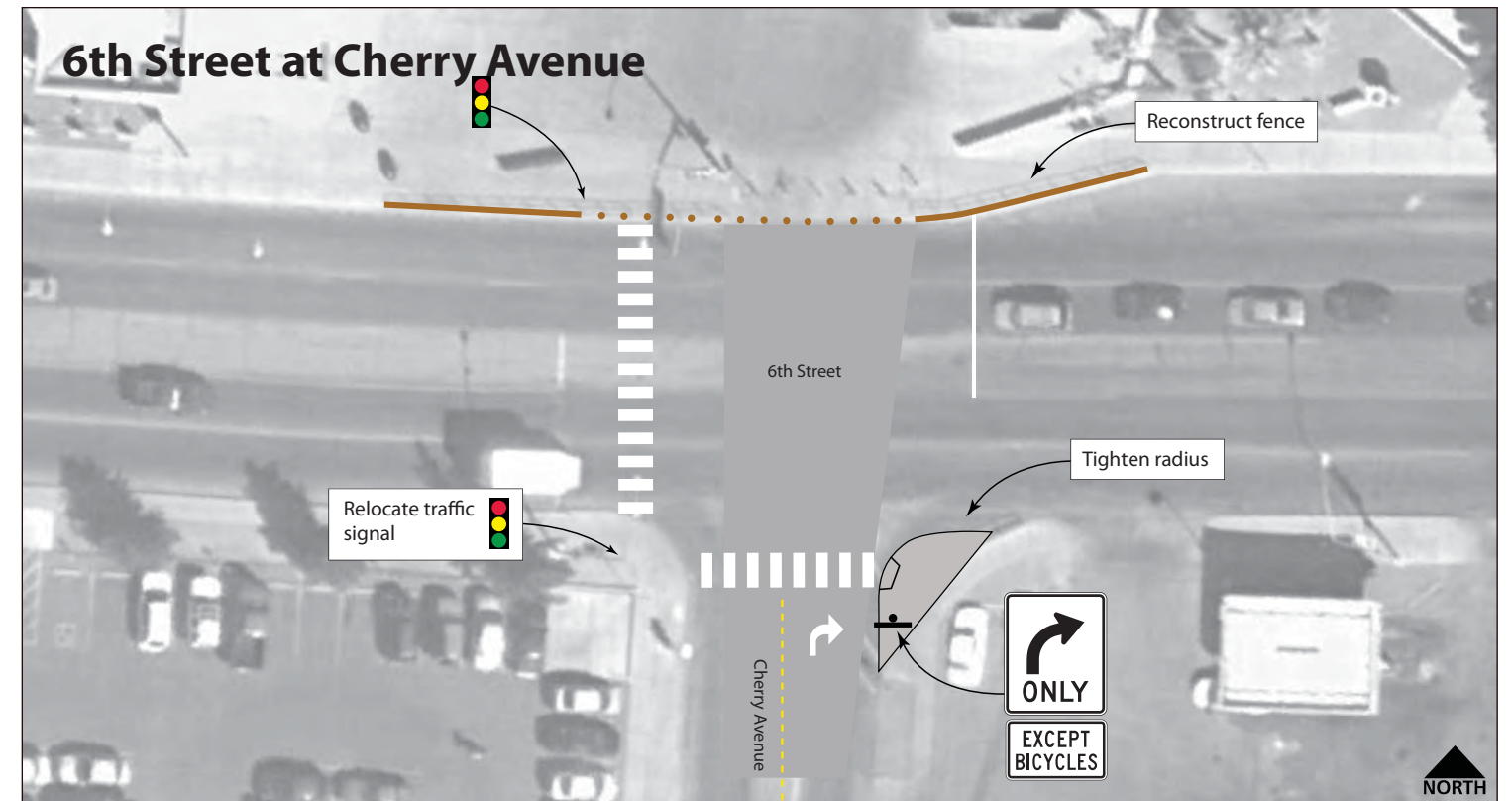
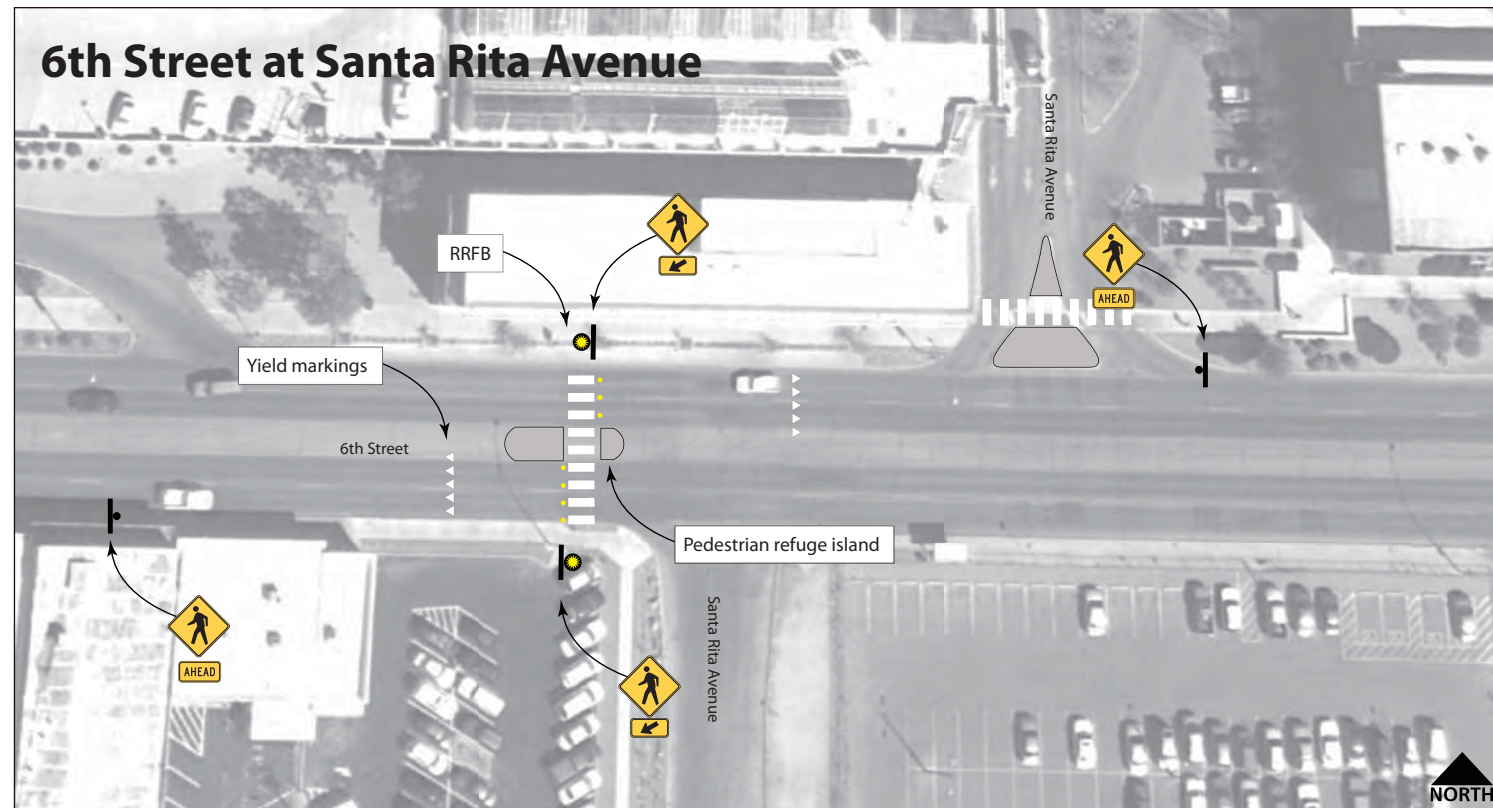
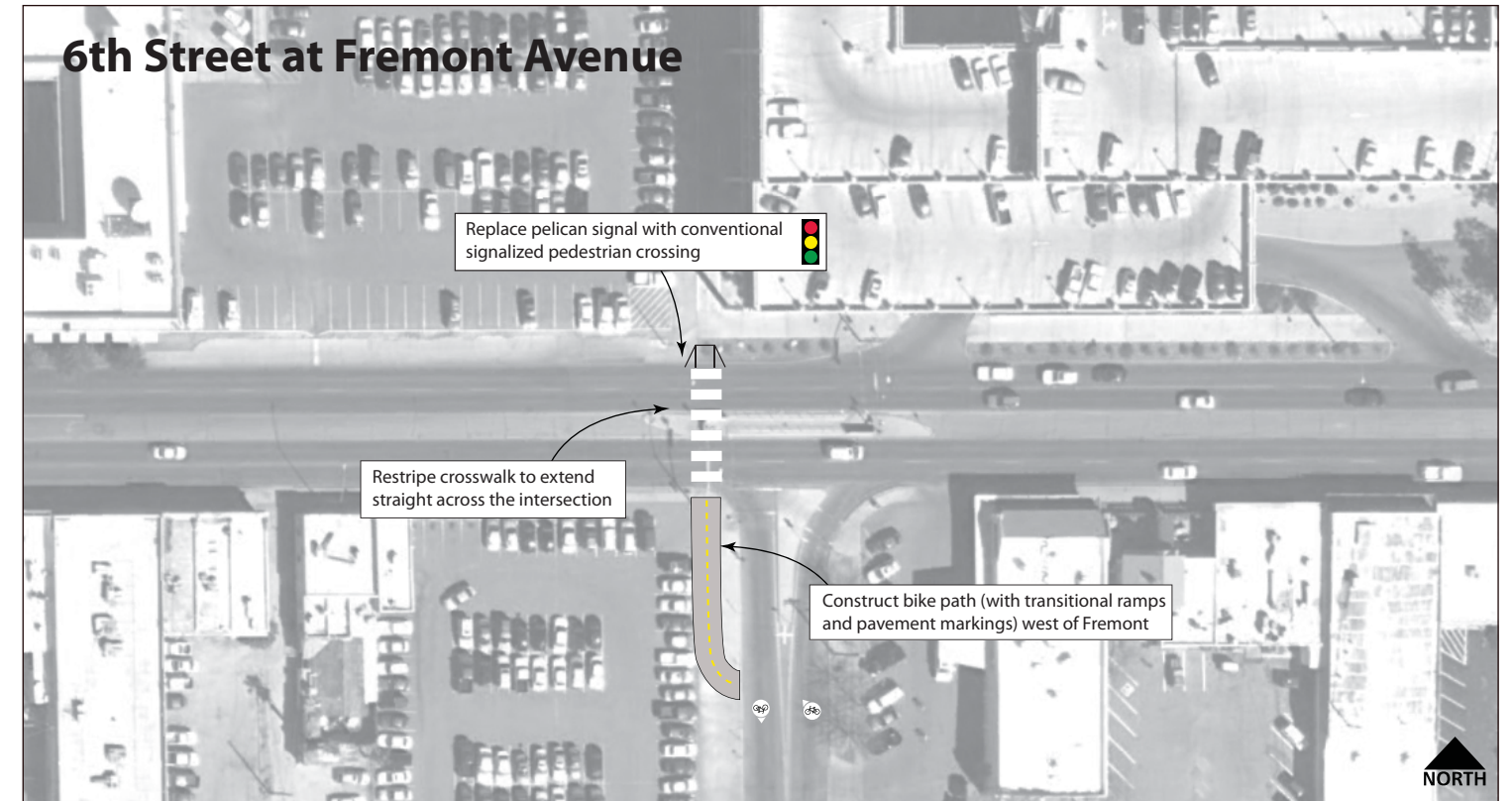
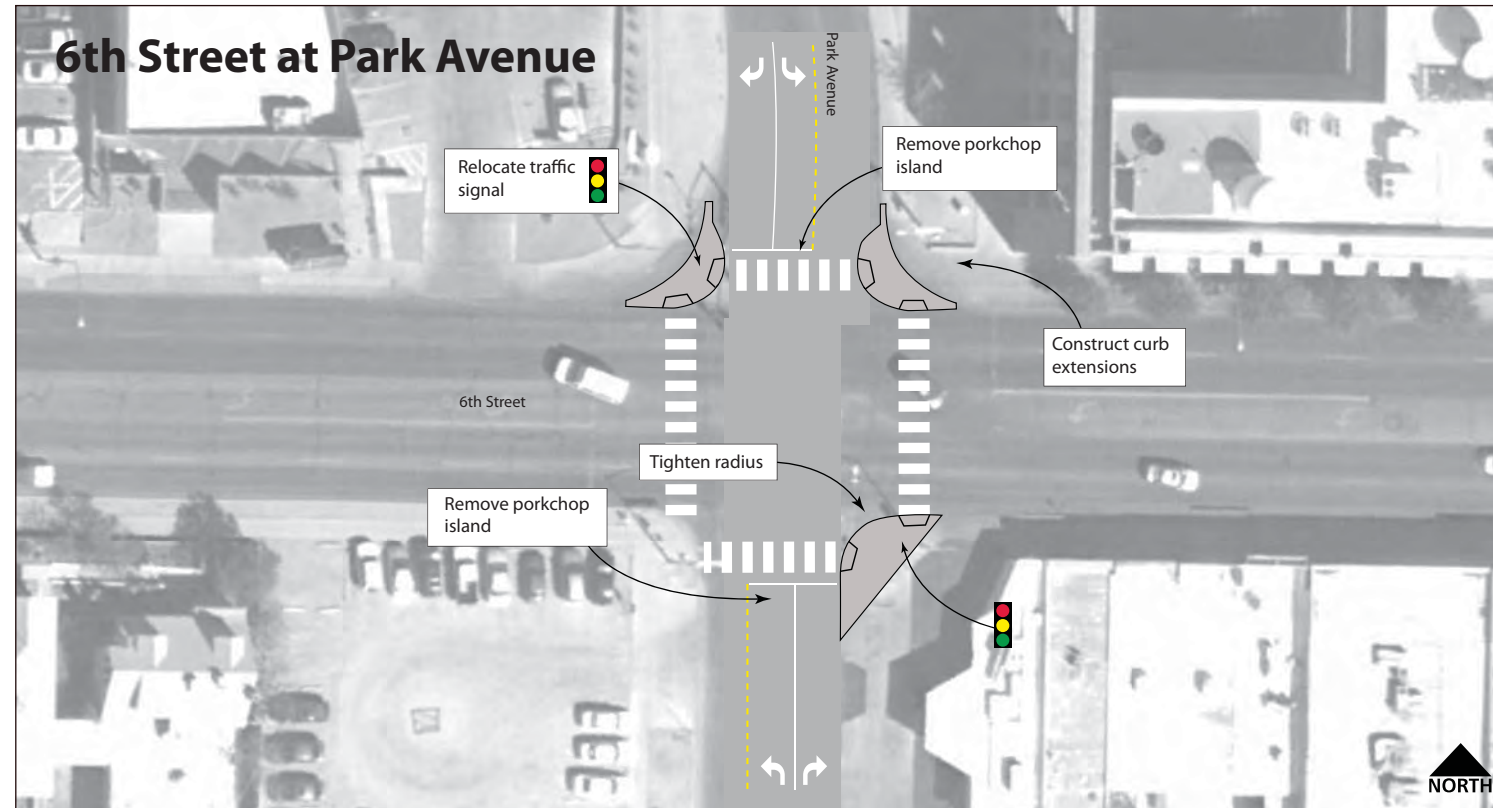
Cost Estimate

\$660,000

Concept Graphics



Concept Graphics



Project 1.5 (b) : 6th Street Road Diet and Streetscape Improvements (Stone Avenue to Campbell Avenue)

Project Description

As previously mentioned, 6th Street is a four lane road with a center turn lane and a posted speed limit of 30 miles per hour. West of Euclid Avenue, the Average Daily Traffic volumes (ADT) on 6th Street are approximately 21,000 vehicles per day. This segment of 6th Street contains primarily commercial land uses. From Euclid Avenue to Campbell Avenue, the ADT is approximately 26,000 vehicles per day. This segment of 6th Street is adjacent to the University of Arizona campus. East of Campbell Avenue, the ADT on 6th Street is approximately 17,000 vehicles per day. This segment consists primarily of residential land uses.

6th Street as a whole is a challenging environment for both bicyclists and pedestrians. There are no dedicated bicycle facilities, so bicyclists must share the road with motorists. This is especially challenging on the segment between Euclid Avenue and Campbell Avenue, which experiences high vehicle volumes. Sidewalks on 6th Street are narrow and primarily lack buffers between the pedestrian zone and vehicular traffic.

Proposed Improvements

In the medium- to long-term, a 1.65-mile road diet and streetscape improvement project will enhance the environment for bicyclists and pedestrians, and convert 6th Street to an overall bike- and pedestrian-friendly street. Reducing the number of lanes from five to three (one travel lane in each direction with a center turn lane) will provide the necessary width to install one-way raised cycle tracks and widen the sidewalks for street trees and furnishings, such as benches, pedestrian scale lighting, or water fountains. These features will not only make the environment safer for bicyclists and pedestrians by providing more separation from vehicles, they will make the area more attractive and potentially increase bicycle and pedestrian mode share. The City has plans to widen Broadway Boulevard (a parallel roadway nearby to the south), which may reduce traffic impacts associated with travel lane reduction on 6th Street, as Broadway Boulevard will have increased vehicle carrying capacity. The City should also study the feasibility of extending the road diet east of Campbell Avenue.

List of improvements:

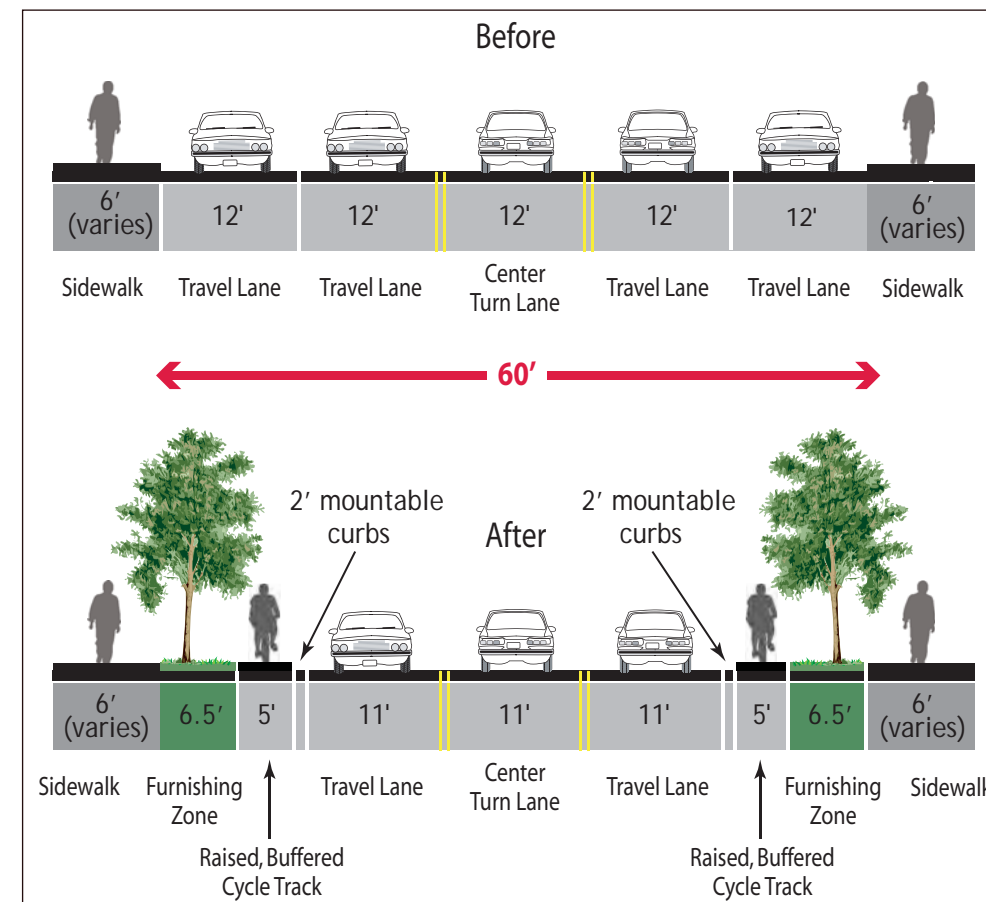
- Restripe 6th Street with one travel lane in each direction and a center turn lane
- Construct one-way raised and buffered cycle tracks in each direction
- Install planter strips between the existing sidewalks and relocated curbs
- Install street furniture and street trees

Cost Estimate

\$1,500,000

This estimate is meant as a broad approximation of the cost of implementing a road diet and streetscape improvement project. The amount presented is likely to change with additional feasibility analyses.

Concept Graphics



Cross section of recommended road diet on 6th Street



6th Street at Tyndall Avenue: Before



6th Street at Tyndall Avenue: After (photosimulation)

This page intentionally left blank.

Project 1.6: Bicycle/Pedestrian Enhancements on the Mall

Project Description

The Mall is centrally located on the University of Arizona campus, extending from Old Main on the west to Cherry Avenue on the east. The Mall experiences extremely high levels of pedestrian and bicycle activity (particularly during class change times) due to key University attractors including the Student Union to the north and the library and gymnasium to the south. The corridor is used by students, faculty, staff, and visitors to cross campus east-west. The Mall also serves as a broader east-west bicycling route linking the University Boulevard commercial area with neighborhoods east of campus. The Mall also directly links with the Third Street Bicycle Boulevard, the Bear Down Bike Path, and the Highland Avenue corridor.

Both the northern and southern segments of the Mall are approximately 20 feet wide and currently operate as a shared roadway between bicyclists, pedestrians and maintenance/service vehicles. Maintenance/service vehicles are provided one-way travel (westbound on the northern Mall alignment, and eastbound on the southern alignment). There is no delineation between the various modes using the roadway. Bicyclists are required to dismount in vicinity of the Student Union.



The Mall is a shared path between bicyclists, pedestrians, and maintenance/service vehicles

Potential Improvements

A variety of options exist for enhancing pedestrian and bicycle circulation along and across the Mall, and to address conflicts between various transportation user types. The graphic on the following page illustrates several potential Mall configurations, ranging from minimal treatments (e.g., signage to alert users to the presence of other transportation modes) to formalizing dedicated space for pedestrians and bicyclists. All options would include wayfinding signage placed at key user “decision points.” A supplemental table also describes the potential treatment options with a summary of potential benefits and drawbacks. Given the Mall’s prominence and various stakeholders who should be involved with future enhancements, it is recommended that the University conduct a focused analysis on this corridor to determine the most appropriate treatment.



There are existing bicycle lanes on University Boulevard east of Cherry Avenue

- Extend the existing sidewalk along the Koeffler building north to the south Mall
- Install signage/markings to delineate bicycle/pedestrian zones
- Install wayfinding signage at approaches to the intersection of the Mall and Cherry Avenue, and the Mall and Highland Avenue
- Stripe intersection crossing markings to guide bicyclists to the northern segment of the Highland Avenue bike path, and from the Mall to the bike lanes on University Boulevard
- Install warning signage and markings at crossings
- Install additional sandblasting of the surface at Highland Avenue and the North Mall for improved slip resistance
- Stripe high visibility crosswalks at the west end of the Mall and adjacent to the Highland Avenue bike path

Cost Estimate

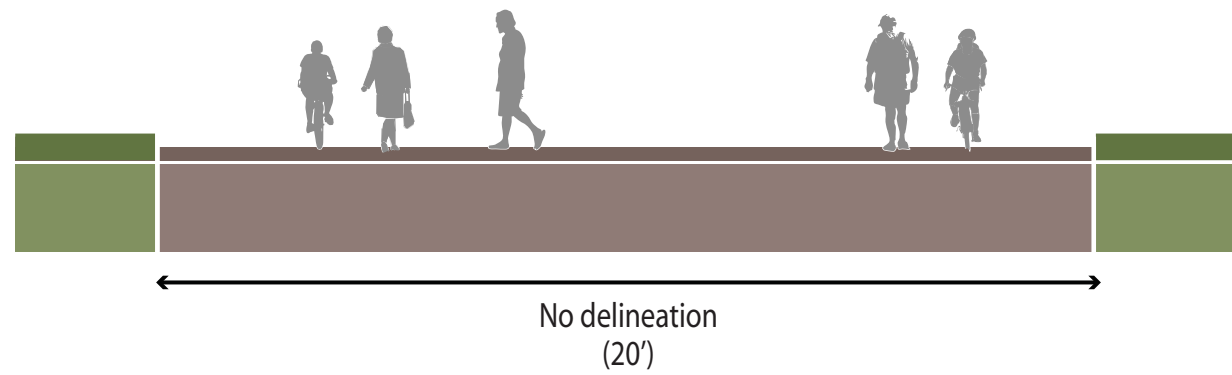
Dependent on improvement type ultimately selected

Concept Graphic

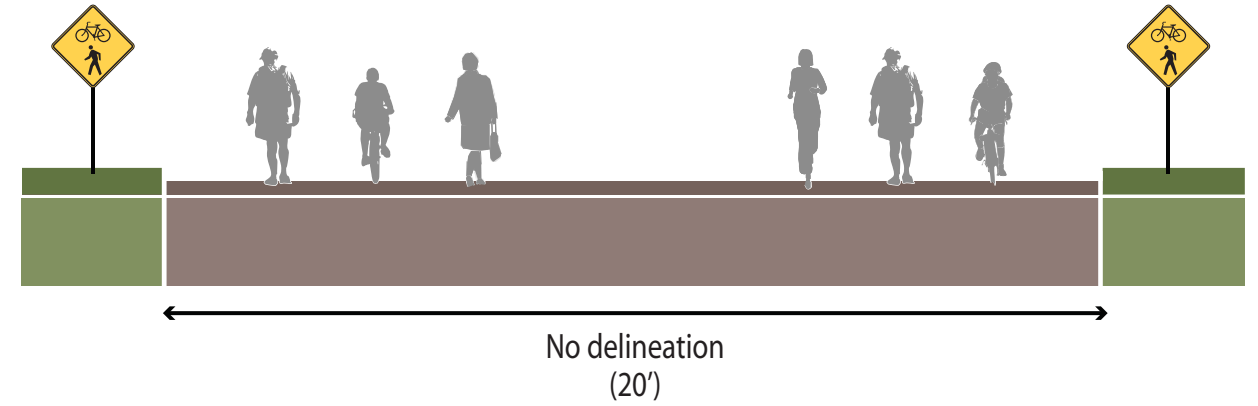


Photosimulation of a cycle track on the Mall

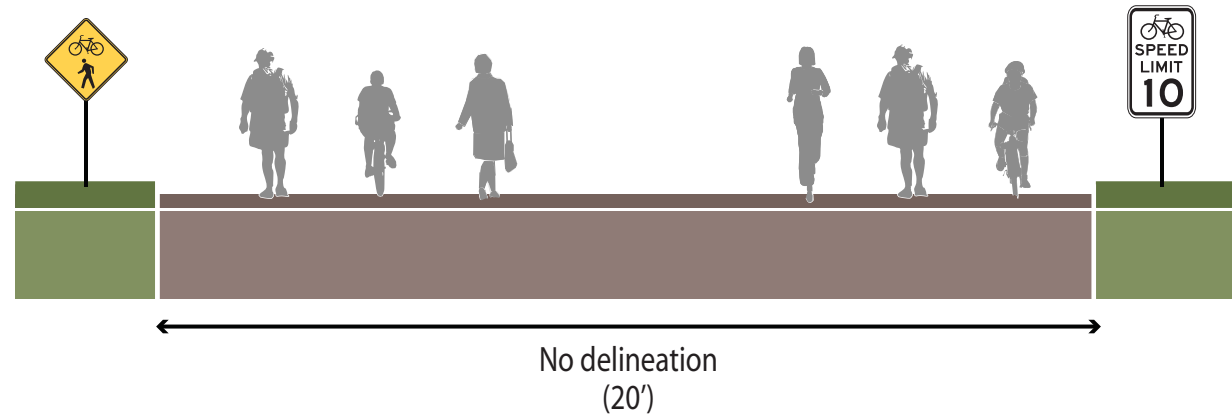
Option 1: Mixed Pedestrian/Two-Way Bicycle Flow (Current Conditions)



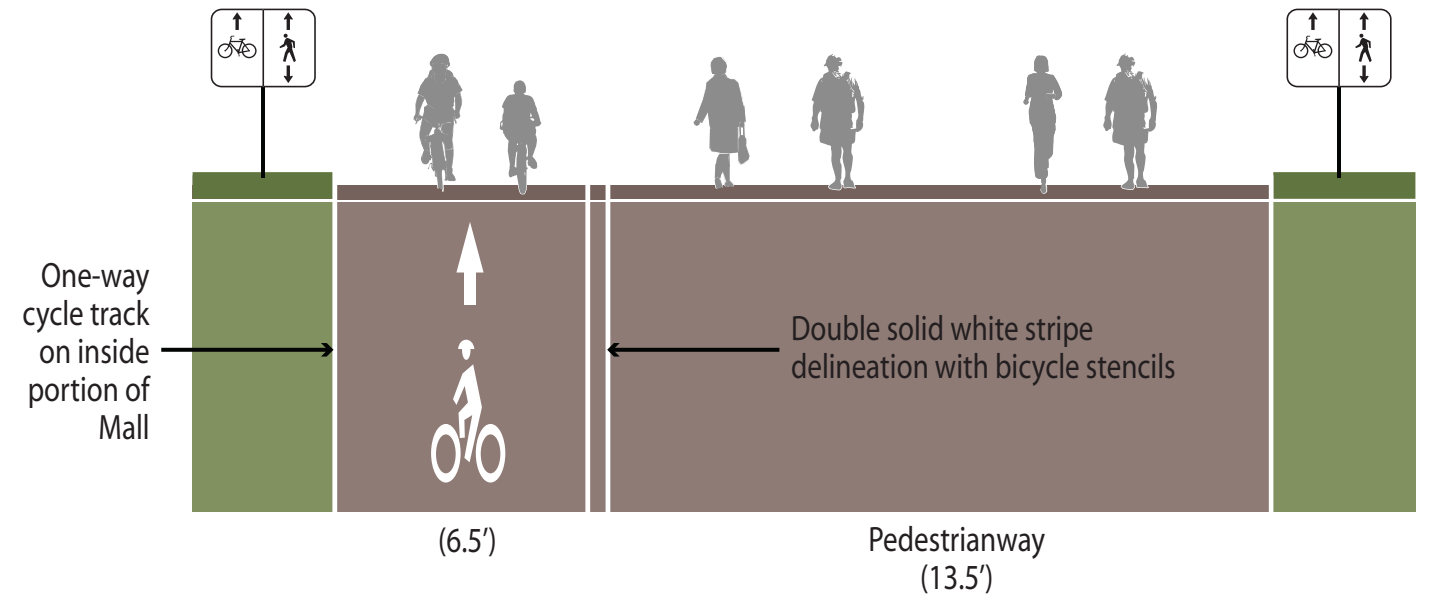
Option 2: Mixed Pedestrian/Two-Way Bicycle Flow with Warning Signage



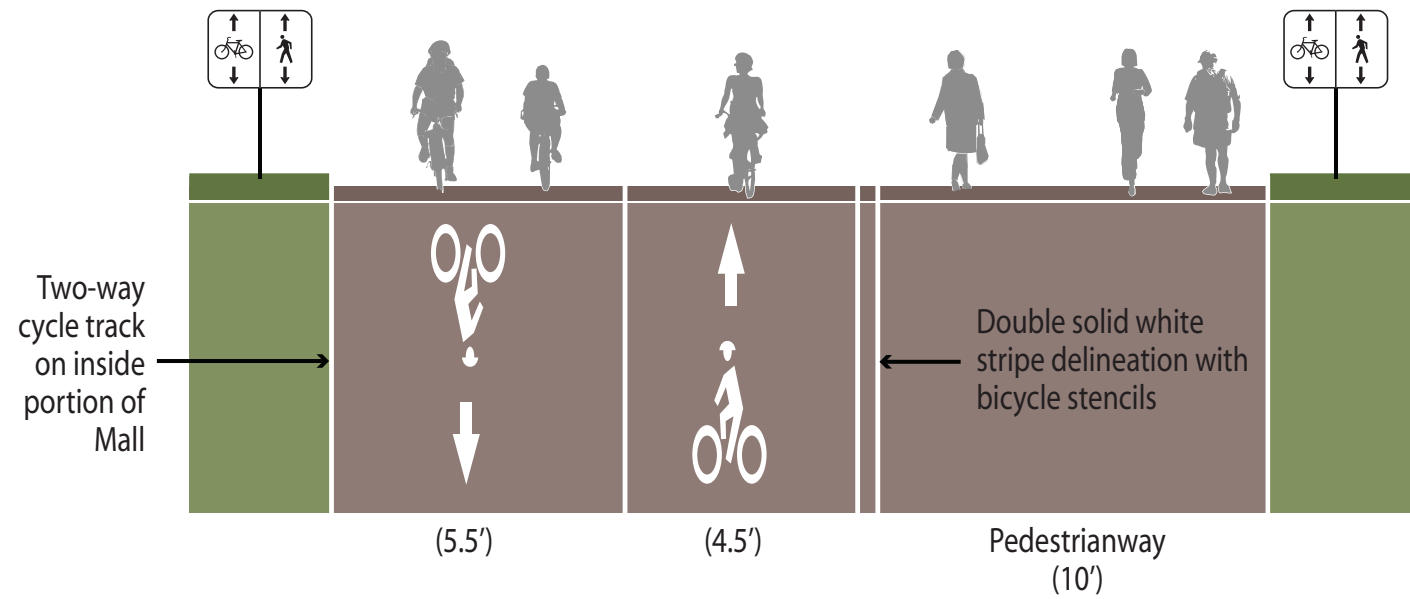
Option 3: Mixed Pedestrian/Two-Way Bicycle Flow with Warning Signage and Bicycle Speed Limit



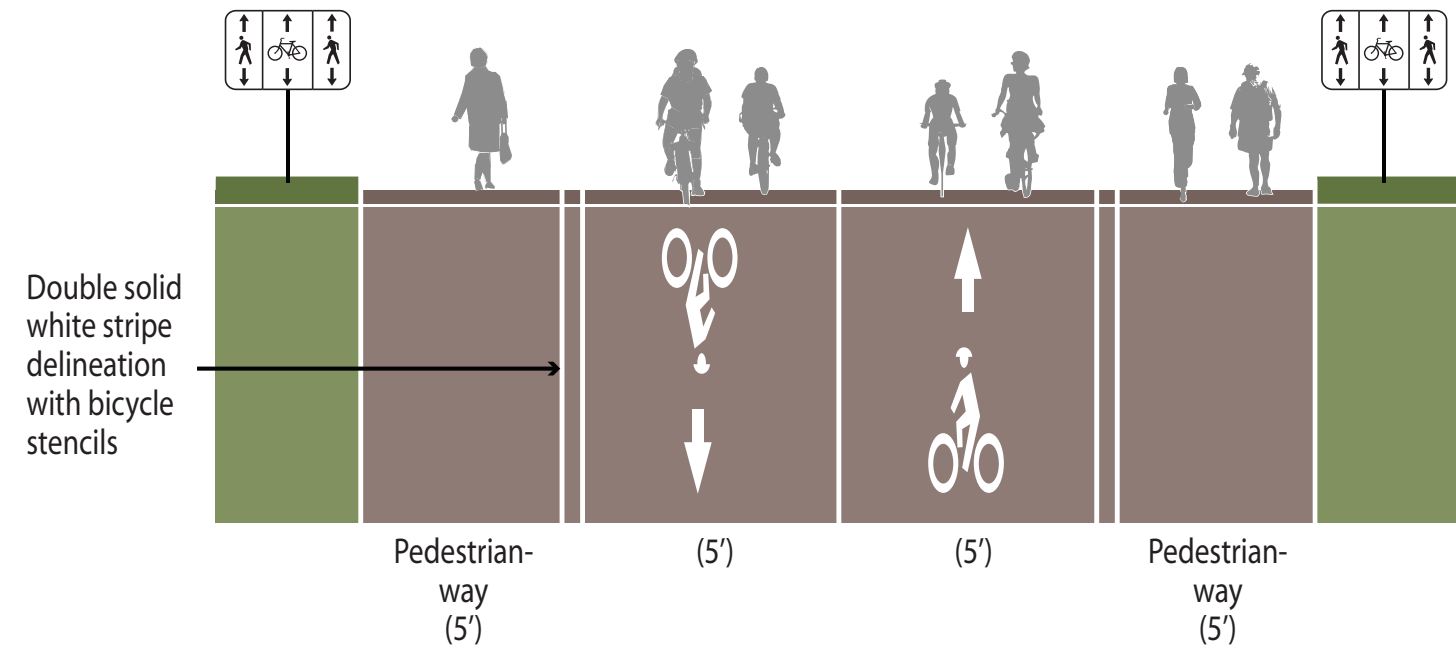
Option 4: One-Way Cycle Track



Option 5: Two-Way Cycle Track



Option 6: Center-Running Two-Way Cycle Track



Concept Graphics Descriptions

Enhancement Option	Potential Improvements	Benefits	Drawbacks
Option 1: Mixed Pedestrian/Two-Way Bicycle Flow (Current Conditions)	<ul style="list-style-type: none"> No changes from current conditions 	<ul style="list-style-type: none"> Would necessitate no capital costs Would create the fewest physical and visual impacts 	<ul style="list-style-type: none"> Pedestrian/bicyclist conflicts would continue to exist, particularly during high volume periods
Option 2: Mixed Pedestrian/Two-Way Bicycle Flow with Warning Signage	<ul style="list-style-type: none"> Warning signage to alert users to the presence of other transportation modes 	<ul style="list-style-type: none"> Would necessitate minimal capital costs Would create few visual impacts Would create no physical impacts 	<ul style="list-style-type: none"> May have limited effectiveness in addressing pedestrian/bicyclist conflicts
Option 3: Mixed Pedestrian/Two-Way Bicycle Flow with Warning Signage and Bicycle Speed Limit	<ul style="list-style-type: none"> Warning signage to alert users to the presence of other transportation modes Bicycle speed limit signs 	<ul style="list-style-type: none"> Would necessitate minimal capital costs Would create few visual impacts Would create no physical impacts 	<ul style="list-style-type: none"> May have limited effectiveness in addressing pedestrian/bicyclist conflicts May have limited effectiveness in controlling bicyclist speeds in the absence of enforcement efforts
Option 4: One-Way Cycle Track*	<ul style="list-style-type: none"> One-way cycle track separated from a parallel pedestrianway through striping treatments; cycle track would be placed on the inside (non-building side) of the Mall Supplemental signage to organize pedestrians and cyclists traveling on the Mall Warning signage and pavement markings at intersections and conflict points 	<ul style="list-style-type: none"> May reduce conflicts by separating higher-speed cyclists from slower-speed pedestrians Pedestrian movements between the Mall and adjacent buildings would remain unobstructed 	<ul style="list-style-type: none"> Pedestrian movements across the cycle track would be restricted to formalized crossing points, thereby creating circuitous walking routes in some instances Delineated separation may not fully prevent cyclists from riding in the pedestrianway (and vice versa) New pavement markings would generate visual impacts One-way bicycle restrictions could create circuitous routing to/from other bikeways (e.g., Highland Avenue, Bear Down Bike Path) One-way bicycle restrictions may have limited effectiveness in preventing wrong-way riding in the absence of enforcement efforts
Option 5: Two-Way Cycle Track**	<ul style="list-style-type: none"> Two-way cycle track separated from a adjacent pedestrianway through striping treatments; cycle track would be placed on the inside (non-building side) of the Mall Supplemental signage to organize pedestrians and cyclists traveling on the Mall Warning signage and pavement markings at intersections and conflict points 	<ul style="list-style-type: none"> May reduce conflicts by separating higher-speed cyclists from slower-speed pedestrians Pedestrian movements between the Mall and adjacent buildings would remain unobstructed Two-way bicycle movements would not create circuitous routing to/from other bikeways (e.g., Highland Avenue, Bear Down Bike Path) Minimal potential for wrong-way riding (compared with the one-way cycle track option) 	<ul style="list-style-type: none"> Pedestrian movements across the cycle track would be restricted to formalized crossing points, thereby creating circuitous walking routes in some instances Delineated separation may not fully prevent cyclists from riding in the pedestrianway (and vice versa) New pavement markings would generate visual impacts
Option 5: Center-Running Two-Way Cycle Track**	<ul style="list-style-type: none"> Two-way cycle track separated from parallel pedestrianways through striping treatments; cycle track would be placed in the center of the Mall between two pedestrianways Supplemental signage to organize pedestrians and cyclists traveling on the Mall Warning signage and pavement markings at intersections and conflict points 	<ul style="list-style-type: none"> May reduce conflicts by separating higher-speed cyclists from slower-speed pedestrians Pedestrian movements between the Mall and adjacent buildings would remain unobstructed (for pedestrians on the "outside" portion of the mall) Two-way bicycle movements would not create circuitous routing to/from other bikeways (e.g., Highland Avenue, Bear Down Bike Path) Minimal potential for wrong-way riding (compared with the one-way cycle track option) 	<ul style="list-style-type: none"> All bicycle turning movements onto and off the Mall would traverse the pedestrianway Pedestrian movements across the cycle track would be restricted to formalized crossing points, thereby creating circuitous walking routes in some instances Delineated separation may not fully prevent cyclists from riding in the pedestrianway (and vice versa) New pavement markings would generate visual impacts

*An eastbound cycle track would be placed on the southern Mall alignment, and a westbound cycle track would be placed on the northern Mall alignment. Preservation of the existing bicycle dismount zone in vicinity of the Student Union would necessitate a two-way cycle track on the southern Mall alignment between Old Main and Highland Avenue/Bear Down Bike Path to provide a continuous westbound bicycle corridor.

** Preservation of the existing bicycle dismount zone in vicinity of the Student Union would necessitate the northern cycle track to terminate at Highland Avenue/Bear Down Bike Path.

This page intentionally left blank.

8 Zone 2 Recommendations

This chapter presents the recommended improvements and estimated costs for Zone 2, comprised of the University of Arizona and the area immediately surrounding the campus. Recommended improvements are shown in Figure 8-1. Recommendations are organized into intersection and sidewalk improvements. Pedestrian connections should be provided to and from the expanded facilities discussed in this chapter. It should also be noted that increasing walking mode share as a result of plan implementation will result in reduced demand for additional parking structures on campus.

8.1 Recommended Improvements

8.1.1 Intersections

This section presents a “toolbox” of recommended treatments for improving intersections given existing site conditions. Treatments are organized into signalized and non-signalized crossing enhancements.

8.1.1.1 Signalized Crossing Enhancements

This section presents recommendations to improve the pedestrian environment at signalized intersections.

High Visibility Crosswalks

Crosswalks act as the right-of-way for pedestrians crossing the street. They can be marked with paint, thermoplastic, decorative pavers, and other materials to establish the area where pedestrians should cross. High visibility crosswalks help to highlight to motorists the presence of pedestrians in the intersection. Common styles of high visibility crosswalks are zebra or continental crosswalks, which resemble a ladder. Crosswalks paved with decorative pavers can also be considered high visibility crosswalks as the contrast between the crosswalk and the street can be effective in directing the motorist’s attention to the pedestrian.

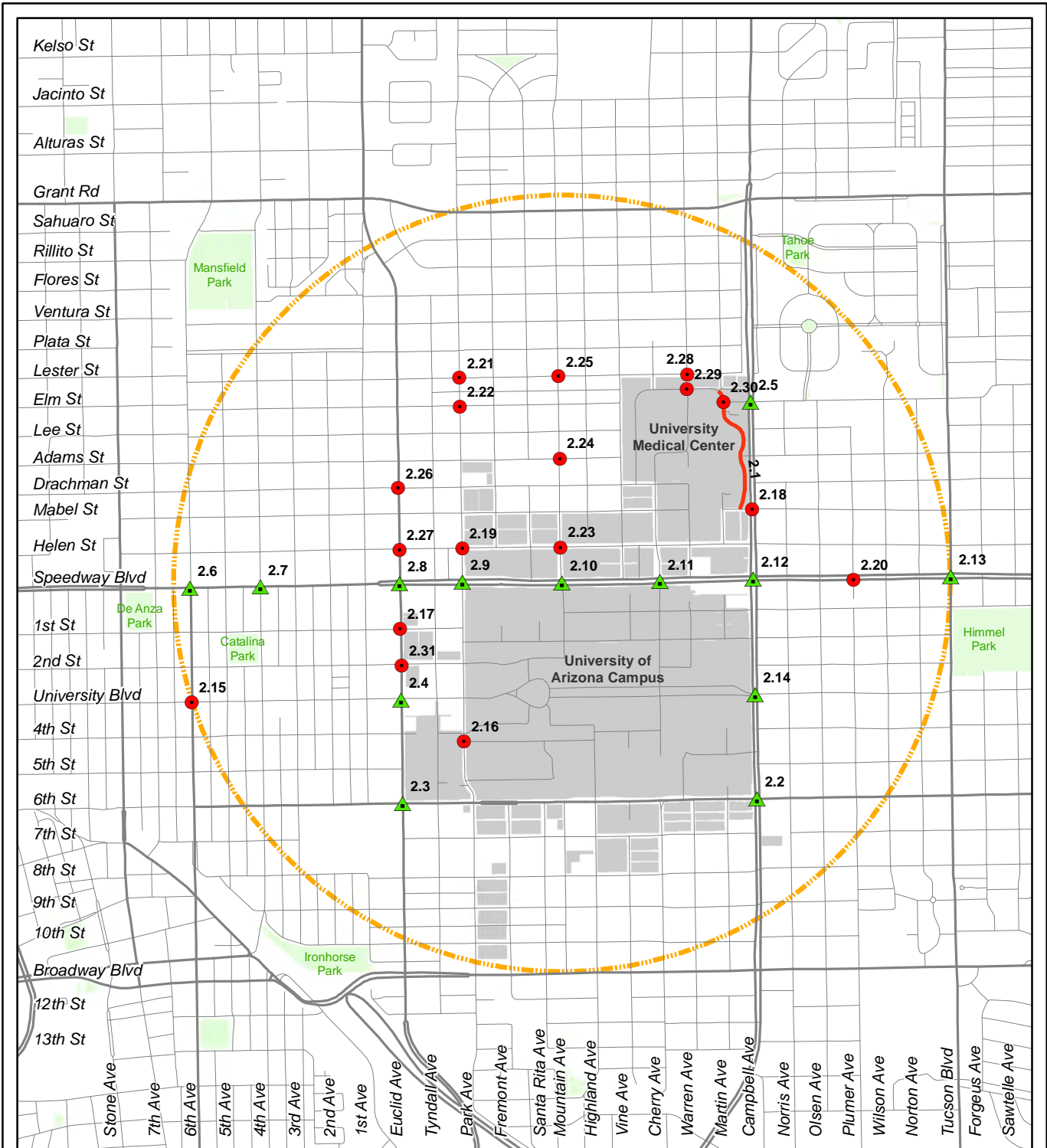
The intersection of Speedway Boulevard and Cherry Avenue is an example of an appropriate location for the installation of high visibility crosswalks. This intersection currently has transverse crosswalks on each leg of the intersection, which are not as effective at directing motorist’s attention to the pedestrian zone.

Leading Pedestrian Intervals

Leading Pedestrian Intervals (LPI) provide pedestrians the “Walk” sign several seconds before motor vehicles traveling in the same direction receive a green light. LPIs allow pedestrians to get a head start on crossing before vehicles begin turning. LPIs are typically installed to reduce conflicts with pedestrians and turning vehicles sharing the same right-of-way. Pedestrians permitted to enter the intersection prior to the release of traffic are more visible to motorists and drivers are less likely to initiate turns when pedestrians are already in the street. All signalized intersections in Zone 2 should be upgraded to have LPIs.



High visibility crosswalk in Santa Monica, CA



Legend

- ▲ Signaled Crossing Enhancement
- Unsignaled Crossing Enhancement
- Sidewalk on the east side of the street
- Zone 2: Pedestrian-oriented treatments within quarter-mile of campus

University of Arizona Area Bicycle and Pedestrian Plan

Figure 8-1: Zone 2 Recommended Improvements



0 500 1,000 2,000 Feet



The intersection of Speedway Boulevard and Campbell Avenue is an example of an appropriate location for the installation of LPs. The crossing distance at this intersection ranges from 130 feet to 150 feet and there have been pedestrian injury collisions at this site in recent years.

Pedestrian Countdown Timers

A pedestrian countdown timer allows pedestrians to activate the traffic signal by pressing a push button at the intersection. A pedestrian signal head at the opposite side of the street displays the crossing time remaining. Pedestrian countdown timers may be particularly beneficial at preventing pedestrians from failing to complete their crossings at intersections with shorter crossing times or wider crossing distances.

All signalized intersections that do not currently have pedestrian countdown timers should be retrofitted to have them installed.

“Yield to Pedestrian” Signs for Right-Turning Vehicles

“Yield to Pedestrian” signs for right-turning vehicles are used to tell motorists who are executing turns that they need to yield to pedestrians in crosswalks. These signs are typically used at signalized intersections where right turns on red (RTOR) movements are allowed. Installing “Yield to Pedestrian” signs has the potential to reduce conflicts between pedestrians and vehicles turning right when there are high volumes of turning vehicles, high pedestrian volumes, and the presence of pedestrian signal indications.



Yield to pedestrian signage

Curb Extensions

Curb extensions are an expansion of the curb into the parking lane at intersections. Curb extensions reduce the pedestrian crossing distance, making pedestrians more visible to motorists and lowering motor vehicle speeds by visually narrowing the roadway. Curb extensions are typically installed with curb cuts to increase accessibility for persons with disabilities and in combination with marked crosswalks to increase the visibility of pedestrians crossing. Since there is the potential for reductions in the number and severity of crashes involving motor vehicles and pedestrians, curb extensions are often used in highly urbanized environments where pedestrian volumes are high. Curb extensions can also be effective traffic calming treatments at non-signalized intersections.

The intersection of Euclid Avenue and University Boulevard is an example of an appropriate location for curb extensions. This intersection is located on a corridor with high pedestrian volumes as it is a main entrance to campus. The existing northeast corner of the intersection functions as a curb extension because of the parking inset. Installing curb extensions on the other corners would complement the existing configuration.

Pedestrian Scrambles

A pedestrian scramble is an exclusive pedestrian phase during which pedestrians are permitted to cross diagonally in all directions while vehicular movements are prohibited. By separating vehicular and pedestrian movements, pedestrian scrambles strive to reduce potential conflicts between the two modes. Pedestrian scrambles may offer the greatest safety benefits at intersections with large volumes of both vehicles and



Pedestrian scramble in Pasadena, CA

pedestrians. Where pedestrian volumes are low, vehicles may violate the pedestrian-only phase and where vehicle volumes are low, pedestrians are more likely to cross during gaps in traffic rather than wait for the signal.

The intersection of 4th Avenue and University Boulevard is a potential intersection for a pedestrian scramble. This intersection is along a commercial downtown corridor adjacent to the University of Arizona, is heavily traveled by pedestrians, and will likely attract more pedestrians in the future since it is along the Modern Streetcar route.

8.1.1.2 Non-signalized Crossing Enhancements

This section presents recommendations to improve the pedestrian environment at non-signalized intersections.



Raised intersection

Raised Intersections

Raised intersections are flat elevated areas that span an entire intersection. They are typically either elevated to the same level as the sidewalk or just below so that visually impaired pedestrians can detect the change. Raised intersections are often installed with decorative pavers so that motorists are more aware of the intersection and can detect that it is a pedestrian zone.

A potential location for a raised intersection is University Boulevard at Cherry Avenue. Located adjacent to the Mall, this is a key gateway to campus, and has a high volume of people using this intersection.

Raised Crosswalks

Raised crosswalks are elevated pedestrian crossings that extend the sidewalk across the street. They make the pedestrian more visible to drivers and provide more convenient crossings for persons with disabilities. Raised crosswalks result in reduced vehicle speeds, thereby creating a safer pedestrian environment.

A potential location for a raised crosswalk is the intersection of Park Avenue and Helen Street. Traffic does not stop on Park Avenue at the existing marked crosswalk at Helen Street. A raised crosswalk could increase the rate of vehicles yielding to pedestrians, as well as calm traffic as it enters the University of Arizona campus.

Advance Yield Markings

Advance yield markings are placed on the roadway in advance of the crosswalk to increase the rate at which motorists yield to pedestrians and allow pedestrians to complete a safe crossing¹¹. They can be particularly helpful on multilane roads to reduce the potential for a multiple threat crash, which involves a motorist in one lane yielding to allow a pedestrian to cross and the driver in the adjacent lane proceeding into the crosswalk, thus causing a collision.



Advance yield teeth

Appropriate locations for advance yield markings are at uncontrolled and midblock crossings on 2nd Street. These crossings have high volumes of pedestrians and advance yield markings could increase safety and ease of crossing.

Pedestrian Signals

Pedestrian signals are pedestrian-activated signals at non-signalized intersections or midblock crossings. When pedestrians activate the signal, motor vehicles see a red light or flashing light and are required to stop for pedestrians. Examples of pedestrian signals include Pedestrian Hybrid Beacons (HAWK), pelican signals, and toucan signals, and are discussed in greater detail in Chapter 4.

In-Pavement Flashing Lights

In-pavement flashing lights are placed adjacent to crosswalks to increase the visibility of pedestrians crossing and increase yielding by motorists. They are found to be more beneficial at night when motorists may have difficulty seeing pedestrians.

In-pavement flashing lights are most beneficial at uncontrolled or midblock crossings, such as those on 2nd Street on the University of Arizona campus where high volumes of pedestrians are often crossing at night.

Mini Traffic Circle

A mini traffic circle creates a circular intersection at which approaching traffic yields to flow into a single direction around a median island. Traffic circles have been found to improve pedestrian safety by lowering the number of conflict points with motorists.



Traffic Circle

Appropriate locations for traffic circles include, but are not limited to, non-signalized intersections that experience issues with traffic congestion, bike boulevards, four-way stops, and neighborhood streets.

¹¹ At controlled intersections, advance yield markings should be placed between four and 30 feet back from the intersection. At uncontrolled intersections, they should be placed 20 to 50 feet in advance of the crosswalk.

8.1.2 Sidewalks

Sidewalks are crucial in providing access to key destinations, especially for persons with disabilities. As shown in Figure 8-1, a sidewalk is missing along the east side of Ring Road near the University Medical Center. The public identified this location as an important part of the pedestrian network and this plan recommends the installation of a sidewalk at that site.

This plan also recommends that in addition to the proposed facilities shown in Figure 8-1, the University of Arizona, the City of Tucson, and the Pima Association of Governments coordinate resources to conduct a comprehensive sidewalk inventory to identify missing sidewalks and prioritize installation. More information about a sidewalk inventory can be found in Chapter 10.

8.1.3 Streetscape Improvements

Though the engineering improvements discussed in previous sections are critical in improving safety of pedestrians, they are not guaranteed to increase mode share of walking. Treatments to enhance the pedestrian environment will help to increase the numbers of people walking by creating a more attractive and comfortable pedestrian environment. These streetscape improvements include, but are not limited to, the following:

- Pedestrian scale lighting
- Street trees and canopies
- Water fountains
- Public seating and benches
- Public art
- Improved transit stops

8.2 Estimated Costs

Table 8-1 provides estimated costs to implement the recommended network in Zone 2. As shown, it will cost approximately \$3,855,000 to implement the proposed facilities. It should be noted that these estimates are planning level and are likely to change with future feasibility analyses, and that the estimated project costs are for construction only and do not include contingencies, design, mobilization, or environmental review. Cost estimates for crossing enhancements at unsignalized intersections include treatments such as pedestrian signals or flashing beacons. Cost estimates for crossing enhancements at signalized intersections include improvements to existing infrastructure, such as high visibility crosswalks and changes to signal timing.

It should be noted that further engineering feasibility, analysis and evaluation will be needed to determine specific appropriate treatments at these intersections as projects move toward implementation.

Table 8-1: Cost of Zone 2 Improvements

Zone	Street / Intersection	Treatment	Cost Estimate
2.1	Ring Road (Chauncy Lane – Mabel Street)	Sidewalk on the east side of the street	\$65,000
2.2	Campbell Avenue / 6th Street	Crossing enhancement at signalized intersection	\$30,000
2.3	6th Street / Euclid Avenue	Crossing enhancement at signalized	\$30,000

Pima Association of Governments and University of Arizona
University of Arizona Area Bicycle and Pedestrian Plan

Zone	Street / Intersection	Treatment	Cost Estimate
		intersection	
2.4	Euclid Avenue / University Boulevard	Crossing enhancement at signalized intersection	\$30,000
2.5	Campbell Avenue / Elm Street	Crossing enhancement at signalized intersection	\$30,000
2.6	Speedway Boulevard / 6th Avenue	Crossing enhancement at signalized intersection	\$30,000
2.7	Speedway Boulevard / 4th Avenue	Crossing enhancement at signalized intersection	\$30,000
2.8	Speedway Boulevard / Euclid Avenue	Crossing enhancement at signalized intersection	\$30,000
2.9	Speedway Boulevard / Park Avenue	Crossing enhancement at signalized intersection	\$30,000
2.10	Speedway Boulevard / Mountain Avenue	Crossing enhancement at signalized intersection	\$30,000
2.11	Speedway Boulevard / Cherry Avenue	Crossing enhancement at signalized intersection	\$30,000
2.12	Speedway Boulevard / Campbell Avenue	Crossing enhancement at signalized intersection	\$30,000
2.13	Speedway Boulevard / Tucson Boulevard	Crossing enhancement at signalized intersection	\$30,000
2.14	Campbell Avenue / 3rd Street	Crossing enhancement at signalized intersection	\$30,000
2.15	6th Avenue / University Boulevard	Crossing enhancement at unsignalized intersection	\$200,000
2.16	4th Street / Park Avenue	Crossing enhancement at unsignalized intersection	\$200,000
2.17	Euclid Avenue / 1st Street	Crossing enhancement at unsignalized intersection	\$200,000
2.18	Campbell Avenue / Mabel Street	Crossing enhancement at unsignalized intersection	\$200,000
2.19	Helen Street / Park Avenue	Crossing enhancement at unsignalized intersection	\$200,000
2.20	Speedway Boulevard / Plumer Avenue	Crossing enhancement at unsignalized intersection	\$200,000
2.21	Park Avenue / Lester Street	Crossing enhancement at unsignalized intersection	\$200,000
2.22	Park Avenue / Elm Street	Crossing enhancement at unsignalized intersection	\$200,000
2.23	Mountain Avenue / Helen Street	Crossing enhancement at unsignalized	\$200,000

Chapter Eight | Zone 2 Recommended Improvements

Zone	Street / Intersection	Treatment	Cost Estimate
		intersection	
2.24	Mountain Avenue / Adams Street	Crossing enhancement at unsignalized intersection	\$200,000
2.25	Mountain Avenue / Lester Street	Crossing enhancement at unsignalized intersection	\$200,000
2.26	Euclid Avenue / Drachman Street	Crossing enhancement at unsignalized intersection	\$200,000
2.27	Euclid Avenue / Helen Street	Crossing enhancement at unsignalized intersection	\$200,000
2.28	Lester Street / Warren Avenue	Crossing enhancement at unsignalized intersection	\$200,000
2.29	Chauncy Street / Warren Avenue	Crossing enhancement at unsignalized intersection	\$200,000
2.30	Elm Street / Ring Road	Crossing enhancement at unsignalized intersection	\$200,000
2.31	Euclid Avenue / 2nd Street	Crossing enhancement at unsignalized intersection	\$200,000
Total Cost			\$3,855,000

9 Zone 3 Recommendations

This chapter presents the recommended improvements and estimated costs for Zone 3, comprised of an approximately 50 square mile area including the University of Arizona campus and portions of the City of Tucson. Recommended improvements include broad facility recommendations for improving bicycling conditions and are shown on Figure 9-1.

9.1 Recommended Improvements

Recommended facilities are discussed below and include bike lanes, buffered bike lanes, bike routes (shared lane markings), bike boulevards, colored bikeways, and shared-use paths. Table 9-1 displays the mileage of each recommended facility type. Though not specifically referenced in this plan, cycle tracks (on-street separated bikeways) can be substituted for conventional or buffered bike lanes where street width is available. Other non-facility improvements are discussed in section 9.1.7. Bicycle connections should be provided to and from the expanded facilities discussed in this chapter. It should also be noted that increasing bicycling mode share as a result of plan implementation will result in reduced demand for additional parking structures on campus.

Table 9-1: Mileage of Recommended Facilities

Facility Type	Mileage
Bike Lanes	6.83
Buffered Bike Lanes	45.36
Bike Routes (Shared Lane Markings)	5.70
Bike Boulevard	91.11
Colored Bikeways	16.82
Shared-Use Path	26.45
Total Mileage	192.27

9.1.1 Bike Lanes

Bike lanes are striped and signed on-street travel lanes exclusively for bicycles. Bike lanes provide physical separation from automobile traffic and appeal to bicyclists with moderate to high levels of experience. Because they often provide the most direct connections, these facilities tend to be most popular with experienced bicycle commuters. This plan recommends 6.83 miles of bike lanes on roadways previously lacking bicycle facilities.

9.1.2 Buffered Bike Lanes

Buffered bike lanes are a type of bike lane with a striped or paver delineated buffer either between the bicycle path of travel and the motor vehicle path of travel or a parking lane. A buffered bike lane can encourage bicyclists with less confidence to ride more often as it provides an increased level of safety that standard bike lanes do not offer. Buffers between the bicycle and motor vehicle



Buffered bike lane

path of travel are useful for high-speed, high-volume arterials or collectors, while buffers between the bicycle path of travel and a parking lane are appropriate for areas with high parking turnover that put bicyclists at risk of riding in the door zone. This plan recommends 45.36 miles of buffered bike lanes. Streets where buffered bike lanes are recommended may require travel lanes to be narrowed to ten feet in some locations or the removal of a travel lane.

9.1.3 Bike Routes

Bike routes share the right-of-way between vehicles and bicyclists and utilize signage and optional shared lane markings to indicate that the road is a shared use facility. These facilities are typically recommended for streets with relatively low traffic speeds (25 mph or less) and lower volumes (<3,000 ADT) such that less experienced bicyclists will feel comfortable bicycling with mixed traffic.

This plan recommends 5.70 miles of bike routes. In order to better highlight the presence of bicyclists to motorists, bike routes could potentially be supplemented with shared lane markings, green backed sharrows, or a “sharrow lane,” though the City of Tucson does not currently use shared lane markings on residential streets. A sharrow lane is a colored painted line below shared lane markings to increase the visibility of bicyclists on a shared roadway. These pavement markings help to make less experienced riders more comfortable on the road. A green sharrow lane is a non-standard treatment and will require participating in the request to experiment process through the FHWA, as well as conducting before and after studies to monitor impacts.

9.1.4 Bike Boulevards

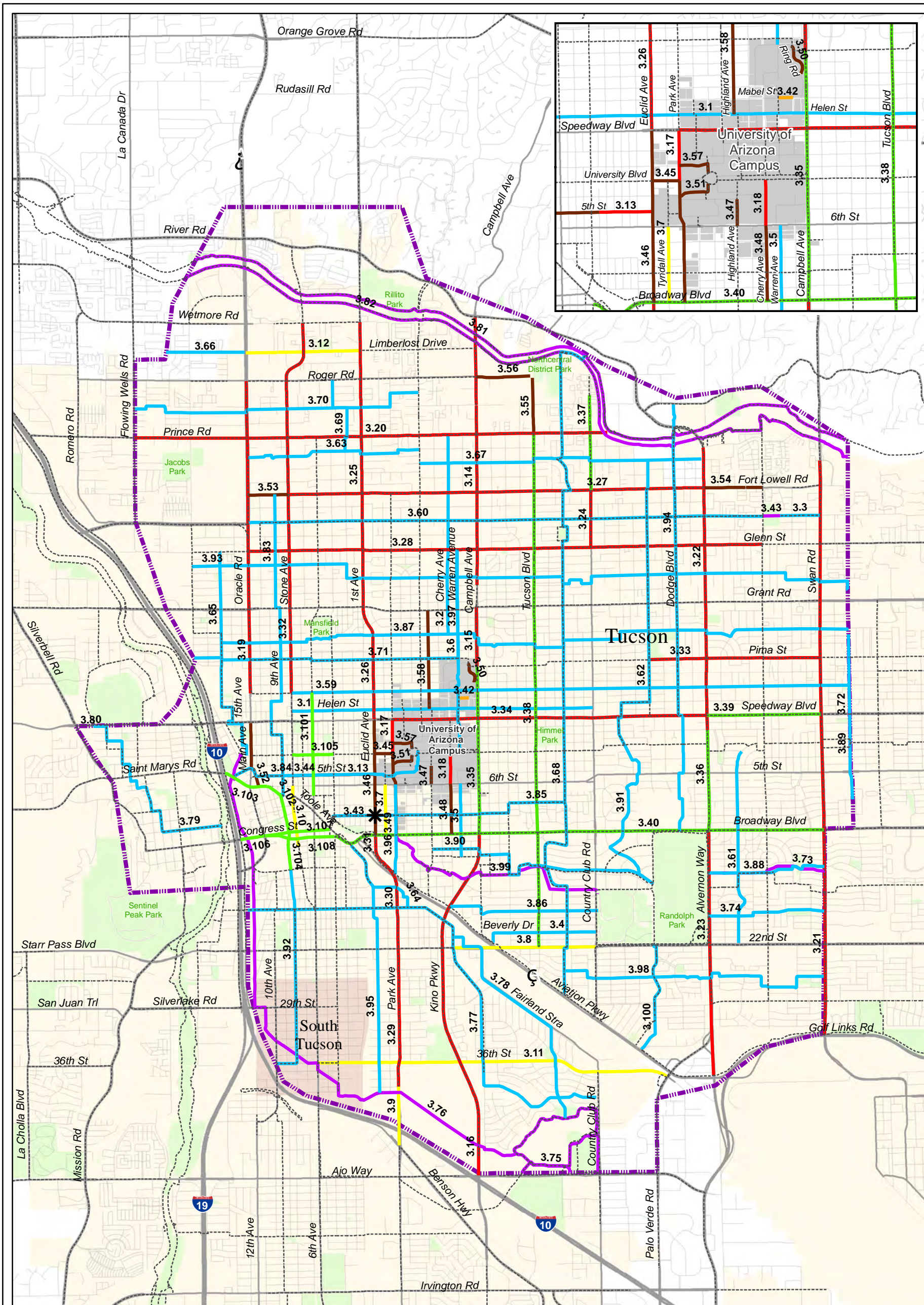
A bike boulevard is a bike route on a local or neighborhood street that prioritizes pedestrians, neighborhood traffic, and bicycles, and discourages cut-through traffic. Bike boulevards include a wide range of treatment options including the following:

- Wayfinding signage
- Pavement markings
- Speed reduction measures (bulb-outs, traffic circles, traffic diverters, chicanes, speed humps)
- Traffic volume reduction measures
- High visibility pedestrian crosswalks
- Bicycle detectors at intersections
- Bicycle crossing signals



Bike Boulevard

Bike boulevards are effective in encouraging the ‘interested but concerned’ to ride more often since they provide a comfortable bicycling environment for most ability levels. This plan recommends 91.11 miles of bike boulevards, 7.34 of which are in addition to those already proposed by the City of Tucson (projects 3.1 through 3.6 on Figure 9-1 and in Table 9-2). It should be noted that bike boulevards require careful design considerations to create the desired traffic calming effect. The proposed bike boulevard on Helen Street, for example, has a high demand for on-street parking, which should be considered in the design phase.

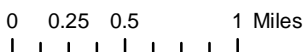


Legend

- Other - Install bicycle detection to trigger the HAWK
- Bike Boulevard
- Bike Lanes
- Buffered Bike Lanes
- Colored Bike Lanes
- Other - Remove Dismount Zone
- Shared-Use Path
- Shared Lane Markings
- Existing Bicycle Facilities
- Zone 3: Bikeway network improvement zone
- 3.1** Project Number (corresponds with Table 9-2)

University of Arizona Area Bicycle and Pedestrian Plan

**Figure 9-1: Zone 3
Recommended
Improvements**



This page intentionally left blank.

9.1.5 Colored Bikeways

Colored bikeways have been used throughout the U.S. either along the entire bikeway facility, in conflict zones or beneath bike/arrow stencils. The color highlights the presence of bicyclists to motorists and increases awareness where there is a mixing of modes. The City of Tucson is using dashed color markings at conflict zones to draw attention to the locations where motorists may cross paths with bicyclists. Colored shared lane markings are recommended on corridors that do not have sufficient width for a conventional bike lane and where vehicular speeds do not exceed 35 miles per hour. This study recommends 16.82 miles of colored facilities.



Colored conflict zone

9.1.6 Shared-Use Paths

Shared-use paths are paved facilities used by bicyclists, pedestrians, equestrians, and those using other non-motorized modes of transportation. These facilities can be constructed in roadway right-of-way or can have exclusive right-of-way off-street. Shared-use paths are generally slower moving than bicycle paths and other facility types because they are shared among a variety of users. This plan recommends 26.45 miles of shared-use paths.

9.1.7 Cycle Tracks

A cycle track is an exclusive bicycle facility combining the user experience of a separated path with the on-street infrastructure of a conventional bike lane. Cycle tracks may take many forms but share common elements. Cycle tracks provide space that is intended to be exclusively or primarily for bicycles and are separated from vehicle travel lanes, parking lanes and sidewalks. Cycle tracks can be either one-way or two-way, on one or both sides of a street, and separated from vehicles and pedestrians by pavement markings or coloring, bollards, curbs/medians or a combination of these elements. The appropriate design treatment will depend on corridor- and site-specific conditions.

Cycle tracks may provide increased comfort for bicyclists and greater clarity about expected behavior on the part of cyclists and motorists. Properly designed cycle tracks may reduce conflicts between cyclists and parked cars by placing the cycle track on the curb side of the parking lane. They also provide adequate space to minimize the danger of car “dooring.” However, bicyclists may be less visible to motorists (particularly motorists executing right turns) as are they not traveling directly alongside one another, potentially leading to increased vulnerability at intersections. A variety of countermeasures exist to address these turning movement conflicts.

9.1.8 Non-Facility Improvements

Three other non-facility improvements are recommended as part of this plan. First, it is recommended that the existing dismount zone in the University Medical Center area be removed. This dismount zone is not necessary to improve safety. Second, this study recommends enhancing and simplifying bicyclist crossings at pedestrian hybrid beacon (HAWK) signals, similar to treatments recently installed at the Swan Road/3rd

Avenue intersection. Participants in this planning process specifically identified the existing HAWK signal on Euclid Avenue at 9th Street as a potential candidate for near-term improvements.

9.2 Estimated Cost

Table 9-2 provides estimated costs to implement the recommended network in Zone 3. As shown, it will cost approximately \$42,235,750 to implement the proposed facilities. It should be noted that these estimates are planning level and are likely to change with future feasibility analyses, and that the estimated project costs are for construction only and do not include contingencies, design, mobilization, or environmental review.

Table 9-2: Estimated Cost of Zone 3 Improvements

Zone	Street / Intersection	From	To	Facility	Estimated Cost
3.1	Helen Street	Stone Avenue	Country Club Road	Bike Boulevard	\$870,000
3.2	Cherry Avenue	Prince Road	Seneca Street	Bike Boulevard	\$580,000
3.3	Blackledge Drive	East of park	Swan Road	Bike Boulevard	\$120,000
3.4	Norris Avenue - Beverly Drive	The Aviation Bikeway	Country Club Road	Bike Boulevard	\$320,000
3.5	Warren Avenue	6th Street	13th Street	Bike Boulevard	\$215,000
3.6	Warren Avenue	Glenn Street	UMC Ring Road	Bike Boulevard	\$330,000
3.7	Tyndall Ave	6th Street	Broadway Boulevard	Bike lanes	\$290,000
3.8	22nd Street	Cherrybell Stra	Country Club Road	Bike lanes	\$825,000
3.9	Park Avenue	39th Street	Benson Highway	Bike lanes	\$290,000
3.10	Stone Avenue	6th Street	Ochoa Street	Bike lanes	\$355,000
3.11	36th Street	6th Avenue	Palo Verde Road	Bike lanes	\$2,040,000
3.12	Limberlost Drive	Oracle Road	1st Avenue	Bike lanes	\$660,000
3.13	5 th Street	Hoff Avenue	Euclid Avenue	Buffered Bike Lanes	\$16,000
3.14	Campbell Avenue	River Road	Silver Street	Buffered bike lanes	\$115,000
3.15	Campbell Avenue	Grant Road	Elm Street	Buffered bike lanes	\$27,000
3.16	Kino Parkway	Broadway Boulevard	Ajo Way	Buffered bike lanes	\$158,000
3.17	Park Avenue	Speedway Boulevard	University Boulevard	Buffered bike lanes	\$15,000
3.18	Cherry Avenue	University Boulevard	6th Street	Buffered Bike Lanes	\$15,000
3.19	Oracle Road	Roger Road	Drachman Street	Buffered Bike Lanes	\$140,000
3.20	Prince Road	Flowing Wells Road	The Loop	Buffered Bike Lanes	\$210,000

Pima Association of Governments and University of Arizona
University of Arizona Area Bicycle and Pedestrian Plan

Zone	Street / Intersection	From	To	Facility	Estimated Cost
3.21	Swan Road	Paseo de los Rios	Golf Links Road	Buffered Bike Lanes	\$250,000
3.22	Alvernon Way	Paradise Falls Drive	2nd Street	Buffered Bike Lanes	\$125,000
3.23	Alvernon Way	Broadway Boulevard	The Aviation Bikeway	Buffered Bike Lanes	\$110,000
3.24	Country Club Road	Fort Lowell Road	Glenn Street	Buffered Bike Lanes	\$25,000
3.25	1st Avenue	River Front Drive	Grant Road	Buffered Bike Lanes	\$125,000
3.26	Euclid Avenue	Grant Road	Speedway Boulevard	Buffered Bike Lanes	\$50,000
3.27	Fort Lowell Road	Stone Avenue	Alvernon Way	Buffered Bike Lanes	\$180,000
3.28	Glenn Street	Oracle Road	Columbus Boulevard	Buffered Bike Lanes	\$225,000
3.29	Park Avenue	18th Street	39th Street	Buffered Bike Lanes	\$80,000
3.30	Euclid Avenue	12th Street	18th Street	Buffered Bike Lanes	\$30,000
3.31	Euclid Avenue	Broadway Boulevard	12th Street	Buffered Bike Lanes	\$6,000
3.32	Stone Avenue	Wetmore Road	Drachman Street	Buffered Bike Lanes	\$170,000
3.33	Pima Street	Palo Verde Boulevard	Swan Road	Buffered Bike Lanes	\$75,000
3.34	Speedway Boulevard	Park Avenue	Alvernon Way	Buffered Bike Lanes	\$140,000
3.35	Campbell Avenue	Elm Street	Broadway Boulevard	Colored Bikeway	\$225,000
3.36	Alvernon Way	2nd Street	Broadway Boulevard	Colored Bikeway	\$135,000
3.37	Country Club Road	Pso de las Canchas	Fort Lowell Road	Colored Bikeway	\$130,000
3.38	Tucson Boulevard	Prince Road	22nd Street	Colored Bikeway	\$700,000
3.39	Speedway Boulevard	Alvernon Way	Swan Road	Colored Bikeway	\$155,000
3.40	Broadway Boulevard	4th Avenue	Swan Road	Colored Bikeway	\$670,000
3.41	9th Street/ Euclid Avenue			Other - Install bicycle detection to trigger the HAWK	\$10,000

Chapter Nine | Zone 3 Recommended Improvements

Zone	Street / Intersection	From	To	Facility	Estimated Cost
3.42	UMC dismount zone			Other - Remove dismount zone	\$0
3.43	Blacklidge Drive	Columbus Boulevard	Blacklidge Drive (east of park)	Shared-Use Path	\$15,000
3.44	5 th Street	Ash Avenue	Hoff Avenue	Bike Route	\$1,800
3.45	University Boulevard	Euclid Avenue	Park Avenue	Bike Route	\$600
3.46	Euclid Avenue	Speedway Boulevard	Broadway Boulevard	Bike Route	\$3,900
3.47	Highland Avenue	4th Street	6th Street	Bike Route	\$600
3.48	Cherry Avenue	6th Street	Broadway Boulevard	Bike Route	\$1,800
3.49	Park Avenue	University Boulevard	Broadway Boulevard	Bike Route	\$1,800
3.50	Ring Road	Adams Street	Martin Street	Bike Route	\$750
3.51	South Campus Drive	Park Avenue	University Boulevard	Bike Route	\$900
3.52	Main Avenue	Drachman Street	St Mary's Road	Bike Route	\$2,250
3.53	Fort Lowell Road	Oracle Road	Stone Avenue	Bike Route	\$1,350
3.54	Fort Lowell Road	Alvernon Way	Laurel Avenue	Bike Route	\$1,950
3.55	Tucson Boulevard	Roger Road	Prince Road	Bike Route	\$1,950
3.56	Roger Road	Campbell Avenue	Tucson Boulevard	Bike Route	\$1,800
3.57	North Campus Drive	Park Avenue	University Boulevard	Bike Route	\$900
3.58	Highland Avenue	Grant Road	Helen Street	Bike Route	\$3,500
3.59	Drachman/Fairmont BB	Stone Avenue	Arcadia Ave	Bike Boulevard	\$1,620,000
3.60	Blacklidge BB	Oracle Road	Columbus Boulevard	Bike Boulevard	\$1,500,000
3.61	Irving BB	22nd Street	3rd Street	Bike Boulevard	\$570,000
3.62	Palo Verde BB	Kleindale Road	Speedway Boulevard	Bike Boulevard	\$920,000
3.63	Yavapai BB	Oracle Road	Mountain Avenue	Bike Boulevard	\$528,000
3.64	Mill overpass	Euclid Avenue	18th Street	Bike Boulevard	\$147,000
3.65	15th Ave BB	Glenn Street	University Boulevard	Bike Boulevard	\$680,000
3.66	Limberlost BB	Zone 3 Boundary	Oracle Road	Bike Boulevard	\$228,000
3.67	Kleindale BB	Mountain Avenue	Alvernon Way	Bike Boulevard	\$838,000
3.68	Treat BB	River Road	Aviation Parkway	Bike Boulevard	\$2,120,000
3.69	Roger Connection	Roger Road	Yavapai Road	Bike Boulevard	\$251,000
3.70	Pastime BB	Flowing Wells Road	Mountain Avenue	Bike Boulevard	\$888,000

Pima Association of Governments and University of Arizona
University of Arizona Area Bicycle and Pedestrian Plan

Zone	Street / Intersection	From	To	Facility	Estimated Cost
3.71	Lester BB	I-10	3rd Street	Bike Boulevard	\$1,060,000
3.72	Arcadia BB	Seneca Street	8th Street	Bike Boulevard	\$480,000
3.73	Arroyo Chico Grnway	Alvernon Way	Swan Road	Shared-Use Path	\$107,000
3.74	Kenyon/Eastland BB	Alvernon Way	Swan Road	Bike Boulevard	\$347,000
3.75	Julian Wash Path	45th Street	Ajo Way	Shared-Use Path	\$87,000
3.76	El Paso Greenway	Van Alstine Street	Country Club Road	Shared-Use Path	\$755,000
3.77	Cherrybell/Pinal Vista	20th Street	Country Club Road	Bike Boulevard	\$841,000
3.78	18th St BB	I-10	El Paso Greenway	Bike Boulevard	\$1,360,000
3.79	Menlo Park BB	El Rio Drive	Bonita Avenue	Bike Boulevard	\$648,000
3.80	El Rio/Dragoon BB	Speedway Boulevard	Speedway Boulevard	Bike Boulevard	\$1,900
3.81	Rillito River Path N	Zone 3 Boundary	Zone 3 Boundary	Shared-Use Path	\$678,000
3.82	Rillito River Path S	Zone 3 Boundary	Zone 3 Boundary	Shared-Use Path	\$701,000
3.83	9th Ave/Castro BB	Fort Lowell Road	Church Avenue	Bike Boulevard	\$952,000
3.84	5th St BB	Hughes Street	University Boulevard	Bike Boulevard	\$612,000
3.85	9th St/8th St. BB	Stevens Avenue	Treat Avenue	Bike Boulevard	\$702,000
3.86	18th St/Eastland BB	Kino Parkway	Country Club Road	Bike Boulevard	\$452,000
3.87	Seneca/Waverly BB	15th Avenue	Zone 3 Boundary	Bike Boulevard	\$1,940,000
3.88	Timrod/14th/Williams	Alvernon Way	Swan Road	Bike Boulevard	\$356,000
3.89	Arcadia Greenway	Pima Street	5th Street	Shared-Use Path	\$110,000
3.90	Arroyo Chico BB	Highland Avenue	Randolph Way	Bike Boulevard	\$751,000
3.91	Camino Miramonte BB	3rd Street	Arroyo Chico	Bike Boulevard	\$487,000
3.92	8th Av/Convent BB	Cushing Street	Zone 3 Boundary	Bike Boulevard	\$625,000
3.93	Copper/Flower BB	Fairview Avenue	Zone 3 Boundary	Bike Boulevard	\$2,050,000
3.94	Dodge BB	Zone 3 Boundary	Broadway Boulevard	Bike Boulevard	\$1,270,000
3.95	Euclid BB	Broadway Boulevard	El Paso Greenway	Bike Boulevard	\$743,000
3.96	Park Ave BB	6th Street	Factory Avenue	Bike Boulevard	\$260,000
3.97	Warren BB	Lester Street	Glenn Street	Bike Boulevard	\$315,000
3.98	Andrew BB	Bristol Avenue	Swan Road	Bike Boulevard	\$846,000
3.99	Arroyo Chico Grnway	Park Avenue	Country Club Road	Shared-Use Path	\$222,000
3.100	Palo Verde BB	22nd Street	Aviation Parkway	Bike Boulevard	\$340,000
3.101	6th Ave Two Way	Drachman Street	7th Street	Colored Bikeway	\$140,000
3.102	Church Ave	Meyer Ave	Congress Street	Colored Bikeway	\$75,000
3.103	Downtown LINKS	I-10	Meyer Avenue	Colored Bikeway	\$62,000
3.104	University Boulevard	Congress Street	Cushing Street	Colored Bikeway	\$52,000
3.105	University Boulevard	Stone Avenue	4th Avenue	Colored Bikeway	\$56,000

Chapter Nine | Zone 3 Recommended Improvements

Zone	Street / Intersection	From	To	Facility	Estimated Cost
3.106	West Congress	I-10	Granada Avenue	Colored Bikeway	\$33,000
3.107	Congress	Granada Avenue	4th Avenue	Colored Bikeway	\$89,000
3.108	Broadway	Granada Avenue	4th Avenue	Colored Bikeway	\$92,000
Total Cost					\$42,235,750

10 Regional Programmatic Improvements

This chapter presents the recommended programmatic improvements for Zone 4, comprised of an approximately 160 square mile area including the University of Arizona campus and portions of the City of Tucson. Recommended improvements include education, encouragement, enforcement, and evaluation programs.

10.1 Education

Equally as important as providing bicycle and pedestrian infrastructure is ensuring that users are familiar with the treatments and know how to use them. According to the League of American Bicyclists, Pima County provides the largest bicycle education program in the nation. This section presents additional recommended region-wide bicycle, pedestrian, and motorist education programs.

10.1.1 Bicycle and Pedestrian Campus Orientation

A bicycle/pedestrian campus orientation for all incoming students at the beginning of each school year can introduce bicycling and walking on/around campus to freshmen and transfer students, and offer a refresher to returning students. A variety of outreach methods and materials can address important topics such as rights and responsibilities, when and where not to bicycle on campus, proper security measures, etc. The orientations should not, however, be given on bikeway facilities (such as paths) or other locations that would create a safety hazard.



A Bicycle/Pedestrian Orientation should include:

- Distribution of information to incoming and returning students at the beginning of the year through school information packets, including the location and rules of bicycle dismount zones, locations of bike parking, instructions on how to properly lock your bicycle, how to share the road with cars, etc.
- Bike repair clinics and other activities advertised through flyers, email, bulletin boards, and campus newsletters
- Information tabling at campus events and prominent locations
- Promotion of the University of Arizona bicycling website, a resource for all bicycling related information on campus
- At-cost or low-cost bike lights and helmets sold at tabling events and through the campus bookstore
- Distribution of free promotional items promoting safe and courteous bicycling and walking on campus
- As noted above, it is important to educate motorists as well.

A bicycle/pedestrian orientation should distribute information about biking and walking

A “bike/walk buddy” program can also be implemented to match current bicycling and walking students with interested students. This can be a simple program where students wear a sticker that says “I bike/walk to school, ask me how,” or a more elaborate program that matches bike/walk buddies with interested students who live in their neighborhood. The Pima Association of Governments has an existing Bike Buddy program as part of its Sun Rideshare program. The University of Arizona should collaborate with PAG to market and strengthen the existing Bike Buddy program to increase student participation.

10.1.2 Pedestrian Education Campaign

In driver education courses, little focus is given to the traffic regulations for pedestrians. Also, many new pedestrian treatments have been implemented since much of the public went through driver’s education. This results in non-motorized transportation users interacting with each other and motor vehicles, many of which are unfamiliar with how to do so safely. A pedestrian education campaign will teach the general public the rules of the road for people walking, such as when it is legal to step into a crosswalk, rights-of-way, how to use pedestrian hybrid beacons and signals, and courtesy on shared-use paths and trails. The campaign should be presented in a variety of media to reach as many people as possible, such as on billboards, posters at bus-stops, public service announcements, and in newspapers. The Pima Association of Governments could undertake this campaign to ensure region-wide consistency.

10.1.3 City-Wide Wayfinding and Signage Program

Bicycle wayfinding signage provides destination, direction, and distance information to bicyclists navigating through the University of Arizona area bicycle network. The region has existing wayfinding signage, which if expanded to additional bicycle facilities could assure bicyclists that they are riding on a designated bikeway. The city-wide bicycle wayfinding system will direct bicyclists to major destinations, such as downtown areas, the University of Arizona, and future Modern Streetcar stations to educate bicyclists on how to get to their destinations by bicycling. Wayfinding signs can also be useful to pedestrians, especially when coupled with kiosks at major destinations that highlight bikeways, ideal walking routes, bike parking locations, and nearby important sites.

The wayfinding and signage program also can be used to “brand” the city as a bicycle friendly community by providing signs that are recognizable and identifiable. The City of Berkeley, CA, for example, uses purple signs on its bicycle boulevards. This program should be implemented through collaboration with the University of Arizona and the City of Tucson.

10.1.4 Women-on-Bikes Programs

Women-only clinics, workshops, and rides are designed to be welcoming and supportive for participants. Topics address typical barriers to bicycling that many women face and may include maintenance basics, bike cleaning, riding in the rain and dark, shopping by bike, or bicycle fashion. Women-only rides can be themed, such as to art museums or restaurants and can range from low, medium, to high mileage.



Women-only rides can be themed, such as the “Mother’s Day Ride” in Columbia, MO

Pima County's Bike Ambassador Program includes women-only Traffic Skills 101 courses and women-only mechanics classes. The University of Arizona should collaborate with Pima County to offer women-only classes and workshops on campus through the existing program.

10.1.5 Bicycle Co-op

A bicycle co-op is a space that aims to empower bicyclists by teaching them skills and techniques for bicycle repair and maintenance. Co-ops are effective at encouraging less experienced bicyclists to start riding since they create a non-intimidating workspace and break down initial barriers to riding. Co-ops are typically managed by non-profit groups and volunteers. The City of Tucson has an existing co-op called BICAS. The University of Arizona should open a campus co-op, similar to what is offered at the University of California, Santa Cruz¹².

10.1.6 Drivers' Education Training

Interacting with bicyclists on the road is often not included in training for new drivers. Teaching motorists how to share the road from the start can help reduce potential conflicts between drivers and bicyclists. The League of American Bicyclists (LAB) offers a three-hour motorist education classroom session that teaches participants topics including roadway positioning of bicyclists, traffic and hand signals, principles of right-of-way, and left and right turn problems.¹³ The City of Tucson could encourage instructors of driver education courses to add this class to their curriculum. The City could also work with the Department of Motor Vehicles and Superior Court to explore opportunities to offer this class as a diversion course for motorists who receive citations for reckless driving or as a training session for local professional drivers.

10.1.7 Public Service Announcements

Public service announcements are a way to educate the public on bicycle and pedestrian safety. They can be in a variety of formats, including radio and television announcements. The City of Tucson could play public service announcements on its public access television channel and the University of Arizona could play them during other campus announcements.

10.1.8 University of Arizona Elective Course

The University of Arizona should add a Bicycle and Pedestrian Safety and Education elective class to its curriculum. The course could be taught by a certified instructor through the League of American Bicyclists or through the County's Bike Ambassador program. Topics could include a wide range of education, bicycle maintenance, street skills, and non-motorized transportation laws. The one-unit course could be held for an hour per week for the semester, or could be a condensed class that meets for longer periods (two to three hours per week) over an eight-week period.



Los Angeles, CA Give Me 3 Campaign

¹² <http://bikecoop.ucsc.edu/>

¹³ <http://www.bikeleague.org/programs/education/courses.php#motorist>

10.2 Encouragement

Similar to education programs, encouragement programs provide incentives and benefits to the public to try bicycling and walking. This section presents recommended region-wide bicycle and pedestrian encouragement programs.

10.2.1 Bike Share Programs

Regular bicycle commuting requires some activities that not all people are interested in, such as finding secure parking areas and bicycle upkeep. Bike-sharing programs can encourage people to give bicycling a try by reducing these barriers. Bike-sharing programs include stations of bikes around a city or region available for checkout. Several different distribution models have been used, such as Capital Bikeshare in Washington, D.C., which has 140 stations throughout the district and in Arlington, VA. Users checkout bicycles for a specified period of time at one station (usually 30 minutes maximum) and turn them back in at any other station. Bike sharing programs not only increase the visibility of bicycling and reduce barriers to riding, but can create an identity for the implementing jurisdiction.



Bike share station at the University of Arizona

The University of Arizona, City of Tucson, and County of Pima have the opportunity to create a partnership to implement a bike share program for the region. Station locations could be along the future Modern Streetcar project, in the downtown, and at the University of Arizona to tie in with the existing campus bike share program.

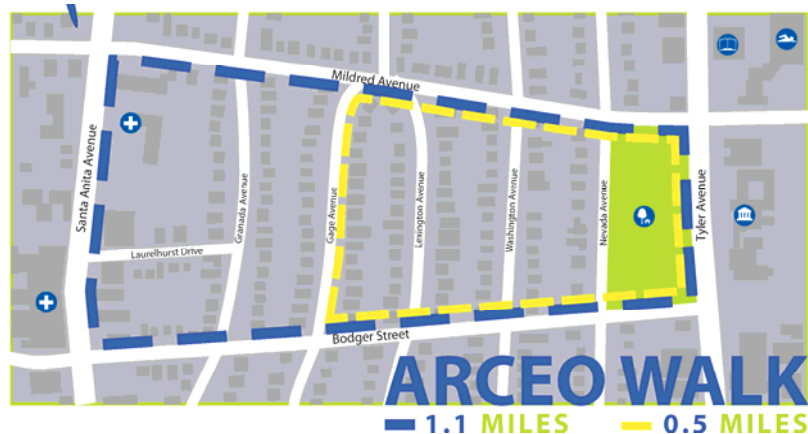
10.2.2 Bikeway Maps by Level of Bicyclist Comfort

Pima County and the University of Arizona have existing bicycling maps that highlight existing routes by bicycle facility type. These maps are effective in informing the public where bicycle facilities are located so residents can plan their trips accordingly. However, bicycle facilities vary greatly by type and within type. For example, some bicycle lanes are located on high-speed, high-volume arterials, while others are on collector or local roads that had adequate right-of-way for installation. Less experienced bicyclists may not understand the difference between these facilities and thus be discouraged after riding on a busy arterial that was outside of their comfort zone.

A bicycle map that displays bicycle facilities ranked by relative level of bicyclist comfort will better portray to bicyclists where they will feel comfortable riding. Knowing which routes are on streets with fewer motor vehicles, lower speeds, and other barriers may encourage those not bicycling to try. This map could be an inset map on the existing bicycle map or provided as a separate brochure that specifically targets the “interested but concerned” bicycling population. Pima County could update its existing bicycle maps to reflect user level of comfort.

10.2.3 Walking Maps

Though it is common for jurisdictions to create bicycling maps to highlight existing bicycle routes, it is less common to show people where to walk. As a result, many people are not aware of how easy it can be to get somewhere on foot. For example, many people don't realize that it only takes 20 minutes on average to walk a mile. Walking maps not only show suggested routes and the locations of pedestrian facilities, but can have



Walking map with buffers

a buffered radius or grid to show how long it takes for people to walk to specific destinations. Walking maps should also include parks, schools, libraries, business districts, public restrooms, transit, and other key destinations. The Pima Association of Governments could distribute and advertise walking maps with its bicycling maps.

10.2.4 Campus Car-Free Event

Usually held on a weekend day, car-free events temporarily close streets to cars and open them up to people walking, bicycling, dancing, hula hooping, skateboarding, playing games, and so on. These events (often called 'ciclovias') have been very successful internationally and are rapidly becoming popular in cities across the world. The City of Tucson has a "Cyclovia" during which streets are annually closed to motorized traffic. Car-free events on campus could highlight the ease and convenience of walking and biking to school.

This type of event could include a street fair or other festival-type activities to garner interest, and the University could partner with the City, a local bicycling group, or a campus environmental or social group to host the event. A car-free day on campus would promote health and community by creating a safe space for physical activity and social interaction, while celebrating bicycling and other forms of non-motorized transportation. A car-free street event could take place one time or annually on a weekend day on campus. It is expected that this type of event would be very popular among students and well-attended by the campus community.

10.2.5 Walk Friendly Community Designation

Walk Friendly Communities (WFC) is a national recognition program developed to encourage towns and cities across the U.S. to establish or recommit to a high priority for supporting safer walking environments. The WFC program recognizes communities that are working to improve a wide range of conditions related to walking, including safety, mobility, access, and comfort.¹⁴ The Living Streets Alliance is applying for designation for the City of Tucson. This effort should be expanded in the future to include Pima County.

¹⁴ <http://www.walkfriendly.org/>

10.2.6 Campus Bicycle Station

Though the University of Arizona has an existing bicycle station, it is open limited days and hours. The hours of operation should be expanded to broaden the number of bicyclists the service reaches.

10.3 Enforcement

Enforcing traffic laws related to bicycling and walking helps to promote a safer environment for all road users. This section presents recommended region-wide bicycle and pedestrian enforcement programs.

10.3.1 Student Community Service Officer

Student community service officers assist the University of Arizona Police Department with detection of criminal activity. This position is ideal for the enforcement of bicycle and pedestrian violations on campus. Students can patrol by foot or by bike and enforce violations, such as wrong way riding, speeding, illegal crossings, and improper bicycle parking. Since community service officers are also students, this is a way to train the campus population in the rules and regulations of bicycling and allows them to teach their peers, as well.

10.3.2 Speed Radar Trailers

Speed radar trailers can help reduce traffic speeds and enforce speed limits in areas with speeding problems. Police set up an unmanned trailer that displays the speed of approaching motorists along with a speed limit sign. Speed trailers may be effective on busier arterial roads without bikeway facilities or near schools with reported speeding. The speed trailer's roadway placement should not obstruct bicycle traffic. Speed trailers work as both an educational and enforcement tool. By itself, the unmanned trailer educates motorists about their current speed in relation to the speed limit.

Speed trailers can transport easily to streets where local residents complain about speeding problems. The cities' police departments could station officers near the trailer to issue speeding citations when speeding continues to occur.

The City of Tucson could provide the management role for this program, working with the public to determine which locations are in most need of enforcement. This program can be administered randomly, cyclically, or as demand necessitates because of the speed trailers' portability. Speed trailers could be especially beneficial on bicycle boulevards to reinforce the role the City is taking in improving the bicycle environment for less experienced bicyclists.



Speed radar trailers can help reduce speeds.

10.3.3 Targeted Enforcement

Traffic enforcement agencies enforce laws pertaining to bicycles as part of the responsible normal operations. Directed enforcement is one way to publicize bicycle laws in a highly visible and public manner. Examples of directed enforcement actions include: intersection patrols or stings, handing out informational sheets to motorists, bicyclists and pedestrians; and enforcing speed limits and right-of-way. This can help with issues prevalent in the study area.

10.3.4 Pedestrian Diversion Course

Pima County currently funds a bicycle diversion program for the University of Arizona and City of Tucson. A pedestrian diversion course can be offered in lieu of a ticket for pedestrian related infractions. Those who are cited for pedestrian violations can attend a class that teaches pedestrian safety. Pedestrian diversion courses enforce the law while also reinforcing safe behaviors through education.

10.4 Evaluation

Monitoring and evaluating the trends in bicycle and pedestrian activity is important to understanding what strategies have been effective at increasing walking and biking rates and safety efforts. This section presents recommended monitoring and evaluation programs for implementation by the University of Arizona, the City of Tucson, or the Pima Association of Governments.

10.4.1 Campus Bicycle and Pedestrian Advisory Committee

Many local governments have an official Bicycle Advisory Committee made of citizen volunteers, appointed by City Council or the appropriate body, to advise on bicycling issues. An advisory committee establishes an institution's commitment to making bicycling safer. With the assistance of campus bicycling advocates or enthusiasts, the University of Arizona should form an ongoing Bicycle and Pedestrian Advisory Committee (BPAC) composed of students, faculty, and staff to address bicycling issues on campus. See Chapter 11 for more detailed recommendations about this position.

10.4.2 Campus Bicycle and Pedestrian Program Coordinator

Having a full-time person dedicated to bicycle and pedestrian issues can significantly increase the number of projects implemented from a plan. The University of Arizona should establish a Campus Bicycle and Pedestrian Program coordinator to serve on the BPAC and work toward implementing this plan's recommended projects.

10.4.3 City of Tucson Bicycle and Pedestrian Program Coordinator

Though the City already has this position, the Bicycle and Pedestrian Program Coordinator has experienced budget cuts and reduced staffing and resources. This plan recommends continuing to obtain funding for this position to ensure adequate staffing and resource dedication.

10.4.4 Automated Bicycle and Pedestrian Counters

Bicycle and pedestrian counts act as a mechanism for tracking bicycling and walking trends over time and for evaluating the impact of bicycle and pedestrian projects, policies, and programs. Automated counters can increase the amount of data collected by consistently counting year-round. Information such as peak time of day and weather effects on bicycling and walking can be analyzed from data obtained through automated counters. Automated counters that publicly display the number of people biking and walking can be a way to encourage more people to bike and walk, as well. Automated counters could be jointly funded and implemented by the University of Arizona, City of Tucson, and Pima Association of Governments to broaden the range of count locations.

10.4.5 Intercept Surveys

Intercept surveys are a way to solicit public input about bicycle and pedestrian facilities from those actually using the facilities. They involve stopping bicyclists and pedestrians while walking and biking to interview them about their experiences, suggestions for improvements, and perceptions about safety. Intercept surveys are most effective when conducted annually with bicycle and pedestrian counts to track the changes in attitudes about bicycling and walking. Survey efforts should be coordinated between the University of Arizona, City of Tucson, and Pima Association of Governments to capture input from both areas.



Incerpt survey

10.4.6 Bicycle and Pedestrian Collision Report

Though police departments throughout the nation have detailed records of collision data, this information is often in the form of raw data and is not readily accessible to the public. Publishing an annual traffic safety and collision report will allow for tracking of safety improvements with implementation of bicycle and pedestrian improvements. The report should identify locations with high collision rates and reasons for the collisions, and include a methodology that allows the locations to be ranked in order of highest priority sites for improvements. This report could be a collaboration between the University of Arizona, City of Tucson, and/or Pima Association of Governments.

10.4.7 Non-Motorized Transportation Report Card

A non-motorized transportation report card will provide an annual snapshot of relevant bicycling metrics to track the efforts of the University of Arizona Area Bicycle and Pedestrian Plan. Results from bicycle and pedestrian counts, user surveys, and the collision report should be included in the report card, as well as recently completed improvement projects and new bikeway facility miles. The report card should compare the changes and accomplishments from year to year, which will help focus the following year's improvements and goals. Similarly to the bicycle and pedestrian collision report, this could be a joint effort between the University of Arizona, City of Tucson, and/or Pima Association of Governments.

10.4.8 Regional Sidewalk Inventory

As mentioned in Chapter 8, the Pima Association of Governments in collaboration with the City of Tucson and University of Arizona should conduct a more extensive sidewalk inventory that obtains data for all street types. Sidewalks should then be prioritized for improvement or installation based on destinations and communities served. Student volunteers studying related disciplines, such as urban planning or landscape architecture could be recruited for the effort.

10.4.9 Maintenance Program

Bicycle and pedestrian facilities experience wear-and-tear issues similar to roadways for automobiles. Sidewalks can become cracked from tree routes and bikeways can become uneven from worn pavement. These issues create safety hazards for non-motorized transportation users. Establishing a maintenance program to

Pima Association of Governments and University of Arizona
University of Arizona Area Bicycle and Pedestrian Plan

help repair bicycle and pedestrian facilities will improve safety. This program can include a website or phone number for the public to report areas in need of maintenance, as well as regular schedule for repairing facilities.

This page intentionally left blank.

11 Project Prioritization and Implementation

This chapter presents a ranking and phasing of the bicycle and pedestrian projects recommended in this plan. Also included is a discussion of potential funding sources to implement the proposed projects and programs, recommendations for establishing a bicycle and pedestrian advisory committee, and policy implications related to the recommendations.

11.1 Project Prioritization

This section describes the ranking methodology for the recommended bicycle and pedestrian facilities and includes a list of prioritized projects. Pedestrian projects include those from Zone 2 and bicycle projects include those from Zone 3. Since Zone 1 projects have already been identified as high priority, these are not included in the prioritization.

11.1.1 Prioritization Strategy

A prioritized list of bicycle and pedestrian projects will help guide the implementation of the proposed bicycle and pedestrian facilities presented in this plan. Proposed facilities are ranked by criteria that define a facility's ability to address an existing or future need at the University of Arizona and in the City of Tucson. The following criteria are used to evaluate each proposed bicycle and pedestrian project.

Gap Closure (bicycle projects only)

Gaps in the bicycle network come in a variety of forms, ranging from a “missing link” on a roadway to larger geographic areas without bicycle facilities. Gaps in the bikeway network discourage bicycle use because they limit access to key destinations and land uses. Facilities that fill a gap in the existing and proposed bicycle network are of high priority.

Connectivity to Existing Facilities

Proposed bikeways and pedestrian improvements that connect to existing bicycle and pedestrian facilities in the study area increase the convenience of bicycling and walking. Proposed facilities that fit this criterion are of high importance.

Connectivity to Regional Proposed Facilities (bicycle projects only)

Proposed bikeways in the study area will eventually become existing bicycle facilities. Thus, facilities that link to them will enhance future connectivity by improving bicycle travel between cities or destinations in other cities. This will continue to enhance bicycle travel in Tucson and Pima County.

Connectivity to Activity Centers

Activity centers include major commuter destinations, such as commercial and retail centers, schools, parks, and downtowns. These locations generate many trips which could be made by bicycling or walking if the proper facilities were available. Bicycle and pedestrian facilities on roadways that connect to activity centers are of priority.

Connectivity to Multi-Modal Transportation Centers

Bicycle and pedestrian facilities that link to modes of public transportation increase the geographical distance that bicyclists and pedestrians are able to travel. Proposed bicycle and pedestrian facilities that connect to transit stops and centers improve mobility and are, therefore, key pieces of the network.

Safety

Bicycle and pedestrian facilities have the potential to increase safety by reducing the potential conflicts between bicyclists, pedestrians, and motorists that often result in collisions. Proposed facilities that are located on roadways with past bicycle-automobile or pedestrian-automobile collisions are important.

Public Input

The University of Arizona and Pima Association of Governments solicited public input through a community workshop. Facilities that community members identified as desirable for future bicycle or pedestrian facilities are of priority to the network because they address the needs of the public.

Project Cost

Projects that are less expensive do not require as much funding as other projects and are therefore easier to implement. Projects that cost less are of high priority.

11.1.2 Project Ranking

Table 11-1 and Table 11-2 show how the criteria described in the previous section translate into weights for project prioritization and ranking. Weights are based on direct, secondary, or no service at all. Direct service means that a facility intersects with a facility/destination, whereas secondary access occurs when the primary facility is located in close proximity to an existing facility/destination.

Table 11-1: Bicycle Project Prioritization Criteria

Criteria	Score	Multiplier	Total	Description
Gap Closure	2	3	6	Fills a network gap between two existing facilities
	1	3	3	Fills a network gap between an existing facility and a proposed facility
	0	3	0	Does not directly or indirectly fill a network gap
Connectivity: Existing	2	2	4	Provides direct access to an existing bicycle facility
	1	2	2	Provides secondary connectivity to an existing bicycle facility
	0	2	0	Does not directly or indirectly access an existing bicycle facility
Connectivity: Activity Centers	2	3	6	Provides direct access to a major trip-generating destination
	1	3	3	Provides secondary connectivity to a major trip-generating destination
	0	3	0	Does not directly or indirectly access an Activity Center
Connectivity:	2	2	4	Provides direct access to a multi-modal transportation center

Criteria	Score	Multiplier	Total	Description
Multi-Modal	1	2	2	Provides secondary connectivity to a multi-modal transportation center
	0	2	0	Does not directly or indirectly access a multi-modal transportation center
Safety	2	2	4	Provides a bicycle facility on a roadway that experienced 1 or more bicycle collisions between 2007-2010
	1	2	2	Provides a bicycle facility on a roadway with secondary access to a roadway with a bicycle collisions between 2007-2010
	0	2	0	Provides a bicycle facility on a roadway or secondary access to a roadway that did not experience any bicycle collisions between 2007-2010
Public Input	2	3	6	Roadway was identified by the public as a desirable for a future facility multiple times
	1	3	3	Roadway was identified by the public as desirable for a future facility once
	0	3	0	Roadway was not identified by the public as desirable for a future facility
Project Cost	2	3	6	Will cost less than \$100,000 to implement
	1	3	3	Will cost between \$100,001 and \$500,000 to implement
	0	3	0	Will cost over \$500,000 to implement

Table 11-2: Pedestrian Project Prioritization Criteria

Criteria	Score	Multiplier	Total	Description
Connectivity: Existing	2	2	4	Provides direct access to an existing pedestrian facility
	1	2	2	Provides secondary connectivity to an existing pedestrian facility
	0	2	0	Does not directly or indirectly access an existing pedestrian facility
Connectivity: Activity Centers	2	3	6	Provides direct access to a major trip-generating destination
	1	3	3	Provides secondary connectivity to a major trip-generating destination
	0	3	0	Does not directly or indirectly access an Activity Center
Connectivity: Multi-Modal	2	2	4	Provides direct access to a multi-modal transportation center
	1	2	2	Provides secondary connectivity to a multi-modal transportation center
	0	2	0	Does not directly or indirectly access a multi-modal transportation center
Safety	2	2	4	Provides a pedestrian facility on a roadway that experienced 1 or more pedestrian collisions between 2007-2010
	1	2	2	Provides a pedestrian facility on a roadway with secondary access to a roadway with a pedestrian collisions between 2007-2010

Criteria	Score	Multiplier	Total	Description
	0	2	0	Provides a pedestrian facility on a roadway or secondary access to a roadway that did not experience any pedestrian collisions between 2007-2010
Public Input	2	3	6	Corridor was identified by the public as a desirable for a future facility multiple times
	1	3	3	Corridor was identified by the public as desirable for a future facility once
	0	3	0	Corridor was not identified by the public as desirable for a future facility
Project Cost	2	3	6	Will cost less than \$35,000 to implement
	1	3	3	Will cost between \$35,001 and \$70,000 to implement
	0	3	0	Will cost over \$70,000 to implement

Table II-3 presents the list of prioritized bicycle projects and Table II-4 presents the prioritized pedestrian projects. Project IDs correlate with the numbering from Figure 8-1 and Figure 9-1. The following abbreviations are used to describe the project types:

- SUP: Shared use path
- BL: Bike lanes
- BBL: Buffered bike lanes
- BR: Bike route (shared lane markings)
- BB: Bike boulevard
- C: Colored bikeways
- Other: Other bicycle improvements
- U: Enhancement to unsignalized crossing
- S: Enhancement to signalized crossing

The projects that ranked the highest should generally be implemented first. Projects with lower rankings may also be combined with other projects to increase connectivity.

Table 11-3: Prioritized Bicycle Projects

Project ID	Type	Street	From	To	Gap Closure	Connectivity: Existing	Connectivity: Activity Centers	Connectivity: Multi-Modal	Safety	Public Input	Project Cost	Total
3.17	BBL	Park Avenue	Speedway Boulevard	University Boulevard	0	4	6	4	4	6	6	30
3.108	C	Broadway	Granada Avenue	4th Avenue	6	4	6	4	4	0	6	30
3.105	C	University Boulevard	Stone Avenue	4th Avenue	6	4	6	2	2	3	6	29
3.9	BL	Park Avenue	39th Street	Benson Highway	6	4	6	2	4	3	3	28
3.47	BR	Highland Avenue	4th Street	6th Street	0	4	6	4	2	6	6	28
3.52	BR	Main Avenue	Drachman Street	St Mary's Road	6	4	6	2	4	0	6	28
3.10	BL	Stone Avenue	6th Street	Ochoa Street	6	4	6	4	4	0	3	27
3.26	BBL	Euclid Avenue	Grant Road	Speedway Boulevard	0	4	6	4	4	3	6	27
3.31	BBL	Euclid Avenue	Broadway Boulevard	12 th Street	0	4	6	4	4	3	6	27
3.34	BBL	Speedway Boulevard	Park Avenue	Alvernon Way	0	4	6	4	4	6	3	27
3.45	BR	University Boulevard	Euclid Avenue	Park Avenue	0	4	6	4	4	3	6	27
3.49	BR	Park Avenue	University Boulevard	Broadway Boulevard	0	4	6	4	4	3	6	27
3.54	BR	Fort Lowell Road	Alvernon Way	Laurel Avenue	6	4	3	4	4	0	6	27

Project ID	Type	Street	From	To	Gap Closure	Connectivity: Existing	Connectivity: Activity Centers	Connectivity: Multi-Modal	Safety	Public Input	Project Cost	Total
3.96	BB	Park Ave BB	6th Street	Factory Avenue	3	4	6	4	4	3	3	27
3.43	SUP	Blacklidge Drive	Columbus Boulevard	Blacklidge Drive (east of park)	6	4	6	2	2	0	6	26
3.50	BR	Ring Road	Adams Street	Martin Street	6	4	6	2	2	0	6	26
3.5	BB	Warren Avenue	6th Street	13th Street	6	4	6	4	2	0	3	25
3.18	BBL	Cherry Avenue	University Boulevard	6th Street	0	4	6	4	2	3	6	25
3.106	C	West Congress	I-10	Granada Avenue	3	4	6	2	4	0	6	25
3.107	C	Congress	Granada Avenue	4th Avenue	3	4	6	2	4	0	6	25
3.1	BB	Helen Street	Stone Avenue	Country Club Road	3	4	6	4	4	3	0	24
3.8	BL	22nd Street	Cherrybell Stra	Country Club Road	6	4	6	4	4	0	0	24
3.14	BBL	Campbell Avenue	River Road	Silver Street	0	4	6	4	4	3	3	24
3.33	BBL	Pima Street	Palo Verde Boulevard	Swan Road	0	4	6	4	4	0	6	24
3.35	C	Campbell Avenue	Elm Street	Broadway Boulevard	0	4	6	4	4	3	3	24
3.44	BR	5 th Street	Ash Avenue	Hoff Avenue	0	4	3	4	4	3	6	24

Pima Association of Governments and University of Arizona
University of Arizona Area Bicycle and Pedestrian Plan

Project ID	Type	Street	From	To	Gap Closure	Connectivity: Existing	Connectivity: Activity Centers	Connectivity: Multi-Modal	Safety	Public Input	Project Cost	Total
3.46	BR	Euclid Avenue	Speedway Boulevard	Broadway Boulevard	0	4	6	4	4	0	6	24
3.75	SUP	Julian Wash Path	45th Street	Ajo Way	6	4	6	2	0	0	6	24
3.48	BR	Cherry Avenue	6th Street	Broadway Boulevard	0	4	6	2	2	3	6	23
3.53	BR	Fort Lowell Road	Oracle Road	Stone Avenue	6	4	3	2	2	0	6	23
3.58	BR	Highland Avenue	Grant Road	Helen Street	0	4	6	2	2	6	3	23
3.73	SUP	Arroyo Chico Grnway	Alvernon Way	Swan Road	6	4	6	2	2	0	3	23
3.74	BB	Kenyon/Eastland BB	Alvernon Way	Swan Road	6	4	6	2	2	0	3	23
3.86	BB	18th St/Eastland BB	Kino Parkway	Country Club Road	6	4	6	2	2	0	3	23
3.88	BB	Timrod/14th/Williams	Alvernon Way	Swan Road	6	4	6	2	2	0	3	23
3.91	BB	Camino Miramonte BB	3rd Street	Arroyo Chico	6	4	6	2	2	0	3	23
3.99	SUP	Arroyo Chico Grnway	Park Avenue	Country Club Road	6	4	6	2	2	0	3	23
3.102	C	Church Ave	Meyer Ave	Congress Street	6	4	3	2	2	0	6	23
3.24	BBL	Country Club Road	Fort Lowell Road	Glenn Street	0	4	6	2	4	0	6	22
3.30	BBL	Euclid Avenue	12 th Street	18 th Street	0	4	6	4	2	0	6	22

Project ID	Type	Street	From	To	Gap Closure	Connectivity: Existing	Connectivity: Activity Centers	Connectivity: Multi-Modal	Safety	Public Input	Project Cost	Total
3.59	BB	Drachman/Fairmont BB	Stone Avenue	Arcadia Ave	6	4	6	2	4	0	0	22
3.84	BB	5th St BB	Hughes Street	University Boulevard	6	4	6	2	4	0	0	22
3.94	BB	Dodge BB	Zone 3 Boundary	Broadway Boulevard	6	4	6	2	4	0	0	22
3.15	BBL	Campbell Avenue	Grant Road	Elm Street	0	4	3	4	4	0	6	21
3.19	BBL	Oracle Road	Roger Road	Drachman Street	0	4	6	4	4	0	3	21
3.20	BBL	Prince Road	Flowing Wells Road	The Loop	0	4	6	4	4	0	3	21
3.21	BBL	Swan Road	Paseo de los Rios	Golf Links Road	0	4	6	4	4	0	3	21
3.22	BBL	Alvernon Way	Paradise Falls Drive	2nd Street	0	4	6	4	4	0	3	21
3.23	BBL	Alvernon Way	Broadway Boulevard	The Aviation Bikeway	0	4	6	4	4	0	3	21
3.27	BBL	Fort Lowell Road	Stone Avenue	Alvernon Way	0	4	6	4	4	0	3	21
3.28	BBL	Glenn Street	Oracle Road	Columbus Boulevard	0	4	6	4	4	0	3	21
3.29	BBL	Park Avenue	18th Street	39th Street	0	4	3	4	4	0	6	21
3.32	BBL	Stone Avenue	Wetmore Road	Drachman Street	0	4	6	4	4	0	3	21
3.39	C	Speedway Boulevard	Alvernon Way	Swan Road	0	4	6	4	4	0	3	21

Pima Association of Governments and University of Arizona
University of Arizona Area Bicycle and Pedestrian Plan

Project ID	Type	Street	From	To	Gap Closure	Connectivity: Existing	Connectivity: Activity Centers	Connectivity: Multi-Modal	Safety	Public Input	Project Cost	Total
3.100	BB	Palo Verde BB	22nd Street	Aviation Parkway	6	4	6	2	0	0	3	21
3.104	C	Church Avenue	Congress Street	Cushing Street	3	2	6	2	2	0	6	21
3.51	BR	South Campus Drive	Park Avenue	University Boulevard	0	4	6	2	2	0	6	20
3.57	BR	North Campus Drive	Park Avenue	University Boulevard	0	4	6	2	2	0	6	20
3.63	BB	Yavapai BB	Oracle Road	Mountain Avenue	6	4	6	2	2	0	0	20
3.65	BB	15th Ave BB	Glenn Street	University Boulevard	6	4	6	2	2	0	0	20
3.69	BB	Roger Connection	Roger Road	Yavapai Road	3	4	6	2	2	0	3	20
3.70	BB	Pastime BB	Flowing Wells Road	Mountain Avenue	6	4	6	2	2	0	0	20
3.71	BB	Lester BB	I-10	3rd Street	6	4	6	2	2	0	0	20
3.78	BB	18th St BB	I-10	El Paso Greenway	6	4	6	2	2	0	0	20
3.79	BB	Menlo Park BB	El Rio Drive	Bonita Avenue	6	4	6	2	2	0	0	20
3.81	SUP	Rillito River Path N	Zone 3 Boundary	Zone 3 Boundary	6	4	6	2	2	0	0	20
3.82	SUP	Rillito River Path S	Zone 3 Boundary	Zone 3 Boundary	6	4	6	2	2	0	0	20
3.90	BB	Arroyo Chico BB	Highland Avenue	Randolph Way	6	4	6	2	2	0	0	20

Project ID	Type	Street	From	To	Gap Closure	Connectivity: Existing	Connectivity: Activity Centers	Connectivity: Multi-Modal	Safety	Public Input	Project Cost	Total
3.101	C	6th Ave Two Way	Drachman Street	7th Street	6	4	3	2	2	0	3	20
3.103	C	Downtown LINKS	I-10	Meyer Avenue	3	4	3	2	2	0	6	20
3.6	BB	Warren Avenue	Glenn Street	UMC Ring Road	0	4	6	2	4	0	3	19
3.68	BB	Treat BB	River Road	Aviation Parkway	6	4	3	4	2	0	0	19
3.72	BB	Arcadia BB	Seneca Street	8th Street	0	4	6	2	4	0	3	19
3.87	BB	Seneca/Waverly BB	15th Avenue	Zone 3 Boundary	3	4	6	2	4	0	0	19
3.3	BB	Blacklidge Drive	East of park	Swan Road	6	4	3	0	2	0	3	18
3.4	BB	Norris Avenue - Beverly Drive	The Aviation Bikeway	Country Club Road	3	4	6	0	2	0	3	18
3.13	BBL	5 th Street	Hoff Avenue	Euclid Avenue	0	0	6	2	4	0	6	18
3.25	BBL	1st Avenue	River Front Drive	Grant Road	0	4	3	4	4	0	3	18
3.36	C	Alvernon Way	2nd Street	Broadway Boulevard	0	4	3	4	4	0	3	18
3.37	C	Country Club Road	Pso de las Canchas	Fort Lowell Road	0	4	3	4	4	0	3	18
3.40	C	Broadway Boulevard	4th Avenue	Swan Road	0	4	6	4	4	0	0	18

Pima Association of Governments and University of Arizona
University of Arizona Area Bicycle and Pedestrian Plan

Project ID	Type	Street	From	To	Gap Closure	Connectivity: Existing	Connectivity: Activity Centers	Connectivity: Multi-Modal	Safety	Public Input	Project Cost	Total
3.12	BL	Limberlost Drive	Oracle Road	1st Avenue	3	2	6	4	2	0	0	17
3.56	BR	Roger Road	Campbell Avenue	Tucson Boulevard	0	4	3	2	2	0	6	17
3.60	BB	Blacklidge BB	Oracle Road	Columbus Boulevard	3	4	6	2	2	0	0	17
3.62	BB	Palo Verde BB	Kleindale Road	Speedway Boulevard	3	4	6	2	2	0	0	17
3.67	BB	Kleindale BB	Mountain Avenue	Alvernon Way	6	4	3	2	2	0	0	17
3.92	BB	8th Av/Convent BB	Cushing Street	Zone 3 Boundary	6	4	3	2	2	0	0	17
3.95	BB	Euclid BB	Broadway Boulevard	El Paso Greenway	3	4	3	2	2	3	0	17
3.11	BL	36th Street	6th Avenue	Palo Verde Road	6	4	0	2	4	0	0	16
3.16	BBL	Kino Parkway	Broadway Boulevard	Ajo Way	0	4	3	2	4	0	3	16
3.38	C	Tucson Boulevard	Prince Road	22nd Street	0	4	6	2	4	0	0	16
3.76	SUP	El Paso Greenway	Van Alstine Street	Country Club Road	3	4	3	2	4	0	0	16
3.85	BB	9th St/8th St. BB	Stevens Avenue	Treat Avenue	3	4	3	2	4	0	0	16
3.89	SUP	Arcadia Greenway	Pima Street	5th Street	0	4	3	2	4	0	3	16
3.7	BL	Tyndall Ave	6th Street	Broadway Boulevard	0	0	6	2	4	0	3	15

Project ID	Type	Street	From	To	Gap Closure	Connectivity: Existing	Connectivity: Activity Centers	Connectivity: Multi-Modal	Safety	Public Input	Project Cost	Total
3.61	BB	Irving BB	22nd Street	3rd Street	3	4	3	2	2	0	0	14
3.77	BB	Cherrybell/Pinal Vista	20th Street	Country Club Road	3	4	3	2	2	0	0	14
3.93	BB	Copper/Flower BB	Fairview Avenue	Zone 3 Boundary	3	4	3	2	2	0	0	14
3.98	BB	Andrew BB	Bristol Avenue	Swan Road	3	4	3	2	2	0	0	14
3.2	BB	Cherry Avenue	Prince Road	Seneca Street	0	4	3	0	2	3	0	12
3.83	BB	9th Ave/Castro BB	Fort Lowell Road	Church Avenue	0	4	3	2	2	0	0	11
3.55	BR	Tucson Boulevard	Roger Road	Prince Road	0	4	0	0	0	0	6	10
3.66	BB	Limberlost BB	Zone 3 Boundary	Oracle Road	0	0	3	2	2	0	3	10
3.41	Other	9th Street/ Euclid Avenue			0	0	0	0	0	3	6	9
3.42	Other	UMC dismount zone			0	0	0	0	0	0	6	6
3.80	BB	El Rio/Dragoon BB	Speedway Boulevard	Speedway Boulevard	0	0	0	0	0	0	6	6
3.64	BB	Mill overpass	Euclid Avenue	18th Street	0	0	0	0	0	0	3	3
3.97	BB	Warren BB	Lester Street	Glenn Street	0	0	0	0	0	0	3	3

Table 11-4: Prioritized Pedestrian Projects

Project ID	Type	Street	Connectivity: Existing	Connectivity: Activity Centers	Connectivity: Multi-Modal	Safety	Public Input	Project Cost	Total
2.10	S	Speedway Boulevard / Mountain Avenue	4	6	4	4	0	6	24
2.3	S	6th Street / Euclid Avenue	4	6	0	4	3	6	23
2.12	S	Speedway Boulevard / Campbell Avenue	4	6	0	4	3	6	23
2.9	S	Speedway Boulevard / Park Avenue	4	6	2	4	0	6	22
2.2	S	Campbell Avenue / 6th Street	4	6	0	4	0	6	20
2.4	S	Euclid Avenue / University Boulevard	4	6	2	2	0	6	20
2.5	S	Campbell Avenue / Elm Street	4	6	0	4	0	6	20
2.6	S	Speedway Boulevard / 6th Avenue	4	6	0	4	0	6	20
2.11	S	Speedway Boulevard / Cherry Avenue	4	6	2	2	0	6	20
2.13	S	Speedway Boulevard / Tucson Boulevard	4	6	0	4	0	6	20
2.14	S	Campbell Avenue / 3rd Street	4	6	2	0	0	6	18
2.31	U	Euclid Avenue / 2nd Street	4	6	4	4	0	0	18

Project ID	Type	Street	Connectivity: Existing	Connectivity: Activity Centers	Connectivity: Multi-Modal	Safety	Public Input	Project Cost	Total
2.7	S	Speedway Boulevard / 4th Avenue	4	3	0	4	0	6	17
2.8	S	Speedway Boulevard / Euclid Avenue	4	3	0	4	0	6	17
2.23	U	Mountain Avenue / Helen Street	4	6	2	4	0	0	16
2.1	S	Ring Road (Chauncy Lane to Mabel Street)	2	6	2	2	0	3	15
2.16	U	4th Street / Park Avenue	4	6	2	2	0	0	14
2.17	U	Euclid Avenue / 1st Street	4	6	2	2	0	0	14
2.18	U	Campbell Avenue / Mabel Street	4	6	2	0	0	0	12
2.19	U	Helen Street / Park Avenue	4	6	2	0	0	0	12
2.15	U	6th Avenue / University Boulevard	4	3	2	0	0	0	9
2.20	U	Speedway Boulevard / Plumer Avenue	4	0	0	4	0	0	8
2.26	U	Euclid Avenue / Drachman Street	2	0	0	4	0	0	8
2.27	U	Euclid Avenue / Helen Street	2	0	2	4	0	0	8
2.30	U	Elm Street / Ring Road	2	6	0	0	0	0	8
2.24	U	Mountain Avenue / Adams Street	2	0	4	0	0	0	6

Project ID	Type	Street	Connectivity: Existing	Connectivity: Activity Centers	Connectivity: Multi-Modal	Safety	Public Input	Project Cost	Total
2.28	U	Lester Street / Warren Avenue	0	6	0	0	0	0	6
2.29	U	Chauncy Street / Warren Avenue	0	6	0	0	0	0	6
2.25	U	Mountain Avenue / Lester Street	2	0	2	0	0	0	4
2.21	U	Park Avenue / Lester Street	0	0	2	0	0	0	2
2.22	U	Park Avenue / Elm Street	0	0	2	0	0	0	2

11.2 Phasing Plan

Implementation of the University of Arizona Area Bicycle and Pedestrian Plan will take place incrementally through small steps taken over many years, depending on available funding and coordination with external agencies. The following phasing plan can guide the University and City toward developing the projects identified in this plan. Ideally, the University should complete higher-priority projects found within the Phase I, Phase II, and Phase III lists below in the general order that they appear in the prioritization matrix. However, many opportunities will likely arise over the years that will make lower priority projects feasible either through efforts of an external agency (e.g. street resurfacing), or through on-campus construction projects.

Table 11-5 shows the phasing plan for the bicycle prioritized projects. The phasing plan uses the prioritization exercise to help guide implementation. The phasing plan organizes projects into Phase I, Phase II, and Phase III projects. Phase I includes projects that ranked high, are inexpensive in comparison to others, and will not require a significant period of time (0-5 years) or roadway reallocation to implement. Phase II projects ranked moderately high, will be moderately expensive, or may require additional study or roadway allocation to implement (6-10 years). Phase III projects are those that ranked low, will cost a significant amount of money to implement, will require a substantial amount of time (11-20 years) to install, or will require significant roadway reallocation or additional roadway right-of-way.

Project IDs in the table correlate with the numbering from Figure 9-1. The following abbreviations are used to describe the project types:

- SUP: Shared use path
- BL: Bike lanes
- BBL: Buffered bike lanes
- BR: Bike route (shared lane markings)
- BB: Bike boulevard
- C: Colored bikeways
- Other: Other bicycle improvements

Table 11-5: Phasing of Bicycle Projects

Project ID	Type	Street	From	To
Phase I (2012-2017)				
3.108	C	Broadway	Granada Avenue	4th Avenue
3.105	C	University Boulevard	Stone Avenue	4th Avenue
3.9	BL	Park Avenue	39th Street	Benson Highway
3.47	BR	Highland Avenue	4th Street	6th Street
3.52	BR	Main Avenue	Drachman Street	St Mary's Road
3.1	BL	Stone Avenue	6th Street	Ochoa Street
3.45	BR	University Boulevard	Euclid Avenue	Park Avenue
3.49	BR	Park Avenue	University Boulevard	Broadway Boulevard
3.54	BR	Fort Lowell Road	Alvernon Way	Laurel Avenue
3.96	BB	Park Ave BB	6th Street	Factory Avenue

Pima Association of Governments and University of Arizona
University of Arizona Area Bicycle and Pedestrian Plan

Project ID	Type	Street	From	To
3.5	BR	Ring Road	Adams Street	Martin Street
3.5	BB	Warren Avenue	6th Street	13th Street
3.106	C	West Congress	I-10	Granada Avenue
3.107	C	Congress	Granada Avenue	4th Avenue
3.1	BB	Helen Street	Stone Avenue	Country Club Road
3.8	BL	22nd Street	Cherrybell Stra	Country Club Road
3.35	C	Campbell Avenue	Elm Street	Broadway Boulevard
3.44	BR	5 th Street	Ash Avenue	Hoff Avenue
3.46	BR	Euclid Avenue	Speedway Boulevard	Broadway Boulevard
3.48	BR	Cherry Avenue	6th Street	Broadway Boulevard
3.53	BR	Fort Lowell Road	Oracle Road	Stone Avenue
3.58	BR	Highland Avenue	Grant Road	Helen Street
3.102	C	Church Ave	Meyer Ave	Congress Street
3.39	C	Speedway Boulevard	Alvernon Way	Swan Road
3.104	C	Church Avenue	Congress Street	Cushing Street
3.51	BR	South Campus Drive	Park Avenue	University Boulevard
3.57	BR	North Campus Drive	Park Avenue	University Boulevard
3.101	C	6th Ave Two Way	Drachman Street	7th Street
3.103	C	Downtown LINKS	I-10	Meyer Avenue
3.36	C	Alvernon Way	2nd Street	Broadway Boulevard
3.37	C	Country Club Road	Pso de las Canchas	Fort Lowell Road
3.4	C	Broadway Boulevard	4th Avenue	Swan Road
3.56	BR	Roger Road	Campbell Avenue	Tucson Boulevard
3.38	C	Tucson Boulevard	Prince Road	22nd Street
3.55	BR	Tucson Boulevard	Roger Road	Prince Road
3.41	Other	9th Street/ Euclid Avenue		
3.42	Other	UMC dismount zone		
Phase II (2017-2022)				
3.17	BBL	Park Avenue	Speedway Boulevard	University Boulevard
3.26	BBL	Euclid Avenue	Grant Road	Speedway Boulevard
3.31	BBL	Euclid Avenue	Broadway Boulevard	12 th Street
3.34	BBL	Speedway Boulevard	Park Avenue	Alvernon Way
3.43	SUP	Blacklidge Drive	Columbus Boulevard	Blacklidge Drive (east of park)
3.18	BBL	Cherry Avenue	University Boulevard	6th Street
3.14	BBL	Campbell Avenue	River Road	Silver Street
3.33	BBL	Pima Street	Palo Verde Boulevard	Swan Road
3.75	SUP	Julian Wash Path	45th Street	Ajo Way
3.73	SUP	Arroyo Chico Grnway	Alvernon Way	Swan Road

Project ID	Type	Street	From	To
3.74	BB	Kenyon/Eastland BB	Alvernon Way	Swan Road
3.86	BB	18th St/Eastland BB	Kino Parkway	Country Club Road
3.88	BB	Timrod/14th/Williams	Alvernon Way	Swan Road
3.91	BB	Camino Miramonte BB	3rd Street	Arroyo Chico
3.99	SUP	Arroyo Chico Grnway	Park Avenue	Country Club Road
3.24	BBL	Country Club Road	Fort Lowell Road	Glenn Street
3.30	BBL	Euclid Avenue	12 th Street	18th Street
3.59	BB	Drachman/Fairmont BB	Stone Avenue	Arcadia Ave
3.84	BB	5th St BB	Hughes Street	University Boulevard
3.94	BB	Dodge BB	Zone 3 Boundary	Broadway Boulevard
3.15	BBL	Campbell Avenue	Grant Road	Elm Street
3.19	BBL	Oracle Road	Roger Road	Drachman Street
3.2	BBL	Prince Road	Flowing Wells Road	The Loop
3.21	BBL	Swan Road	Paseo de los Rios	Golf Links Road
3.22	BBL	Alvernon Way	Paradise Falls Drive	2nd Street
3.23	BBL	Alvernon Way	Broadway Boulevard	The Aviation Bikeway
3.27	BBL	Fort Lowell Road	Stone Avenue	Alvernon Way
3.28	BBL	Glenn Street	Oracle Road	Columbus Boulevard
3.29	BBL	Park Avenue	18th Street	39th Street
3.32	BBL	Stone Avenue	Wetmore Road	Drachman Street
3.1	BB	Palo Verde BB	22nd Street	Aviation Parkway
Phase III (2022-2032)				
3.63	BB	Yavapai BB	Oracle Road	Mountain Avenue
3.65	BB	15th Ave BB	Glenn Street	University Boulevard
3.69	BB	Roger Connection	Roger Road	Yavapai Road
3.7	BB	Pastime BB	Flowing Wells Road	Mountain Avenue
3.71	BB	Lester BB	I-10	3rd Street
3.78	BB	18th St BB	I-10	El Paso Greenway
3.79	BB	Menlo Park BB	El Rio Drive	Bonita Avenue
3.81	SUP	Rillito River Path N	Zone 3 Boundary	Zone 3 Boundary
3.82	SUP	Rillito River Path S	Zone 3 Boundary	Zone 3 Boundary
3.9	BB	Arroyo Chico BB	Highland Avenue	Randolph Way
3.6	BB	Warren Avenue	Glenn Street	UMC Ring Road
3.68	BB	Treat BB	River Road	Aviation Parkway
3.72	BB	Arcadia BB	Seneca Street	8th Street
3.87	BB	Seneca/Waverly BB	15th Avenue	Zone 3 Boundary
3.3	BB	Blacklidge Drive	East of park	Swan Road
3.4	BB	Norris Avenue - Beverly Drive	The Aviation Bikeway	Country Club Road

Pima Association of Governments and University of Arizona
University of Arizona Area Bicycle and Pedestrian Plan

Project ID	Type	Street	From	To
3.13	BBL	5 th Street	Hoff Avenue	Euclid Avenue
3.25	BBL	1st Avenue	River Front Drive	Grant Road
3.12	BL	Limberlost Drive	Oracle Road	1st Avenue
3.6	BB	Blacklidge BB	Oracle Road	Columbus Boulevard
3.62	BB	Palo Verde BB	Kleindale Road	Speedway Boulevard
3.67	BB	Kleindale BB	Mountain Avenue	Alvernon Way
3.92	BB	8th Av/Convent BB	Cushing Street	Zone 3 Boundary
3.95	BB	Euclid BB	Broadway Boulevard	El Paso Greenway
3.11	BL	36th Street	6th Avenue	Palo Verde Road
3.16	BBL	Kino Parkway	Broadway Boulevard	Ajo Way
3.76	SUP	El Paso Greenway	Van Alstine Street	Country Club Road
3.85	BB	9th St/8th St. BB	Stevens Avenue	Treat Avenue
3.89	SUP	Arcadia Greenway	Pima Street	5th Street
3.7	BL	Tyndall Ave	6th Street	Broadway Boulevard
3.61	BB	Irving BB	22nd Street	3rd Street
3.77	BB	Cherrybell/Pinal Vista	20th Street	Country Club Road
3.93	BB	Copper/Flower BB	Fairview Avenue	Zone 3 Boundary
3.98	BB	Andrew BB	Bristol Avenue	Swan Road
3.2	BB	Cherry Avenue	Prince Road	Seneca Street
3.83	BB	9th Ave/Castro BB	Fort Lowell Road	Church Avenue
3.66	BB	Limberlost BB	Zone 3 Boundary	Oracle Road
3.8	BB	El Rio/Dragoon BB	Speedway Boulevard	Speedway Boulevard
3.64	BB	Mill overpass	Euclid Avenue	18th Street
3.97	BB	Warren BB	Lester Street	Glenn Street

Table 11-6 shows the phasing plan for pedestrian projects. Similar to the phasing plan for bicycle projects, pedestrian projects are organized into Phase I, Phase II, and Phase III. Phase I includes projects that ranked high, will be inexpensive to implement, and can be installed in a short period of time (0-5 years). Phase II projects are those that ranked moderately high, will be moderately expensive to implement, or may require additional time (6-10 years) to plan and design. Phase III includes projects that ranked low, will be expensive to implement, and may require additional time to plan and design (11-20 years).

Project IDs in the table correlate with the numbering from Figure 8-1. The following abbreviations are used to describe the project types:

- U: Enhancement to unsignalized crossing
- S: Enhancement to signalized crossing

Table 11-6: Phasing of Pedestrian Projects

Project ID	Type	Street
Phase I (2012-2017)		
2.10	S	Speedway Boulevard / Mountain Avenue
2.9	S	Speedway Boulevard / Park Avenue
2.12	S	Speedway Boulevard / Campbell Avenue
2.3	S	6th Street / Euclid Avenue
2.13	S	Speedway Boulevard / Tucson Boulevard
2.2	S	Campbell Avenue / 6th Street
2.5	S	Campbell Avenue / Elm Street
2.6	S	Speedway Boulevard / 6th Avenue
2.11	S	Speedway Boulevard / Cherry Avenue
2.4	S	Euclid Avenue / University Boulevard
Phase II (2017-2022)		
2.31	U	Euclid Avenue / 2nd Street
2.23	U	Mountain Avenue / Helen Street
2.16	U	4th Street / Park Avenue
2.17	U	Euclid Avenue / 1st Street
2.7	S	Speedway Boulevard / 4th Avenue
2.8	S	Speedway Boulevard / Euclid Avenue
2.1	S	Ring Road (Chauncy Lane to Mabel Street)
2.14	S	Campbell Avenue / 3rd Street
2.18	U	Campbell Avenue / Mabel Street
2.19	U	Helen Street / Park Avenue
Phase III (2022-2032)		
2.20	U	Speedway Boulevard / Plumer Avenue
2.26	U	Euclid Avenue / Drachman Street
2.27	U	Euclid Avenue / Helen Street
2.15	U	6th Avenue / University Boulevard
2.30	U	Elm Street / Ring Road
2.24	U	Mountain Avenue / Adams Street
2.28	U	Lester Street / Warren Avenue
2.29	U	Chauncy Street / Warren Avenue
2.25	U	Mountain Avenue / Lester Street
2.21	U	Park Avenue / Lester Street
2.22	U	Park Avenue / Elm Street

11.3 Funding Sources

The following section outlines sources of funding for bicycle and pedestrian projects in Arizona. Federal, state, regional, and other sources of funding are identified. The following descriptions are intended to provide an overview of available options and do not represent a comprehensive list. Funding sources can be used for a variety of activities, including: planning, design, implementation and maintenance. It should be noted that this section reflects the funding available at the time of writing. The funding amounts, fund cycles, and even the programs themselves are susceptible to change without notice. Table 11-7 presents potential funding sources that can be used to implement the bicycle and pedestrian projects recommended in this plan.

11.3.1 Federal Funds

The passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991 signaled a major change to allocation of federal funding for transportation projects. As the first federal legislation after the completion of the Interstate Highway System, ISTEA presented an intermodal approach to transportation planning and funding, giving additional control to the country's Metropolitan Planning Organizations. ISTEA and subsequent transportation legislation, the Transportation Equity Act for the 21st Century (TEA-21) (1998) and the Safe, Accountable, Flexible, Efficient Transportation Equity Act, a Legacy for Users (SAFETEA-LU) (2005), have allocated dedicated funding for transit, bicycle and pedestrian projects and programs. Bicycle and pedestrian projects are funded at a very small percentage compared to highway projects, but SAFETEA-LU provided broader eligibility requirements than previous acts that allow bicycle and pedestrian projects to qualify for traditional "highway" funding.

On June 29, 2012 a new transportation bill (MAP-21) was passed that has many changes to the funding of bicycle and pedestrian projects. SAFETEA-LU, the previous legislation, contained dedicated programs including Transportation Enhancements, Safe Routes to School, and Recreational Trails, which were all commonly tapped sources of funding to make non-motorized improvements nationwide. MAP-21 combines these programs into a single source called 'Transportation Alternatives.' Overall levels of funding for these programs were reduced from \$1.2 billion annually to approximately \$800 million – a reduction of one third. Additionally, states may 'opt-out' of up to 50 percent of the funding and use it for other projects. If Arizona decides to opt-out, this will result in a reduction in funding for Complete Street related improvements by up to two-thirds when compared to 2011 levels. At the time of publication of this plan, these funding mechanisms are completely new, and it will take some time to fully understand all of the implications of MAP-21 and to get this new program up and running. Table 11-7 includes funding sources available prior to MAP-21 as part of SAFETEA-LU.

11.3.2 Federal Transit Funds

An August 2011 policy statement by the Federal Transit Administration ruled that federal transit funds may be used on an 80 percent federal and 20 percent state or local basis for bicycle and pedestrian access to transit facilities, or to install racks or other equipment for transporting bicycles on transit vehicles. "All pedestrian improvements located within one-half mile and all bicycle improvements located within three miles of a public transportation stop or station shall have a de facto physical and functional relationship to public transportation. Pedestrian and bicycle improvements beyond these distances may be eligible for FTA funding by demonstrating that the improvement is within the distance that people will travel by foot or by bicycle to

use a particular stop or station.” At the time of publication (August 2012), it remains unclear how MAP-21 will fully impact transit funding.

11.3.3 State Funds

Historically, ADOT has been actively involved in the funding of bicycle and pedestrian facilities. With the passage of MAP-21 at the Federal level it remains to be seen how this will impact spending on the state level, as such programs such as Safe Routes to School and Recreational Trails will most likely not continue in their earlier form and will be combined into the new ‘Transportation Alternatives’ program.

Table 11-7: Funding Sources

Grant Source	Due Date*	Administering Agency	Annual Total	Matching Requirement	Eligible Applicants	Planning	Construction	Other	Notes
Federal Funds									
Transportation Investment Generating Economic Recovery Program (TIGER)	Varies	United States Department of Transportation	Varies	20%	States, counties, cities	X	X		Can be used for innovative, multi-modal and multi-jurisdictional transportation projects that promise significant economic and environmental benefits to an entire metropolitan area, a region, or the nation. These include bicycle and pedestrian projects.
Federal Lands Highway Program	Not available	Federal Highway Administration	\$1,019 million in 2009	None	States, counties, cities, tribes (projects must be open to the public)		X		Can be used for bicycle/pedestrian provisions associated with roads and parkways.
Bus and Bus Facilities Program: State of Good Repair	March	Federal Transit Administration	\$650 million in 2012	10%	Direct Recipients under the Section 5307 Urbanized Area Formula program, States, and Indian Tribes		X	X	Can be used for projects to provide access for bicycles to public transportation facilities, to provide shelters and parking facilities for bicycles in or around public transportation facilities, or to install equipment for transporting bicycles on public transportation vehicles.
Bus Livability Initiative	March	Federal Transit Administration	\$125 million in 2012	10%	Direct Recipients under the Section 5307 Urbanized Area Formula program, States, and Indian Tribes		X	X	Can be used for bicycle and pedestrian support facilities, such as bicycle parking, bike racks on buses, pedestrian amenities, and educational materials.

Pima Association of Governments and University of Arizona
University of Arizona Area Bicycle and Pedestrian Plan

Grant Source	Due Date*	Administering Agency	Annual Total	Matching Requirement	Eligible Applicants	Planning	Construction	Other	Notes
Hazard Elimination and Railway-Highway Crossing Program	Not available	Federal Highway Administration	\$5 million per year	10%	States	X	X		Can be used for identification and modification of areas that may create a danger to bicyclists and pedestrians, a review of hazardous sites, projects on publicly-owned bicycle/pedestrian pathways, or any safety-related traffic calming measure.
National Highway System	Not available	Federal Highway Administration	\$6.3 million in 2009	20%	States		X	X	Can be used for bicycle/pedestrian facilities on NHS routes, which are arterial routes serving key population centers.
Safe Routes to School	End of the calendar year	Arizona Department of Transportation, Pima Association of Governments	\$11.3 million in AZ in FY 2010	None	State, city, county, MPOs, RTPAs and other organizations that partner with one of the above.		X	X	Construction, education, encouragement and enforcement program to encourage walking and bicycling to school.
Surface Transportation Program (STP)	October	Federal Highway Administration	\$6.6 million in 2009	20%	States and local governments		X	X	Can be used for sidewalk installation, sidewalk upgrades to meet ADA requirements, shared-use paths, paved shoulders, bike lanes, and for bicycle/pedestrian educational programs.
Transportation, Community and System Preservation Program	Varies, generally January or February.	Federal Transit Administration	\$204 m nationally in 2009	20%	States, MPOs, local governments and tribal agencies	X	X	X	Funds projects that reduce the environmental impacts of transportation and reduce the need for costly future public infrastructure investments.

Chapter Eleven | Project Prioritization and Implementation

Grant Source	Due Date*	Administering Agency	Annual Total	Matching Requirement	Eligible Applicants	Planning	Construction	Other	Notes
Rivers, Trails and Conservation Assistance Program	Aug 1 for the following fiscal year	National Parks Service	Program staff time is awarded.	Not applicable	States, local agencies, tribes, non-profit organizations, or citizens' groups			X	RTCA staff provides technical assistance to communities so they can conserve rivers, preserve open space, and develop trails and greenways.
National Scenic Byways Program	Varies by agency	FHWA	\$3 m annually nationwide	20%	State agencies	X	X	X	NSB funds may be used to fund on-street or off-street facilities, intersection improvements, user maps and other publications. Projects must be located along a National Scenic Byway.
Paul S. Sarbanes Transit in Parks and Public Lands Program	Varies, Generally October.	Federal Transit Administration	\$27 m in 2009	None	Federal, State, local and tribal agencies that manage federal lands	X	X		Funds transportation modes that reduce congestion in parks and public lands, and includes non-motorized transportation systems such as pedestrian and bicycle trails

Pima Association of Governments and University of Arizona
University of Arizona Area Bicycle and Pedestrian Plan

Grant Source	Due Date*	Administering Agency	Annual Total	Matching Requirement	Eligible Applicants	Planning	Con-struction	Other	Notes
State Funds									
Arizona Game and Fish Department Heritage Funds	Varies	Department of Game and Fish	Varies	None	Federal government, tribes, State, local governments, school districts		X	X	Can be used for habitat creation, displays, signage, etc. that provide public access for recreational use.
Arizona State Parks Heritage Funds (currently inactive)	Not available	Arizona State Parks	Varies	50%	State, local governments, tribes		X		Can be used for trail development if trails are part of the Arizona State Trails System.
Community Development Block Grants	Varies between grants	U.S. Dept. of Housing and Urban Development (HUD)	\$42.8 m	Varies between grants	City, county	X	X	X	Funds local development activities in low-to moderate-income communities, such as affordable housing, anti-poverty programs, and infrastructure development. Can be used to build sidewalks and recreational facilities.
Growing Smarter Planning Grant Program	Varies	Department of Commerce	\$10,000 per recipient	50%	Counties, cities, communities	X			Can be used for developing comprehensive plans that meet State Growing Smarter requirements, including multimodal transportation and recreational planning.
Highway User Revenue Fund	Not applicable	Arizona Department of Transportation	Varies	None	Cities, counties, towns		X		Funded by State gas tax revenues, the vehicle license tax, and other miscellaneous fees. Can be used for landscaping, bicycle lanes, paved shoulders, sidewalks, and shared-use paths within the roadway right-of-way.
Highway Safety Improvement Program	October	Arizona Department of Transportation	\$750,000 to PAG each year	Varies between 0% and 10%	City, county or federal land manager	X	X	X	Projects must address a safety issue and may include education and enforcement programs. This program includes the Railroad-Highway Crossings and High Risk Rural Roads programs.

Chapter Eleven | Project Prioritization and Implementation

Grant Source	Due Date*	Administering Agency	Annual Total	Matching Requirement	Eligible Applicants	Planning	Construction	Other	Notes
Land and Water Conservation Fund (on hold)	Not available	Arizona State Parks	\$300,000 nationwide in 2011	50% + 2-6% administration surcharge	Cities, counties and districts authorized to operate, acquire, develop and maintain park and recreation facilities	X		X	Fund provides matching grants the acquisition and development of land for outdoor recreation areas. Lands acquired through program must be retained in perpetuity for public recreational use. Individual project awards are not available. The Department of Parks and Recreation levies a surcharge for administering the funds.
Office of Traffic Safety (OTS) Grants	Varies	Arizona Department of Transportation	Varies annually	None	Government agencies, state colleges, state universities, city, county, school district, fire department, public emergency service provider			X	Funds safety improvements to existing facilities, safety promotions including bicycle helmet giveaways and studies to improve traffic safety.
Recreational Trails Program	Varies (next opportunity in June 2012)	Arizona State Parks	\$1.4 million in 2012	20%	Agencies and organizations that manage public lands	X	X	X	Funds can be used for acquisition of easements for trails from willing sellers, and to develop/maintain recreational trails for non-motorized activities.
Transportation Enhancements	Every two years in July (state), varies for MPOs	ADOT, PAG	\$750,000 for local projects, and \$1,000,000 for state projects	5.7%	State, City, County, tribe		X		Can be used for paved shoulders, bike lanes, sidewalks, paved/unpaved pathways primarily used for transportation, and rails-to-trails projects.

Pima Association of Governments and University of Arizona
University of Arizona Area Bicycle and Pedestrian Plan

Grant Source	Due Date*	Administering Agency	Annual Total	Matching Requirement	Eligible Applicants	Planning	Construction	Other	Notes
Regional Funds									
Congestion Mitigation and Air Quality Improvement Program (CMAQ)	Not available	Maricopa Association of Governments	\$1.8 million nationally in 2009	20%	Cities	X	X	X	Funds are allocated for transportation projects that aim to reduce transportation-related emissions. Funds can be used for construction of bicycle facilities and pedestrian walkways or for non-construction projects related to safe bicycling and walking (i.e. maps and brochures). Projects must be linked to a plan adopted by the State and MPO.
Development Impact Fees	Not applicable	City of Tucson, Pima County	Varies	None	City, County		X		Can be used for paved shoulders, bike lanes, shared-use paths, and sidewalks to address transportation demand from new developments.
Flood Control District Funds	Not applicable	Pima County	Varies	None	County		X		Can be used for shared-use paths and undercrossings.
General funds	Not applicable	City of Tucson, Pima County	Varies	None	City, County	X	X	X	Funds come from taxes including sales and property taxes, and can be used for design and construction of bicycle/pedestrian facilities.
Parks and Recreation Funds	Not applicable	City of Tucson, Pima County	Varies	None	City, County		X	X	Can be used for development and maintenance of pathways, and pedestrian amenities.
Regional Transportation Authority Funding	Not applicable	Regional Transportation Authority	Varies	None	City, County		X		Funding comes from a ½ cent excise tax and can be used for bicycle and pedestrian projects.
Other Funding Sources									
American Greenways Kodak Awards (currently inactive)	Early June	The Conservation Fund	\$2,500 per project	None	Organizations and agencies	X	X	X	Can be used for public trails and greenways.

Chapter Eleven | Project Prioritization and Implementation

Grant Source	Due Date*	Administering Agency	Annual Total	Matching Requirement	Eligible Applicants	Planning	Construction	Other	Notes
Bikes Belong Grant	Multiple dates throughout year.	Bikes Belong	Not Available	50% minimum	Organizations and agencies		X	X	Bikes Belong provides grants for up to \$10,000 with a 50% match that recipients may use towards paths, bridges and parks.
Community Action for a Renewed Environment	March	US EPA	Varies	Not Available	Applicant must fall within the statutory terms of EPA's research and demonstration grant authorities	X		X	Grant program to help community organize and take action to reduce toxic pollution in its local environment
Frank Kush Youth Foundation	Not applicable	Frank Kush Youth Foundation	Varies	None	Organizations		X	X	Provides funding to encourage youth health and physical fitness
REI	Not applicable	REI	Varies	None	Non-profit groups		X	X	REI grants provide partner organizations with the resources and capacity to organize stewardship activities and get volunteers involved. These can include recreational trail projects.
Robert Wood Johnson Foundation	Varies	Robert Wood Johnson Foundation	Varies by program	None	Organizations			X	Provides varying grant opportunities to promote healthy communities and lifestyles.
Volunteer and Public-Private Partnerships	Not Applicable	City, county, joint powers authority	Varies	Not Applicable	Public agency, private industry, schools, community groups		X	X	Requires community-based initiative to implement improvements.

* Due dates for Federal Highway Administration Programs are subject to change due to pending authorization of a new federal transportation bill.

11.4 Campus Bicycle and Pedestrian Advisory Committee Implementation

As discussed in Chapter 10 of this plan, it is recommended that the University of Arizona establish a bicycle and pedestrian advisory committee. This section presents example committees from throughout the United States, as well as recommendations for how the University of Arizona should establish a bicycle and pedestrian advisory committee of its own.

11.4.1 Committee Examples

Colorado State University

Colorado State University (CSU) established its Campus Bicycle Advisory Committee (CBAC) in 2008. The BAC board consists of bicycle advocates, police personnel, City transportation staff, CSU faculty and staff, and CSU students that support and provide guidance on bicycle-related projects and programs. The CBAC has four purposes for existence:

- To promote a safe campus bicycle experience
- To encourage bicycling as a viable alternative transportation mode
- To educate the campus community regarding all modes of transportation
- To develop a culture of bicycling enthusiasts for health, lifestyle and to distinguish our university from all others

The CBAC works with the City of Fort Collins on educational campaigns, highlights safety concerns for study on campus, applies for grants to implement projects and programs, and creates public services announcements.¹⁵ The CBAC officers include a Chairperson and Vice Chairperson, which are elected to fill a two-year term. Members of the CBAC consist of any person in attendance at CBAC meetings. The meetings occur at least four times per year.¹⁶

University of South Carolina

The University of South Carolina's Bicycle Advisory Committee is a group of students, faculty, and staff bicycling advocates and who all aim to create a better environment for bicyclists at the University of South Carolina. Faculty/staff members of the committee include representatives from the following campus organizations: Facilities and Planning and Programming, Healthy Carolina, Orientation & Testing Services, Outdoor Recreation, Sustainable Carolina, and Vehicle Management & Parking Services.

The committee has five main initiatives: improved campus engineering, increased campus education, increased leadership efforts, improved advocacy, and more consistent enforcement. Based on these goals, the committee is organized into five working groups: Education, encouragement (advocacy), enforcement, evaluation, and engineering. Each working group has between three and six members, totaling to approximately 23 overall members. Sample current projects conducted by the working groups include assessment data, safety clinics, awareness events, bike registration, and bikeway planning and implementation.¹⁷

¹⁵ <http://bicycle.colostate.edu/initiatives>

¹⁶ <http://bicycle.colostate.edu/campus-bike-advisory-committee>

¹⁷ <http://www.cas.sc.edu/greenquad/node/146>

Cornell University

Cornell University (Cornell) has a Bicycle and Pedestrian Traffic Safety Committee. This committee meets monthly and covers issues pertaining to improving the bicycling and walking environment on campus. The committee consists primarily of staff from Transportation Services, Environmental Health and Safety, Police, Planning, and the Judicial Administrator's office. Interested students and staff can participate.¹⁸

Boston University

Boston University (BU) has a very active Bike Safety Committee that aims to educate all campus road users on rules, safety, and how to share the road. The University's executive vice president created the committee in 2008 in response to safety concerns.¹⁹ The committee runs a website informing the university community about biking on campus, conducts bicycling surveys, organizes and hosts bicycle-related events, and evaluates the need for improved bikeways and bicycle support facilities.²⁰

11.4.2 Recommended Duties

Based on a review of the previous example campus bicycle and pedestrian advisory committees, as well as existing city and county committees, it is recommended that the University of Arizona establish a committee similar in structure to the bicycle advisory committees at Colorado State University and the University of South Carolina.

For consistency and stability, the committee should have formal positions, including but not limited to a chairperson and vice chairperson. These positions can be elected or volunteer, depending on demand, and should be permanent University faculty and staff. The position terms should be for a minimum of one academic year. The committee should meet monthly to discuss goals and progress.

Since members will be volunteers, it is essential to have strong staffing to support the committee in order for it to be successful. One of the positions discussed above should take charge of managing the recruitment process, appointing members, managing agendas and minutes, scheduling meetings, bringing agency issues to the committee, and reporting back to the university about the recommendations and findings.

Within the committee, there should be working groups that focus on education, encouragement, enforcement, engineering, and evaluation as they relate to bicycle and pedestrian issues. The charges of the working groups and committee as a whole should include some or all of the following:

- Review and provide input on campus facility planning and design as it affects bicycling and walking (e.g., streets, intersections, signals, and parking facilities)
- Participate in the development, implementation, and evaluation of transportation studies and plans
- Provide a formal liaison between university, faculty, staff, and students
- Develop and monitor goals and indices related to bicycling and walking on campus
- Promote safe and courteous bicycling and walking on campus

¹⁸ <http://www.bike.cornell.edu/oncampus.html>

¹⁹ <http://www.bu.edu/today/2008/bike-accidents-prompt-new-safety-plan/>

²⁰ <http://www.bu.edu/bikesafety/enforcement-and-policies/bike-safety-committee/>

11.5 Policy Implications

Overall, the projects proposed in this plan are consistent with University of Arizona, City of Tucson, Pima County, and Arizona State policies, which are outlined in Chapter 3. However, Tucson's bike route with striped shoulder policy may present challenges in implementing several of the proposed bike lanes and buffered bike lanes recommended. With further study, these projects may require reducing vehicle travel lanes to 10 feet, including those that are adjacent to oncoming traffic. In these cases, the City should consider revising the policy to allow for 10 foot vehicle travel lanes in all situations. If revising the policy is not practical, the City should study the feasibility of minimizing the width of buffered bike lanes and reducing speed limits to accommodate these bikeways.

This page intentionally left blank.

Appendices

Appendix A: 2003 Comprehensive Campus Plan Policies, Goals, and Objectives Related to Walking and Biking

Policy 1

Transportation and circulation within and surrounding the University should maintain a balance of travel modes, along with providing a sense of order and convenient access. Circulation routes and transportation systems should contribute to a pleasing environment for individuals who work at, attend, and visit the University as well as for those who live in adjacent neighborhoods. Providing a clearly organized system of pedestrian, bicycle, transit, and vehicular facilities is essential for creating this environment. Expanding transit services, consolidating parking services and providing additional facilities off campus, improving travel routes and way-finding, increasing the use of alternative modes, encouraging modal connectivity, and obtaining funds to support these activities are critical to achieving the vision within the University area.

Goal

To create and maintain a balanced multi-modal transportation system that provides choices among all modes, reduces reliance on any single mode, and takes advantage of the inherent benefits of each mode.

Objectives

- Promote alternative modes and flexible hours to reduce vehicle miles traveled and peak-hour congestion
- Develop and implement projects that accommodate multiple modes

Goal

Create a pedestrian, transit, and bicycle-oriented circulation system on campus while maintaining access for emergency and service vehicles.

Objectives

- Provide an access network within campus for all mode types
- Emphasize pedestrian and bicycle circulation as the primary modes of travel on campus
- Develop convenient bicycle parking and a safe, efficient, and continuous bicycle circulation system with separated facilities wherever feasible

Goal

Improve the function and legibility of transportation access to campus

Objectives

- Implement design concepts for Sixth Street that recognize the University and pedestrian character while reducing the auto orientation and conflicts between modes
- Identify highly visible gateways and provide way-finding aids at each gateway and along permanent corridors
- Define access and circulation routes by mode preference and design each route to minimize congestion and on-campus vehicular circulation
- Identify potential improvements to alleviate congestion and operational problems on surrounding streets

Goal

Protect area neighborhoods from University related traffic and arterial traffic and promote neighborhood quality of life through traffic management and control strategies

Objectives

- Provide safe and continuous travelways for pedestrians and bicycles

Policy 3

Coordinate transportation and land use planning to ensure that future developments positively contribute to the quality of life on campus and in the University area

Goal

Encourage and endorse the University area land use decisions that will better support the transit, bicycle, and pedestrian systems, and improve the quality of life

Objectives

- Identify off-campus areas appropriate for student, faculty, and staff housing that are clustered or concentrated along major transit corridors (Transportation Oriented Developments – TODS), or are within walking and biking distance from campus
- Encourage compatible development within the neighborhoods o Increase student residential capacity on campus and relocate student family housing closer to campus
- Work actively to attract sustainable commercial/mixed use development to the University area
- Reassess the results of the 1997 SunTran Comprehensive Operational Analysis (COA) used to assess the value of the benefits to the community and users, resulting in good decisions regarding enhanced transit service to, and within, the University area. Investigate potential circulator and feeder routes that could more intensely service the surrounding two to three miles.

Goals

- Change the urban design of transportation routes to eliminate or reduce conflicts between transportation modes
- Modify the City of Tucson Major Streets and Routes Plan and Development Standards to include the designation and design of “traffic-calmed” streets around the University area.

Policy 6

In the University area, support improvements and projects proposed by the City, which will enhance the level of service for Speedway Boulevard in conjunction with other strategies that promote the use of alternative modes.

Goal

Research and implement changing traffic signal timing and activated devices to encourage safe pedestrian and bicycle crossing and changing traffic signalization cycles to allow a left turn sequence at key intersections

Policy 8

Universal accessibility will be provided entering into and throughout campus. Case-by-case exceptions may be made where prior development simply cannot achieve this level of universal accessibility

Goal

Accessible routes of travel will coincide with routes of travel used by individuals who are ambulatory

Goal

Aesthetically appealing signage indicating accessibility accommodations, such as locations of TDDs, should be consistent with the decor and ambiance of the surrounding area while maintaining maximum functional usability

Appendix B: Regional Pedestrian Plan Goals, Objectives, and Policies

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

Objectives	Policies
1. Promote the education and public awareness of the general public on pedestrian issues.	<ul style="list-style-type: none"> • Develop materials and a specific approach to provide information to the public on the need to clear privately installed or grown obstacles from public walkways. • Develop materials to educate neighborhoods on how to achieve pedestrian friendly walkways in front of private properties (along public and private streets). • Work with Neighborhood Associations to increase understanding of the benefits of walking as a mode of transportation by providing information in associations' newsletters. • Develop a regional pedestrian safety program in order to provide educational information to the public. • Conduct workshops and presentations to showcase pedestrian friendly ideas and practices. • Build liaisons with different user communities and agencies. • Develop a uniform set of shared-use trail guidelines to encourage safe and predictable behavior by all shared-use trail users. Display these guidelines using signage and trail markings at regular intervals.
2. Develop databases useful for pedestrian planning, prioritization of pedestrian improvements and collision prevention.	<ul style="list-style-type: none"> • Conduct periodic community-wide public opinion surveys to assess the general public's perceptions on pedestrian issues. • Develop jurisdiction inventories of pedestrian facilities, sidewalks and trails. Compile into a regional report. Use inventories as a basis to update this Plan in the future, with emphasis on more specificity. • Develop a regional pedestrian collision database to assist in educational and roadway improvement planning and prioritization.
3. Support regional pedestrian advocacy.	<ul style="list-style-type: none"> • Strengthen the role of all jurisdictions in regional programs such as the FHWA Pedestrian Road Show. • Promote the concept of pathways and walkways interconnecting as a way to improve neighborhood safety.
4. Develop a Public Information Campaign	<ul style="list-style-type: none"> • Publicize the environmental and health related benefits of walking both as an exercise and as a transportation mode. • Develop and broadcast Public Service Announcements (PSA) on the benefits of walking. • Sponsor events such as a "Walk Your Child to School" or "Walk to Work" day. • Encourage, participate in, and help publicize walking events such as historic walking tours in neighborhoods. • Continue to produce materials and brochures to promote walking to the general public.

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

Objectives	Policies
1. Strengthen linkages	None

with transit, bus stops, activity centers, schools, and other major destinations.

2. Provide direct pedestrian connections by developing a completely integrated sidewalk and shared-use trail system.

- Carefully establish mid-block crossings & paths to reduce distances and promote walking
- Follow trail location recommendations in the 1989 Eastern Pima County Trails System Master Plan, and the 1996 Pima County Trails Plan. Support future Pima County Trails Planning efforts.
- Identify the locations of interfaces between the sidewalk network and the river parks and other shared-use trails, and promote linkages between these systems.
- Promote the retrofitting of existing streets to add sidewalks.

3. Promote pedestrian friendly land use planning and development.

- Make development regulations more pedestrian and transit friendly.
- Develop a uniform set of standards for the design and construction of pedestrian facilities.
- Provide for internal and external pedestrian access with all land use developments.
- Provide direct, safe pedestrian access from neighborhoods to adjoining shopping centers, retail areas, and schools.
- Monitor other uses of the sidewalk area, such as landscaping and cafes, to ensure that they support rather than obstruct a continuous pedestrian network.
- Locate signal poles, signage, utility appurtenances and so forth so that they do not conflict with safe pedestrian circulation and access for the mobility impaired.
- Design and support traffic calming measures to reduce speeds and potential conflicts with alternative modes of transportation, as indicated.

4. Construct all pedestrian facilities in compliance with American with Disabilities Act (ADA) standards and AASHTO guidelines.

- Construct paved or hard packed dirt shared-use pathways (minimum 12 feet wide) along at least one side of river park watercourses.
- Construct pedestrian bridges across large gaps that prevent convenient, safe, and direct pedestrian travel.
- Encourage the construction of grade-separated pathways at appropriate major roadway crossings.

Goal: Improve pedestrian visibility and safety.

Objectives	Policies
1. Promote region-wide accessible sidewalks and street crossings.	<ul style="list-style-type: none"> • Install ADA accessible walkways and ramps on both sides of the street. • Provide barrier-free wide shoulders along uncurbed roadways. • Install pedestrian-actuation buttons or other user-friendly devices at all major signalized intersections. • Install signalized pedestrian crossings and lighting in high pedestrian activity zones. • Provide accessible and convenient wheelchair loading areas at all public transit stops.

2. Improve safety and convenient access for pedestrians around construction zones.	<ul style="list-style-type: none"> • Provide clear access through, or marked detours in, construction zones. • Provide signage to direct pedestrian traffic safely through or around construction zones.
3. Design for pedestrian safety and provide for direct and visible pedestrian connections across major barriers such as bridges, railroads, rivers, major roadways and other features that impede pedestrian travel.	<ul style="list-style-type: none"> • Continue to expand arterial street lighting. • Install curb/sidewalk treatments at arterial street crossings to reduce the distance pedestrians need to cross. • Provide a median refuge when crossing distances cannot be reduced for safe crossing in a single signal phase. • Install stop bars on all approach legs at signalized intersections. • Install safety lighting at intersections. <ul style="list-style-type: none"> o Minimize curb radius at intersections and driveways at specific high pedestrian activity locations, to reduce speed of right turning vehicles. • Provide automatic pedestrian phases at high demand intersections, and pedestrian actuation buttons in lower demand areas. • Consider the installation of exclusive pedestrian signal phases where traffic volumes are unusually heavy and where unusual, particularly risky conditions exist. • Design well marked, well lit crosswalks. • Provide audible signal indicators for visually impaired pedestrians, where warranted.
4. Improve the understanding of motorists, bicyclists, and pedestrians regarding traffic laws and proper ways to share the right of way.	<ul style="list-style-type: none"> • Encourage the creation of a traffic unit within all law enforcement agencies whose primary focus is to increase safety for alternative modes. • Reduce conflicts between vehicular traffic and alternative modes of travel. • Reduce the number of pedestrian related traffic collisions.

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

Objectives	Policies
1. Develop a maintenance request program to ensure routine maintenance of walkways, trails, street crossings and other pedestrian facilities.	<ul style="list-style-type: none"> • Promote a higher level of maintenance on existing sidewalks, crosswalks, and pedestrian signals and controls, through easier reporting of, and response to, defects.
2. Enhance the regional pedestrian environment.	<ul style="list-style-type: none"> • Provide amenities that improve the character of the pedestrian environment such as shade, landscaping, seating, and drinking fountains. • Install human scale lighting improvements, such as varied light spacing and heights, and add to the character of pedestrian spaces using features such as luminaries.

- Develop and install way-finding devices for providing directions to pedestrian travelers.
- Form partnerships with the Arts Community to develop streetscape art to add character and interest to pedestrian pathways.
- Develop target goals for the placement of trees and seating along major pedestrian routes throughout the region.
- Set target goals for the development of walkway and streetlight improvement districts.
- Develop pedestrian places to provide breaks from adjacent vehicular movement.
- Develop human scale gateways and thresholds for pedestrian travelers.
- Enhance walkways by installing interpretive signage with information about history, culture, nature or other relevant features of the area.
- Construct shade structures such as arcades where appropriate within the urban area.

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

Objectives	Policies
1. Establish an aggressive program for the funding of new pedestrian facilities and the improvement and maintenance of existing facilities.	<ul style="list-style-type: none"> • Support the establishment of a dedicated funding source for alternative modes of travel. • Encourage local jurisdictions to establish and/or increase their budgets for pedestrian facilities.
2. Provide neighborhoods with pedestrian improvement funding options from Federal, State, and local funds.	<ul style="list-style-type: none"> • Encourage the formation of Special Improvement Districts (SID) for pedestrian facility construction in neighborhoods.

Appendix C: Tucson Regional Plan for Cycling Goals and Actions

Goals	Actions
<p>Goal 1- Education: Educate all road users, especially bicyclists and motorists, on legal, predictable and safe behavior. Continue and expand implementation of both adult and child bicycle driving and traffic education programs. Coordinate with all area school districts and with the state and local Safe Routes to School Programs.</p>	<ul style="list-style-type: none"> • Action 1. Support and expand the Safe Routes to School Bike-Ed Program in schools in the Tucson region. • Action 2. Continue development and use of video and audio PSAs, short instructional safety videos to promote proper and legal cyclist behavior, and other educational materials such as bus bench and shelter signs, as well as posters in bike shops, community centers, libraries, and other public and semi-public locations. • Action 3. Educate the public on traffic laws, and the legal status of bicyclists, especially the three feet minimum passing distance law (ARS 28-735). • Action 4. Support and expand the adult bicycle education program; utilize periodic safety, commuter and defensive driver classes, PSAs, wrong-way signing and marking, open houses and other marketing methods. • Action 5. Continue the Bicycle Educator staff position in the Pima County Bicycle Program; establish a comparable position at the City of Tucson, and work to establish part-time bicycle educator positions at other PAG jurisdictions. • Action 6. Continue and expand local Police Bicycle Patrol Units, and dedicate a percentage of the officers’ time to educational efforts on proper bicycling behavior. • Action 7. Develop and implement a bike offender diversion program (i.e., community service program) to complement the above enforcement efforts. • Action 8. Promote head injury awareness and helmet usage through PSAs, educational brochures, and low-cost helmet distribution. • Action 9. Maintain and improve the League of American Bicyclists “Bicycle Friendly Communities” gold designation, as well as Bicycling Magazine’s “Top Ten Best Cities for Cycling” award for the region. • Action 10. Expand inclusion of bicycling-related questions in motor vehicle driving license tests as a means to raise awareness of bicyclists’ rights and responsibilities. Work to include standardized modules on proper and legal cyclist-motorist interactions and safety in drivers’ education courses. • Action 11. Continue to work cooperatively to update and distribute an improved, userfriendly bicycle map of the Tucson Region • Action 12. Work cooperatively to develop, publish and distribute a user-friendly Tucson Regional Bicycle Commuter Handbook. • Action 13. Continue to work cooperatively to update and distribute the Share the Road Guide. • Action 14. Periodically review, and update as needed, national “best practices” in cyclist and motorist education.
<p>Goal 2 – Enforcement: Establish and implement targeted enforcement of</p>	<ul style="list-style-type: none"> • Action 1. Update or develop materials for use by law enforcement personnel to support their education and enforcement efforts. • Action 2. Work with law enforcement to acquire or develop training materials for

Goals	Actions
<p>specific traffic laws on bicyclists and motorists, based on the documented most frequent bicyclist – motorist crashes.</p>	<p>officers, to increase their understanding of and attention to legal and illegal bicycling and motorist behaviors.</p> <ul style="list-style-type: none"> • Action 3. Commit a defined portion of law enforcement time (both police bicycle patrols and motor vehicle patrols) to target specific research-based bicyclist and motorist offenses for focused enforcement. • Action 4. Develop and implement a consistent, year-round traffic law education program for law enforcement personnel which focuses on teaching police officers a balanced education and enforcement program for improving motorist and bicyclist compliance with traffic laws. • Action 5. Periodically review, and update as needed, national “best practices” in cyclist and motorist enforcement.
<p>Goal 3 – Engineering: Plan, design, construct and maintain bicycle facilities that meet or exceed accepted standards and guidelines.</p>	<ul style="list-style-type: none"> • Action 1. Provide dedicated local funding sources for the construction and maintenance of bikeways. • Action 2. Incorporate bicycle-friendly roadway design practices and standards through consistent, routine training of ADOT and all PAG member jurisdiction staff on bicycle transportation planning and design practices. • Action 3. Increase regional bikeway miles to 1165 by 2020 and 1,581 by 2030. • Action 4. Develop an interconnected network of bikeways on and between 1) local and collector streets, 2) major arterial roadways, and 3) shared-use paths in linear parks, primarily along waterways. Concentrate bicycle improvements in a three-mile radius (“hub and spoke”) around major employment centers, schools and activity centers. • Action 5. Plan, program and implement special provisions for mid-block bicycle/pedestrian crossings of high-volume streets, at selected locations. • Action 6. Locate new schools, especially elementary and middle schools, on collector streets, where roadway volumes and speeds are lower, providing safer non-motorized access opportunities for school children. • Action 7. Provide periodic news releases for bicycle planning and bicycle system development and actively solicit public input. • Action 8. Develop land use policies, including zoning and subdivision regulations, which will accommodate and promote bicycle use in and to activity centers, neighborhoods, schools and parks. • Action 9. Require short and long-term bicycle parking for all commercial and business uses, and for multi-family housing. • Action 10. Revise codes to require motor vehicle parking on the side or rear of the developed lot, not in the front (street-side), to reduce potential for pedestrian and bicycle conflict (where the potential is highest). • Action 11. Monitor the implementation of elements within this Regional Plan for Bicycling and update the plan at approximate five-year intervals. • Action 12. Periodically conduct community-wide public opinion surveys to assist programs that could improve bicycling in the Tucson region. • Action 13. Continue and expand a PAG bicycle traffic counting program to

Goals

Actions

identify usage levels and help determine progress toward achieving future bicycle mode split goals.

- Action 14. Develop and implement a cooperative bikeway inventory system as part of the Regional Bike Map updating process.
- Action 15. Develop a regional bicycle crash database to assist in educational and roadway improvement efforts.
- Action 16. Prioritize implementation of bicycle facilities that connect key linkages to the roadway and river path systems, including interim roadway and path improvements where needed, and spot safety improvements on existing routes and paths.
- Action 17. Re-stripe all principal roadways to provide maximum outside lane width, based on recommended widths in this plan.
- Action 18. Provide and maintain a striped shoulder of at least four feet on uncurbed roadways (measured from white edge stripe to edge of shoulder), or bike/shoulder lane of at least five feet on curbed roadways (measured from white edge stripe to gutter face with at least four feet between the edge stripe and the edge of the gutter pan) on all new, rehabilitated, or reconstructed arterial and collector roadways.
- Action 19. Modify existing traffic signal detection equipment or install new equipment, such as loop detectors, video detectors, or safely accessible push-button actuators to make all traffic signals bicyclist-responsive.
- Action 20. Provide a multi-use auxiliary lane of at least eight feet on all new or reconstructed bridges, underpasses and overpasses.
- Action 21. Plan and design for bicycle travel with all intersection capacity improvements, based on AASHTO Guidelines.
- Action 22. Develop smaller radius corners on streets with bikeways to slow right turning traffic.
- Action 23. Continue and expand street sweeping programs on designated bike routes, sweeping all bike lanes/shoulders and bike routes at least every other week.
- Action 24. Maintain street surfaces on designated bikeways and key shared-use path linkages to a high standard, including elimination of potholes, and maintenance of bicycle-safe railroad crossings, drain grates and cattle guards. Avoid use of chip sealing on high-volume bikeways whenever practicable.
- Action 25. Continue to routinely maintain and sweep street surfaces on arterials and collectors not designated as bicycle routes to reduce hazards (e.g., potholes, debris) for bicyclists that must use these roadways.
- Action 26. Continue or establish strong jurisdictional responsiveness to maintenance requests from citizens through the use of on line or telephone reporting systems for citizens to report problems. Continue or establish a goal of five working days to address these problems.
- Action 27. Seek and support a bottle deposit program in order to reduce littering

Goals	Actions
	<p>of roadways, parks and bikeway facilities with hazardous broken glass.</p> <ul style="list-style-type: none"> • Action 28. Provide and maintain bikeway detours through construction zones, and maximize outside (curb) lane widths (provide lane widths of at least 15 feet) through construction zones on roadways that do not have bike lanes/shoulders. Where this is not feasible, provide appropriate bicycle-friendly detours and detour signing. • Action 29. Provide bicycle coordinator or planning staff positions in PAG and PAG member jurisdictions and the Tucson Regional Office of the Arizona Department of Transportation (ADOT). • Action 30. Periodically review, and update, as needed, national “best practices” in cyclist engineering practices.
<p>Goal 4- Encouragement: Encourage increased use of bicycles for transportation and recreation; support organized events, especially those that have substantive beneficial economic impacts. Promote the Tucson region's ideal climate and facilities for year-round bicycling to visitors.</p>	<ul style="list-style-type: none"> • Action 1. Increase the Region-wide bicycle commute mode share by 2020, and again by 2030. • Action 2. Continue the interface between bikes and buses, including such features bicycle racks (upgrade all future bus bike racks to hold three bikes) and lockers, park and ride lots, and low-floor buses and signal preemption for buses at signalized intersections. • Action 3. Encourage wide-spread support of and participation in bicycle awareness programs by bicycle shops, bicycle clubs, the Tucson-Pima County Bicycle Advisory Committee, and other bicycle interest groups in efforts to promote public awareness of bicycling. • Action 4. Continue and expand marketing efforts to promote bicycling as an alternate mode of transportation, especially through cooperative efforts with PAG’s Regional Travel Reduction and Rideshare Programs. • Action 5. Develop and implement specific incentives to encourage existing businesses and other entities to provide support facilities for bicycling, such as racks and bicycle lockers, showers and clothes lockers, parking cash allowances and guaranteed ride home programs. • Action 6. Provide outreach and personal travel cost information that shows how bicycle transportation can be financially beneficial to the low-income workforce and students. • Action 7. Construct bicycle facilities where needed, including roadway and parking improvements, in low-income areas. • Action 8. Promote the quantifiable air quality benefits of bicycling through public outreach efforts to major public and private sector employers. • Action 9. Develop and promote local bicycle parking ordinances where they do not currently exist, and monitor and assist improvement of existing local bicycle parking ordinances, based in part on bicyclist and business feedback and recommendations. • Action 10. Provide adequate bicycle parking facilities at schools, parks, libraries and other locations. • Action 11. Promote organized bicycle events as a means of increasing public

Goals	Actions
	<p>awareness of the potentials of bicycling and as a viable sport for public viewing and participation.</p> <ul style="list-style-type: none"><li data-bbox="524 323 1437 432">• Action 12. Support the efforts of the Tucson-Pima County Bicycle Advisory Committee (TPCBAC) to promote bicycling and improve bicycle safety through effective responses to TPCBAC concerns.<li data-bbox="524 443 1437 512">• Action 13. Periodically review and update, as needed, national “best practices” in cyclist encouragement.<li data-bbox="524 522 1437 585">• Action 14. Promote the Bicycle Commuter Act. Action 15. Promote and support Bicycle to Work Month and Bike Fest.

Appendix D: 2010 Bicycle Count Data

The following table presents bicycle count data in the University of Arizona study area. Some counts were conducted from 11:00 am to 1:00 pm and experienced high volumes of bicyclists as compared to counts conducted during other times.

Location	Area	AM_Total	PM_Total	Total
University Blvd / Stone Ave	Downtown	141	150	291
Broadway Blvd / Aviation Pkwy (Snake Bridge)	Downtown	50	74	124
St.Mary's Rd / Santa Cruz Pathway	Downtown	122	79	201
7th St / 7th Ave	Downtown	27	40	67
Congress St / Granada Ave	Downtown	34	57	91
18th St / 6th Ave	Downtown	26	33	59
6th St / 9th Ave	Downtown	30	67	97
9th St / 4th Ave	Downtown	127	144	271
Congress Rd / Grande Ave	Downtown	12	34	46
Alameda St / Church Ave	Downtown	53	79	132
Toole Ave / 7th Ave	Downtown	18	62	80
Toole Ave / Congress St	Downtown	110	160	270
St. Mary's Rd / Santa Cruz Pathway WE	Downtown	159	0	159
22nd St / Kolb	East	21	36	57
Broadway Blvd / Houghton Rd	East	6	9	15
Rita Rd / Esmond-Rankin	East	15	9	24
Catalina Hwy / Harrison Rd	East	70	13	83
Old Spanish Trail / Freeman Rd	East	74	32	106
Snyder Rd / Catalina Hwy WE	East	206	0	206
Old Spanish Trail / Kenyon Dr	East	9	12	21
Valencia Rd / Kolb Rd	East	11	12	23
Speedway Blvd / Pantano Pathway	East	16	10	26
Old Spanish Trail / Freeman Rd WE	East	487	0	487
Continental / Camino del Sol	Green Valley / Sahuarita	28	7	35
Continental Rd / Abrego Dr	Green Valley / Sahuarita	11	4	15
Duval Mine Rd / La Canada Dr	Green Valley / Sahuarita	27	10	37
Rancho Sahuarita Blvd / La Villita Rd	Green Valley / Sahuarita	35	41	76
River Rd / Sabino Canyon Rd	North and NW	38	27	65
Tangerine Rd / 1st Ave	North and NW	67	36	103
Ina Rd / Oracle Rd	North and NW	39	22	61
Sunrise Dr / Swan Rd	North and NW	86	21	107
River Rd / La Cholla Blvd	North and NW	46	20	66
Silverbell Rd / Cortaro Rd	North and NW	14	9	23
Naranja Dr / La Canada Dr	North and NW	52	51	103

Pima Association of Governments and University of Arizona
University of Arizona Area Bicycle and Pedestrian Plan

Location	Area	AM_Total	PM_Total	Total
Rancho Vistoso / Oracle Rd	North and NW	20	16	37
Wilds Rd / Oracle Rd	North and NW	23	13	36
Twin Peaks Rd / Coachline Rd	North and NW	28	24	53
Ina Rd / Thornydale Rd	North and NW	12.5	17	29
Orange Grove Rd / Thornydale Rd	North and NW	2	13	15
Rancho Vistoso / Oracle Rd	North and NW	260	0	260.25
Wilds Rd / Oracle Rd	North and NW	196	0	196
3rd St / Campbell Ave	UA	472	520	992
University Blvd / Park Ave	UA	441	545	986
Helen St / Mountain Ave	UA	409	362	771
6th St / Park Ave	UA	59	119	178
Speedway Blvd / Park Ave	UA	111	130	241
6th St / Cherry Ave	UA	55	50	105
Ring Rd / Warren Ave	UA	49	68	117
2nd St / Highland Ave	UA	243	323	566
Speedway Blvd / Cherry Ave	UA	43	62	105
Blacklidge Dr / Mountain Ave	Urban Core	172	135	307
Rillito Pathway / Mountain Ave - North	Urban Core	122	111	233
Elm St / Tucson Blvd	Urban Core	122	112	234
Glenn St / Treat Ave	Urban Core	65	92	157
Speedway Blvd / Treat Ave	Urban Core	67	50	117
Pima St / Columbus Blvd	Urban Core	70	70	140
Broadway Blvd / Alvernon Way	Urban Core	39	53	93
Grant Rd / Campbell Ave	Urban Core	40	65	105
3rd St / Swan Rd	Urban Core	40	38	78
Prince Rd / Fairview Ave	Urban Core	30	35	65
St.Mary's Rd / Anklam Rd	Urban Core	27	48	75
Broadway Blvd / Wilmot Rd	Urban Core	35	41	76
Ft Lowell Rd / Alvernon Way	Urban Core	29	14	43
Tanque Verde Rd / Kolb Rd	Urban Core	27	45	72
Ajo Way / Mission Rd	Urban Core	15	13	28
Golf Links / Craycroft Rd	Urban Core	14	33	47
Arroyo Chico / Tucson Blvd	Urban Core	22	19	41
Lester St / 4th Ave	Urban Core	19	31	50
River Rd / Campbell Ave	Urban Core	35	18	53.5
Ironwood Hill Dr / Silverbell Rd	Urban Core	18	19	37
Rillito Pathway / Oracle Rd	Urban Core	106	120	226
29th St / 4th Ave	Urban Core	11	23	34
3rd St / Country Club Rd	Urban Core	208	132	340
Valencia Ave / Mission Rd WE	Urban Core	171	0	171

Appendices

Location	Area	AM_Total	PM_Total	Total
Gates Pass Rd / Camino de Oeste WE	Urban Core	189	0	189
Yavapai Rd / Fontana Ave	Urban Core	17	37	54
43rd St / 10th Ave	Urban Core	11	11	22
Valencia Rd / San Fernando Ave	Urban Core	7	8	15
39 St / 6th Ave	Urban Core	17	39	56
Nebraska St / Liberty Ave	Urban Core	13	8	21
Rillito Pathway / Mountain Ave - South	Urban Core	68	56	124
Rillito Pathway / Mountain Ave - North WE	Urban Core	292	0	292
Rillito Pathway / Mountain Ave - South WE	Urban Core	145	0	145
Total Bicyclists		6,957	5,100	12,057

Appendix E: 2010 Pedestrian Count Data

The following table presents pedestrian count data in the University of Arizona study area. Some counts were conducted from 11:00 am to 1:00 pm and experienced high volumes of pedestrians as compared to counts conducted during other times.

Location	Area	Pedestrians
University Blvd / Stone Ave	Downtown	257
Broadway Blvd / Aviation Pkwy (Snake Bridge)	Downtown	69
St.Mary's Rd / Santa Cruz Pathway	Downtown	76
7th St / 7th Ave	Downtown	52
Congress St / Granada Ave	Downtown	689
18th St / 6th Ave	Downtown	72
6th St / 9th Ave	Downtown	82
9th St / 4th Ave	Downtown	304
Congress Rd / Grande Ave	Downtown	91
Alameda St / Church Ave	Downtown	949
Toole Ave / 7th Ave	Downtown	91
Toole Ave / Congress St	Downtown	351
St. Mary's Rd / Santa Cruz Pathway WE	Downtown	0
22nd St / Kolb	East	392
Broadway Blvd / Houghton Rd	East	7
Rita Rd / Esmond-Rankin	East	55
Catalina Hwy / Harrison Rd	East	4
Old Spanish Trail / Freeman Rd	East	11
Snyder Rd / Catalina Hwy WE	East	29
Old Spanish Trail / Kenyon Dr	East	34
Valencia Rd / Kolb Rd	East	0
Speedway Blvd / Pantano Pathway	East	70
Old Spanish Trail / Freeman Rd WE	East	39
Continental / Camino del Sol	Green Valley / Sahuarita	15
Continental Rd / Abrego Dr	Green Valley / Sahuarita	13
Duval Mine Rd / La Canada Dr	Green Valley / Sahuarita	18
Rancho Sahuarita Blvd / La Villita Rd	Green Valley / Sahuarita	290
River Rd / Sabino Canyon Rd	North and NW	9
Tangerine Rd / 1st Ave	North and NW	13
Ina Rd / Oracle Rd	North and NW	85
Sunrise Dr / Swan Rd	North and NW	67
River Rd / La Cholla Blvd	North and NW	38
Silverbell Rd / Cortaro Rd	North and NW	20
Naranja Dr / La Canada Dr	North and NW	99
Rancho Vistoso / Oracle Rd	North and NW	0

Appendices

Location	Area	Pedestrians
Wilds Rd / Oracle Rd	North and NW	0
Twin Peaks Rd / Coachline Rd	North and NW	130
Ina Rd / Thornydale Rd	North and NW	75
Orange Grove Rd / Thornydale Rd	North and NW	12
Rancho Vistoso / Oracle Rd	North and NW	0
Wilds Rd / Oracle Rd	North and NW	0
3rd St / Campbell Ave	UA	319
University Blvd / Park Ave	UA	1959
Helen St / Mountain Ave	UA	771
6th St / Park Ave	UA	406
Speedway Blvd / Park Ave	UA	646
6th St / Cherry Ave	UA	641
Ring Rd / Warren Ave	UA	52
2nd St / Highland Ave	UA	763
Speedway Blvd / Cherry Ave	UA	287
Blacklidge Dr / Mountain Ave	Urban Core	89
Rillito Pathway / Mountain Ave - North	Urban Core	224
Elm St / Tucson Blvd	Urban Core	66
Glenn St / Treat Ave	Urban Core	65
Speedway Blvd / Treat Ave	Urban Core	114
Pima St / Columbus Blvd	Urban Core	248
Broadway Blvd / Alvernon Way	Urban Core	334
Grant Rd / Campbell Ave	Urban Core	88
3rd St / Swan Rd	Urban Core	15
Prince Rd / Fairview Ave	Urban Core	122
St.Mary's Rd / Anklam Rd	Urban Core	12
Broadway Blvd / Wilmot Rd	Urban Core	216
Ft Lowell Rd / Alvernon Way	Urban Core	177
Tanque Verde Rd / Kolb Rd	Urban Core	50
Ajo Way / Mission Rd	Urban Core	78
Golf Links / Craycroft Rd	Urban Core	26
Arroyo Chico / Tucson Blvd	Urban Core	61
Lester St / 4th Ave	Urban Core	25
River Rd / Campbell Ave	Urban Core	97
Ironwood Hill Dr / Silverbell Rd	Urban Core	74
Rillito Pathway / Oracle Rd	Urban Core	118
29th St / 4th Ave	Urban Core	23
3rd St / Country Club Rd	Urban Core	99
Valencia Ave / Mission Rd WE	Urban Core	13
Gates Pass Rd / Camino de Oeste WE	Urban Core	12

Pima Association of Governments and University of Arizona
 University of Arizona Area Bicycle and Pedestrian Plan

Location	Area	Pedestrians
Yavapai Rd / Fontana Ave	Urban Core	87
43rd St / 10th Ave	Urban Core	33
Valencia Rd / San Fernando Ave	Urban Core	318
39 St / 6th Ave	Urban Core	166
Nebraska St / Liberty Ave	Urban Core	258
Rillito Pathway / Mountain Ave - South	Urban Core	249
Rillito Pathway / Mountain Ave - North WE	Urban Core	234
Rillito Pathway / Mountain Ave - South WE	Urban Core	126
Total Pedestrians		14,369