CITY OF SIERRA VISTA

FINAL REPORT

SAFE **Bicycle** and **Pedestrian** ROUTES PLAN

ADOT
ARIZONA DEPARTMENT OF TRANSPORTATION

AUGUST 2011

Kimley-Horn and Associates, Inc.

City of Sierra Vista Safe Bicycle and Pedestrian Routes Plan

ADOT MPD Task Assignment 31-10
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Final Report

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ARIZONA DEPARTMENT OF TRANSPORTATION

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1 INTRODUCTION

The Arizona Department of Transportation (ADOT), through the Planning Assistance for Rural Areas (PARA) program, awarded funding for the City of Sierra Vista Safe Bicycle and Pedestrian Routes Plan. The purpose of the PARA program is to assist counties, cities, towns, and tribal communities address a broad range of multimodal transportation planning issues in rural Arizona, including roadway and non-motorized modes of travel.

Improving bicycle and pedestrian safety has many benefits to the city of Sierra Vista and its residents. Improving and providing safe bicycle and pedestrian facilities provides a viable transportation option for those people who cannot or do not drive. In addition, it is anticipated that development of a network of safe bicycle and pedestrian routes will increase the number of bicycle and pedestrian trips, thus reducing reliance on personal vehicles.

The primary products of the City of Sierra Vista Safe Bicycle and Pedestrian Routes Plan are:

- **A map depicting existing Sierra Vista bicycle and pedestrian routes.** The Sierra Vista Bicycle and Pedestrian Routes Map identifies existing City of Sierra Vista shared-use paths, on-street bicycle lanes, and other local streets suitable for bicycles and pedestrians. The map is designed to be easily understandable and utilized by the public and will include bicycle and pedestrian routes that connect key nodes such as schools, parks, and commercial centers.
- **Identification of needs and deficiencies of the Sierra Vista bicycle and pedestrian Routes.** These could include signalized or unsignalized pedestrian crossings, striped bicycle lanes, widened shoulders, or additional shared-use paths to establish connectivity.
- **Identification of prioritized projects that upon implementation will improve the connectivity, function, and safety of the Sierra Vista bicycle and pedestrian routes.** The resulting project list will serve as a guide for community development, project funding applications, and project implementation.

1.1 Study Area

The study area encompasses the urbanized portion of the City of Sierra Vista, including County enclaves, as depicted in **Figure 1**. Fort Huachuca is not included in the study area.

1.2 Study Objectives

The City of Sierra Vista Safe Bicycle and Pedestrian Routes Plan was accomplished through completion of the following project objectives:

- Identify nodes and activity centers.
- Map a network of bicycle and pedestrian routes that connect the nodes and activity centers.

- Identify route deficiencies in terms of safety and comfort of the bicyclist and pedestrian.
- Identify improvement projects that will address the deficiencies.
- Prioritize improvement projects consistent with safety and connectivity considerations.
- Develop a Final Report that includes the plan of improvements and final recommendations.

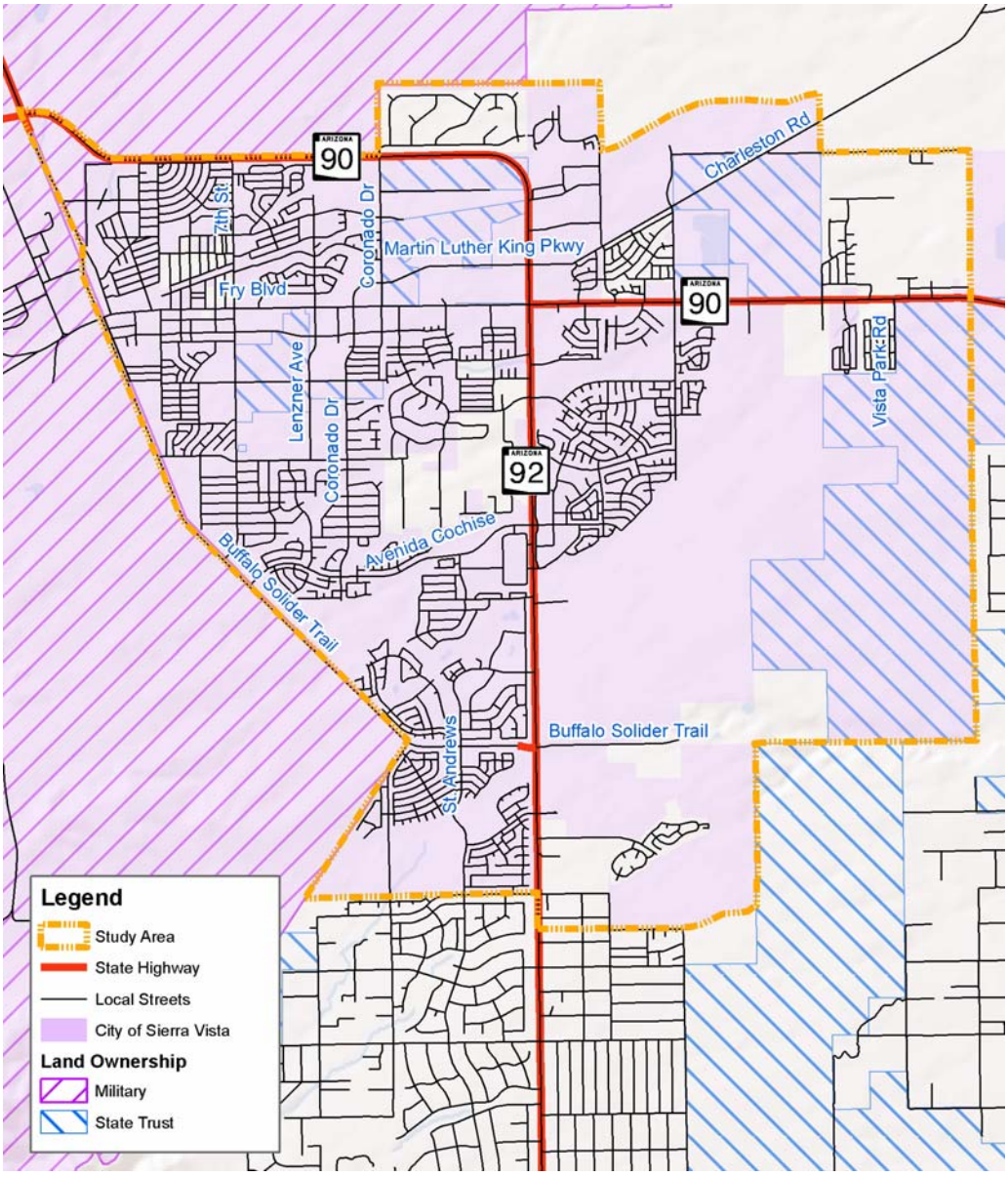

Figure 1 – City of Sierra Vista Safe Bicycle and Pedestrian Routes, Study Area

1.3 FHWA and USDOT Support for Bicycling and Walking

The Federal Highway Administration (FHWA) has consistently expressed its support for bicycle and pedestrian accommodation. In a memorandum dated February 24, 1999, the FHWA emphasized not only its position that nonmotorized modes are an integral part of the mission of the FHWA and a critical element of the local, regional, and national transportation system, but also its strong commitment to improving conditions for bicycling and walking. The memorandum states:

> "We expect every transportation agency to make accommodation for bicycling and walking a routine part of their planning, design, construction, operations and maintenance activities….
>
> Increasing bicycling and walking offers the potential for cleaner air, healthier people, reduced congestion, more livable communities, and more efficient use of precious road space and resources (accessed on 5/13/2011 at http://www.fhwa.dot.gov/environment/bikeped/memo.htm)"

The FHWA and the US Department of Transportation (USDOT) reaffirmed their support for bicycle and pedestrian accommodation on March 15, 2010 (United States Department of Transportation Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations, March 15, 2010) by directing transportation agencies to:

> "Consider[ing] walking and bicycling as equals with other transportation modes: The primary goal of a transportation system is to safely and efficiently move people and goods. Walking and bicycling are efficient transportation modes for most short trips…. Because of the benefits they provide, transportation agencies should give the same priority to walking and bicycling as is given to other transportation modes. Walking and bicycling should not be an afterthought in roadway design (accessed on 5/13/2011 at http://www.fhwa.dot.gov/environment/bikeped/memo.htm)."

1.4 Existing Local Policies Regarding Bicycle and Pedestrian Facilities

Policies regarding bicycle and pedestrian facilities from the Vista 2020 General Plan (ratified 2003) are summarized in **Table 1**.

Table 1 – Vista 2020 General Plan Policies Regarding Bicycle and Pedestrian Facilities

General Plan Element	Policy (or Strategy)	Vista 2020 Goal* Supported by Policy
Transportation and Circulation Element	Seek funding to upgrade and improve sidewalk accessibility routes.	Goal 3-3: Consider all ADA requirements and the prime users when designing and constructing the transportation system.
	1. Require adequate bicycle and motorcycle parking facilities at community shopping centers, public parks, and other public facilities. 2. Encourage the use of carpools, public transit, and other transportation systems. 3. Identify the needs of commuter and recreational bicyclists and prioritize the development of multimodal routes. 4. Coordinate with Cochise County and Fort Huachuca in designing and constructing an interconnected city-wide system of multimodal routes. 5. Continue development of a multimodal transportation system.	Goal 3-4: Increase alternate transportation options in order to reduce vehicular congestion.
Open Space Element	No policy or strategy associated with Goal 4-4.	Goal 4-4: Designate adequate open space land to meet the community standard of .83 miles of multimodal paths per 1,000 residents.
Growth Element	Encourage multimodal transportation systems within the growth areas.	Goal 5-1: Target growth to identified growth areas.
Parks and Recreation Element	Establish an environmentally friendly multimodal pathway system to interconnect linear parks where possible.	Goal 10-1: Develop and maintain a system of high quality and environmentally sensitive parks, recreation facilities, and programs.
Urban Design Element	Create pedestrian-friendly neighborhoods.	Goal 17-2: Develop a cohesive urban character that distinguishes the City of Sierra Vista as a community unto itself.

*Goals are quoted verbatim from the General Plan

Source: Vista 2020 General Plan

2 ACTIVITY CENTERS

Information on activity centers was obtained from the General Plan (Vista 2020), stakeholder and TAC members, and from City of Sierra Vista staff. An overview of the main activity centers and their locations is summarized below:

- **Retail and professional services –** These are primarily located on Fry Boulevard and State Route 92. Fry Boulevard has a variety of shops, restaurants, and other commercial establishments. The Cochise Shopping Center and a K-Mart Retail Center are located on Fry Boulevard near Coronado Drive. The Vista Business Park is located on Fry Boulevard near 7th Street. A number of retail malls and shopping areas are located on State Route (SR) 92 and on the SR 90 Bypass near Fry Boulevard. The Mall at Sierra Vista is located further south, with access on SR 92 and Avenida Cochise.
- **Fort Huachuca**, which employs over 15,000 people, is a major employer in the area. Fort Huachuca's Main Gate connects to Fry Boulevard at Buffalo Soldier Trail. There are two other gates: an East Gate at Buffalo Soldier Trail and SR 90 (Hatfield Street inside the Base) and a West Gate on Canelo Road.

- **Parks –** Veteran's Memorial Park is located north of Fry Boulevard and east of Coronado Drive. Another major park and recreation area is the Domingo Paiz Sport Complex, which is located on Tacoma Street.
- **Schools –** Cochise College is located in the north east section of Sierra Vista, and can be accessed via Campus Drive. Buena High School is located on Buena School Boulevard, north of Charleston Road. The Joyce Clark Middle School is located on Lenzner Avenue. The Sierra Vista Unified School District has five elementary schools including Bella Vista School, Carmichael, Huachuca Mountain, Pueblo Del Sol, and Town and Country Elementary. There are also a number of charter and religious-based schools.
- **Medical –** The Sierra Vista Regional Health Center is located on the southeast corner of El Camino Real and Wilcox Drive. Medical offices are also located near this intersection.
- **Government** – The Public Works Complex is located at 401 Giulio Cesare Avenue. The City Hall and Council Chambers and the Police Department are located on North Coronado Street. The Public Library, Oscar Yrun Community Center, Ethel Berger Center, and Visitor Center are located on Tacoma Street.

3 CURRENT MULTIMODAL FACILITIES

This chapter describes existing bicycle and pedestrian facilities in the City of Sierra Vista. Definitions are consistent with the American Association of SR and Transportation Officials (*AASHTO) Guide for the Development of Bicycle Facilities* (1999).

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

Shared Roadway: A roadway which is open to both bicycle and motor vehicle travel. This may be an existing roadway, or a street with wide curb lanes or with paved shoulders.

Shared-Use Path: A bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way. Shared-use paths may also be used by pedestrians, skaters, wheelchair users, joggers, and other non-motorized users.

3.1 Existing Bicycle Lanes

Streets with bicycle lanes are summarized in **Table 2**. The locations of these bicycle lanes are also shown graphically in **Figure 2.**

Table 2 – Existing Bicycle Lanes

Street Name	Segment
Avenida Cochise	Calle Montana to SR 92
Via Riata	from Snyder Boulevard to Avenida Cochise
Avenida El Rancho	from Colombo Avenue to Camino Soledad
Foothills Drive	El Camino Real to Avenida Escuela
El Camino Real	Fry Boulevard to Foothills Drive
Lenzner Avenue	Wilcox Drive to Fry Blvd.
Carmichael Avenue	Whitton Drive to Nelson Drive
North Avenue	Fry Boulevard to Sycamore
Golf Links Road	7th Street to Hummingbird Lane
Saint Andrews Drive	SR 92 to Kachina Trail
Cherokee Avenue	Buffalo Soldier Trail to Kachina Trail
Buffalo Soldier Trail	SR 90 to SR 92
Greenbrier Road	Oakmont to SR 92
Calle Mercancia	SR 92 to Avenida Cochise

Source: City of Sierra Vista

3.2 Existing Shared-Use Paths

Shared-use paths exist at the following locations:

- Buffalo Soldier Trail from SR 90 Bypass to SR 92 (discontinuous)
- Lenzner Avenue from Town and Country Elementary to Wilcox Drive
- Coronado Drive from Martin Luther King Parkway to Tacoma Street
- Coronado Drive from SR 90 Bypass to just south of Carmelita Drive
- Martin Luther King Parkway from Coronado to SR 90 Bypass
- Snyder Boulevard from Avenida Del Sol to SR 92 (ribbon-cutting in April, 2010)
- Snyder Boulevard from Via Riata to Avenida Del Sol (south side)
- Avenida Cochise from SR 92 to Coronado Drive
- Cherokee Avenue from Kachina Trail to Ramsey Canyon Road
- Charleston Road from Colombo to Guilio Cesare Avenue

Shared-use paths on state routes exist at the following locations:

- SR 90 Bypass from Buffalo Soldier Trail to 7th Street
- SR 90 Bypass from Charleston Road to Campus Drive
- SR 90 from SR 90 Bypass to Colonia De Salud
- SR 92 from SR 90 to Buffalo Soldier Trail (discontinuous)

Shared-use paths within washes and parks exist at the following locations:

- Eddie Cyr Park Loop (0.5 mile path)
- Soldier's Creek Park (0.7 mile path)
- Len Roberts Park (0.4 mile path)
- Tompkins Park (0.6 mile path)
- Coronado Crossings Trail (1.0 mile path)
- Woodcutters Linear Park (0.9 mile path)

The locations of these paths are shown in **Figure 2**.

3.3 Bikeable Residential Streets

A key component of the City's bicycle and pedestrian network are residential streets with low traffic volumes and low traffic speeds (less than 30 mph). These residential streets are ideal for bicycling. Selected residential streets ideal for bicycling and walking were identified based on stakeholder and public input and are shown in **Figure 2.**

3.4 Existing Sidewalks

An existing sidewalk inventory is not available for the project. Key streets where sidewalks may be needed or desirable were identified through public, stakeholder, and Technical Advisory Committee (TAC) input and are summarized in subsequent sections.

3.5 Map of Existing Bicycle and Pedestrian Network

Figure 2 presents a map of existing bicycle and pedestrian facilities in the study area including the following:

- Shared-Use Paths;
- Bicycle Lanes: streets that have a white edge line, 4- to 10-feet-wide paved shoulders, and speed limits of 25 mph or more;
- Shared Roadways: selected bikeable streets with a maximum speed of 35 mph; and
- Key Connecting Streets: provide connectivity on popular recreational or commuting routes, which may be appropriate for experienced riders.

This system of routes will form a basis for developing projects in the next phase of work. These existing routes also serve as the basis for the City of Sierra Vista Bicycle and Pedestrian Routes Map, which will be distributed free of charge by the City upon conclusion of the Study. The map is also available for download at http://www.azdot.gov/MPD/Systems_Planning/SierraVista.asp.

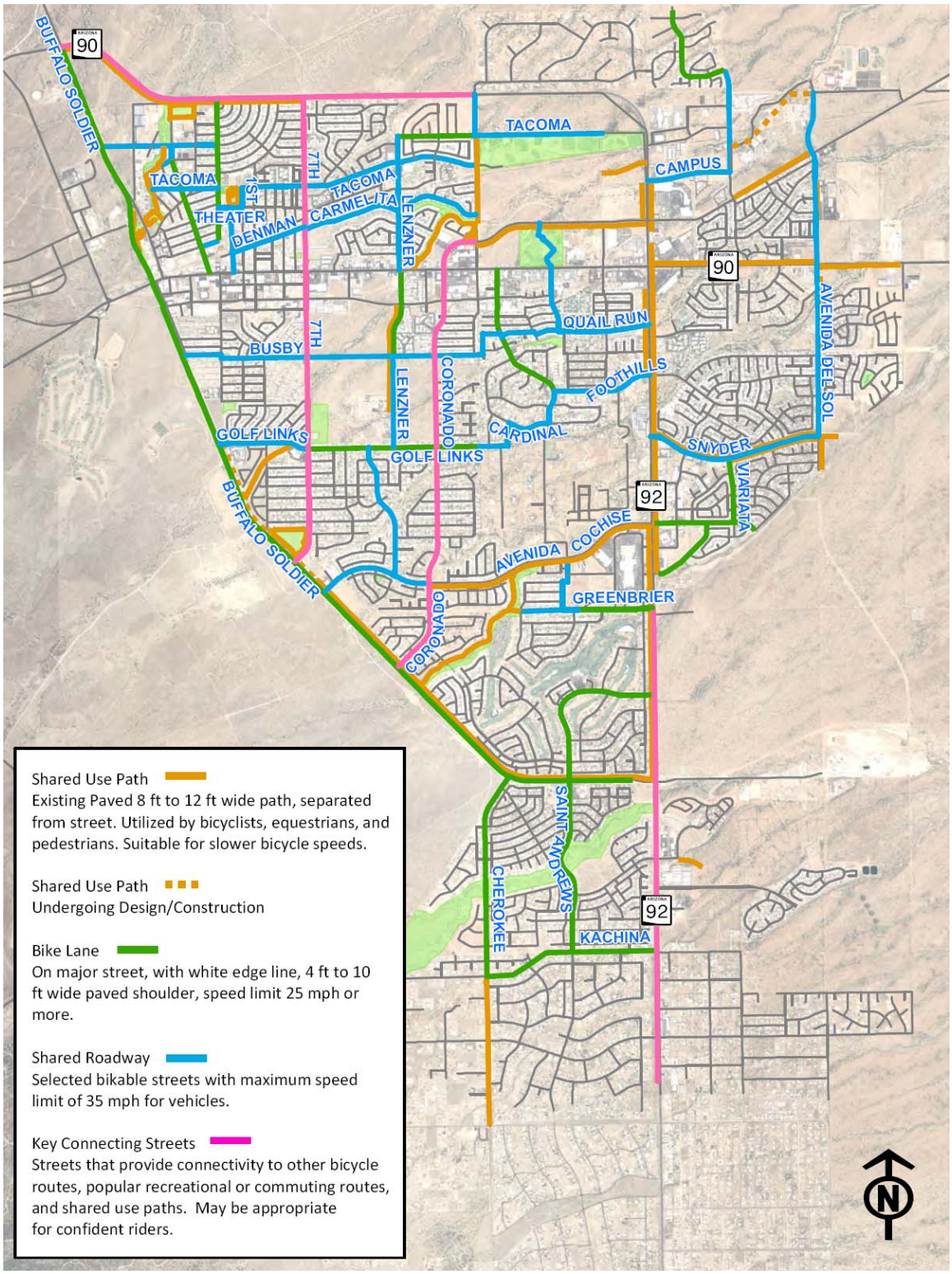

Figure 2 – Existing Bicycle and Pedestrian Network

3.6 Street System Inventory

A street inventory is provided in **Table 3**. This inventory provides street segments, lengths and widths, functional classifications, and pavement condition (where available). This inventory will be utilized in the upcoming project phases to help identify streets that may be suitable for new bicycle lanes. Functional classification designations are City of Sierra Vista functional classifications, and not necessarily Federal Functional Classifications.

Table 3 – Street Inventory

Street	From	To	Length (feet)	Width (feet)	Pavement Condition	Functional Classification
Avenida Cochise	Buffalo Soldier Trail	Coronado Dr	3693	56	Fine	Minor Arterial
Avenida Cochise	Coronado Dr	SR 92	7780	48	Not available	Prin. Arterial
Avenida Cochise	SR 92	Via Riata	2410	46	Not available	Minor Arterial
Avenida Cochise	Via Riata	Camino Montana	248	46	Not available	Minor Arterial
Avenida Del Sol	SR 90	End Of Pavement	6,495	48	Coarse	Minor Arterial
Buffalo Soldier Tr N.	SR 90	Fry Blvd	7,362	84	Weathered	Principal Arterial
Buffalo Soldier Tr S.	Fry Blvd	Cherokee Ave	10,108	74	Fine	Principal Arterial
Buffalo Soldier Tr E.	Cherokee Ave	SR 92	14173	64	Fine	Principal Arterial
Busby Dr	Carmichael Ave	Seventh St.	2615	35	Weathered	Local
Busby Dr	Frontage Rd	Carmichael Ave	1120	24	Weathered	Collector
Busby Dr	Seventh St	Calle Del Norte	6908	32	Coarse	Collector
Busby Dr	SR 92	End Of Pavement	2122	46	Weathered	Collector
Calle Del Norte	Quail Run Dr	Busby Dr	805	32	Not available	Local
Calle Del Norte	Busby Dr	End Of Pavement	196	32	Not available	Local
Calle Mercancia	SR 92	El Mercado Loop	232	66	Weathered	Local
Calle Mercancia	Avenida Cochise	SR 92	2518	38	Not available	Local
Calle Portal	Quail Run Dr	Fry Blvd	2009	38	Not available	Local

Table 3 – Street Inventory (continued)

Street	From	To	Length (feet)	Width (feet)	Pavement Condition Fine/coarse	Functional Classification
Campus Dr	SR 90	Colombo Avenue	2904	25	Weathered	Collector
Carmichael Ave	Nelson Dr	Danser Dr	436	18	Fine	Local
Carmichael Ave	Danser Dr	School Dr	1919	38	Not available	Local
Carmichael Ave	Tacoma St.	Whitton St	1665	42	Coarse	Local
Carmichael Ave	Fry Blvd	Busby Dr	2130	56	Weathered	Collector
Carmichael Ave	Busby Dr	Timothy Lane	1350	30	Weathered	Local
Carmichael Ave	School Dr	Tacoma St	482	37	Not available	Local
Charleston Rd	SR 90	City Limits	12214	42	Not available	Principal Arterial
Coronado Dr	SR 90	Carmelita Dr - End Of New Pavement	3287	46	Weathered	Minor Arterial
Coronado Dr	Carmelita Dr	Martin Luther King Dr	875	64	Weathered	Minor Arterial
Coronado Dr	Fry Blvd	Wilcox Dr	970	62	Fine	Minor Arterial
Coronado Dr	Wilcox Dr	Busby Dr	1687	58	Fine	Minor Arterial
Coronado Dr	Busby Dr	Golf Links Rd	3072	30	Weathered	Minor Arterial
Coronado Dr	Golf Links Rd	Avenida Cochise	4028	62	Weathered	Minor Arterial
Coronado Dr	Avenida Cochise	Buffalo Soldier Trail	2,855	69	Fine	Minor Arterial
Coronado Dr	Martin Luther King Dr.	Fry Blvd	1,648	64	Weathered	Minor Arterial
El Camino Real	Fry Blvd	Foothills Dr	3918	60	Not available	Collector
El Camino Real	Foothills Dr	End of City Pavement	1732	44	Not available	Collector
First St	Denman Ave.	Fry Blvd	700	40	Fine	Local
First St	Theater Dr	Tacoma St	608	28	Fine	Local
First St	Fry Blvd	Wilcox Dr	743	40	Weathered	Local
First St	Busby Dr	Witt Dr	470	30	Weathered	Local
Foothills Dr	Coronado Dr	End Of Pavement	1368	44	Coarse	Local
Foothills Dr	El Camino Real	End Of City Pavement	1704	44	Weathered	Collector

Table 3 – Street Inventory (continued)

Street	From	To	Length (feet)	Width (feet)	Pavement Condition	Functional Classification
Foothills Dr	SR 92	Snyder Blvd	4785	46	Weathered	Collector
Frontage Rd	La Linda Way	Calle Mercancia	2721	28	Weathered	Local
Fry Blvd	Buffalo Soldier Trail	Seventh St	4715	65	Weathered	Minor Arterial
Fry Blvd	Seventh St	SR 90/92	10565	65	Weathered	Principal Arterial
Golf Links Rd	Buffalo Soldier Trail	Seventh St	2846	36	Weathered	Local
Golf Links Rd	Seventh St	End Of City Pavement	5296	38	Weathered	Collector
Guilio Cesare Ave	Charleston Rd	End Of Pavement North	2293	60	Fine	Minor Arterial
Guilio Cesare Ave	SR 90	Montebello Sub. Boundary	672	50	Weathered	Collector
Guilio Cesare Ave	Montebello Sub Boundary	Charleston Road	2663	64	Weathered	Collector
Las Brisas Way	Lenzner Ave	Coronado Dr	2400	46	Weathered	Local
Las Brisas Way	Coronado Dr	End Of Pavement	500	68	Weathered	Local
Lenzner Ave	Fry Blvd	Las Brisas	3274	50	Not available	Collector
Lenzner Ave	Las Brisas	Tacoma St	791	35	Fine	Collector
Lenzner Ave	Tacoma St.	End Of Pavement - North	724	41	Fine	Collector
Lenzner Ave	Fry Blvd	Busby Dr	2645	48	Not available	Collector
Lenzner Ave	Busby Dr	Golf Links Rd	3070	24	Not available	Collector
Martin Luther King Dr.	SR 90	Coronado Dr	6031	48	Fine	Minor Arterial
North Garden Ave	Buffalo Soldier Trail	Taylor Dr.	1213	51	Weathered	Collector
North Garden Ave	Taylor Dr	Fry Blvd	1348	64	Weathered	Collector
Quail Run Dr	Avenida Escuela	SR 92	1160	40	Not available	Local

Table 3 – Street Inventory (continued)

Street	From	To	Length (feet)	Width (feet)	Pavement Condition Fine/coarse	Functional Classification
Quail Run Dr	Calle Del Norte	El Camino Real	498	32	Not available	Local
Quail Run Dr	El Camino Real	Calle Central	960	32	Not available	Local
Quail Run Dr	Calle Central	Calle Portal	860	38	Not available	Local
Quail Run Dr	Calle Portal	Avenida Escuela	1370	24	Not available	Local
Saint Andrews Dr	SR 92	Mission Shadows Sub. Boundary	2292	46	Not available	Collector
Saint Andrews Dr	Mission Shadows Sub. Boundary	Buffalo Soldier Trail	2990	46	Not available	Collector
Saint Andrews Dr	Buffalo Soldier Trail	Raven Dr	1570	46	Not available	Collector
Saint Andrews Dr.	Raven Dr.	Canyon De Flores	2,115	52	Not Available	Collector
Saint Andrews Dr	Canyon De Flores Dr	Kachina Trail	1785	52	Not available	Collector
Seventh St	SR 90	Fry Blvd	5320	62	Weathered	Minor Arterial
Seventh St	Fry Blvd	Wilcox Dr	850	62	Weathered	Minor Arterial
Seventh St	Wilcox	Savannah	3291	63	Weathered	Minor Arterial
Seventh St	Savannah	Golf Links Rd	1395	58	Weathered	Minor Arterial
Seventh St	Golf Links Rd.	Buffalo Soldier Tr	3535	62	Weathered	Collector
Snyder Boulevard	SR 92	Avenida Del Sol	5292	62	Not available	Minor Arterial
Tacoma St	Pfister Ave	Taylor Dr	1212	26	Not available	Local
Tacoma St East	Second St	Third Street	445	19	Not available	Local
Tacoma St	Taylor Dr	Carmichael Ave	680	30	Not available	Local
Tacoma St East	First St.	Seventh St	1009	28	Fine	Local
Tacoma Street	Seventh St	Lenzner Ave	3014	44	Not available	Local
Tacoma St	Lenzner Ave	Coronado Dr	2335	35	Fine	Local
Tacoma St	Coronado Dr	End Of Pavement	3977	38	Not available	Collector
Theatre Dr	Carmichael Ave	First St	704	40	Coarse	Local

Table 3 – Street Inventory (continued)

Street	From	To	Length (feet)	Width (feet)	Pavement Condition Fine/coarse	Functional Classification
Town And Country Dr	Golf Links Rd	Picadilly Dr	3084	40	Not available	Local
Town And Country Dr	Picadilly Dr	Avenida Cochise	1065	44	Weathered	Local
Via Riata	Snyder Boulevard	Avenida Cochise	1938	46	Coarse	Collector
Via Riata	Avenida Cochise	Calle Chico	430	46	Coarse	Local
Via Riata	Paseo Arruza	Snyder Blvd	278	34	Not available	Local
Wilcox Dr	Buffalo Soldier Trail	Seventh St	5018	46	Weathered	Minor Arterial
Wilcox Dr	Seventh St.	Lenzner Ave	2971	46	Fine	Minor Arterial
Wilcox Dr	Lenzner Ave	Coronado Dr	1482	46	Fine	Minor Arterial
Wilcox Dr	Coronado Dr	El Camino Real	1600	47	Weathered	Minor Arterial
Wilcox Dr	El Camino Real	Calle Portal	1762	38	Not available	Collector

Source: City of Sierra Vista

3.6.1 Video Detection

The City of Sierra Vista currently has several signalized intersections that are equipped with video detection, which may be configured to detect bicyclists. Based on information provided by the City of Sierra Vista, intersections with video detection include:

- Fry Boulevard / Lenzner Avenue
- Fry Boulevard / Coronado Drive
- Fry Boulevard / El Camino Real
- Fry Boulevard / Calle Portal
- Fry Boulevard / Avenida Escuela
- Wilcox Drive / Buffalo Soldier Trail
- Wilcox Drive / Coronado Drive
- Coronado Drive / Martin Luther King Parkway
- Buffalo Soldier Trail / Avenida Cochise
- Avenida Cochise / Coronado Drive
- Buffalo Soldier Trail / Coronado Drive
- Buffalo Soldier Trail / Cherokee Avenue
- Buffalo Soldier Trail / St. Andrews Drive
- Martin Luther King Parkway at Lowe's
- Buffalo Soldier Trail / 7th Street

This inventory will be used in upcoming project phases to identify intersections where video detection may be easily configured to detect bicyclists.

3.7 Bicycle and Pedestrian Crash Data

Crash data was reviewed for pedestrian and bicycle crashes with motor vehicles for a five-year period from 1/01/2004 to 1/31/2008. Locations of crashes and crash severity are shown graphically in **Figure 3**.

3.7.1 Bicycle crashes

There were 85 bicycle crashes in the five-year period. Although no fatal crashes were noted, 43 bicycle crashes with incapacitating injuries occurred, or almost 51 percent. Streets with five or more bike crashes in the five-year period are summarized in **Table 4**. Fry Boulevard had the largest number of bicycle crashes, with 22 crashes over the five-year period.

Table 4 – Streets with Five or More Bicycle Crashes, 2004 – 2008

Street	Number of Bicycle Crashes, 2004-2008	Street Characteristics
Fry Boulevard	22	Numerous driveway openings, no bicycle lane, significant distance between traffic signals
SR 90	8	Higher speeds, multiple lanes, shared-use path between 7th Street and Buffalo Soldier Trail
SR 92	7	Higher speeds, multiple lanes, shared-use path along much of its length

Source: ADOT Safety Datamart

3.7.2 Pedestrian Crashes

There were 59 pedestrian crashes in the five-year period. Streets with five or more pedestrian crashes in the five-year period are summarized in **Table 5.** Fry Boulevard had the largest number of pedestrian crashes during this time period, including two fatal accidents. A number of crashes occurred at driveways.

Table 5 – Pedestrian Crashes

Street	Number of Pedestrian Crashes, 2004-2008	Street Characteristics
Fry Boulevard	16	Numerous driveway openings, no bicycle lane, significant distance between traffic signals, sidewalk on both sides
SR 90	10	Higher speeds, multiple lanes Shared-use path between 7th Street and Buffalo Soldier Trail, some sidewalk east of SR 92
SR 92	8	Higher speeds, multiple lanes, shared-use path along much of its length; some locations with sidewalk

Source: ADOT Safety Datamart

Location of Bicycle and Pedestrian Crashes with Motor Vehicles, 2004-2008

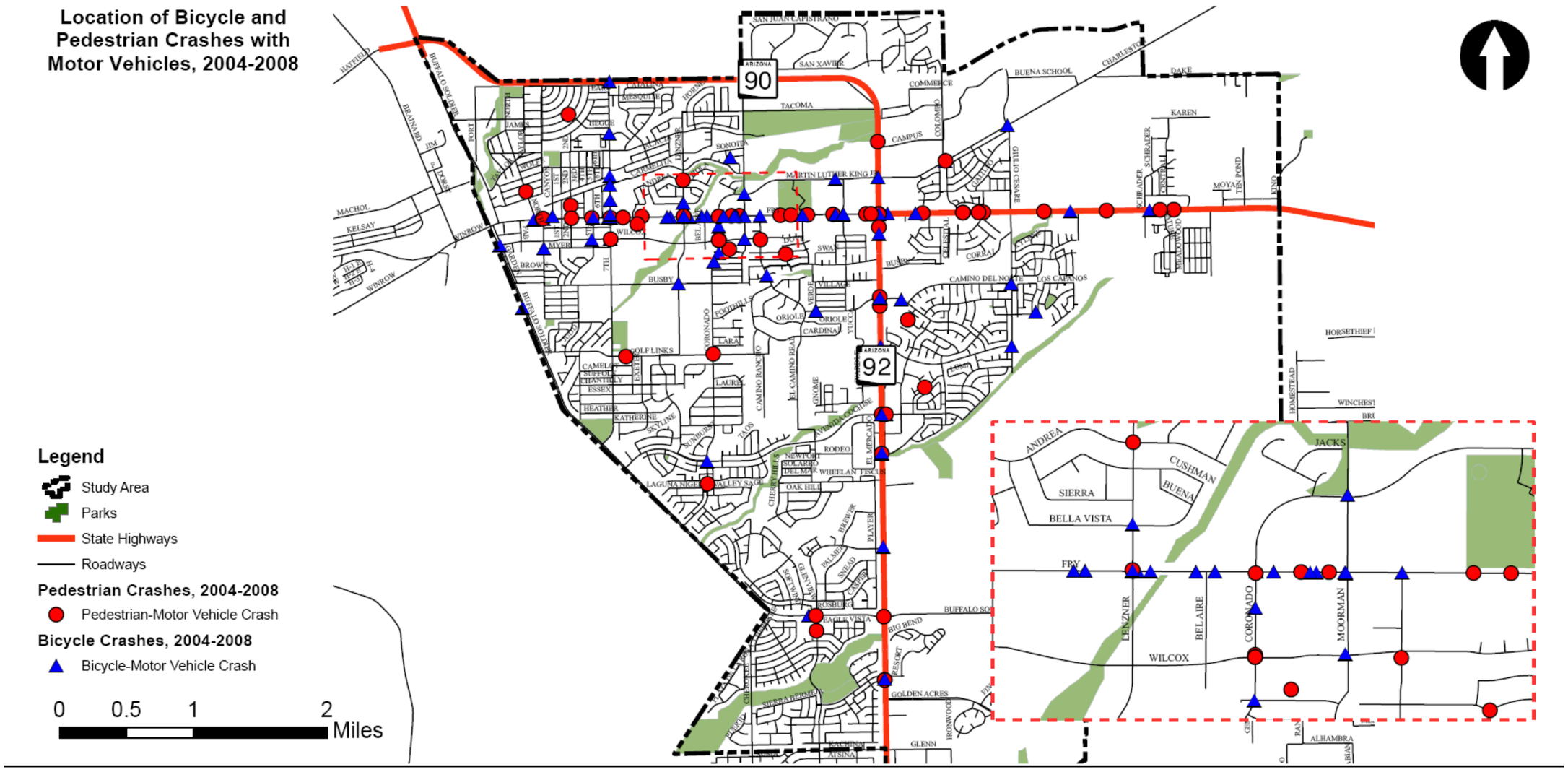

Figure 3 – Location of Bicycle and Pedestrian Crashes, 2004-2008

4 BICYCLE AND PEDESTRIAN CONDITIONS SURVEY

A web-based survey was developed to solicit input and perspectives from the public regarding bicycle and pedestrian usage patterns, conditions, and concerns related to bicycle and pedestrian safety at specific locations on roadways in Sierra Vista. The survey information and link was included on all announcements for the open house. The complete survey responses are included in Working Paper No. 1.

4.1 Survey Results

There were 62 respondents to the online survey, which was posted for approximately a four-week period. A complete summary of the responses is included in Working Paper No. 1. The study team recognizes the self-selecting nature of the survey respondents is not scientific and does not represent all bicyclists and pedestrians in the City.

A majority of survey respondents were ages 41 to 60 (**Table 6),** with the largest percentage being 51 to 60.

When asked to describe their bicycling level of experience (**Table 7**), survey respondents indicated that they were comfortable sharing the streets with motor vehicle traffic. The study team recognizes that survey respondents were largely associated with bicycling clubs and advocacy groups and do not represent the 'average' bicyclist or pedestrian in the City.

Most survey respondents bicycle three to four days per week (**Table 8**) and bicycle on average 10 to 20 miles per bicycling trip (**Table 9**). This indicates that the survey respondents were largely bicycling for recreation.

As indicated in **Table 10,** respondents stated that they walk on average of one to two days per week, and for a distance of one to three miles (**Table 11**). The vast majority walk for exercise, social reasons, or to run errands.

When asked for reasons that residents of Sierra Vista do not walk or bicycle more, the top three reasons identified were difficulty crossing busy streets, high traffic volumes, and lack of bicycle lanes or wide shoulders (**Table 13**). When asked which improvements would be most beneficial to improving bicycling and walking in the City, survey respondents identified the following (**Table 14**):

- Increase enforcement of motorists laws
- Stripe bicycle lanes on City streets
- Construct shared-use paths along City streets
- Increase shoulder or bicycle lane width
- Sweep shoulder or bicycle lanes

Table 16 identifies specific pedestrian or bicycling safety issues, concerns, or obstacles on streets in Sierra Vista identified by survey respondents. **Table 17** identifies general comments that apply to all of Sierra Vista, which are organized by issue categories.

Survey respondents were asked to identify the most important considerations in prioritizing projects. As shown in **Table 18**, safety and connectivity are of most concern.

Table 6 – Age Ranges

Age Range	Response Percent	Response Count
Under 10 Years	0%	0
10 to 16 Years	3%	2
17 to 21 Years	2%	1
22 to 30 Years	5%	3
31 to 40 Years	9%	5
41 to 50 Years	20%	12
51 to 60 Years	**36%**	**21**
61 to 70 Years	22%	13
71 to 80 Years	2%	1
More than 80 Years	2%	1

Table 7 – Level of Bicycling Experience

Answer Options	Response Percent	Response Count
I only ride my bicycle in the neighborhood, or on local streets with very low traffic.	6.5%	3
I am comfortable venturing outside of my neighborhood on off-street shared-use paths.	15.2%	7
I am comfortable sharing the roadway with automobile traffic, but only on streets that have wide shoulders or bicycle lanes.	**34.8%**	**16**
I am experienced and willing to ride my bicycle just about anywhere, or under any conditions.	**43.5%**	**20**

Table 8 – Freqeuncy of Bicycling

Answer Options	Response Percent	Response Count
7 days per week	8.9%	4
5 - 6 days per week	24.4%	11
3 - 4 days per week	**37.8%**	**17**
1 - 2 days per week	17.8%	8
Once per month	11.1%	5

Table 9 – Typical Length of Bicycling Trip

Answer Options	Response Percent	Response Count

Less than 5 miles	20.0%	9
Between 5 and 10 miles	24.4%	11
Between 11 and 20 miles	**31.1%**	**14**
More than 15 miles	24.4%	11

Table 10 – Frequency of Walking

Answer Options	Response Percent	Response Count
7 days per week	25.0%	6
5 - 6 days per week	16.7%	4
3 - 4 days per week	20.8%	5
1 - 2 days per week	**37.5%**	**9**
Once per month	0.0%	0

Table 11 – Typical Length of Walking Trip

Answer Options	Response Percent	Response Count
Less than 1/4 mile	0.0%	0
Between 1/4 and 1 mile	12.5%	3
Between 1 and 3 miles	**50.0%**	**12**
More than 3 miles	37.5%	9

Table 12 – Typical Purpose of Walking or Bicycling Trip

Answer Options	Response Percent*	Response Count
Work	15.0%	6
School	7.5%	3
Errands/Shopping	35.0%	14
Social	25.0%	10
Recreation or Exercise	**97.5%**	**39**
Other (please describe below) Runner – uses paths for training Walking the dog Commute to the gym ** Respondents could select more than one trip purpose*	22.5%	9

Table 13 – Typical Reasons for Not Walking or Bicycling

Answer Options	Response Percent	Response Count

Other alternatives are available	20.0%	5
Unable to safely cross busy streets	20.0%	5
Too much traffic on streets	12.0%	3
Lack of bicycle lanes or wide shoulders	**32.0%**	**8**
Lack of sidewalks or shared-use paths	24.0%	6
Weather	4.0%	1
No lighting/too dark	20.0%	5
Destination too far	20.0%	5

Table 14 – Suggestions to Improve Bicycle and Pedestrian Safety and Comfort

Answer Options	Response Percent	Response Count
Implement bicycle and pedestrian safety educational programs	33.3%	20
Increase enforcement of motorists laws	**41.7%**	**25**
Increase enforcement of bicyclists and pedestrian laws	18.3%	11
Stripe bicycle lanes on City streets	**45.0%**	**27**
Construct more sidewalks	13.3%	8
Construct shared-use paths along City streets	**63.3%**	**38**
Develop a network of bicycle routes on low volume streets	33.3%	20
Increase shoulder or bicycle lane width	**51.7%**	**31**
Sweep shoulder or bicycle lanes	**50.0%**	**30**
Repair shoulder or bicycle lanes	30.0%	18
Install bicycle-sensitive traffic signals	33.3%	20
Install ramps for disabled persons at intersections	13.3%	8
Install mid-block pedestrian crossing beacons on major streets so that pedestrians can cross at a signal	15.0%	9

Table 15 – Project Prioritization Criteria

Answer Options	Very important	Important	Somewhat important	Not important	Rating Average	Response Count
Weighting for Ranking Calculation	1	2	3	4	-	-
Project impact on safety	47	10	1	2	1.30	60
Cost of the project, considering anticipated benefit	12	38	10	0	1.97	60
Project impact on pedestrian or bicyclist comfort	14	26	17	3	2.15	60
Project attracts the most users	21	23	12	4	1.98	60
Project establishes or improves connectivity between activity centers	25	19	13	3	1.90	60
Projects should be spread equally throughout the City	13	16	18	13	2.52	60

Table 16 – Location-Specific Safety Issues, Concerns, or Obstacles

Road Name	Segment	Stakeholder Input
7th Street	Entire roadway	**Shared-use path** needed on this major corridor. Should connect to other shared-use paths such as along Buffalo Soldier Trail.
7th Street	Entire roadway	**Need sidewalks**, especially to bus stops.
Avenida del Sol	Encinita Avenue to SR 90	There is no curb, no shared-use, and broken pavement in the bike lane. Curb needs to be extended on both sides of the street or construct a **shared-use path.**
Buffalo Soldier Trail	North from Gas City	**Shared use path** needs to be extended further north.
Buffalo Soldier Trail	Entire roadway	**Needs a bike path.**
Buffalo Soldier Trail	Entire roadway	Lots of debris and litter.
Buffalo Soldier Trail	Entire roadway	Need traffic "turtles" on the bike lane stripe (Study Team Note: assuming that this comment refers to raised pavement markers, the Manual of Uniform Traffic Control Devices states that “Posts or raised pavement markers should not be used to separate bicycle lanes from adjacent travel lanes.").
Colombo Avenue	From Charleston to Cochise College and Berean Academy	Getting to the schools can be quite difficult as traffic moves very fast on the four lane road. No crosswalks at the schools.
Coronado and Cochise	Intersection	Suggest putting the pictures of a **bicycle painted in the crosswalk** where the shared-use path crosses intersections. A car is turning right from Coronado onto Cochise, is so busy looking to see if there is traffic from the left, they don't see where the shared-use path bicyclist might be coming across Cochise. **Or maybe a sign a few feet before the intersection that denotes, "bicycle crossing" where the shared-use path crosses.**
Coronado Drive	Entire roadway	**Bike path** needed because current roadway is too narrow and there's too much congestion - there is no safe way to bike to the post office.
Coronado Drive	Golf Links Road and Busby Drive; Martin Luther King and Tacoma	Dangerous to ride. No **sidewalk or shared-use path.**
Coronado Drive	South of Wilcox Drive	Could use **bike lane** improvements for the first mile south.

Table 16 – Location-Specific Safety Issues, Concerns, or Obstacles (continued)

Road Name	Segment	Stakeholder Input
Equestrian Avenue (Cochise County)	Entire roadway	Speed bumps as on Equestrian could have small gaps on the shoulder for bicycles.
Fry Boulevard	Entire roadway	Fry St. is too congested, not worth putting in bike lanes. Construct lanes on parallel routes instead.
Fry Boulevard	Entire roadway	Unsafe and horrible for riding, either on sidewalks or on the road. No safe access to businesses.
Fry Boulevard and Calle Portal	Intersection	Need a longer pedestrian signal.
SR 90	Entire roadway	Unsafe to bike along SR 90. Suggest **shared-use path** that should also link to the trail going into the Canyon de Flores Linear Park.
SR 90	7th Street to Gas City	Continue shared-use path east of Ft. Huachuca's east gate.
SR 90, SR 92, and Buffalo Soldier Trail	Traffic lights on these roadways	Traffic lights don't detect bicyclists.
SR 92	Entire roadway	Needs **continuous bike lanes** on both sides of the roadway. SR 92 is currently dangerous to cross or to ride in the shoulder.
SR 92	Shared-use path crossings	Drivers are oblivious to traffic on shared-use paths. **Need signage and/or stripes to get the attention of the motorists.**
SR 92	Near McDonalds, Delio's, and Circle K	Uneven pavement in bicycle lane (Note: this refers to the shoulder).
SR 92	Buffalo Soldier Trail to Ramsey Road	**Needs a shared-use path**.
SR 92	SR 90 to Foothills	Motorists drive/park on the shared-use paths. Mail trucks drive down it rather than go back out on the highway; it becomes overflow parking for Hatfield Funeral Home.

Table 16 – Location-Specific Safety Issues, Concerns, or Obstacles (continued)

Road Name	Segment	Stakeholder Input
SR 92	Fry Boulevard to Avenida Cochise	**Shared use path** is poorly lit
SR 92	Entire roadway	The shared-use path is dangerous. No crosswalks at Bisbee; no signs indicating bicycle presence for drivers, coming on the path on 92 to St. Andrews (going south) when the pedestrian white light is on, right turners don't give the right-of-way to bicyclists or pedestrians. The bicycle/wheelchair accesses are either not wide enough or improperly placed.
Lenzner Avenue	South of Fry Boulevard	The bike lane ends so cars can make right turns. **The bike lane should continue.**
Martin Luther King Drive	Near Lowes	Shared use lanes are obstructed by curbs.
Moson Road (Cochise County)	Entire roadway	Not safe for bicyclists and could use a **bicycle lane.**
No specific roadway (Cochise County)	From Yaqui into town	It would be advantageous to have a direct safe path for bicycles from Yaqui into town. Shoulders are too narrow until Buffalo Soldier Trail.
Ramsey Road and SR 92 (Cochise County)	Intersection	Potholes and gravel present.
Ramsey Road (Cochise County)	Entire roadway	**Bike lane** is too narrow and has uneven/broken pavement.
Snyder Drive and SR 92	Intersection	Southern approach on **the bike path is obscured by trees and bikes** cannot see or be seen. From the northern approach, drivers turning right onto SR 92 can't see riders approaching from the bike path until they are in the intersection.
Wilcox Drive	Entire roadway	Too narrow and has high curbs.
Winterhaven Drive	Buffalo Soldier Trail Fitness Loop and Winterhaven Drive intersection	Need a pedestrian crossing.

Table 17 – Survey Respondent, General Safety Issues, Concerns, or Obstacles

Issue Category	Stakeholder Input
Education	• Shared use path courtesy • Bicyclists and driver education on sharing the road • General education on the rights of motorists, bicyclists, and pedestrians
Signing and Signals	• Traffic signals should detect bicycles • Need "share the road" signs along roadways
Enforcement	• Enforcement for drivers who don't adhere to pedestrian/bicycle crossing signs and signals • Enforce distracted driving laws • Enforce the 5-foot rule (Study Team Note: This comment refers to ARS 28-735, which stipulates a "3-foot" passing law.) • Enforce bicyclists riding the wrong way on roadways
Connectivity	• Bicycle routes lack connectivity, especially between older and newer parts of town • Need more east-west bicycle routes • Need more bicycle lanes on major roadways • There are no designated bicycle routes
Safety	• Need signs for drivers to indicate bicycle crossings where shared-use paths cross roadways • Lots of debris in bike lanes • Rumble strips trap dirt in the shoulder and are dangerous to cross • Drivers failing to yield to bikes proceeding across an intersection when the car makes a right-hand turn • Improved lighting on major roadways
	• At many intersections around Sierra Vista, ramps have not been constructed and if they have, they are not positioned well for a cyclist to get up on the sidewalk and push the pedestrian crossing button • Children under 18 should wear helmets (Note: per 1995 City Ordinance)
General	• Sealing cracks in the roadway makes a bumpy ride • Produce a bicycle map showing all routes • Include bike lanes on all roadway construction projects

5 BICYCLE AND PEDESTRIAN NEEDS AND DEFICIENCIES

Bicycle and pedestrian needs and deficiencies were identified from survey responses and from extensive stakeholder and TAC input. This chapter summarizes the key needs and deficiencies. The identified needs and deficiencies will serve as the basis for developing a plan of improvements in the next phase of work.

The chapter is divided into a section on general needs and deficiencies and a section on specific bicycle and pedestrian needs.

The study team acknowledges the efforts of John Wettack and Thomas Armstrong for their effort in compiling input to the identification of needs and deficiencies.

5.1 General Needs and Deficiencies

5.1.1 Bicycle and Pedestrian Safety Education Campaign

A significant need exists in the City of Sierra Vista to educate motorists, bicyclists, and pedestrians on the "rules of the road" and safe and courteous walking and bicycling practices, both when using on-street facilities and off-street shared use paths.

Education materials should be adapted to include proper shared use path etiquette. Shared use paths require all users – bicyclists, walkers, joggers, parents with strollers, people with dogs, roller bladders, and skateboarders – to respect one another and to recognize that they are on a shared facility. Messages that could be incorporated into an education campaign include 'Shared Use Path Etiquette' as described on the next page. Tools that could be developed or adapted to educate bicyclists, pedestrians, and other users are listed below.

- Signs: Pathway signage can convey simple messages such as "All Users Keep Right," and "Bicyclists Yield to Pedestrians". Pathway signage on shared use paths adjacent to state highways must conform to ADOT PGP 1031.
- Printed materials: ADOT developed "Be a Roll Model" Bicycle and Pedestrian Safety Awareness Campaign education materials targeted to pedestrians and bicycle riders of all ages, motorists, community leaders, planners, and designers. These materials are available on the ADOT Bicycle and Pedestrian Program website (http://www.azbikeped.org/education.html) and are available for adaptation and use by the City of Sierra Vista. Materials include

print ads, flyers, and promotional stickers. Television and radio public service announcements are also available.

- Education booklets: The ADOT Bicycle and Pedestrian Program publishes several education booklets and makes them available for free distribution:
  - Arizona Street Smarts
  - Share the Road, A Guide for Bicyclists and Motorists
  - Sharing the Road with Pedestrians, a Guide for Pedestrians and Motorists
- Special events: Community and special events can be used to promote bicycle and pedestrian safety and etiquette.
- Presentations. Presentations to schools, church groups, recreation clubs, and civic organizations can be used to educate people about shared use path safety and etiquette.

Shared Use Path Etiquette:

Source: Adapted from Arizona State Parks, Trails Program http://azstateparks.com/trails/share.html, and North Carolina Bicycle and Pedestrian Transportation Program, http://www.ncdot.org/bikeped/bicycle/types/

- **Share the Path**: Shared-use paths are exactly that – paths intended for multiple users. This could lead to potential conflicts among the users, especially on popular paths or in congested areas. Regardless of whether you are bicycling, walking, jogging, or skating, if you follow the same set of rules as everyone else your trip will be safer and more enjoyable.
- **Be friendly and courteous**: Greet other folks with a simple "Hello!" or "Nice day today!" Avoid greetings which may be misconstrued such as "On your left."
- **Announce yourself when approaching others,** especially from behind. It's often helpful to give other users information such as, "Two more behind me." If you're in a group, avoid blocking the path.
- **Keep Right**: Stay as near to the right side of the path as is safe, except when passing another user.
- **Pass On the Left**: Pass others going in your direction on their left. Look ahead and back to make sure the path is clear before you pull out. Pass with ample separation. Do not move back to the right until safely past.
- **Yield to slower traffic**: Bicyclists, skaters and skateboarders must always yield right of way to pedestrians. When in doubt, give other users the right of way.
- **Use caution and stay extra alert if using headphones or earbuds** — you may not be able to hear others.
- **Be considerate, keep dogs leashed and under control at all times**. Other path users don't know your dog is friendly.

5.1.2 Designated Bicycle Lanes and Bicycle Routes

There are many different levels of bicyclist abilities, skills, and comfort level. Bicyclists with more experience often feel comfortable negotiating busy roads and would prefer not to ride on shared-use paths as they can present potential conflicts with pedestrians and other bicycle riders. Other riders, including children, often prefer shared-use paths that are separated from motor vehicle traffic.

The *AASHTO Guide for the Development of Bicycle Facilities* describes three types of bicycle riders:

- A: Advanced or experienced riders that generally use their bicycles as they would a motor vehicle.
- B: Basic or less confident adult riders that prefer to avoid roads with fast and busy motor vehicle traffic and
- C: Children, who may not travel as fast as adults, but require access to key destinations.

Other schemata have also been developed to represent the different skill levels and comfort level of bicyclists. For the online survey of City of Sierra Vista residents, the following categories of bicyclists were presented:

- I only ride my bicycle in the neighborhood, or on local streets with very low traffic.
- I am comfortable venturing outside of my neighborhood on off-street shared-use paths.
- I am comfortable sharing the roadway with automobile traffic, but only on streets that have wide shoulders or bicycle lanes.
- I am experienced and willing to ride my bicycle just about anywhere, or under any conditions.

Key Bicycle and Pedestrian Need: Regardless of bicycling skill and comfort level, there is a need in Sierra Vista to provide systems that all three types and skill levels of bicycle riders can use. This system will include shared-use paths, streets with striped bicycle lanes, and improvements to residential streets that make them more bikeable.

With respect to this plan, four types of bicycle and pedestrian facilities are identified:

- Shared-Use Paths: paved 10-to 12-foot-wide path, separated from the street. These pathways serve multiple users including bicyclists, equestrians, and pedestrians. They are suitable for slower speeds;
- Bike Lanes: streets that have a white edge line, 4- to 10-foot-wide paved shoulders, and speed limits of 25 mph or more;
- Shared Roadways: selected bikeable streets with a maximum speed of 35 mph; and
- Key Connecting Streets: higher volume or higher speed streets that provide connectivity to other bicycle routes or facilities; these streets lack bicycle infrastructure (bicycle lanes, wide shoulder) and may be appropriate for experienced riders.

Sidewalks represent another type of pedestrian facility. For this study, a comprehensive sidewalk inventory is not available. As such, a thorough evaluation of sidewalk needs and deficiencies will not be evaluated in this study. However, specific sidewalk needs as identified by stakeholders will be incorporated into the plan.

5.1.3 Detection of Bicyclists at Signalized Intersections

Key Bicycle and Pedestrian Need: Upgrade traffic signals with video detection to detect bicyclists.

As previously stated in Section 3.6.1, the City of Sierra Vista currently has several signalized intersections that are equipped with video detection. The video detection at

these traffic signals can be configured to detect bicyclists that are riding in the street (including in a bicycle lane or shoulder). As traffic signals are improved and as new traffic signals area constructed, video detection should be included. The video detection should be configured to detect bicyclists.

5.1.4 "Share the Road" Signage

Key Bicycle and Pedestrian Need: Provide warning signage to alert drivers that bicyclists are also present on the roadway.

A number of stakeholders mentioned the need for more signage to make drivers aware that drivers are legally obligated to provide three feet when passing a bicycle in the same direction, and bicyclists are legally allowed to be on the road.

Stakeholders proposed installing "Share the Road" and W11-1 signs (shown below) on routes frequently used by bicyclists, and where bicyclists frequently cross streets (e.g., at shared-use path intersections with streets).

All signage must be consistent with the Manual on Uniform Traffic Control Devices (MUTCD). Relevant sections of the 2009 MUTCH, Section 9B.19- Other Bicycle Warning Signs are shown on the following page (2009 Manual has not yet been adopted in Arizona). However, it must be emphasized that increased signage does not necessarily address the issues of inattentive drivers, and care must be taken to limit "sign clutter."

W16-1P*

W11-1*

Section 9B.18 Bicycle Warning and Combined Bicycle/Pedestrian Signs (W11-1 and W11-15)

Support:

01 The Bicycle Warning (W11-1) sign (see Figure 9B-3) alerts the road user to unexpected entries into the roadway by bicyclists, and other crossing activities that might cause conflicts. These conflicts might be relatively confined, or might occur randomly over a segment of roadway.

Option:

02 The combined Bicycle/Pedestrian (W11-15) sign (see Figure 9B-3) may be used where both bicyclists and pedestrians might be crossing the roadway, such as at an intersection with a shared-use path. A TRAIL X-ING (W11-15P) supplemental plaque (see Figure 9B-3) may be mounted below the W11-15 sign.

03 A supplemental plaque with the legend AHEAD or XX FEET may be used with the Bicycle Warning or combined Bicycle/Pedestrian sign.

Guidance:

04 *If used in advance of a specific crossing point, the Bicycle Warning or combined Bicycle/Pedestrian sign should be placed at a distance in advance of the crossing location that conforms with the guidance given in Table 2C-4.*

Section 9B.19 Other Bicycle Warning Signs

Option:

01 Other bicycle warning signs (see Figure 9B-3) such as PATH NARROWS (W5-4a) and Hill (W7-5) may be installed on shared-use paths to warn bicyclists of conditions not readily apparent.

02 In situations where there is a need to warn motorists to watch for bicyclists traveling along the highway, the SHARE THE ROAD (W16-1P) plaque (see Figure 9B-3) may be used in conjunction with the W11-1 sign.

Guidance:

03 *If used, other advance bicycle warning signs should be installed at least 50 feet in advance of the beginning of the condition.*

04 *Where temporary traffic control zones are present on bikeways, appropriate signs from Part 6 should be used.*

Option:

05 Other warning signs described in Chapter 2C may be installed on bicycle facilities as appropriate.

5.1.5 Pedestrian and Bicycle Access to Fry Boulevard

Fry Boulevard is a primary commercial street in Sierra Vista with many retail businesses, restaurants, professional offices, and service providers. In general, bicyclists do not feel comfortable bicycling on this street due to the high traffic volume and lack of bicycle lanes. No street near and parallel to Fry Boulevard has bicycle lanes or is designated as a bicycle route. Few streets with bicycle lanes lead to and or intersect Fry Boulevard. Stakeholder input indicated that these conditions make it difficult to access businesses on Fry Boulevard comfortably by bicycle and to travel from one business to another.

Crossing Fry Boulevard can be difficult for both pedestrians and bicyclists, as traffic signals are spaced approximately one-half mile apart. Consideration should be given to providing signalized pedestrian crossings at mid-block locations on Fry Boulevard. Furthermore, providing median refuge islands on Fry Boulevard would improve pedestrian safety.

The Federal Highway Administration published a "Guidance Memorandum on Consideration and Implementation of Proven Safety Countermeasures." The publication is available at http://safety.fhwa.dot.gov/policy/memo071008/. The Guidance Memorandum encourages consideration of raised medians as pedestrian refuge areas:

Description:
The *Median* is the area between opposing lanes of traffic, excluding turn lanes. Medians can either be open (pavement markings only) or they can be channelized (raised medians or islands) to separate various road users.

Pedestrian Refuge Areas (or crossing islands)—also known as center islands, refuge islands, pedestrian islands, or median slow points—are raised islands placed in the street at intersection or midblock locations to separate crossing pedestrians from motor vehicles.

Background:
Providing raised medians or pedestrian refuge areas at pedestrian crossings at marked crosswalks has demonstrated a 46% reduction in pedestrian crashes. Installing such raised channelization on approaches to multi-lane intersections has been shown to be particularly effective. At unmarked crosswalk locations, medians have demonstrated a 39% reduction in pedestrian crashes. Medians are especially important in areas where pedestrians access a transit stop or other clear origin/destinations across from each other. Midblock locations account for over 70% of pedestrian fatalities. Also it is where vehicle travel speed are higher which contributes to the injury and fatality rate at this location. Over 80% of pedestrians die when hit by vehicles traveling at 40 mph or faster while less than 20% die when hit at 20 mph.

Guidance Statement/Application:
Raised medians (or refuge areas) should be considered in curbed sections of multi-lane roadways in urban and suburban areas, particularly in areas where there are mixtures of a significant number of pedestrians, high volumes of traffic (more than 12,000 ADT) and intermediate or high travel speeds. Medians/refuge islands should be at least 4 feet wide (preferably 8 feet wide for accommodation of pedestrian comfort and safety) and of adequate length to allow the anticipated number of pedestrians to stand and wait for gaps in traffic before crossing the second half of the street.

Key Bicycle and Pedestrian Need:

- Provide parallel and crossing bike routes to provide access to Fry Boulevard.
- Add bicycle lanes to Fry Blvd.
- Consider locations for pedestrian beacon signals on Fry Boulevard to allow easier crossing by pedestrians.
- Improve existing signals to include pedestrian countdown signals.
- Consider installation of raised medians to serve as pedestrian refuges.

Fry Boulevard at Lenzner Avenue
Photo Source: Kimley-Horn and Associates

5.1.6 Maintenance of Existing Bicycle Lanes

A number of stakeholders and survey respondents identified a need for increased sweeping and maintenance of bicycle lanes and shoulders. Debris, loose gravel, and broken glass in bicycle lanes and shoulders can pose potential conflicts for bicyclists, as exemplified in the photos on the following page. Stakeholders mentioned that SR 90 on the north and east sides of the city are particularly troublesome.

Another concern expressed by stakeholders is the blocking of bicycle lanes/road shoulders with temporary traffic control signs (mowing, construction, etc.), requiring bicycles to move onto traffic lanes.

Generally, the City of Sierra Vista performs street sweeping on state routes in their jurisdiction. Ideally, street sweeping would occur on a routine basis; however, shoulders are difficult to maintain, particularly in areas with numerous unpaved turnouts and roads.

Stakeholders also expressed concern that some catch basin grates can pose safety hazards to bicyclists. Spacing of cross bars and transverse bars on catch basin grates should be such that they are bicycle compatible. Grate inlets on State Highways should conform to ADOT Construction Standard Drawing C-15.50. City of Sierra Vista has adopted MAG Uniform Specifications and Standard Details for Public Works Construction.

Example of debris and gravel on SR 92.
Photo Source: Thomas Armstrong

Example of debris on SR 92
Photo Source: Thomas Armstrong

Another maintenance issue is uneven paving. A ridge of new paving narrows the "effective" shoulder width that is available to a bicyclist, as shown below.

Example of an irregular shoulder on SR 92 that can cause a hazard to bicycle riders
Photo Source: Thomas Armstrong

Key Bicycle and Pedestrian Need:

- Provide more street sweeping on key bike routes.
- Consider bike lane needs when repaving.

Members of the technical advisory committee have noted that maintenance issues arise frequently. While maintenance may appear to be an 'easy' action item to resolve, maintenance funds must compete with other critical needs and, as a result, are often underfunded. Efforts should be made to help policy makers understand the importance of adequate maintenance to existing bicycle and pedestrian facilities.

5.1.7 Bike Lane Striping at Intersections

Key Bicycle and Pedestrian Need: Provide bicycle lane striping / ADOT bicycle buffer and signing at intersections to conform to MUTCD guidelines.

Stakeholder input indicated that there are a number of locations where intersection striping could be designed to accommodate bicycles. An example of bicycle lane striping at a right-turn lane is excerpted from the MUTCD in **Figure 4** (showing Figure 9C-4, 2009 MUTCD).

The MUTCD bicycle lane treatment at a right-turn-only lane provides a bicycle lane in between the right turn lane and the through lane. In addition, ADOT Roadway Design Guidelines refer to a Bicycle Buffer, and state "Where bicycles are expected to be prevalent, a buffer area between the through lane and the right-turn lane should be provided. Figure 408.11A shows the bicycle buffer with a wide curb lane. The buffer area is formed by the extension of the through lane and the face of curb line. Figure 408.11B shows the bicycle buffer for non-curb and gutter sections. The buffer may be omitted where bicycle traffic or right-turn traffic is expected to be infrequent."

Examples of intersections where bicycle buffer treatments at intersections could be implemented are on SR 92 at intersections with Canyon De Flores, Glenn Road, St. Andrews Drive, and Buffalo Soldier Trail. Photos of SR 92 at Canyon de Flores and St. Andrews Drive are shown below. Note that installation of buffer treatments at these, and other intersections, are subject to engineering review. Installation could be considered as a part of future intersection improvement projects.

SR 92 and Canyon De Flores, looking south – bicyclists do not have a designated area while waiting to proceed through the intersection

Photo Source: Thomas Armstrong

SR 92 and St Andrews Drive, looking south – bicyclists do not have a designated area while waiting to proceed through the intersection

Photo Source: Thomas Armstrong

Figure 9C-4. Example of Bicycle Lane Treatment at a Right Turn Only Lane

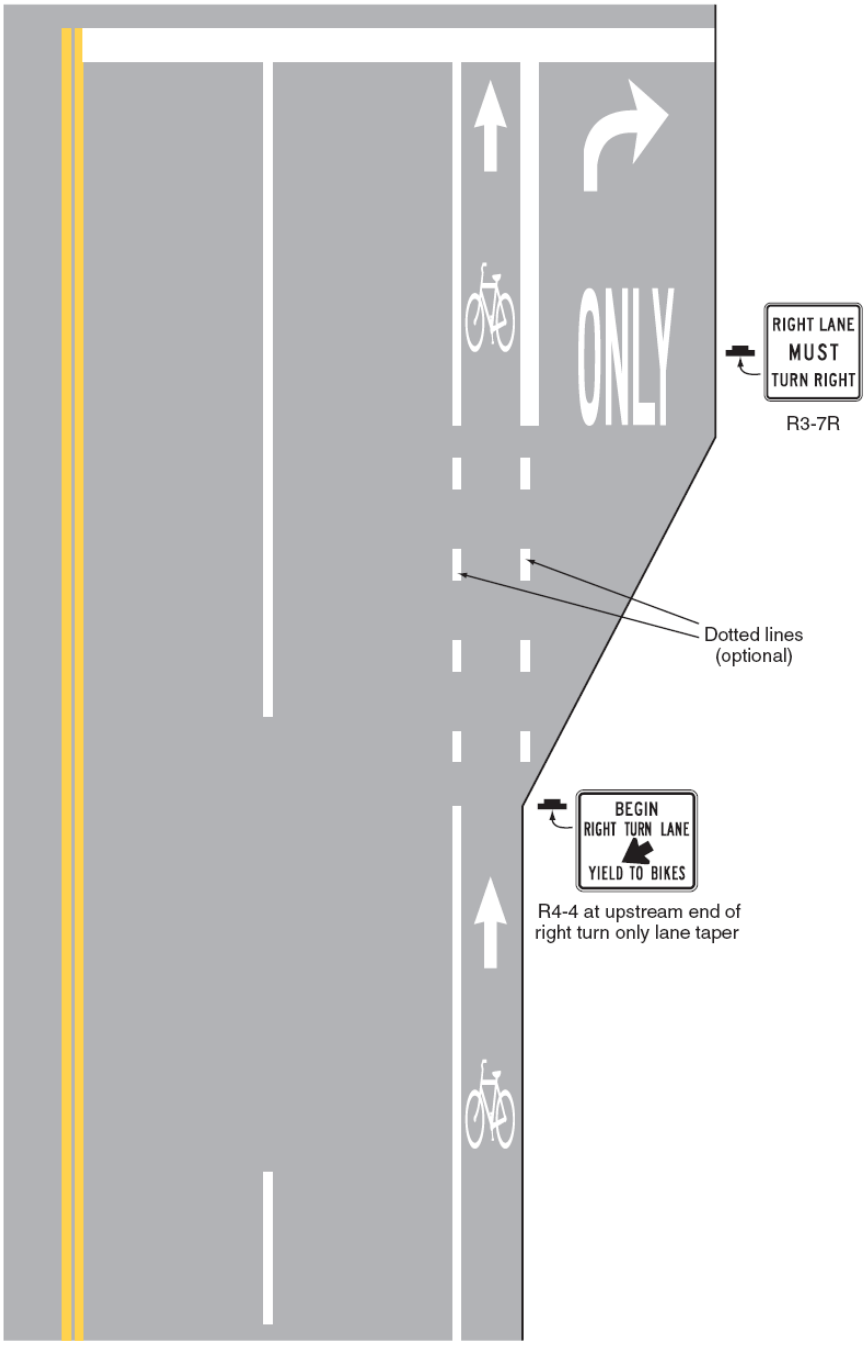

Figure 4 – MUTCD Bicycle Lane Treatment at Right Turn Only Lane

5.1.8 Shared-Use Paths

Key Bicycle and Pedestrian Need: Provide shared-use paths with safe approaches at intersections.

Street and driveway crossings with two-way shared-use paths located immediately adjacent to roadways can introduce operational problems. The *AASHTO Guide for the Development of Bicycle Facilities (1999)* identifies nine specific issues associated with paths located immediately adjacent to the roadway. These include:

- They may require one direction of bicycle traffic to ride against motor vehicle traffic.
- When the path ends, bicyclists going against traffic will tend to continue to travel on the wrong side of the road.
- At intersections, motorists entering or crossing the roadway will not notice the bicyclist approaching from their right.
- Signs posted for roadway users are backwards or contra-flow for bicycle traffic.
- Many bicyclists will use the roadway instead of the shared-use path because they have found the roadway to be more convenient, better maintained, or safer. Bicyclists using the roadway may be harassed by motorists who feel that in all cases cyclists should be on the adjacent path.
- Motorists falsely expect bicyclist to stop or yield at all cross-streets and driveways.
- Stopped cross-street motor traffic or vehicles exiting side streets may block the path crossing.
- Barriers are often necessary to keep vehicle traffic out of shared-use paths. These barriers can represent obstructions to bicyclists and motorists, and can complicate the maintenance of the facility.

The Guide concludes that "shared-use paths should not be considered a substitute for street improvements even when a path is located adjacent to the highway." On state routes, ADOT Traffic Engineering Policies, Guidelines, and Procedures Number 1031-Signing and Marking of Shared-Use Paths, must be adhered to.

The paths on the east side of SR 90 Bypass and SR 92 are representative of some of the above challenges of paths adjacent to roadways. Stakeholders have observed that drivers crossing the paths to enter SR 90 Bypass and SR 92 (1) block the path while waiting to turn onto the street and (2) look only to the left for oncoming traffic before turning right. Similarly, drivers turning off the state routes and crossing the paths often "do not see" path users in or entering the crosswalks. According to some stakeholders, these conditions, and the resulting need to slow down for each crossing, are why many bicycle riders choose to ride on the narrow shoulders of the state routes, despite the heavy traffic.

In addition, natural vegetation and landscape and hardscape features (some of which may predate construction of the shared-use path) often contribute to sight distance concerns.

Sight distance concerns contribute to behavior in which motorists do not wait at the stop bar or sign location, causing the shared-use path to be occupied by a motor vehicle when the bicyclist or pedestrian is attempting to cross at the street intersection with the shared-use path. Shared use path crossings with these conditions should be identified and corrected. In addition, these concerns should be considered when planning and designing shared-use paths.

Another issue involves service or other vehicles parking on the paths, obstructing path access for pedestrians and bicyclists. This was observed during field reviews for the project.

Examples of these issues are shown in the following photos.

Vehicle obstructing shared-use path access
Photo Source: Kimley-Horn and Associates

Example of shared-use path at intersection
Photo Source: Kimley-Horn and Associates

The Manual on Uniform Traffic Control Devices on Bicycle Section 9B.18 provides warning signage that may be appropriate for consideration on City of Sierra Vista shared-use paths.

Section 9B.18 Bicycle Warning and Combined Bicycle/Pedestrian Signs (W11-1 and W11-15)

Support:

01 The Bicycle Warning (W11-1) sign (see Figure 9B-3) alerts the road user to unexpected entries into the roadway by bicyclists, and other crossing activities that might cause conflicts. These conflicts might be relatively confined, or might occur randomly over a segment of roadway.

Option:

02 The combined Bicycle/Pedestrian (W11-15) sign (see Figure 9B-3) may be used where both bicyclists and pedestrians might be crossing the roadway, such as at an intersection with a shared-use path. A TRAIL X-ING (W11-15P) supplemental plaque (see Figure 9B-3) may be mounted below the W11-15 sign.

03 A supplemental plaque with the legend AHEAD or XX FEET may be used with the Bicycle Warning or combined Bicycle/Pedestrian sign.

Guidance:

04 *If used in advance of a specific crossing point, the Bicycle Warning or combined Bicycle/Pedestrian sign should be placed at a distance in advance of the crossing location that conforms with the guidance given in Table 2C-4.*

5.1.9 Sidewalks

An existing sidewalk inventory was not available for the project. As such, a comprehensive list of sidewalk needs is not available. However, the study team and TAC members recognize that many streets throughout the City of Sierra Vista lack sidewalks. Key streets where sidewalks may be needed or desirable have been identified through public, stakeholder, and TAC input, and are summarized in Section 5.2. A comprehensive sidewalk inventory and identification of existing sidewalk gaps is needed. In addition, providing sidewalks should be considered in all new development and street reconstruction.

5.2 Summary of Location-Specific Needs and Deficiencies

Significant input regarding infrastructure on roadways in Sierra Vista, as applicable to bicyclists and pedestrians, was obtained through the web-based stakeholder survey presented in Section 4.1.

In addition, stakeholders and members of the TAC provided input on needs and deficiencies. A summary of needs and deficiencies is provided in **Table 18.**

These needs and deficiencies will serve as the basis for identifying improvements in the next phase of the project.

Table 18 – Summary of Location-Specific Bicycle and Pedestrian Needs and Deficiencies

Street Name	Segment	Bike Routes	Shared-Use Paths	Sidewalks / Pedestrian Needs	Other comments
Avenida Cochise	Coronado Drive to SR 92				
Avenida Cochise	Buffalo Soldier Trail to Coronado Drive	Provide striped bike lane.	Need a shared-use path on Avenida Cochise between Coronado and Buffalo Soldier Trail. At Avenida Cochise /Coronado Drive intersection, provide striping or signing to show that shared-use path bicyclists cross Avenida Cochise.	Buffalo Soldier Trail Fitness Loop and Winterhaven Drive intersection - needs a pedestrian crossing.	
Avenida Del Sol	SR 90 to Snyder Boulevard	Provide striped bike lane to accommodate more experienced bicyclists.	Complete gaps in path system to provide access to Buena High School.		Avenida del Sol path between SR 90 and Camino del Norte is under design. Comment that between Encinita Street and SR 90 there is no curb or shared-use path and there is broken pavement in the bike lane. There was a request to extend the curbs in that area, or construct a shared-use path.
Bartow Drive	Carmichael Avenue to 7th Street	Provide a parallel bike route to Fry Blvd.			
Buffalo Soldier Trail	SR 90 to SR 92	Survey requests to add rumble strips, a bike path, and provide traffic signal detection for bicyclists.	Survey request to add shared-use path north of Gas City. Public input is that shared use paths should be constructed on both sides of the roadway.		Clean debris from shoulders more frequently.
Busby Drive	Buffalo Soldier Trail to 7th Street	Provide a central east-west bike route.			
Busby Drive	7th Street to El Camino Real	Provide a central east-west bike route.			
Busby Drive	SR 92 to Avenida Del Sol	Provide a central east-west bike route.			
Calle Portal	Martin Luther King to Quail Run Drive	Provide a bike route to provide better north-south connectivity.			
Campus Drive	SR 90 Bypass to Colombo Avenue		Connect to shared-use paths on SR 92 and Colombo Avenue.		
Carmelita	6th Street to Coronado	Provide a parallel bike route to Fry Blvd.	Connect to shared-use path.		
Colombo Avenue	Charleston to Cochise College and Berean Academy			Provide school crosswalks.	
Cardinal	Martingale to El Camino Real	Provide a bike route connection. Can connect to a future bike route on Golf Links Road.			
Coronado Drive	Buffalo Soldier Trail to Martin Luther King	Provide bike route striping, or a bike path although this route would be for more experienced riders because of vehicular speeds.	Extend shared-use path further east of SR 92 to businesses.	Provide a sidewalk or shared-use path.	Separate bike path preferable because vehicular speeds are higher and road is narrow.
Denman	Canyon to 6th Street	Provide a parallel bike route to Fry Blvd.	Connect to shared-use path.		
El Camino Real	Cardinal to Foothills	Provide a bike route connection.			

Table 18 – Summary of Location-Specific Bicycle and Pedestrian Needs and Deficiencies (continued)

Street Name	Segment	Bike Routes	Shared-Use Paths	Sidewalks / Pedestrian Needs	Other comments
Equestrian Avenue (Cochise County)		Request to put gaps in speed humps to allow bikes easier access. Equestrian Ave is south of the study area, but connects to St. Andrew Drive.			
Foothills Drive	Camino Real to east end	Bike route connection to SR 92 shared-use path.			
Fry Boulevard	El Camino Real to SR 92	Comments indicated that parallel bike facilities may be better.		Provide a longer pedestrian signal at Calle Portal intersection.	
Fry Boulevard	Buffalo Soldier Trail to El Camino Real	Comments indicated that parallel bike facilities may be better.			
Golf Links Road	Buffalo Soldier Trail to 7th Street	Provide bike route connection to link route on Golf Links Road from 7th Street to Hummingbird Lane.			
Greenbrier Road	Oakmont to SR 92	Provide bike route connection.			
Lenzner Avenue	Tacoma Street to Fry Blvd.	Continue the bike lane north (it currently terminates at Fry Blvd).			
Lenzner Avenue	Foothills to Golf Links Road		Continue shared-use path south to Golf Links Road.		
Martingale Road	Golf Links Road to Cardinal	Provide bike route connection.			
Martin Luther King	Coronado Drive to SR 90 Bypass	Provide a parallel route to Fry Blvd.	Shared use path is obstructed by curbs at Lowe's (west of SR 90).		
Mission	Newport to Greenbrier Road	Provide bike lane connection.			
Newport	Oakmont to Mission	Provide bike lane connection.			
Quail Run Drive	El Camino Real to SR 92	Provide a central east-west bike route. Connect to Busby Drive.			
7th Street	entire length	Bike lane striping desirable, however street is relatively high speed (40mph) and would attract more experienced riders.	A shared-use path could connect to the path on Buffalo Soldier Trail.	Need sidewalks, especially to bus stops.	
Snyder Boulevard	SR 92 to Avenida Del Sol	Provide a bike lane to supplement shared-use path. At Snyder and SR 92 intersection, the southern approach on the bike path is obscured by trees.			
SR 90	SR 92 to Moson Road	Need traffic signals to detect bicyclists.	Request for shared-use path to link to Canyon de Flores Linear Park.		

Table 18 – Summary of Location-Specific Bicycle and Pedestrian Needs and Deficiencies (continued)

Street Name	Segment	Bike Routes	Shared-Use Paths	Sidewalks / Pedestrian Needs	Other comments
SR 90	7th Street to Gas City		Continue shared-use path east of Fort Huachuca's East Gate.		
SR 90 Bypass	7th Street to Coronado Drive		Extend shared-use path to Coronado Drive.		Note this is a bike route for experienced riders.
SR 92	SR 90 Bypass to Ramsey Road	Need traffic signals to detect bicyclists. Comments that there is uneven pavement in the bicycle lane on SR 92. Need for continuous bike lanes on both sides of the road (entire roadway).	Request for shared-use path south of Buffalo Soldier Trail to Ramsey Road (south of study area). Address concerns about insufficient lighting on the shared-use path between Fry Blvd and Avenida Cochise. Address complaints about vehicles not giving right-of-way to bicyclists and pedestrians - locations include SR 92/Snyder Rd and at SR 92/St Andrews intersection.	Need crosswalks at intersection with Busby Drive. Wheelchair access not placed properly at intersection with St. Andrews.	Need signage or striping to alert drivers to bicyclists and pedestrians at the shared-use path crossings. Concerns about crossing or riding in the shoulder. There was a comment that there is uneven pavement in the shoulder on SR 92. Concerns that mail trucks and other vehicles use the shared-use paths for parking.
Tacoma Street	Coronado Drive to east end (Domingo Paiz Sport Complex)	Provide connection to Domingo Paiz Sport Complex.			
Tacoma Street	Pfister Avenue to Carmichael Avenue	Provide bike lane connection to Carmichael Avenue, and east-west bike connection.			
Wilcox Drive	Buffalo Soldier Trail to El Camino Real				Too narrow and has high curbs

6 PROPOSED IMPROVEMENTS, POLICIES, AND PROGRAMS

This chapter proposes recommendations to improve conditions, safety, and comfort of bicyclists and pedestrians in the City of Sierra Vista. The recommendations are presented in the form of:

- Programs, Practices, and Guidelines to improve conditions for bicyclists and pedestrians in the City of Sierra Vista.
- Projects that, upon their implementation, address the needs and deficiencies documented in *Working Paper No. 1*.

Each of the recommendations is directed towards improving safety and comfort of bicyclists and pedestrians, further establishing a well-connected multimodal network in the City of Sierra Vista.

6.1 Programs, Practices, and Guidelines

The following policies, practices, and guidelines are proposed for consideration by the City of Sierra Vista to improve the safety, comfort, and accommodation of bicyclists and pedestrians.

1. ***Develop and implement a city-wide bicycle and pedestrian safety education campaign.***

Stakeholder and public input identified a need for bicycle and pedestrian education in the City of Sierra Vista. Education should be provided to all roadway users (bicyclists, pedestrians, and motorists), as well as to law enforcement, planners, and engineers. The ADOT Bicycle and Pedestrian Program developed sample bicycle and pedestrian safety campaign materials and posted these materials to their website, www.azbikeped.org. The materials include Arizona Bicycling Street Smarts booklet, Share the Road guides (for bicyclists, motorists, and pedestrians), promotional stickers, flyers, rack cards, and public service announcements for radio and television. Please note that Arizona Bicycling Street Smarts is copyrighted material and may not be reproduced without written permission of the publisher.

2. ***Require bicycle lanes and either sidewalks or shared-use paths as part of new construction or major reconstruction of principal, major, and minor arterials and collector streets.***

Bike lanes provide more consistent separation between bicyclists and passing motorists than shared travel lanes. The presence of the bike lane stripe has also been shown from research to result in fewer erratic motor vehicle driver maneuvers, more predictable bicyclist riding behavior, and enhanced comfort levels for both motorists and bicyclists (accessed on 2/3/2011 at http://www.bicyclinginfo.org/bikesafe/countermeasure.cfm?CM_NUM=11).

Bike lanes should meet minimum AASHTO design standards, which generally consist of a five-foot bike lane. AASHTO Guidance (*AASHTO Guide, pp. 22–23, 35*) includes the following:

- The recommended width of a bike lane is 5 feet from the face of a curb or guardrail to the bike lane stripe. This 5-foot width should be sufficient in cases where a 1-2 foot wide concrete gutter pan exists, given that a minimum of 3 feet of ridable surface is provided, and the longitudinal joint between the gutter pan and pavement surface is smooth. The width of the gutter pan should not be included in the measurement of the ridable or usable surface.
- For roadways with no curb and gutter, the minimum width of a bike lane should be 1.2 m (4 feet).
- If parking is permitted, the bike lane should be placed between the parking area and the travel lane and have a minimum width of 1.5 m (5 feet).
- Where parking is permitted but a parking stripe or stalls are not utilized, the shared area should be a minimum of 3.3 m (11 feet) without a curb face and 3.6 m (12 feet) adjacent to a curb face. If the parking volume is substantial or turnover is high, an additional 0.3 to 0.6 m (1 to 2 feet) of width is desirable.
- When two-way shared use paths are located adjacent to a roadway, wide separation between a shared use path and the adjacent highway is desirable to demonstrate to both the bicyclist and the motorist that the path functions as an independent facility for bicyclists and others. When this is not possible and the distance between the edge of the shoulder and the shared use path is less than 1.5m (5 feet), a suitable physical barrier is recommended. Such barriers serve both to prevent path users from making unwanted movements between the path and the highway shoulder and to reinforce the concept that the path is an independent facility. Where used, the barrier should be a minimum of 1.1 m (42 inches) high to prevent bicyclists from toppling over it. A barrier between a shared use path and adjacent highway should not impair sight distance at intersections, and should be designed to not be a hazard to errant motorists.

3. Establish a program of regular sweeping of bike lanes, shared roadways, and shared-use paths.

Debris in shoulders and in bike lanes is a concern voiced by stakeholders. Stakeholders also noted that temporary traffic control signs are often placed in the bicycle lane during construction. Treating bicycle lanes as a functional travel lane by removing debris and placing temporary traffic control signs out of the bicycle lane will improve the safety and comfort of bicyclists.

The City of Sierra Vista currently has a mechanism in place to report a street or traffic concern. The system includes options to report concerns related to streets, street lights, traffic signals sidewalks, and potholes. It is recommended that this list be expanded to include shared-use paths and bicycle lanes. It is also recommended that the Public Works

Department telephone number (520) 458-5775 be posted on bicycle and pedestrian materials (City of Sierra Vista Bicycle and Pedestrian Map, Shared-Use Path Map, education materials).

The City currently has a regular maintenance program that includes sweeping of streets and shared-use paths. All streets are swept at least four times per year. Major arterials are swept more frequently, in some cases as often as every two weeks. Shared use paths are swept at least once per month. Paths with increased maintenance needs, such as those next to drainage areas that tend to collect dirt and debris, are swept more frequently.

It is recommended that the City include bicycle routes (as identified in the *City of Sierra Vista Existing Bicycle and Pedestrian Routes, Working Paper No. 1*) into a routine of regular sweeping consistent with the following:

- Major arterials and bicycle lanes: every two weeks
- Collector and residential streets (shared roadways and bicycle lanes): six times per year.

It should be noted that ADOT is responsible for the maintenance of state highways, including SR 90 and SR 92. ADOT will address maintenance concerns on an as-needed basis. Maintenance concerns may be reported to the ADOT Safford District.

4. Install or reconfigure video detection of bicyclists at traffic signals.

Stakeholders identified a need to upgrade/reconfigure traffic signals throughout the City to allow detection of bicyclists waiting at the traffic signal.

New or improved traffic signals should include video detection configured to detect bicyclists riding in the street, including in a bicycle lane or shoulder.

5. Install pedestrian countdown signals at traffic signals.

New or improved traffic signals should include pedestrian countdown signals to improve pedestrian safety when crossing streets. Countdown signals are used in conjunction with the traditional upraised hand (DON'T WALK) and walking person (WALK) symbols. The countdown accompanies the flashing DON'T WALK symbol to indicate how much time a pedestrian has to cross the street. Guidelines provided by the MUTCD should be followed when installing pedestrian countdown signals. Examples of countdown signals from the MUTCD are presented in **Figure 5.**

Figure 5 – MUTCD Typical Pedestrian Signal Indications – With Countdown Display

Source: MUTCD Figure 4E-1

6. Consider travel lane width reductions to accommodate bicycle lanes.

In urbanized areas, striped bike lanes generally serve bicyclists and motorists. As described in the AASHTO Bicycle Guide, bicycle lanes are incorporated into a street network when it is desirable to delineate road space for preferential use by bicyclists and motorists and to provide more predictable movements by each. Bicycle lane markings can increase a bicyclist's confidence in motorists not straying into their path of travel; likewise, passing motorists are less likely to swerve to the left out of their travel lane to avoid bicyclists on their right *(AASHTO Guide for the Development of Bicycle Facilities, 1999, page 22).*

Bicycle-friendly cities such as Madison WI; Eugene, OR; Davis, CA; Gainesville, FL; and Palo Alto, CA have developed extensive bike lane networks since the 1970s. More recently, large cities such as Tucson, AZ; Chicago, IL; Houston, TX; Philadelphia, PA; Portland, OR; and Seattle, WA have begun to stripe bike lanes on their arterial and collector streets to encourage bicycle use. In general, bicycle lanes should be:

- One-way, carrying bicyclists in the same direction as the adjacent travel lane on the right side of the roadway;
  Located between the parking lane (if there is one) and the travel lane (accessed on 1/31/2011 at http://www.bicyclinginfo.org/engineering/facilities-bikelanes.cfm).

Recommended bicycle lane width (*AASHTO Guide, pp. 22–24*):

- 4 feet (1.2m): minimum width of bike lane on roadways with no curb and gutter;
- 5 feet (1.5m): minimum width of bike lane when adjacent to parking, from the face of the curb or guardrail;
- 11 feet (3.3m): minimum total width for shared bike lane and parking area, no curb face;
- 12 feet (3.6m): minimum shared bike lane and parking area with a curb face.

Many roadways in urban areas, including Sierra Vista, were originally constructed without bicycle lanes. Busy urban arterials without bicycle lanes often act as deterrents to bicycle travel. Many existing urban roadways can be retrofitted to include bicycle lanes using the following methods (*Oregon Bicycle and Pedestrian Plan, 1995*):

- Marking and signing existing shoulders as bike lanes;
- Physically widening the roadway to add bike lanes; or
- Restriping the existing roadway to add bike lanes.

In many cases the third alternative, restriping the existing roadway to add bike lanes, is the only feasible and reasonable option. The AASHTO Guide states "another important reason for constructing bike lanes is to better accommodate bicyclists where insufficient space exists for comfortable riding on existing streets. This may be accomplished by reducing the width of vehicular lanes or prohibiting parking (*AASHTO Guide for the Development of Bicycle Facilities, 1999, page 8*).

Current City of Sierra Vista standard lane widths are 12 feet on the inside lane and 12 to 14 feet on the outside lane. Center turn lanes are typically 12- to 14-feet wide. A typical City of Sierra Vista street consists of four 12-foot travel lanes (48 feet) and a 14-foot center left turn lane for a 62-foot wide minimum.

According to the Institute of Transportation Engineer's (ITE) *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*, streets with widths greater than 60 feet often encourage greater vehicular speeds and act as a barrier for pedestrians due to the length of the crossing distance. Reducing the width of the travel lanes to 11 feet or 10 feet can have two benefits: 1) it acts as a traffic-calming mechanism, and 2) the new configuration allows enough room for bicycle lanes to be added to the street cross-section.

Within the City of Sierra Vista, many of the streets on which bicycle lanes are recommended will require lane width reductions. Many communities successfully stripe bicycle lanes on 44-foot-wide roads that include the following elements (accessed on 1/31/2011 at http://www.bicyclinginfo.org/engineering/facilities-bikelanes.cfm):

- Two seven-foot parking lanes (14 ft)
- Two five-foot bike lanes and (10 ft)
- Two 10-foot travel lanes (20 ft)

A number of configurations can be considered based on the existing width of the street, and whether on-street parking is allowed. Many City of Sierra Vista streets are 62 to 65 feet wide. The following represent two examples of how a typical City of Sierra Vista street could be restriped to allow installation of bicycle lanes.

65 foot street width (four travel lanes without on-street parking):

- Two five-foot bicycle lanes / parking lane (10 ft)
- Four 11-foot travel lanes (44 ft)
- One 11-foot center turn lane (11 ft)
- Total: 65 ft

62 foot street width (two travel lanes and on-street parking):

- Two 13-foot bicycle lanes adjacent to a parking lane (26 ft)
- Two 12-foot travel lanes (24 ft)
- One 12-foot center turn lane (12 ft)
- Total: 62 ft

Figure 6 illustrates a potential striping configuration for a street with a 64-foot curb to curb street width that includes four travel lanes and a center left turn lane (*City of Phoenix, Minimum Arterial Street Cross Sections, Detail No. P1010),* consisting of the following:

- Bike Lane (5 ft)
- Thru Lane (10.5 ft)
- Thru Lane (10.5 ft)
- Center Left Turn Lane (12 ft)
- Thru Lane (10.5 ft)
- Thru Lane (10.5 ft)
- Bike Lane (5 ft
- Total: 64 ft (curb to curb)

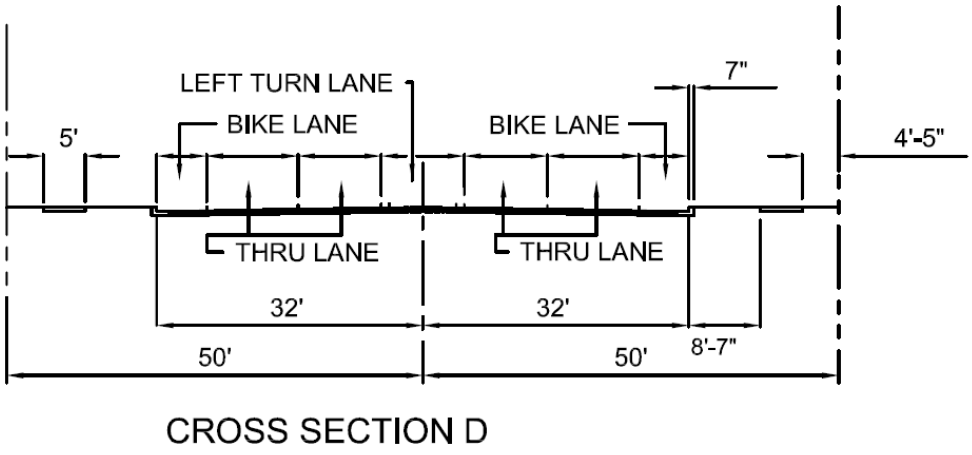

Figure 6 – Potential Street Cross-Section with 64-foot Pavement Width

Source: City of Phoenix Standard Detail, No. P1010, Minimum Arterial Street Cross Sections

A common concern regarding reducing the width of travel lanes is safety. Research conducted by the Midwest Research Institute, *Relationship of Lane Width to Safety for Urban and Suburban Arterials,* concludes that travel lanes on arterial and collector roadways with widths less than 12 feet (e.g. 10 and 11 feet) do not increase the frequency of crashes (accessed on 1/31/2011 at http://www.completestreets.org/webdocs/resources/lanewidth-safety.pdf).

The research team recommends that jurisdictions should provide flexible cross-sections to allow for narrower travel lanes when appropriate, including to provide bicycle lanes. AASHTO recommends that "under interrupted-flow operating conditions at low speeds

(45 mph or less), narrower lane widths are normally adequate" (*AASHTO Policy on Geometric Design of Highways and Streets, 2004, page 473*). Reducing lane widths may allow for a bicycle lane to be added to a roadway without adding additional pavement. AASHTO further recommends that an 11-foot lane width is adequate for through lanes, continuous two-way left-turn lanes, and lanes adjacent to a painted median (*AASHTO Policy on Geometric Design of Highways and Streets, 2004, page 473).*

In addition to safety, the capacity of a roadway is not compromised by lane width reduction to as narrow as 10 feet. The Pedestrian Bicycle Information Center describes recent research that finds roadway capacity is similar for lane widths between 10 feet and 12 feet; for lane widths below 10 feet, there is a measureable difference. Roadway capacity is not degraded until lane widths are reduced to less than 10 feet (accessed on 2/5/2011 at http://www.walkinginfo.org/library/details.cfm?id=4348).

7. Install bicycle lane striping and signing at intersections.

Stakeholder and public input identified a need for a bicycle lane or buffer areas at intersections throughout the city. It is recommended that new or reconstructed intersections with right turn lanes be constructed or reconstructed to include bicycle lane treatments at the intersections. The bicycle lanes should conform to the MUTCD guidelines as shown in **Figure 7**. A striped bicycle lane creates a buffer between bicyclists and motorized vehicles and increases the visibility of bicyclists.

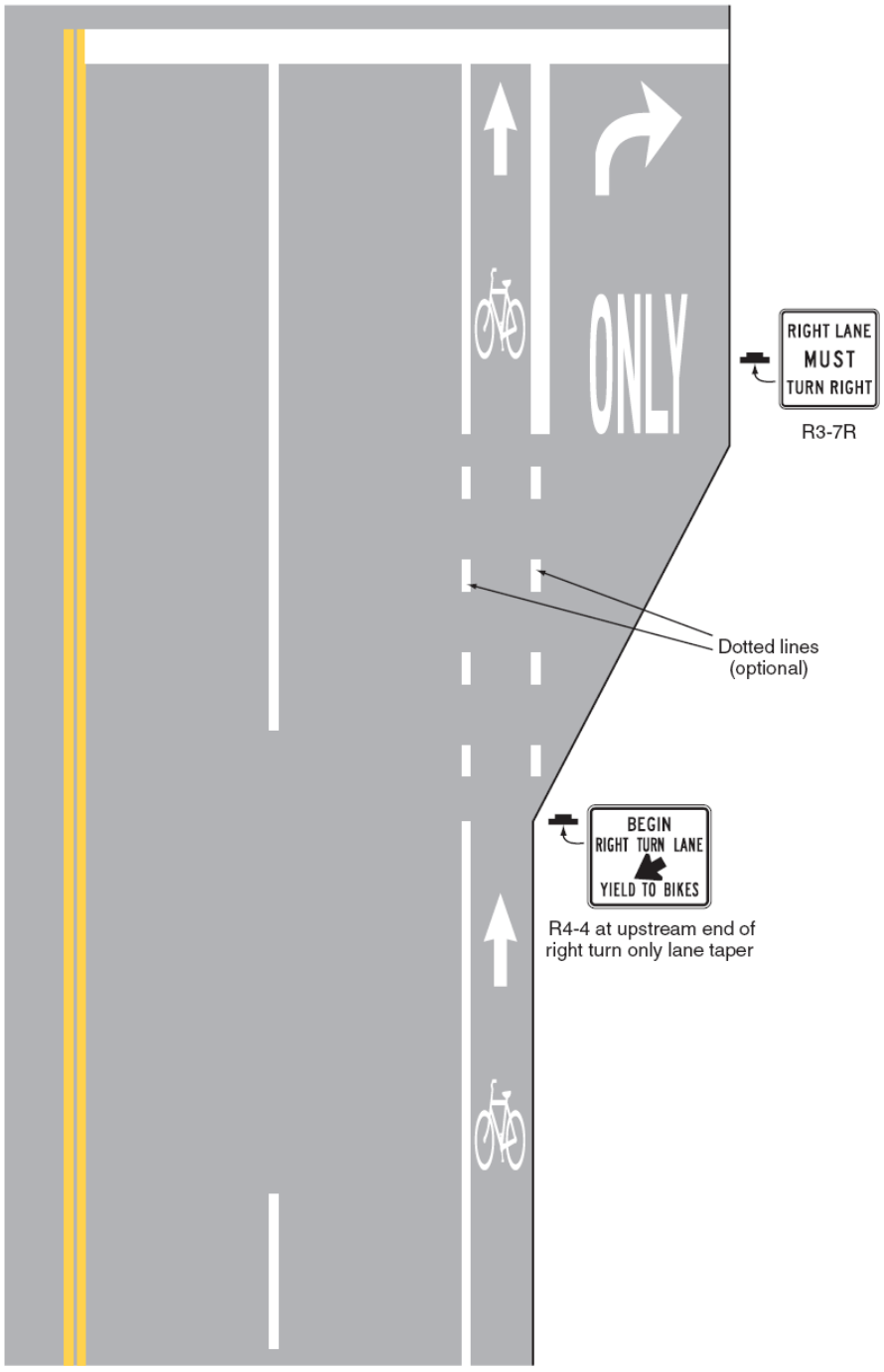

Figure 7 – MUTCD Bicycle Lane Treatment at Right Turn Only Lane

Source: MUTCD Figure 9C-4

8. Consider installation of raised pedestrian refuge crossing islands at marked and unmarked crosswalks on arterials and high volume collectors.

Raised medians should be considered for implementation on multi-lane roadways that experience high pedestrian volumes. Recent FHWA guidance encourages use of raised medians to improve pedestrian safety (http://safety.fhwa.dot.gov/ped_bike/). The guidance states:

Description:

The Median is the area between opposing lanes of traffic, excluding turn lanes. Medians can either be open (pavement markings only) or they can be channelized (raised medians or islands) to separate various road users.

Pedestrian Refuge Areas (or crossing islands)—also known as center islands, refuge islands, pedestrian islands, or median slow points—are raised islands placed in the street at intersection or midblock locations to separate crossing pedestrians from motor vehicles.

Background:

Providing raised medians or pedestrian refuge areas at pedestrian crossings at marked crosswalks has demonstrated a 46% reduction in pedestrian crashes. Installing such raised channelization on approaches to multi-lane intersections has been shown to be particularly effective. At unmarked crosswalk locations, medians have demonstrated a 39% reduction in pedestrian crashes. Medians are especially important in areas where pedestrians access a transit stop or other clear origin/destinations across from each other. Midblock locations account for over 70% of pedestrian fatalities. Also it is where vehicle travel speed is higher which contributes to the injury and fatality rate at this location. Over 80% of pedestrians die when hit by vehicles traveling at 40 mph or faster while less than 20% die when hit at 20 mph.

Guidance Statement/Application:

Raised medians (or refuge areas) should be considered in curbed sections of multi-lane roadways in urban and suburban areas, particularly in areas where there are mixtures of a significant number of pedestrians, high volumes of traffic (more than 12,000 ADT) and intermediate or high travel speeds. Medians/refuge islands should be at least 4 feet wide (preferably 8 feet wide for accommodation of pedestrian comfort and safety) and of adequate length to allow the anticipated number of pedestrians to stand and wait for gaps in traffic before crossing the second half of the street.

It is recommended that raised pedestrian islands be considered for implementation at marked crosswalks and mid-block locations on high-volume roadways such as Fry Boulevard.

9. Install Bicycle Route Signs, Bike Lane signs, and Shared Lane Markings on the City of Sierra Vista Bicycle Network.

Working Paper No. 1 presented the existing *City of Sierra Vista Bicycle and Pedestrian Network*. Expansion and improvement to the network of bike lanes and shared roadways should include installation of bicycle route, bike lane, and share the road signs. Signs should conform to the MUTCD and be placed in a manner so that they are visible to roadway users, but do not create clutter along the roadside. MUTCD guidelines and examples of possible roadway signs from the MUTCD are shown below.

Bike Lanes

Bike lanes are proposed on major streets with higher traffic volumes and a speed limit of 25 mph or more. A list of proposed roadways with bicycle lanes is included in Section 6.2 of the *Existing Bicycle and Pedestrian Network, Working Paper No. 1*. Bike Lanes Sign (R3-17) and MUTCD guidance is illustrated below. Per the 2009 MUTCD, Bike Lane signs are not mandatory, but are recommended.

Figure 8 – MUTCD Bike Lane Sign

Source: MUTCD Figure 9B-2

Section 9B.04 Bike Lane Signs and Plaques (R3-17, R3-17aP, R3-17bP)

Standard:

01 **The BIKE LANE (R3-17) sign and the R3-17aP and R3-17bP plaques (see Figure 9B-2) shall be used only in conjunction with marked bicycle lanes as described in Section 9C.04.**

Guidance:

02 *If used, Bike Lane signs and plaques should be used in advance of the upstream end of the bicycle lane, at the downstream end of the bicycle lane, and at periodic intervals along the bicycle lane as determined by engineering judgment based on prevailing speed of bicycle and other traffic, block length, distances from adjacent intersections, and other considerations.*

Signed Shared Roadways

Signed shared roadways are local roadways that experience relatively lower vehicular traffic and have speeds that are 35 miles per hour or less and serve to:

a. Provide continuity to other bicycle facilities (shared-use paths or bike lanes)

b. Designate preferred routes as alternatives to routes with higher traffic volumes and speeds.

A list of proposed signed shared roadways is included in Section 6.2. Bicycle route signs may be implemented on City of Sierra Vista Signed Shared Roadway Streets. These roadways are appropriate for designation as a bicycle route with way finding signage but do not require striping. **Figure 9** is an example of signage for a bicycle route (Bike Route Sign D11-1). **Figure 10** shows an example guide signing and way finding signage scheme. The MUTCD allows for locally specific guide signing (M1-8) to be developed.

Figure 9 – MUTCD Bike Route Sign

Source: MUTCD Figure 9B-4

Section 9B.20 Bicycle Guide Signs (D1-1b, D1-1c, D1-2b, D1-2c, D1-3b, D1-3c, D11-1, D11-1c)

Option:

01 Bike Route Guide (D11-1) signs (see Figure 9B-4) may be provided along designated bicycle routes to inform bicyclists of bicycle route direction changes and to confirm route direction, distance, and destination.

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

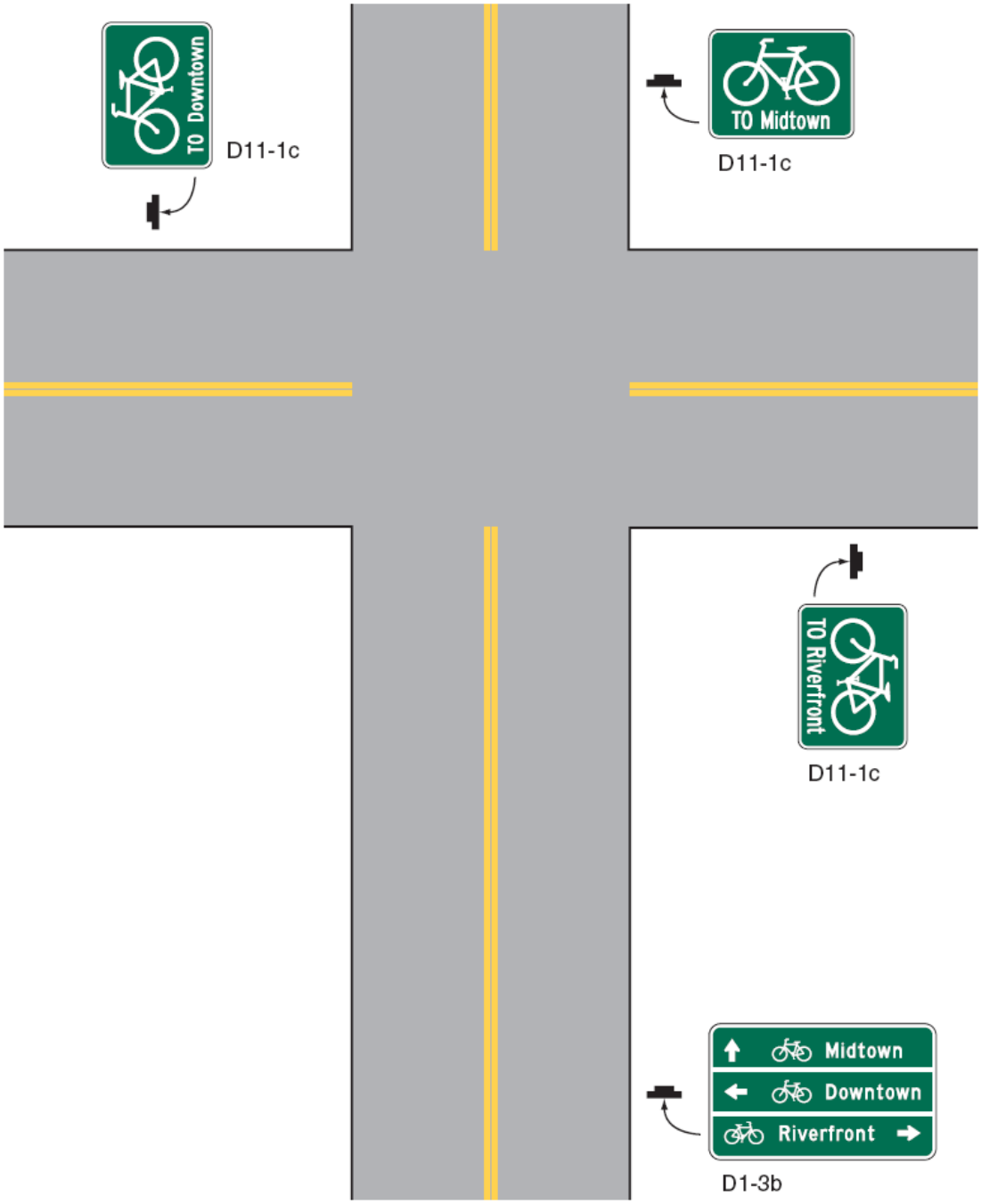

Figure 10 – MUTCD Example of Bicycle Guide Signing

Source: MUTCD Figure 9B-6

Another improvement option for Signed Shared Roadways is shared lane markings, as depicted in **Figure 11**. The MUTCD states that shared lane markings may be used to:

A. Assist bicyclists with lateral positioning in a shared lane with on-street parallel parking in order to reduce the chance of a bicyclist's impacting the open door of a parked vehicle,

B. Assist bicyclists with lateral positioning in lanes that are too narrow for a motor vehicle and a bicycle to travel side by side within the same traffic lane,

C. Alert road users of the lateral location bicyclists are likely to occupy within the traveled way,

D. Encourage safe passing of bicyclists by motorists, and

E. Reduce the incidence of wrong-way bicycling.

The MUTCD states that the shared lane marking should not be placed on roadways with a speed limit above 35 mph, nor should they be used on shoulders or in designated bicycle lanes. In the City of Sierra Vista, shared lane markings are suitable for Signed Shared Roadways with speed limits of 35 mph or less. If used on streets without on-street parking that have outside travel lanes less than 14 feet wide, the center of the Shared Lane Markings should be at least four feet from the face of the curb, or from the edge of the pavement where there is no curb. The Shared Lane Marking should be placed immediately after an intersection and spaced at intervals not greater than 250 feet thereafter.

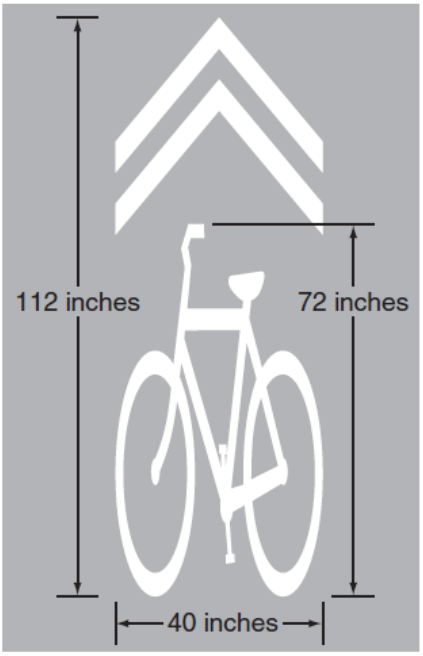

Figure 11 – MUTCD Shared Lane Marking

Source: MUTCD Figure 9C-9

Many of the streets proposed for inclusion in the City of Sierra Vista bicycle route network are shared local streets, where bicycles share the streets with local vehicular traffic. Stakeholders expressed concern about high traffic speeds on local streets and a need for traffic calming.

Traffic calming can reduce vehicular speeds and create a more comfortable and pleasant environment for bicyclists and pedestrians. In addition to lowering vehicle speeds, traffic calming can reduce the number of vehicles that utilize a local street; non-local vehicles are diverted to larger collector and arterial streets.

The City of Sierra Vista Traffic Calming Manual limits traffic calming improvements to local streets with a speed limit of 25 mph or less. Traffic calming devices such as chicanes, chokers, and traffic circles can be considered for implementation on local streets to lower vehicle speeds, and make the routes more conducive to bicycling and walking.

10. Routinely Provide a Sidewalk (5' minimum) or Pathway on BOTH sides of the Street.

A sidewalk inventory and assessment was beyond the scope of this project. However, the study team recognizes that there are significant gaps in Sierra Vista's sidewalk system. Sidewalks and pathways should be considered an essential element of the roadway.

All new and reconstructed roadways should include a sidewalk or pathway on both sides of the road. Both FHWA and the Institute of Transportation Engineers (ITE) recommend a minimum width of 1.5 m (five ft) for a sidewalk or walkway, which allows two people to pass comfortably or to walk side-by-side. Wider sidewalks should be installed near schools, at transit stops, in downtown areas, or at any locations with high concentrations of pedestrians. Sidewalks should be continuous along both sides of a street and fully accessible to all pedestrians, including those in wheelchairs (accessed on 1/31/2011 at http://www.walkinginfo.org/pedsafe/pedsafe_curb1.cfm?CM_NUM=1).

AASHTO's *Guide for the Planning, Design, and Operation of Pedestrian Facilities* also recommends that sidewalks be at least five feet wide. The Guide recommends that along arterials with high pedestrian volumes, the sidewalk width should increase to six to eight feet wide with a landscaped buffer or eight to 10 feet without a landscaped buffer.

From an implementation perspective, in general, sidewalks should be constructed along existing roadways when curb and gutter for drainage is installed.

While sidewalks are typically made of concrete, shared-use paths and pathways may be constructed of asphalt, crushed stone, or other materials if they are properly maintained and accessible (firm, stable, and slip-resistant). In more rural areas, in particular, a "side path" made of one of these materials may be a suitable substitute to a sidewalk.

11. Develop and Adopt a Complete Streets Policy.

Transportation is an important element of the livability of a community. "Livable communities" provide transportation choices and alternatives for all ages of motorists, bicyclists, and pedestrians. However, many streets, including those in Sierra Vista, are

designed only for the motor vehicle. An ongoing movement across the country is to "complete the streets", by planning and constructing road networks that are safer and more welcoming for all users.

Developing and implementing a Complete Streets Policy ensures that transportation planners and engineers consistently design and operate the entire roadway with all users in mind, including bicyclists, public transportation vehicles and riders, and pedestrians of all ages and abilities (accessed on 3/4/2011 at www.completestreets.org). As described by the National Complete Streets Coalition:

> Creating complete streets means transportation agencies must change their approach to community roads. By adopting a Complete Streets policy, communities direct their transportation planners and engineers to routinely design and operate the entire right of way to enable safe access for all users, regardless of age, ability, or mode of transportation. This means that every transportation project will make the street network better and safer for drivers, transit users, pedestrians, and bicyclists – making your town a better place to live. The National Complete Streets Coalition has identified the elements of an ideal Complete Streets policy:
>
> 1. Includes a vision for how and why the community wants to complete its streets.
> 2. Specifies that 'all users' includes pedestrians, bicyclists and transit passengers of all ages and abilities, as well as trucks, buses and automobiles.
> 3. Encourages street connectivity and aims to create a comprehensive, integrated, connected network for all modes.
> 4. Is adoptable by all agencies to cover all roads.
> 5. Applies to both new and retrofit projects, including design, planning, maintenance, and operations, for the entire right of way.
> 6. Makes any exceptions specific and sets a clear procedure that requires high-level approval of exceptions.
> 7. Directs the use of the latest and best design criteria and guidelines while recognizing the need for flexibility in balancing user needs.
> 8. Directs that complete streets solutions will complement the context of the community.
> 9. Establishes performance standards with measurable outcomes.
> 10. Includes specific next steps for implementation of the policy

The National Complete Streets Coalition provides resources and guidance for development and adoption of a Complete Streets Policy. Development and adoption of a Complete Streets Policy will require a cooperative and collaborative effort between local advocacy groups, City staff, and elected officials.

A Complete Streets Policy adopted by City Council will provide the basis on which bicycle and pedestrian improvements can be "mainstreamed" into the city's street improvement and maintenance program. Over time, as pavement preservation projects are funded, consideration will be given to restriping the street to include bicycle lanes. As development or redevelopment occurs, sidewalks, shared-use paths, and bicycle lanes will be a basic part of the infrastructure.

12. Recommended Studies.

The scope of the Sierra Vista Safe Bicycle and Pedestrian Routes Plan did not allow for all multimodal safety deficiencies to be identified and addressed within the City. Additional studies and plans are proposed to continue to address multimodal needs and deficiencies in the City of Sierra Vista.

A. Sidewalk inventory and assessment

Providing a continuous, well-connected system of sidewalks encourages walking as a viable form of transportation in a community. A sidewalk inventory was not included as part of this study. It is suggested that the City conduct a sidewalk inventory to identify existing sidewalks gaps in the City's pedestrian network and to develop an implementation plan to address the gaps.

B. Warrant studies for Mid-block Pedestrian Crossings

A detailed analysis of pedestrian crossings was beyond the scope of this study. However, pedestrian crossings represent a significant percentage of pedestrian crashes within the City, particularly on major roadways such as Fry Boulevard.

It is recommended that a detailed analysis of pedestrian crossings on Fry Boulevard be conducted to identify pedestrian crossing improvements at signalized intersections, and to identify appropriate locations and necessary infrastructure for mid-block pedestrian crossings.

While mid-block crossings allow pedestrians to cross the roadway at more convenient locations, they are not typically expected by motorists. Therefore, mid-block crossings should be installed only in locations where they are needed and only after analyzing pedestrian patterns, traffic volume and speed, roadway width, and adjacent land uses.

C. Shared-Use Path / Multiuse Path Pavement Alternatives

A need identified by the technical advisory committee is to identify and evaluate alternative, ADA-compliant, all-weather surfaces for City of Sierra Vista shared-use paths. Budgetary limitations may necessitate that alternative surfaces be considered that would reduce the cost to construct and maintain City shared-use paths.

If constructed properly, natural surfaces, such as decomposed granite or other crushed and packed stone surfaces, can be compacted to meet ADA requirements as long as the surface is firm and stable. Packed crushed stone, gravel fines compacted with a roller, packed soil and other natural materials bonded with synthetic materials can provide the required degree of stability and firmness. However, these surfaces would likely require

maintenance after large storms. Other alternatives surfaces are more expensive than asphalt (accessed on /1/2011 at http://www.tn.gov/environment/recreation/pdf/trailada.pdf)

D. Bicycle Friendly Community and Walk Friendly Community Action Plan

The League of American Bicyclists sponsors the Bicycle Friendly Community Program to encourage communities to develop and implement policies and infrastructure to support bicycling.

Similarly, the Pedestrian and Bicycle Information Center sponsors the Walk Friendly Communities Program. The purpose of the program is to educate, recognize and encourage walkable communities, raise local and national awareness of livability and walk-friendliness, and increase visibility of pedestrian issues.

The City has previously submitted an application to the League of American Bicyclists for designation as a Bicycle Friendly Community (BFC). The City has been unsuccessful in receiving designation. It is recommended that the City develop and adopt a BFC Action Plan to provide strategic direction toward successful designation as a Bicycle Friendly City. The League of American Bicyclists provides a template Action Plan that includes the following: (accessed on 5/16/2011 at http://www.bikeleague.org/programs/bicyclefriendlyamerica/communities/images/action_plan.pdf)

1. Adopt a target level of bicycle use (e.g. percent of trips) and safety to be achieved within a specific timeframe, and improve data collection necessary to monitor progress.
2. Provide safe and convenient bicycle access to all parts of the community through a signed network of on and off-street facilities, low-speed streets, and secure parking. Local cyclists should be involved in identifying maintenance needs and ongoing improvements.
3. Establish information programs to promote bicycling for all purposes, and to communicate the many benefits of bicycling to residents and businesses (e.g. with bicycle maps, public relations campaigns, neighborhood rides, a ride with the Mayor)
4. Make the City a model employer by encouraging bicycle use among its employees (e.g. by providing parking, showers and lockers, and establishing a city bicycle fleet).
5. Ensure all city policies, plans, codes, and programs are updated and implemented to take advantage of every opportunity to create a more bicycle-friendly community. Staff in all departments should be offered training to better enable them to complete this task.
6. Educate all road users to share the road and interact safely. Road design and education programs should combine to increase the confidence of bicyclists.
7. Enforce traffic laws to improve the safety and comfort of all road users, with a particular focus on behaviors and attitudes that cause motor vehicle/bicycle crashes.

8. Develop special programs to encourage bicycle use in communities where significant segments of the population do not drive (e.g. through Safe Routes to Schools programs) and where short trips are most common.
9. Promote intermodal travel between public transport and bicycles, e.g. by putting bike racks on buses, improving parking at transit, and improving access to rail and public transport vehicles.
10. Establish a citywide, multi-disciplinary committee for nonmotorized mobility to submit to the Mayor/Council a regular evaluation and action plan for completing the items in this Charter.

E. ADA Transition Plan

The Americans with Disabilities Act (ADA) of 1990 prohibits discrimination against people who have disabilities. Title II of the Act requires public services and public transportation to be accessible to those with disabilities. The Act applies to all facilities, including those constructed prior to 1990. State and local government, public entities or agencies are required to perform self-evaluations of their current facilities, relative to the accessibility requirements of the ADA. Agencies are then required to develop a Program Access Plan, also referred to as a Transition Plan, to address any deficiencies. An ADA Transition is intended to achieve the following (*ADA Transition Plans, A Guide to Best Management Practices, May 2009, NCHRP Project Number 20-7 (232*)):

a. Identify physical obstacles that limit the accessibility of facilities to individuals with disabilities,
b. Describe the methods to be used to make the facilities accessible,
c. Provide a schedule for making the access modifications, and
d. Identify the public officials responsible for implementation of the Transition Plan.

The Transition Plan is required to be updated periodically until all accessibility barriers are removed. It is recommended that the City develop an ADA Transition Plan, which it currently does not have.

6.2 Proposed Improvements to City of Sierra Vista Bicycle and Pedestrian Network

This section presents prioritized project recommendations for the Sierra Vista Safe Bicycle and Pedestrian Routes Plan. Projects are physical improvements to make the City of Sierra Vista more bicycle and pedestrian friendly. A wide range of projects are proposed, from on-street projects such as new bicycle lanes to off-street shared-use paths. In addition, shared roadway projects to facilitate connections to other facilities are proposed. As projects are planned, designed, and constructed, they should also address street crossings to make it easier and safer for bicyclists and pedestrians to cross major streets and intersections. Collectively, these projects will establish an interconnected bicycle and pedestrian network in the City of Sierra Vista.

Proposed projects consist of three categories: shared roadways, bicycle lanes, and shared-use paths. Proposed projects that will comprise the City of Sierra Vista Bicycle and Pedestrian Network are depicted in **Figure 12** and **Figure 13** and correspond to the projects numbered in **Table 20** (Shared Roadways), **Table 21** (Bicycle Lanes)**,** and **Table 22** (Shared-Use Paths).

Shared Roadways

As previously defined, shared roadways are local roadways that experience relatively lower vehicular traffic and have speeds that are 35 miles per hour or less, making them ideally suited for bicycle travel. Shared roadways provide continuity to other bicycle facilities (shared-use paths or bicycle lanes), or are preferred alternatives to routes with higher traffic volumes and speeds.

Table 20 is a listing of proposed shared roadways in the City of Sierra Vista. The network of shared roadways is depicted in **Figure 12** and **Figure 13** by the blue "Shared Roadway" symbology.

Implementation of shared roadways can begin immediately, as these projects may simply require signing (Bicycle Route signs) and/or pavement markings (Shared Lane markings). These projects are generally lower-cost and do not require significant engineering, capital, right-of-way acquisition, or project development (design/environmental clearance) costs.

Estimated Costs:

Costs for shared roadway improvements include signage and pavement markings. Many of the costs associated with providing and maintaining good bicycling surfaces should be incorporated into the overall initial project budget or maintenance plan. The costs of hazard identification, short-term sweeping, and spot maintenance programs will be minimized if bicyclist concerns are institutionalized within the regular maintenance and repair framework. Special repairs (such as drain grate repair/replacement) will vary considerably by project (accessed on 1/31/2011 at http://www.bicyclinginfo.org/bikesafe/countermeasure.cfm?CM_NUM=1).

Bicycle Lanes

Table 21 presents bicycle lane signing and striping and new shared-use paths projects. Project numbers correspond to those depicted **Figure 12** and **Figure 13**. Bicycle lane signing and striping and shared-use path projects may require significant funding, project development, environmental clearance, and potential purchase of right-of-way.

Bicycle lanes are not required on all streets; they are most effective on higher volume and higher speed streets to improve bicycle comfort and safety. Generally, bicycle lanes are proposed on arterial and collector streets with vehicular speeds of 25 miles per hour or more, and where adequate street width exists. However, as discussed previously, many City streets may require travel lane width reduction to accommodate the bicycle lanes.

Bicycle lanes should be designed and implemented in accordance with AASHTO's *Guide for the Development of Bicycle Facilities.*

Bicycle lanes should include pavement markings with directional arrows to indicate and reinforce to the bicyclist the correct direction to ride within the bicycle lane, reducing bicyclists riding while facing traffic.

Estimated Costs:

The cost of installing a bike lane is approximately $5,000 to $50,000 per mile depending on the condition of the pavement, the need to remove and repaint the lane lines, the need to adjust signalization, and other factors. It is most cost efficient to create bike lanes during street reconstruction, street resurfacing, or during original construction (accessed on 1/31/2011 at http://www.bicyclinginfo.org/bikesafe/countermeasure.cfm?CM_NUM=11).

Shared-Use Paths

Table 22 presents shared-use paths projects. Project numbers correspond to those depicted **Figure 12** and **Figure 13**.

Shared-use paths are generally 8- to 12-feet wide, separated from vehicular traffic, and only allow non-motorized uses. Shared-use paths should include appropriate signage at intersections and crossings and may be signed and striped to provide separation of users. However, shared-use paths adjacent to state highways (SR 90 and SR 92) are subject to ADOT, Traffic Group, PGP 1031, which states that "shared-use paths on State right-of -way parallel and adjacent to roadways shall not be marked or signed for the preferential or exclusive use of bicyclists. This includes the use of centerline markings, BIKE ROUTE signs, STOP or YIELD signs, or similar devices" (accessed on 1/31/2011 at http://www.azdot.gov/Highways/traffic/standards/PGP/TM1031.pdf).

Estimated Costs:

Many factors, including regional materials and construction costs, topography, complexity of the environment and need for structures, and others affect shared-use path costs. For a 10-foot-wide asphalt paved path with signs, minor drainage, and limited urban road crossings, the cost is approximately $250,000 per mile. Costs as high as $1,000,000 per mile have been reported. Design typically runs about 18 percent of the total construction value (accessed on 1/31/2011 at http://www.bicyclinginfo.org/bikesafe/countermeasure.cfm?CM_NUM=31).

6.3 Project Prioritization

Table 20 (Shared Roadways), **Table 21** (Bicycle Lanes)**,** and **Table 22** (Shared-Use Paths) were prioritized considering how the proposed projects met the needs of Sierra Vista residents in the areas of accessibility, safety, and connectivity, and then balancing these factors with the cost assessment of whether the project is simple, moderately complex, or complex. Rating factors as applied to each City of Sierra Vista proposed project are described in **Table 19.**

Table 19 – Prioritization Rating Criteria, Description, and Point System

Rating Criteria	Description	Point System
1. Connectivity between residential and major shopping and major work/employment locations	Project connects a residential neighborhood to provide direct access from a residential area to shopping or employment areas.	Yes = 1 point No= 0 points Weight of 1
2. Connectivity to recreation areas	Project connects to a public park.	Yes = 1 point No= 0 points Weight of 1
3. Connectivity to schools	Project connects to a public school or charter school.	Yes = 1 point No= 0 points Weight of 2
4. Improves safety	There has been a bicycle or pedestrian crash within the last five years within the project segment limits.	Yes = 1 point No = 0 points Weight of 3
5. Project serves as a critical missing linkage	Project serves as a critical missing link.	Yes = 1 point No= 0 points Weight of 2
6. Project complexity and cost	Estimate of the project cost and complexity. Complex projects require significant project development time to plan, design, and obtain environmental clearances. Simple projects may be implemented with minimal capital costs and require minimal planning and engineering.	Simple/Lower Cost Projects - 3 points Moderately Complex/Moderate Cost" - 2 Points Complex and Most Costly - 1 Point

The highest potential rating score for a project consistent with these criteria is 12 points. Rating factors scores were assigned to each project, as identified in **Table 20** (Shared Roadways), **Table 21** (Bicycle Lanes), and **Table 22** (Shared-Use Paths). The scores were subsequently summed. High priority projects are those with the highest scores (7 to 12 points). Medium priority projects received scores of 4 to 7 points. Low priority projects received less than 4 points.

Implementation of Signed Shared Roadways

Signed shared roadway projects often serve as linkages between existing facilities or proposed facilities (bike lanes or shared-use paths). As such, implementation of signed shared roadways should be considered in relation to other adjacent or connecting projects. **Table 20** "Comments" describes implementation considerations for shared roadway projects.

It should be emphasized that regardless of project priority designation, projects should be implemented if opportunities are identified through new development, redevelopment, or

major roadway reconstruction. Project prioritization serves as a guide to assist City staff in their pursuit of funding opportunities.

6.4 Coordination with General Plan Shared-Use Paths

The network of shared use paths proposed in the Plan serve to supplement those already identified in the City of Sierra Vista General Plan.

A number of the General Plan shared-use paths are located in areas that are currently undeveloped, primarily in the southeast and east areas of the City. Other planned shared-use paths are proposed to be constructed along greenways and wash areas. While these were not fully evaluated as part of this plan, they should be considered for implementation consistent with the General Plan. General Plan shared-use paths are reflected in **Figure 12** and **Figure 13** (in pink).

CITY OF SIERRA VISTA SAFE Bicycle and Pedestrian ROUTES PLAN

TASK ASSIGNMENT MPD 31-10

Shared Use Path
Paved 8 ft to 12 ft wide path, separated from street. Watch for equestrians, pedestrians and dogs. Suitable for slower bicycle speeds.

Bicycle Lane
On major street, with white edge line, 4 ft to 10 ft wide paved shoulder, speed limit 25 mph or more.

Shared Roadway
Selected bikable streets with maximum speed limit of 35 mph for vehicles. Appropriate for designation as a bicycle route with signage.

Northern Study Area

Southern Study Area

Study Area
Parcels
Roadways

Existing Facilities
Shared Use Paths
Bicycle Lanes

Proposed Projects
Shared Use Paths
Bicycle Lanes
Sidewalk Improvements
Shared Roadway
General Plan Shared Use Path

Public Schools

1. Carmichael Elementary School
2. Huachuca Mountain Elementary School
3. Village Meadows Elemantary School
4. Pueblo Del Sol Elementary School
5. Buena High School
6. Apache Middle School
7. Bella Vista Elementary School
8. T&C Elementary/Joyce C. Clark Middle School

Updated: May 17, 2011

Figure 12 - Existing Facilities and Proposed Projects

Northern Study Area

0 0.25 0.5 1 Miles

CITY OF SIERRA VISTA

SAFE Bicycle and Pedestrian ROUTES PLAN

TASK ASSIGNMENT MPD 31-10

Shared Use Path
Paved 8 ft to 12 ft wide path, separated from street. Watch for equestrians, pedestrians and dogs. Suitable for slower bicycle speeds.

Bicycle Lane
On major street, with white edge line, 4 ft to 10 ft wide paved shoulder, speed limit 25 mph or more.

Shared Roadway
Selected bikable streets with maximum speed limit of 35 mph for vehicles. Appropriate for designation as a bicycle route with signage.

Northern Study Area

Southern Study Area

Study Area
Parcels
Roadways

Existing Facilities
Shared Use Paths
Bicycle Lanes

Proposed Projects
Shared Use Paths
Bicycle Lanes
Sidewalk Improvements
Shared Roadway
General Plan Shared Use Path

Public Schools

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4. Pueblo Del Sol Elementary School
5. Buena High School
6. Apache Middle School
7. Bella Vista Elementary School
8. T&C Elementary/Joyce C. Clark Middle School

Updated: May 17, 2011

Figure 13 - Existing Facilities and Proposed Projects

Southern Study Area

0 0.25 0.5 1 Miles

Table 20 – Prioritization of Signed Shared Roadways

Street or Location	From	To	Length (miles)	Connectivity between Residential and Major Shopping / Work Locations		Connectivity to Parks		Connectivity to Schools		Improves Safety		Project Serves as a Critical Missing Link		Project Complexity *"Simple", Lower Cost Projects - 3 points "Moderately Complex" and Moderate Cost - 2 Points Complex and Most Costly - 1 Point*		Total Rating	Priority *Low Priority: 0 to 3 Points Medium Priority: 4 to 7 Points High Priority: 7 to 12 Points*	Comments
				Score	Weighted Score (x1)	Score	Weighted Score (x1)	Score	Weighted Score (x2)	Score	Weighted Score (x3)	Score	Weighted Score (x2)	Score	Weighted Score (x1)			
Signed Shared Roadways																		
Calle Portal	Memorial Veteran Park (north of Fry Boulevard)	Quail Run Drive	0.4	1	1	1	1	1	2	1	3	0	0	3	3	10	High	**Implement with Project No. 23 (Fry Blvd, Coronado to Avenida Escuela/MLK Shared-Use Path).** This project will improve north-south connectivity by connecting Veteran Memorial Park to the proposed bike route on Quail Run Drive. Links two parks and two schools
Canyon Drive	Fry Boulevard	Theater Drive	0.4	1	1	1	1	1	2	1	3	0	0	3	3	10	High	**Implement with Tacoma and Denman / Carmelita Shared Roadway.** Connects the proposed bike routes on Theatre Drive and Denman Avenue to Fry Blvd. Links to Len Roberts Park and Carmichael Elementary School.
Lenzner Avenue	Golf Links Road	Busby Drive	0.5	0	0	0	0	1	2	1	3	1	2	3	3	10	High	This is a low volume roadway suitable for bicycle route signage. Connects higher density housing areas to Joyce Clark Middle School and Town and Country Elementary School.
Quail Run (parts of this project are also on Calle del Norte, El Camino Real, and Calle Central)	Moorman Avenue	SR 92	1.2	1	1	1	1	1	2	0	0	1	2	3	3	9	High	**Implement with Project No. 4 (Busby Drive, Carmichael to Moorman Bicycle Lanes) and Project No. 28 (Busby Drive Extension).** Provides a connection to the proposed bike lanes on the western portion of Busby Drive and to the existing shared-use path on SR 92. Provides access to S.V. Regional Health Center, Nancy Hakes Park, and Village Meadows Elementary School. Planning and design of this project should consider crossing needs for bicyclists and pedestrians of SR 92. This should include assessment of locations and warrants for pedestrian hybrid signals.
North Avenue	James Dr	Kayetan Drive	0.1	1	1	1	1	1	2	0	0	1	2	3	3	9	High	**Implement with Kayetan Drive Shared Roadway.** Establish connectivity between Soldier Creek Park path, proposed shared-use paths west of Buffalo Soldier Trail, and shared-use paths south of SR 90, and to bike lanes on North. Provides access to Veritas Academy.
Sycamore Drive	North Ave	Norman Ave	0.1	1	1	1	1	1	2	0	0	1	2	3	3	9	High	**Implement with Kayetan Drive and North Ave Signed Shared Roadway projects.** Establish connectivity between Soldier Creek Park path, proposed shared-use paths west of Buffalo Soldier Trail, and shared-use paths south of SR 90, and to bike lanes on North. Provides access to Veritas Academy.

Table 20 – Prioritization of Signed Shared Roadways (continued)

Street or Location	From	To	Length (miles)	Connectivity between Residential and Major Shopping / Work Locations		Connectivity to Parks		Connectivity to Schools		Improves Safety		Project Serves as a Critical Missing Link		Project Complexity *"Simple", Lower Cost Projects - 3 points "Moderately Complex" and Moderate Cost - 2 Points Complex and Most Costly - 1 Point*		Total Rating	Priority *Low Priority: 0 to 3 Points Medium Priority: 4 to 7 Points High Priority: 7 to 12 Points*	Comments
				Score	Weighted Score (x1)	Score	Weighted Score (x1)	Score	Weighted Score (x2)	Score	Weighted Score (x3)	Score	Weighted Score (x2)	Score	Weighted Score (x1)			
Signed Shared Roadways (continued)																		
Campus Drive	SR 90 Bypass	Colombo Avenue	0.5	1	1	0	0	1	2	0	0	1	2	3	3	8	High	**Implement with Project No. 27 (Tacoma Street Shared-Use Path Connection to SR 90).** Creates an east-west connection between the SR 90 Bypass and Colombo Avenue. Provides access to Cochise College, Berean Academy, Plaza Vista and Walmart. Planning and design of this project should consider crossing needs for bicyclists and pedestrians of SR 90. This project should include assessment of locations and warrants for a pedestrian hybrid signal.
El Camino Real	Foothills Drive	Southern terminus of El Camino Real (approx. extension of Lexington Drive)	0.2	0	0	1	1	1	2	0	0	1	2	3	3	8	High	**Implement with Project No. 20 (El Camino Real to Oakmont /Avendia Cochise Shared-Use Path connection).** Provides a connection to the existing bike lanes on El Camino Real north of Foothills Drive. At north end, provides access to Village Meadows Elementary School and Nancy Hakes Park
Kayetan Drive	Buffalo Solider Trail	Carmichael	0.7	0	0	1	1	1	2	0	0	1	2	3	3	8	High	Provides connectivity between Buffalo Solider Trail and Carmichael. Within 1/4 mile of Len Roberts Park and Carmichael Elementary School
Busby Drive	Buffalo Soldier Trail	Carmichael Avenue	0.2	1	1	1	1	0	0	0	0	1	2	3	3	7	Medium	**Implement with Project No. 28 (Busby Drive Extension).** Provides a connection to the existing bike lanes on Buffalo Soldier Trail and to the proposed bike lanes on the western portion of Busby Drive. Provides access from residential areas to Fort Huachuca. Busby Drive from Carmichael to Buffalo Soldier Trail is too narrow to accommodate bike lanes. Since it is a low volume, residential street, it is suitable as a shared roadway.
Tacoma Street/Las Brisas (part of project on Theater Drive and 1st Street)	Pfister Avenue	Coronado	3	1	1	1	1	1	2	0	0	0	0	3	3	7	Medium	Provides east-west mobility connecting shared-use paths near Buffalo Solider Trail and Coronado. Also connects to north-south proposed bike lanes. Serves Veritas Charter School, Carmichael Elementary School, Bella Vista Elementary School and Len Roberts Park. Route ends near the Civic Center complex.
Tacoma St		Ball fields at east Tacoma Drive / SR 90	0.8	1	1	1	1	0	0	0	0	1	2	3	3	7	Medium	**Implement with Project No. 27 (Tacoma Street to SR 90 Shared-Use Path connection).** Provides connection to civic facilities on east Tacoma Drive, and Oscar Yrun Community Center and library.

Table 20 – Prioritization of Signed Shared Roadways (continued)

Street or Location	From	To	Length (miles)	Connectivity between Residential and Major Shopping / Work Locations		Connectivity to Parks		Connectivity to Schools		Improves Safety		Project Serves as a Critical Missing Link		Project Complexity *"Simple", Lower Cost Projects - 3 points "Moderately Complex" and Moderate Cost - 2 Points Complex and Most Costly - 1 Point*		Total Rating	Priority *Low Priority: 0 to 3 Points Medium Priority: 4 to 7 Points High Priority: 7 to 12 Points*	Comments
				Score	Weighted Score (x1)	Score	Weighted Score (x1)	Score	Weighted Score (x2)	Score	Weighted Score (x3)	Score	Weighted Score (x2)	Score	Weighted Score (x1)			
Signed Shared Roadways (continued)																		
Town and Country	Golf Links	Avenida Cochise	0.8	0	0	0	0	1	2	0	0	1	2	3	3	7	Medium	**Implement with Project No. 2 (Avenida Cochise, Buffalo Soldier Trail to SR 90 bike lanes).** This route connects existing bicycle lanes on Golf Links to future bicycle lanes on Avenida Cochise.
Busby Drive	SR 92	Avenida del Sol (follows Busby Drive until it ends and picks up on Corral Road)	0.8	1	1	0	0	0	0	0	0	1	2	3	3	6	Medium	**Implement with project No. 28 (Busby Drive Extension).** Provides a connection to the existing shared-use path on SR 92 and to the proposed bike lanes on Avenida del Sol. Project is within 1/4 mile of Cochise Crossroads Shopping Plaza. Will connect to the future shared-use path. Planning and design of this project should consider crossing needs for bicyclists and pedestrians of SR 92. This should include assessment of locations and warrants for pedestrian hybrid signals.
Denman Avenue and Carmelita Drive	Canyon Drive	Coronado Drive	1.7	0	0	1	1	1	2	0	0		0	3	3	6	Medium	**Implement with Canyon Drive Shared Roadway.** Creates an east-west connection north of Fry Boulevard. Connects the existing bike lanes on Carmichael Avenue with the existing shared-use path on Coronado Drive.
Greenbrier Road	Cherry Hills Drive	Mission Drive	0.3	0	0	1	1	0	0	0	0	1	2	3	3	6	Medium	Establishes connectivity to shared-use path through Coronado Crossings Trail. Requires connectivity improvements between Green Brier and Coronado Crossings Trail Shared-Use Path. If connectivity cannot be established, remove from designation as a Signed Shared Roadway.
Oakmont	Shared-Use Path extending from El Camino Real to Oakmont	Avendia Cochise	0.2	1	1	0	0	0	0	0	0	1	2	3	3	6	Medium	**Implement with Project No. 20 (El Camino Real to Oakmont /Avendia Cochise Shared-Use Path connection).** Establish connectivity between El Camino Real and Avendia Cochise. Provides a link to shared-use path that accesses the Mall at Sierra Vista.
Cardinal Drive and Martingale Road	El Camino Real	Golf Links Road	0.4	0	0	0	0	0	0	0	0	1	2	3	3	5	Medium	**Implement with north segment of El Camino Real Shared Roadway.** Provides a connection to the bike lanes on Golf Links Road.

Table 21 – Prioritization of Bicycle Lane Projects

Project Number	Street or Location	From	To	Length (miles)	Connectivity between Residential and Major Shopping and Work/Employment locations		Connectivity to Parks		Connectivity to Schools		Improves Safety		Project Serves as a Critical Missing Link		Project Complexity *"Simple", Lower Cost Projects - 3 points "Moderately Complex" and Moderate Cost - 2 Points Complex and Most Costly - 1 Point*		Total Rating	Priority *Low Priority: 0 to 3 Points Medium Priority: 4 to 7 Points High Priority: 7 to 12 Points*	Comments
					Score	Weighted Score (x1)	Score	Weighted Score (x1)	Score	Weighted Score (x2)	Score	Weighted Score (x3)	Score	Weighted Score (x2)	Score	Weighted Score (x1)			
Bicycle Lanes																			
9	Fry Boulevard	Buffalo Soldier Trail	SR 90 Bypass	2.9	1	1	1	1	1	2	1	3	1	2	2	2	11	High	Provides access to commercial uses and connects to multiple proposed and existing bike lanes and shared-use paths. Planning and design of this project should consider crossing needs for bicyclists and pedestrians of Fry Blvd. This should include assessment of locations and warrants for pedestrian hybrid signals. The project should also consider installation of raised pedestrian refuge crossing islands at marked and unmarked crosswalks. Provision of bike lanes may require narrowing of vehicle travel lanes.
5	Charleston Road	Colombo Avenue	SR 90 Bypass	0.5	1	1	0	0	1	2	1	3	1	2	2	2	10	High	Links shopping at SR 92 and east end of route is within a 1/4 mile of Cochise College and Berean Academy.
8	Foothills Drive	SR 92	Snyder Boulevard	1	0	0	1	1	1	2	1	3	1	2	2	2	10	High	Provides a connection from the bike lanes on El Camino Real to the shared-use path on Snyder Boulevard. Shoulder improvements will be required between Yucca and SR 92. Provides access (within 1/4 mile) to Purple Hearts Park and Pueblo del Sol Elementary School
1	7th Street	SR 90	Buffalo Soldier Trail	2.7	1	1	1	1	1	2	1	3	0	0	2	2	9	High	Provides a north-south route for bicyclists, which connects to multiple existing and proposed shared-use paths and bike lanes. It provides access to SAIC, A.V. Anderson Park, Imagine and First Baptist Charter Schools.
3	Avenida Del Sol / Giulio Cesare Avenue	Snyder Boulevard	Buena School Boulevard	2	1	1	1	1	1	2	1	3	0	0	2	2	9	High	Serves Buena High School, City Public Works, Pueblo de Sol Park and Purple Heart Park.

Table 21 – Prioritization of Bicycle Lane Projects (continued)

Project Number	Street or Location	From	To	Length (miles)	Connectivity between Residential and Major Shopping and Work/Employment locations		Connectivity to Parks		Connectivity to Schools		Improves Safety		Project Serves as a Critical Missing Link		Project Complexity *"Simple", Lower Cost Projects - 3 points "Moderately Complex" and Moderate Cost - 2 Points Complex and Most Costly - 1 Point*		Total Rating	Priority *Low Priority: 0 to 3 Points Medium Priority: 4 to 7 Points High Priority: 7 to 12 Points*	Comments
					Score	Weighted Score (x1)	Score	Weighted Score (x1)	Score	Weighted Score (x2)	Score	Weighted Score (x3)	Score	Weighted Score (x2)	Score	Weighted Score (x1)			
Bicycle Lanes (continued)																			
7	Foothills Drive	El Camino Real	SR 92	0.6	0	0	1	0	1	2	1	3	1	2	2	2	9	High	Provides a connection from the bike lanes on El Camino Real to the shared-use path on Snyder Boulevard. Shoulder improvements will be required between Yucca and SR 92. Provides access to Village Meadows Elementary School and Nancy Hakes Park.
14	SR 90	Buffalo Soldier Trail	SR 92	4.3	1	1	1	1	0	0	1	3	1	2	2	2	9	High	This project involves designation of existing shoulders, where adequate, as bicycle lanes. Where the existing shoulder is not adequate, widening would be required. This project provides a connection to the recommended bike lanes and existing shared-use path on SR 92. Links to numerous employers including Fort Huachuca, Northrup-Grumman, Aegis, and Plaza Vista Shopping Center, and Walmart. Planning and design of this project should consider crossing needs for bicyclists and pedestrians of SR 90.
11	Lenzner Avenue	Tacoma Street	Fry Boulevard	0.6	1	1	0	0	1	2	1	3	0	0	2	2	8	High	Provides north-south connectivity for bicyclists in the center of the city. Bike lanes are not feasible south of Busby Drive because the existing width of the roadway (24'). Serves the Bella Vista Elementary School and Fry Blvd Shopping (approx. 1/4 mile from K-mart).
15	SR 92	SR 90 Bypass	City of Sierra Vista City Limits	3.9	1	1	0	0	0	0	1	3	1	2	2	2	8	High	Currently, there is insufficient space for bike lanes. However, SR 92 ultimate improvements (in DCR phase) present an opportunity to construct wide shoulder/bike lanes. Planning and design of this project should consider crossing needs for bicyclists and pedestrians of SR 90.
2	Avenida Cochise	Buffalo Soldier Trail	Coronado Drive	0.7	0	0	0	0	0	0	1	3	1	2	2	2	7	High	Provides a connection to the existing bike lanes on Buffalo Soldier Trail. Provides access to employer SAIC.

Table 21 – Prioritization of Bicycle Lane Projects (continued)

Project Number	Street or Location	From	To	Length (miles)	Connectivity between Residential and Major Shopping and Work/Employment locations		Connectivity to Parks		Connectivity to Schools		Improves Safety		Project Serves as a Critical Missing Link		Project Complexity *"Simple", Lower Cost Projects - 3 points "Moderately Complex" and Moderate Cost - 2 Points Complex and Most Costly - 1 Point*		Total Rating	Priority *Low Priority: 0 to 3 Points Medium Priority: 4 to 7 Points High Priority: 7 to 12 Points*	Comments
					Score	Weighted Score (x1)	Score	Weighted Score (x1)	Score	Weighted Score (x2)	Score	Weighted Score (x3)	Score	Weighted Score (x2)	Score	Weighted Score (x1)			
Bicycle Lanes (continued)																			
4	Busby Drive	Carmichael Avenue	Moorman Avenue	1.5	0	0	1	1	1	2	0	0	1	2	2	2	7	High	Links shared roadways on either end. It will also connect to the bike lanes on Lenzner, El Camino Real, and the shared-use path on SR 92. This route serves Ciaramitaro Park, and is approximately 1/4 mile from Joyce Clark Middle School, on Lenzner.
6	Coronado Drive	Martin Luther King Jr. Parkway	Buffalo Soldier Trail	2.8	1	1	1	0	0	0	1	3	0	0	2	2	6	Medium	Provides a north-south route for bicyclists, which connects to multiple existing and proposed shared-use paths and bike lanes. Links shopping areas on Fry, Bella Vista Park, Veterans Memorial Park and residential areas.
12	Oakmont Drive	Avendia Cochise	Greenbrier Road	0.2	1	1	1	1	0	0	0	0	1	2	2	2	6	Medium	Connects the existing bike lane on Oakmont Dr to the existing bike lanes on Greenbrier Road. Greenbrier Road connects to the existing SR 92 shared-use path. Oakmont Drive is planned to be extended to Greenbrier. Bike lanes should be included in this project. Provides access to Mall at Sierra Vista
13	Snyder Boulevard	SR 92	Avenida Del Sol	1	0	0	0	0	0	0	1	3	0	0	2	2	5	Medium	Striping and signage will create a continuous bike lane on Snyder. Travel lanes and center turn lane should be reduced to accommodate bike lanes.
10	Golf Links Road	Buffalo Soldier Trail	7th Street	0.5	0	0	1	0	1	2	0	0	0	0	2	2	4	Medium	Provides a connection between the existing bike lanes on Buffalo Soldier Trail and Golf Links Road. Serves First Baptist Charter School and A.V. Anderson Park.

Table 22 – Prioritization of Shared-Use Path Projects

Project Number	Street or Location	From	To	Length (miles)	Connectivity between Residential and Major Shopping and Work/Employment locations		Connectivity to Parks		Connectivity to Schools		Improves Safety		Project Serves as a Critical Missing Linkage		Project Complexity "Simple", Lower Cost Projects - 3 points "Moderately Complex" and Moderate Cost - 2 Points Complex and Most Costly - 1 Point		Total Rating	Priority Low Priority: 0 to 3 Points Medium Priority: 4 to 7 Points High Priority: 7 to 12 Points	Comments
					Score	Weighted Score (x1)	Score	Weighted Score (x1)	Score	Weighted Score (x2)	Score	Weighted Score (x3)	Score	Weighted Score (x2)	Score	Weighted Score (x1)			
Shared-Use Paths																			
30	Avenida Del Sol / Giulio Cesare Avenue	Snyder Boulevard	Camino del Norte	0.5	0	0	1	1	1	2	1	3	1	2	1	1	9	High	Provides a connection to the existing shared-use paths on Snyder Boulevard. The section from SR 90 to Camino del Norte is currently in design. Provides a connection within a 1/4 mile to Purple Hearts Park and Pueblo del Sol Elementary School
18	Buffalo Soldier Trail	SR 90	Avenida Cochise	2.5	1	1	1	1	0	0	1	3	1	2	1	1	8	High	Connects to the existing shared-use path on Buffalo Soldier Trail at Avenida Cochise as well as to multiple shared-use paths and bike lanes on connecting streets. The route serves Fort Huachuca, SAIC, and Tompkins Park. There are some schools in the vicinity, but > 1/4 mi, so these were not included in the scoring. Public input is that shared use paths should be constructed on both sides of the roadway.
23	Fry Boulevard	Coronado Drive	Avenida Escuela to Martin Luther King, Jr.	1.2	0	0	1	1	1	2	1	3	0	0	1	1	7	High	Provides a connection to existing shared-use paths on SR 92 and Martin Luther King Jr. Parkway. Serves Veterans Memorial Park, Apache Middle School Planning and design of this project should consider crossing needs for bicyclists and pedestrians of Fry Blvd. This should include assessment of locations and warrants for pedestrian hybrid signals. The project should also consider installation of raised pedestrian refuge crossing islands at marked and unmarked crosswalks.
26	SR 92	Calle Mercancia	City Limit	2.5	1	1	0	0	0	0	1	3	1	2	1	1	7	High	This will fill gaps in the existing shared-use path along SR 92. It links the Mall at Sierra Vista to residential areas. Planning and design of this project should consider crossing needs for bicyclists and pedestrians of SR 92. This should include assessment of locations and warrants for pedestrian hybrid signals.

Table 22 – Prioritization of Shared-Use Path Projects (continued)

Project Number	Street or Location	From	To	Length (miles)	Connectivity between Residential and Major Shopping and Work/Employment locations		Connectivity to Parks		Connectivity to Schools		Improves Safety		Project Serves as a Critical Missing Linkage		Project Complexity "Simple", Lower Cost Projects - 3 points "Moderately Complex" and Moderate Cost - 2 Points Complex and Most Costly - 1 Point		Total Rating	Priority Low Priority: 0 to 3 Points Medium Priority: 4 to 7 Points High Priority: 7 to 12 Points	Comments
					Score	Weighted Score (x1)	Score	Weighted Score (x1)	Score	Weighted Score (x2)	Score	Weighted Score (x3)	Score	Weighted Score (x2)	Score	Weighted Score (x1)			
Shared-Use Paths (continued)																			
26	SR 92	Foothills Drive	Avenida Cochise (west side)	0.9	1	1	0	0	0	0	1	3	1	2	1	1	7	High	This will fill gaps in the existing shared-use path along SR 92. Also links residential areas to Mall at Sierra Vista.
17	Avenida Del Sol / Giulio Cesare Avenue	SR 90	Buena School Boulevard	1	1	1	0	0	1	2	0	0	1	2	1	1	6	Medium	Connects Buena High School, University of Arizona Campus, City Public Works, and residential area. Provides link between shared-use paths at both ends.
25	SR 90	7th Street	Coronado Drive	1	0	0	0	0	0	0	1	3	1	2	1	1	6	Medium	Provides a connection to proposed shared-use paths on Buffalo Soldier Trail and Coronado Dr.
26	SR 92	Buffalo Soldier Trail	City Limit	1.25	0	0	0	0	0	0	1	3	1	2	1	1	6	Medium	This will fill gaps in the existing shared-use path along SR 92.
21	Coronado Drive	SR 90 Bypass	Tacoma Street	0.5	1	1	0	0	0	0	0	0	1	2	2	2	5	Medium	Provides connectivity to the existing shared-use path on Coronado Drive south of Tacoma. Shared use path is currently in design. This route serves City Hall employment area.
16	7th Street	Wilcox Drive	Golf Links Road	0.9	0	0	1	1	1	2	0	0		0	1	1	4	Medium	Connects First Baptist and Imagine Charter Schools, and connects A.V. Anderson Park
19	Busby Drive	Carmichael Avenue	Moorman Avenue	1.5	0	0	1	1	0	0	0	0	1	2	1	1	4	Medium	Provides connection to the existing shared-use path on Lenzner Avenue and the proposed shared-use path on 7th Street. Provides a link between shared roadways at either end. Connects to Ciaramitaro Park at west end.

Table 22 – Prioritization of Shared-Use Path Projects (continued)

Project Number	Street or Location	From	To	Length (miles)	Connectivity between Residential and Major Shopping and Work/Employment locations		Connectivity to Parks		Connectivity to Schools		Improves Safety		Project Serves as a Critical Missing Linkage		Project Complexity "Simple", Lower Cost Projects - 3 points "Moderately Complex" and Moderate Cost - 2 Points Complex and Most Costly - 1 Point		Total Rating	Priority Low Priority: 0 to 3 Points Medium Priority: 4 to 7 Points High Priority: 7 to 12 Points	Comments
					Score	Weighted Score (x1)	Score	Weighted Score (x1)	Score	Weighted Score (x2)	Score	Weighted Score (x3)	Score	Weighted Score (x2)	Score	Weighted Score (x1)			
Shared-Use Paths (continued)																			
20	Undeveloped	El Camino Real	Oakmont	0.1	0	0	0	0	0	0	0	0	1	2	2	2	4	Medium	Connects El Camino Real to Oakmont Drive, with connection to Avenida Cochise by way of Oakmont Drive. This project could consist of a lower-cost surface such as chip seals or compacted stone.
26	SR 92	west side of 92, south of Fry	north end of Circle K to Fry Blvd.	0.2	0	0	0	0	0	0	0	0	1	2	2	2	4	Medium	This will fill gaps in the existing shared-use path along SR 92.
27	Tacoma Street	End of Tacoma Street	SR 90 Bypass	0.3	0	0	1	1	0	0	0	0	1	2	1	1	4	Medium	Provides connectivity to the existing shared-use path on SR 90 Bypass. Provides access to Oscar Yrun Community Center
31	Off street Shared-Use Path extending southwest of Town and Country	Town and Country	Buffalo Soldier Trail	0.4	1	1	0	0	0	0	0	0	1	2	1	1	4	Medium	Provide a connection between the proposed bike route on Town & Country and the existing shared-use path along Buffalo Shoulder Trail, eliminating the need to use high traffic streets.
24	Lenzner Avenue	Fry Boulevard	Golf Links Road	0.4	0	0	0	0	1	2	0	0	0	0	1	1	3	Low	Provides north-south connectivity for bicyclists and pedestrians in the center of the city. Bike lanes are not recommended south of Busby Drive because the existing width of the roadway (24') does not support bike lanes. Links residential areas to Joyce Clark Middle School and Pueblo Del Sol Elementary School.
28	Busby Drive (Extension)	Eastern terminus Busby Drive	Western terminus of Corral Road	0.3	0	0	0	0	0	0	0	0	1	2	1	1	3	Low	Provides a connection to the proposed shared roadways on Busby Drive and Corral Road
22	Coronado Drive	Busby Drive	Golf Links Road	0.5	0	0	0	0	0	0	0	0	0	0	1	1	1	Low	Provides a connection to the recommended shared-use path on Busby Drive.

6.5 Funding Opportunities

This section describes potential funding and assistance programs for shared-use paths, bike lanes, and sidewalks.

Funding for pedestrian improvements and/or new pedestrian facilities can be identified from a variety of sources, including Federal, State, regional, local, and private resources. A summary of the main components of each of the potential funding sources can be found in **Table 23.**

6.5.1 Federal Programs

This section identifies potential federal funding sources for pedestrian improvement projects. Federal transportation funding sources include the following and are discussed in detail below:

- Safe, Accountable, Flexible, Efficient Transportation Equity Act: a Legacy for Users (SAFETEA-LU)
- National Highway System (NHS)
- Bridge Program
- Surface Transportation Program (STP)
- Transportation Enhancement Activity (TE) Funds
- Highway Safety Improvement Program (HSIP)
- Safe Routes to School Program (SRTS)
- State and Community Traffic Safety Program (Section 402)
- Transportation and Community and System Preservation Pilot Program (TCSP)
- Job Access and Reverse Commute Program (JARC)
- Federal Transit Capital, Urban, and Rural Funds
- Community Development Block Grants (CDBG)

SAFETEA-LU

On August 10, 2005 the President signed into law SAFETEA-LU. The legislation updated Titles 23 and 49 of the United States Code (U.S.C.) and built upon the significant changes made to the Federal transportation policy and programs by the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) and the 1998 Transportation Equity Act for the 21st Century (TEA-21).

SAFETEA-LU addresses the many challenges facing our transportation system today — challenges such as improving safety, reducing traffic congestion, improving efficiency in freight movement, increasing intermodal connectivity, and protecting the environment — as well as laying the groundwork for addressing future challenges. SAFETEA-LU promotes more efficient and effective Federal surface transportation programs by focusing on transportation issues of national significance, while giving state and local transportation decision makers more flexibility for solving transportation problems in their communities. There is available funding for pedestrian facility improvements from the following Federal programs under SAFETEA-LU.

National Highway System (NHS)

The National Highway System (NHS) consists of all national highways and interstates within the United States. Under SAFETEA-LU, the NHS roads are eligible for funding for pedestrian facilities. Pedestrian facilities can include shared-use paths, shoulders, and sidewalks. NHS matching funds are 80 percent Federal and 20 percent state. Funding distribution is based on lane-miles of principal arterials (excluding interstates), vehicle miles traveled (VMT) on those arterials, diesel fuel used on the state's highways, and per capita principal arterial lane-miles.

Bridge Program

The Bridge Program enables states to replace or rehabilitate highway bridges on public roads when they are considered structurally deficient. Under this program, when a bridge is replaced or rehabilitated, pedestrian improvements are encouraged to allow safe pedestrian access to the bridge. The funds for pedestrian improvements can be used for on-street sidewalks and trails that are appropriate for the bridge and the location. The matching funds for the Bridge Program are 80 percent from Federal sources and 20 percent from the state. There is a requirement that at least 15 percent of the bridge apportionment be spent on bridges on public roads that are not Federal-aid highways (off-system bridges).

Surface Transportation Program (STP)

The STP provides flexible funding that may be used by states and localities for projects on any Federal-aid highway, including the National Highway System (NHS), bridge projects on public roads, transit capital projects, and public bus terminals and facilities. The program ensures the consideration of bicyclists and pedestrians in the planning process and facility design by requiring 10 percent of STP funding to be set-aside for Transportation Enhancements (discussed below), which can be spent on pedestrian-related improvements. The STP funds can be used for on-road facilities, off-road trails, construction of sidewalks, crosswalks, traffic calming projects, modification of sidewalks to comply with ADA requirements, bicycle and pedestrian signals, parking, and other supplementary facilities. The STP is funded by 80 percent Federal matching funds and 20 percent state matching funds. The STP has the broadest eligibility requirements, and therefore is considered by states and Metropolitan Planning Organizations (MPOs) as a primary source of funds for pedestrian projects. The STP is distributed based on lane-miles of Federal-aid highways, total VMT on those Federal-aid highways, and estimated contributions to the Highway Account of the Highway Trust Fund (HTF).

Transportation Enhancement (TE) Activity Funds

TE Activity funds are apportioned to the states by formulas, based on amounts made available from the STP under Title 23 U.S.C. 104(b)(3). There are 12 eligible activities for TE funds, and of those 12 there are three that apply directly to pedestrian improvements:

- Provision of facilities for bicyclists and pedestrians
- Provision of safety and educational activities for pedestrians and bicyclists

- Preservation of abandoned railroad corridors (including conversion and use for pedestrian and bicycle trails)

Although anyone can apply, interested applicants must be sponsored by a federal, state, tribal or local government. All local projects require a minimum of 5.7% hard cash match. Projects are selected through a competitive process.

Further information about the transportation enhancement grant program is available through ADOT Transportation Enhancements program.

Highway Safety Improvement Program (HSIP)

HSIP is a Federal-aid funding program authorized by SAFETEA-LU to achieve a significant reduction in traffic fatalities and serious injuries on all public roads. The HSIP emphasizes a data-driven, strategic approach to improving highway safety that focuses on results. HSIP funds may be obligated for pedestrian and bicycle safety improvements on any public road or publicly owned pedestrian or bicycle pathway.

To obligate funds, a state must develop and implement a strategic highway safety plan (SHSP), produce a program of projects or strategies to reduce safety problems, and evaluate the plan on a regular basis. States with a SHSP that meet the requirements of 23 USC 148 may obligate HSIP funds for projects on any public road or publicly owned bicycle and pedestrian pathway or trail. The term "highway safety improvement project" means a project described in the State SHSP that corrects or improves a hazardous road location or feature, or addresses a highway safety problem. The term includes a project for one or more of the following:

- An improvement for pedestrian or bicyclist safety or safety of the disabled;
- Construction of a traffic-calming feature; or
- Installation and maintenance of signs (including fluorescent, yellow-green signs) at pedestrian-bicycle crossings and in school zones.

Safe Routes to School (SRTS) Program

The SRTS program was created by the U.S. Congress to address the growing epidemic of childhood obesity and diabetes. The SRTS program enables states to substantially improve the ability of primary and middle school students to walk and bicycle to school safely. The program provides reimbursable funds for elementary/middle schools to implement projects to encourage children to walk and bicycle to school.

Interested applicants for SRTS funding are required to submit a project application to ADOT. Separate applications are required for each of the SRTS funding sources:

- Infrastructure Projects
- Non-Infrastructure Projects
- Materials and Regional Support Program
- Planning Assistance Program

No matching funds are allowed or permitted by the SRTS programs. Further information about the program is available through the ADOT Safe Routes to School program.

The funds are used towards infrastructure-related and behavioral projects that provide a safe and appealing walking atmosphere, which will encourage more students to walk or bike to school. Infrastructure-related projects are those that are engineered and typically require construction. Behavioral projects are those that are geared toward pedestrian education, enforcement, and encouragement.

State and Community Traffic Safety Program (Section 402)

The purpose of the Section 402 program is to assist states and communities with development and implementation of highway safety programs designed to reduce traffic crashes, deaths, injuries, and property damage. The funds are allocated based 75 percent on road miles and 25 percent on population. The funds may be used for highway safety projects and programs including those that improve pedestrian safety. Some of these programs include training courses for traffic engineers, safety-related events, enforcement, and education materials.

Transportation and Community and System Preservation (TCSP) Pilot Program

The TCSP is a competitive grant program designed to support exemplary or innovative projects that show how transportation projects and plans, community development, and preservation activities can be integrated to create communities with a higher quality of life. The annual grant program is administered by the FHWA, in partnership with the Federal Transit Administration (FTA) and US Environmental Protection Agency (EPA), and may be used to fund State, metropolitan planning organization (MPO), or local government agencies. Eligible projects that relate to pedestrian improvements include traffic calming and a broad range of pedestrian facility projects. These projects can act as a feature in other projects that address larger land use and transportation issues. These funds must be equitably distributed to a diversity of populations and geographic regions. A local match is required in accordance with Title 23, U.S.C.120 (b).

Job Access and Reverse Commute (JARC) Program

The JARC program provides grants to local governments and non-profit organizations to develop transportation services to connect welfare recipients and low-income persons to employment and support services. Job Access projects are targeted at developing new or expanded transportation services such as shuttles, vanpools, new bus routes, connector services to mass transit, and guaranteed ride home programs for welfare recipients and low-income persons. Reverse Commute projects provide transportation services to suburban employment centers from urban, rural and other suburban locations for all populations. Eligible applicants include private nonprofit organizations, State or local governmental authorities, and operators of public transportation services including private operators of public transportation services. The JARC program may include activities that support pedestrian- and bicycle-related facilities as long as they are related to transit and commuting as opposed to recreation purposes. All projects funded under this program must be derived from a locally developed, coordinated public transit-human services transportation planning process.

Federal Transit Capital, Urban, and Rural Funds

Federal Transit Capital, Urban, and Rural Funds (Title 49 U.S.C. 5311) provides formula funding to states for the purpose of supporting public transportation in areas with a population less than 50,000. The statutory formula is 80 percent based on the non-urbanized population of the states, and 20 percent is based on land area. No state may receive more than five percent of the amount apportioned for land area. In addition, the FTA adds amounts apportioned based on non-urbanized population according to the growing states formula factors of Title 49 U.S.C. 5340 to the amounts apportioned to the states under the Section 5311 program.

Funds may be used for capital, operating, and administrative assistance to state agencies, local public bodies, Indian tribes, nonprofit organizations, and operators of public transportation services. The state must use 15 percent of its annual apportionment to support intercity bus service, unless the Governor certifies, after consultation with affected intercity bus providers that these needs of the state are adequately met.

The maximum Federal share for capital and project administration is 80 percent (except for projects to meet the requirement of the Americans with Disabilities Act (ADA), the Clean Air Act, or bicycle access projects, which may be funded at 90 percent.) The maximum Federal share for operating assistance is 50 percent of the net operating costs. The local share is 50 percent, which will come from an undistributed cash surplus, a replacement or depreciation cash fund or reserve, or new capital.

Community Development Block Grants (CDBG)

The CDBG program is administered by the U.S. Department of Housing and Urban Development (HUD) to assist low- to moderate-income neighborhoods. Residents of the neighborhood work closely with city staff to develop a plan for their awarded funds. A neighborhood can choose to spend CDBG monies on installation and repair of curbs, gutters, sidewalks, and installation of streetlights.

6.5.2 State Programs

The following section discusses Arizona State funding sources for pedestrian improvement projects, which include the following:

- State Sales Tax
- Local Transportation Assistance Fund (LTAF)

The funds are generated from the Arizona Lottery, state taxes, and a percentage of monies from other state funding sources that do not typically fund pedestrian projects. Each state resource is discussed in detail on the following page.

State Sales Tax

State sales tax revenues, as with local jurisdiction sales tax revenues, are generally budgeted to high priority programs and needs, which generally have not included bicycle and pedestrian improvements; however, these revenues are available for bicycle and pedestrian facilities and programs.

Local Transportation Assistance Fund (LTAF) (PROGRAM SUSPENDED IN 2010)

LTAF funds are generated by the Arizona Lottery and must be used for transit purposes in all jurisdictions. These funds may be available for the construction of sidewalks, bicycle racks, and other facilities that directly relate to transit use. Each incorporated city and town in Arizona may apply for and receive a portion of the $23 million the Lottery annually contributes to the LTAF. The monies are used for a variety of transportation-related purposes, many of which improve pedestrian facilities, including street maintenance and improvements, street lighting, transportation service for the elderly and disabled, curbs, gutters, and sidewalks.

Annually, each municipality may use up to 10 percent of its LTAF monies, if matched with private monies for cultural, educational, historical, or recreational programs.

6.5.3 Private Programs

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

Opportunities to Improve Bicycle and Pedestrian Facilities with Development

Construction of pedestrian facilities in conjunction with new development is more cost effective than adding pedestrian facilities at a later date. Arizona Revised Statues enable jurisdictions to regulate land use, setbacks, and parking requirements, and require dedication of right-of-way "in order to conserve and promote the public health, safety, and general welfare" of the public.

Land use planning should be integrated with transportation planning, as land use patterns can have a positive or detrimental impact on pedestrian safety. Significant improvements to pedestrian infrastructure can be achieved when pedestrian considerations are made throughout the zoning, rezoning, site design, and site plan approval process.

Pertinent Arizona Revised Statutes include:

9-462.01. Zoning regulations; public hearing; definitions

> A. Pursuant to this article, the legislative body of any municipality by ordinance may in order to conserve and promote the public health, safety and general welfare:

9-461.05. General plans; authority; scope

> A. Each planning agency shall prepare and the governing body of each municipality shall adopt a comprehensive, long-range general plan for the development of the municipality. The planning agency shall coordinate the production of its general plan with the creation of the state land department conceptual land use plans under title 37, chapter 2, article 5.1 and shall cooperate with the state land department regarding integrating the conceptual state land use

plans into the municipality's general land use plan. The general plan shall include provisions that identify changes or modifications to the plan that constitute amendments and major amendments. The plan shall be adopted and readopted in the manner prescribed by section 9-461.06.

C. The general plan shall consist of a statement of community goals and development policies. It shall include maps, any necessary diagrams and text setting forth objectives, principles, standards and plan proposals. The plan shall include the following elements:

1. A land use element that:

(c) Identifies specific programs and policies that the municipality may use to promote infill or compact form development activity and locations where those development patterns should be encouraged.

2. A circulation element consisting of the general location and extent of existing and proposed freeways, arterial and collector streets, bicycle routes and any other modes of transportation as may be appropriate, all correlated with the land use element of the plan.

D. For cities and towns having a population of more than two thousand five hundred persons but less than ten thousand persons and whose population growth rate exceeded an average of two per cent per year for the ten year period before the most recent United States decennial census and for cities and towns having a population of ten thousand or more persons according to the most recent United States decennial census, the general plan shall include, and for other cities and towns the general plan may include:

2. A growth area element, specifically identifying those areas, if any, that are particularly suitable for planned multimodal transportation and infrastructure expansion and improvements designed to support a planned concentration of a variety of uses, such as residential, office, commercial, tourism and industrial uses. This element shall include policies and implementation strategies that are designed to:

(a) Make automobile, transit and other multimodal circulation more efficient, make infrastructure expansion more economical and provide for a rational pattern of land development.

(b) Conserve significant natural resources and open space areas in the growth area and coordinate their location to similar areas outside the growth area's boundaries.

E. The general plan shall include for cities of fifty thousand persons or more and may include for cities of less than fifty thousand persons the following elements or any part or phase of the following elements:

9. A bicycling element consisting of proposed bicycle facilities such as bicycle routes, bicycle parking areas and designated bicycle street crossing areas.

9-463.01. Authority

A. Pursuant to this article, the legislative body of every municipality shall regulate the subdivision of all lands within its corporate limits.

B. The legislative body of a municipality shall exercise the authority granted in subsection A of this section by ordinance prescribing:

1. Procedures to be followed in the preparation, submission, review and approval or rejection of all final plats.

2. Standards governing the design of subdivision plats.

3. Minimum requirements and standards for the installation of subdivision streets, sewer and water utilities and improvements as a condition of final plat approval.

Development Impact Fees

New developments, both residential and commercial, place a strain on existing public facilities, such as parks and streets. Development impact fees are paid by the developers to help cover the additional costs associated with upgrading affected public facilities resulting from new construction. These funds may be used for the provision of paved shoulders, parks, and sidewalks built as part of the required roadway cross section. In some circumstances, shared-use paths have been constructed by jurisdictions using impact fees if they serve transportation needs generated by the new development.

Table 23 summarizes the main components of each of the potential funding sources.

Table 23 – Potential Funding Sources for Bicycle and Pedestrian Improvements

Funding Programs	Project Type (constr, non-constr.)	Required Matching Funds	Eligible Projects	Comments	Source
Federal Programs					
National Highway System (NHS)	Both	20%	Construction of shared-use paths, shoulders, and sidewalks. These facilities can be placed alongside the road or on a separate path parallel to the road.	Under SAFETEA-LU, the NHS is eligible for pedestrian facilities, and pedestrians can and should be expected to use the NHS, especially in urban and suburban areas.	http://www.fhwa.dot.gov/safetealu/summary.htm http://www.fhwa.dot.gov/environment/bikeped/bp-guid.htm#bp4
Bridge Program	Construction	20%	Construction of on-street sidewalks and trails that are appropriate for the bridge and the location.	Under this program, when a bridge is replaced or rehabilitated, pedestrian improvements are encouraged to allow safe pedestrian access to the bridge.	http://www.fhwa.dot.gov/safetealu/summary.htm http://www.fhwa.dot.gov/environment/bikeped/bp-guid.htm#bp4
Surface Transportation Program (STP)	Both	20%	Construction of sidewalks, crosswalks, traffic-calming projects, on-road facilities, off-road trails, modification of sidewalks to comply with ADA requirements, bicycle and pedestrian signals, parking, and other supplementary facilities.	10% dedicated to TE program; 10% dedicated to HES and rail crossings.	http://www.fhwa.dot.gov/safetealu/summary.htm http://www.fhwa.dot.gov/environment/bikeped/bp-guid.htm#bp4
Transportation Enhancement (TE) Activity	Both	5.7% Hard Cash Match	Provision of facilities for bicyclists and pedestrians, provision of safety and educational activities for pedestrians and bicyclists, preservation of abandoned railroad corridors (including conversion and use for pedestrian and bicycle trails).	Administered by ADOT, Environmental and Enhancement Group, Transportation Enhancement and Scenic Roads Section.	http://www.azdot.gov/Highways/SWProjMgmt/enhancement_scenic/
Highway Safety Improvement Program (HSIP)	Construction	20%	Pedestrian and bicycle safety improvements on any public road or publicly owned pedestrian or bicycle pathway.	When a state develops and implements a State Strategic Highway Safety Plan, 10% of their HSIP funds become available that can be used for other pedestrian and bicycle improvement projects.	http://www.fhwa.dot.gov/safetealu/summary.htm http://www.fhwa.dot.gov/environment/bikeped/bp-guid.htm#bp4
Safe Routes to School	Both	N/A	Infrastructure related and behavioral projects that provide a safe and appealing walking atmosphere.	10-30% of each state's funding is to be spent on non-infrastructure activities.	http://www.fhwa.dot.gov/safetealu/summary.htm http://www.fhwa.dot.gov/environment/bikeped/bp-guid.htm#bp5
State and Community Traffic Safety Program, Section 402	Both	20%	Highway safety projects, training courses for traffic engineers, safety-related events, enforcement, and education materials.	The purpose of the program is to assist states and communities with development and implementation of highway safety programs designed to reduce traffic crashes, deaths, injuries, and property damage.	http://www.fhwa.dot.gov/safetealu/summary.htm http://www.fhwa.dot.gov/environment/bikeped/bp-guid.htm#bp5
Transportation and Community and System Preservation (TCSP) Pilot Program	Both	20%	Traffic calming, and a broad range of pedestrian facility projects.	Administered by the FHWA, in partnership with the FTA and EPA, and may be used to fund State, MPO, or local government agencies.	http://www.fhwa.dot.gov/safetealu/summary.htm http://www.fhwa.dot.gov/environment/bikeped/bp-guid.htm#bp7
Job Access and Reverse Commute (JARC)	Non-construction	50%	Supports pedestrian and bicycle-related facilities as long as they are related to transit and commuting as opposed to recreation purposes.	All projects funded under this program must be derived from a locally developed, coordinated public transit-human services transportation planning process.	http://mpd.azdot.gov/mpd/Community_Grant_Services/ProgGuide.asp
Federal Transit Capital, Urban, Rural Funds	Non-construction	20% (capital and project administration); 50% (operating assistance)	Capital, operating, and administrative assistance to state agencies, local public bodies, Indian tribes, nonprofit organizations, and operators of public transportation services.	15 percent of the state's annual apportionment must go to support intercity bus service.	http://www.fhwa.dot.gov/safetealu/summary.htm http://www.fhwa.dot.gov/environment/bikeped/bp-guid.htm#bp7
Community Development Block Grants (CDBG)	Both	N/A	Installation and repair of curbs, gutters, sidewalks, and installation of streetlights.	Administered by the U.S. Department of Housing and Urban Development (HUD) to assist low to moderate income neighborhoods.	http://www.hud.gov/offices/cpd/communitydevelopment/programs/

Table 23 – Potential Funding Sources for Bicycle and Pedestrian Improvements

Funding Programs	Project Type (constr., non-constr.)	Required Matching Funds	Eligible Projects	Comments	Source
Arizona Programs					
State Sales Tax	Construction	N/A	Pedestrian facilities and programs	None	http://www.azbikeped.org/
Local Transportation Assistance Fund (LTAF) *NOTE: THIS PROGRAM WAS SUSPENDED IN 2010.*	Both	Match from private monies is required if used for cultural, educational, historical, and recreational programs.	Street maintenance and improvements, street lighting, transportation service for the elderly and disabled, curbs, gutters, and sidewalks.	Funds are generated from the Arizona Lottery.	http://www.azdot.gov/mpd/Community_Grant_Services/STF.asp
Private Programs					
Development Impact Fees	Construction	N/A	Provision of paved shoulders, parks, and sidewalks built as part of the required roadway cross section.	Development impact fees are paid by the developers to help cover the additional costs associated with upgrading affected public facilities resulting from new construction.	Statewide Bicycle and Pedestrian Plan; A.R.S. 9-463.05; http://www.walkinginfo.org/funding/sources-private.cfm