San Xavier District Pedestrian Access and Safety Study

FINAL REPORT

December 31, 2009

HDR

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A. Current Conditions

1. Introduction

1.1 Background

The San Xavier District of the Tohono O'odham Nation is home to approximately 2,000 people. Numerous others come to the District to visit the San Xavier del Bac Mission Church. The San Xavier District Pedestrian Access and Safety Study is being prepared to improve the walking and bicycling environment on the San Xavier District for Community members and visitors alike.

The study is being funded by the Arizona Department of Transportation (ADOT) Multimodal Planning Division's Planning Assistance for Rural Areas (PARA) program. The PARA program provides federal funds to non-metropolitan communities for the purpose of conducting transportation planning studies. All Native American tribes in Arizona are eligible for funding and PARA funds may be applied to address a broad range of planning issues related to roadway and non-motorized transportation modes. ADOT encourages communities to focus their requests for funding on the most critical transportation planning needs identified in their communities; hence the focus here on pedestrians and bicyclists.

The District Community members desire to establish a system of pathways that connects residential areas with community centers in safety and privacy. In 2006, the San Xavier District Planning Department prepared a Pedestrian Access Concept Plan that identified a 5.5-mile network of pathways linking residential areas with community activity centers. The Project Team, led by HDR Engineering, Inc. (HDR), will build on this first effort to prepare a pedestrian improvement plan that prioritizes needs and links projects to specific funding sources.

Currently, HDR is also conducting a study for a new pedestrian bridge crossing of the Santa Cruz River. The San Xavier Loop Road Pedestrian Bridge Project is Regional Transportation Authority funded project to "provide a multi-use pedestrian crossing structure over the Santa Cruz River adjacent to the Interstate 19 (I-19) southbound on-ramp. The pedestrian bridge will link the Community with the portions of the San Xavier District separated by I-19."

This study encompasses the most densely populated region of the District, generally that area of the District north of Campus Drive and east of Mission Road. Refer to Figure 1, Study Area.

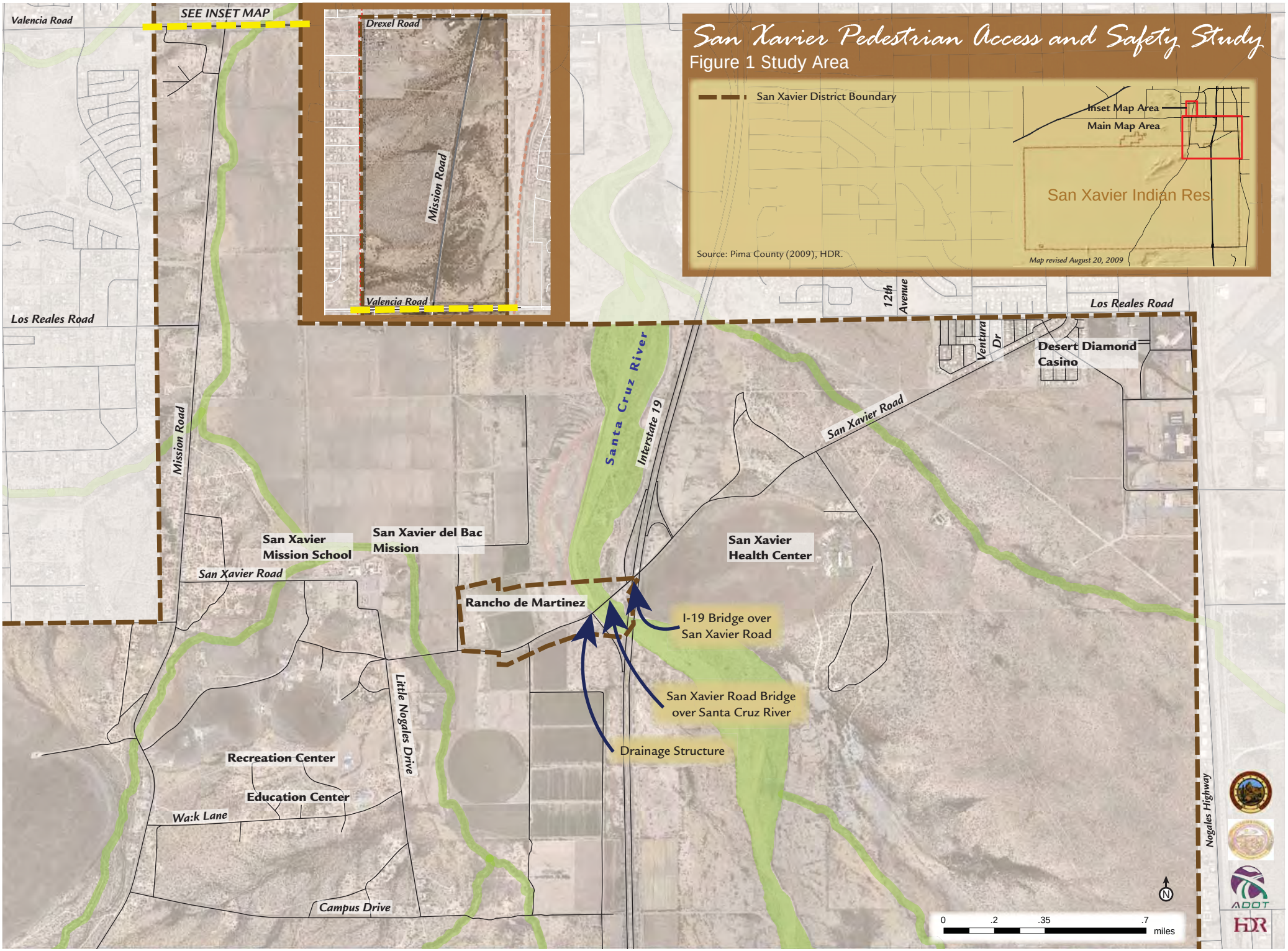
1.2 Key Issues

Walking is an important mode of transportation in the San Xavier District. The National Center for Chronic Disease Prevention and Health Promotion recommends walking as the best type of physical activity to control blood sugar, weight, and blood pressure and prevent heart and blood flow problems. Local health officials estimate that over half of the more than 2,000 residents suffer from diabetes. Additionally, U.S. Census 2000 data shows that statewide 93 percent of Arizona households own at least one automobile; in the San Xavier District only 86 percent of households own at least one automobile. This means that walking is the primary mode of transport for 14 percent of households – twice the state percentage.

Children, elderly, and persons with visual impairments walk more than most other people. These are often the most vulnerable pedestrians. Narrow roadways with no sidewalks or shoulders and frequent

driveway openings are pedestrian hazards. The narrow two-lane bridge across the Santa Cruz River has no room for pedestrians or bicyclists.

Americans With Disabilities Act (ADA) guidelines are also important to consider. Planning for and building facilities that are universally accessible makes them more likely to be used by persons with a wide range of abilities. Ramps that benefit people in wheelchairs also benefit people pushing strollers or workers using wheeled trolleys.


San Xavier Pedestrian Access and Safety Study
Figure 1 Study Area
San Xavier District Boundary
Inset Map Area
Main Map Area
San Xavier Indian Res.
Source: Pima County (2009), HDR.
Map revised August 20, 2009
SEE INSET MAP
Valencia Road
Drexel Road
Mission Road
Valencia Road
Los Reales Road
Mission Road
12th Avenue
Los Reales Road
Ventura Dr
Desert Diamond Casino
Santa Cruz River
Interstate 19
San Xavier Road
San Xavier Mission School
San Xavier del Bac Mission
San Xavier Health Center
San Xavier Road
Rancho de Martinez
I-19 Bridge over San Xavier Road
San Xavier Road Bridge over Santa Cruz River
Drainage Structure
Little Nogales Drive
Recreation Center
Education Center
Wa:k Lane
Campus Drive
Nogales Highway
N
0 .2 .35 .7 miles
ADOT
HDR

2. Existing Conditions

2.1 Roadway Characteristics

Limited right of way (ROW) and narrow roadway sections present challenges for a multi-modal system. This section identifies the roadway characteristics and identifies some of the opportunities and constraints in developing a multi-modal system for the District.

Roadway Type and Width

San Xavier Road and Mission Road are 24 feet of asphalt, consisting of two 12-foot lanes in each direction. Little Nogales Drive and San Xavier Road to the west of Little Nogales Drive are 22 feet of paved asphalt consisting of two 11-foot lanes in each direction. In the community, all the major roadways have dirt shoulders. The minor roads that lead to Community member-only areas are dirt roads. Curb and gutter or sidewalks do not currently exist within the community. Sidewalks are currently being constructed at the Mission and there is an asphalt path that connects the recreation and education centers. The lack of paths in the community makes it especially difficult for persons with disabilities to get to their destinations.

Structures

There are two bridge structures within the study area. One is the I-19 Freeway bridge over San Xavier Road and the other is San Xavier Road over the Santa Cruz River. See Figure 1 for the bridge locations.

Speed Limits

The speed limits are as follows:

- Mission Road is 45 mph
- San Xavier Road east of Little Nogales Drive is 35 mph
- San Xavier Road between Little Nogales Drive and Mission Road is 35 mph except near the school where it is 15mph in the school zone
- Little Nogales Drive is 25 mph

Right of Way

Research on the ROW plans within the study area indicate that ROW is not well defined and would require significant research to adequately ascertain ROW. The information discovered during research for this project is summarized here:

- Mission Road and San Xavier Road are maintained by Pima County and have 60-foot rights-of-way.
- Little Nogales Drive, Campus Drive, and other community roads are under the Tohono O'odham Nation.
- Little Nogales Drive and Campus Drive are managed by the Bureau of Indian Affairs and have 60-foot rights-of-way.
- The design team for the pedestrian bridge structure over the Santa Cruz River would like to place the structure on the south side of the existing roadway structure as there is 50 feet of ROW from the bridge centerline to the south, and only 40 feet of ROW from the existing centerline of the bridge to the north.
- San Xavier Road west of the bridge over the Santa Cruz River has 40 feet of ROW on each side of the roadway centerline.

- San Xavier Road east of the I-19 Bridge has 40 feet of ROW on each side of the existing centerline of the road.

Clear Zone

Clear zone is defined as an unobstructed, relatively flat area beyond the edge of the traveled way that allows a driver to stop safely or regain control of a vehicle that leaves the traveled way. Without curb and gutter this clear zone distance will need to be maintained between the edge of travel way and the edge of the walkway. The distances defined below are from the American Association of State Highway and Transportation Officials (AASHTO) Roadside Design Guide, and are dependant on the Average Daily Traffic (ADT) of the roadway. Although it is recommended that the pathway is located outside the clear zone; it is not mandatory. Table 1 lists the recommended clear zone width for selected study area roads.

Table 1 Roadway Clear Zone

Segment	From	To	Speed (mph)	Recommended Clear Zone Width (ft)
San Xavier Rd.	I-19 NB On Ramp	Ventura Dr.	35	12 to 14
San Xavier Rd.	I-19 SB Off Ramp	I-19 NB On Ramp	35	12 to 14
San Xavier Rd.	Little Nogales Dr.	I-19 SB Off Ramp	35	12 to 14
San Xavier Rd.	Mission Rd.	Little Nogales Dr.	25	12 to 14
Mission Rd.	Valencia Rd.	San Xavier Rd.	45	16 to 18
Little Nogales Dr.	San Xavier Rd. (north)	San Xavier Rd. (south)	25	12 to 14
Little Nogales Dr.	Wa:k Ln.	Campus Dr.	25	7 to 10

Source: AASHTO Roadside Design Guide, March 2006

Intersections

Figure 2 through Figure 4 show the intersection lane configuration and traffic control at the major roadway intersections in the study area.

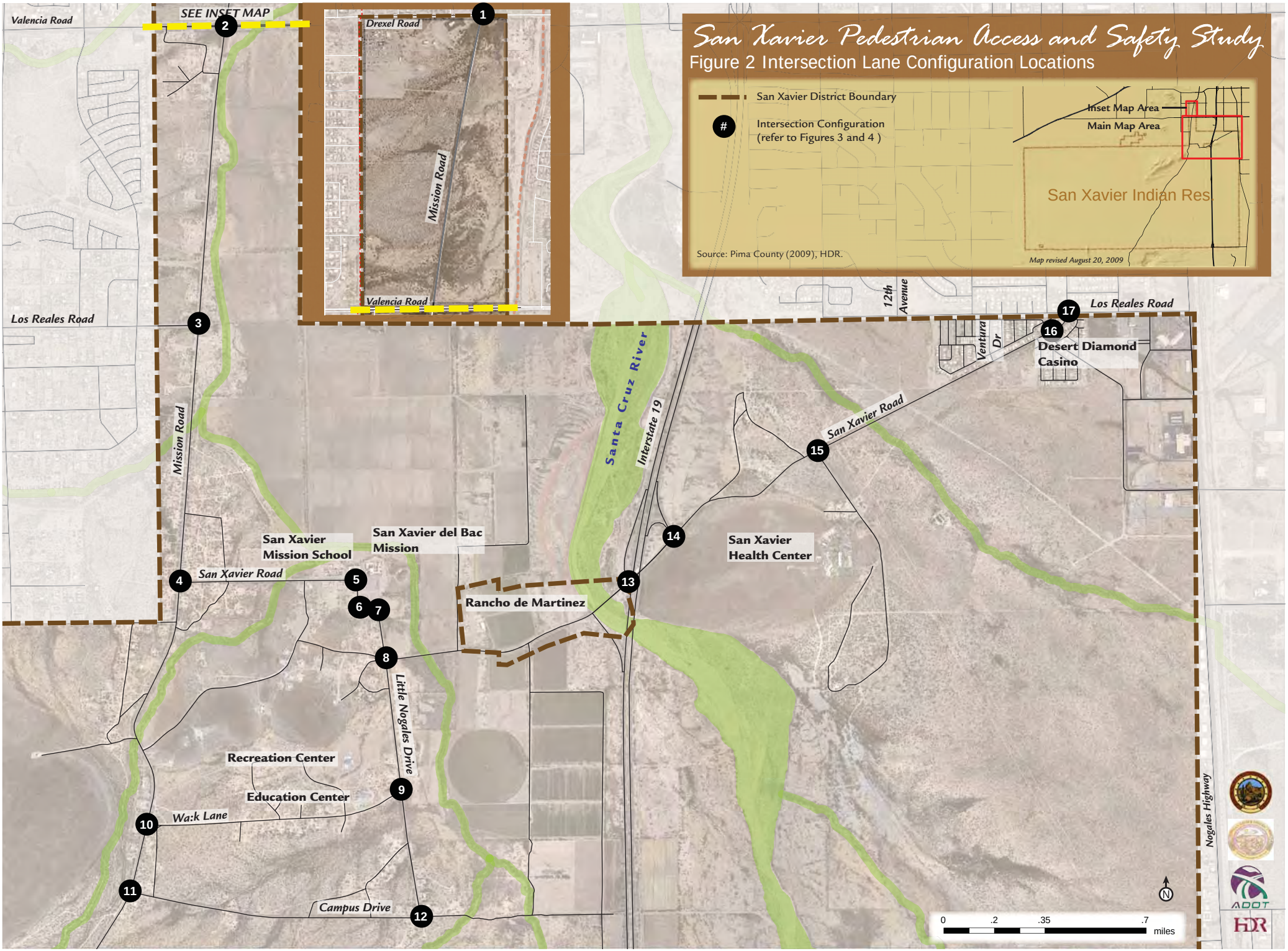

San Xavier Pedestrian Access and Safety Study
Figure 2 Intersection Lane Configuration Locations
San Xavier District Boundary
Intersection Configuration (refer to Figures 3 and 4)
Inset Map Area
Main Map Area
San Xavier Indian Res.
Source: Pima County (2009), HDR.
Map revised August 20, 2009
SEE INSET MAP
Valencia Road
Drexel Road
Mission Road
Los Reales Road
12th Avenue
Ventura Dr
Desert Diamond Casino
Santa Cruz River
Interstate 19
San Xavier Road
San Xavier Mission School
San Xavier del Bac Mission
San Xavier Health Center
Rancho de Martinez
Little Nogales Drive
Recreation Center
Education Center
Wa:k Lane
Campus Drive
Nogales Highway
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
0 .2 .35 .7 miles
N
ADOT
HDR

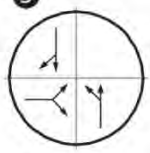
Figure 3. Intersection Lane Configurations (1 of 2)

1 

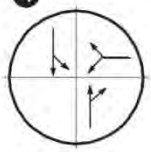
Mission Rd and Drexel Rd - Signalized

2 

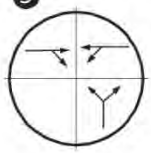
Mission Rd and Valencia Rd - Signalized

3 

Mission Rd and Los Reales Rd - Stop Control on Los Reales Rd

4 

San Xavier Rd and Mission Rd - Stop Control on San Xavier Rd.

5 

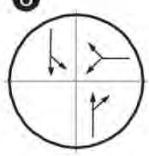
San Xavier Rd and Little Nogales Rd - All Way Stop Control

6 

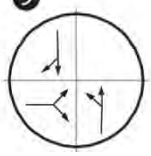
Little Nogales Rd and Private Dr - All Way Stop Control

7 

Little Nogales Rd and Parking Lot Dr - All Way Stop Control

8 

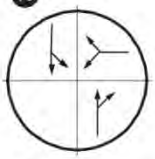
San Xavier Rd and Little Nogales Rd - Stop Control and Yield Control

9 

Little Nogales Rd and Wa:k Ln - Stop Control on Wa:k Ln

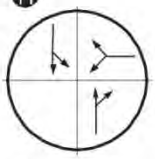
Figure 4. Intersection Lane Configurations (2 of 2)

10



Mission Rd and Wa:k Ln - Stop Control on Wa:k Ln

11

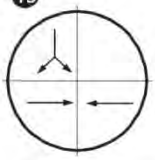


Mission Rd and Campus Dr - Stop Control on Campus Dr

12

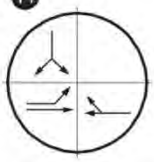
Campus Dr and Little Nogales Rd - Most Traffic Yield at Intersection

13



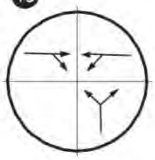
I-19 Off Ramp - Stop Control on Ramp

14



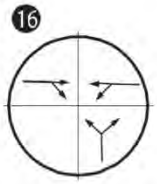
I-19 Off Ramp - Stop Control on Ramp

15



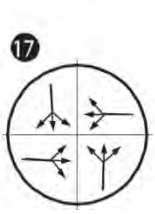
San Xavier Rd and SJ Stock Rd - Stop Control on SJ Stock Rd.

16



San Xavier Rd and Comobabi St - Stop Control on Combabi St

17



San Xavier Rd and Los Reales Rd - All Way Stop Control

Functional Classification

Based on ADOT's roadway functional classification, the roadways in the study area are designated as shown in the table below and in Figure 5. Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide (Federal Highways Administration, 2009). The purpose of functional classification is to set capital improvement and maintenance priorities.

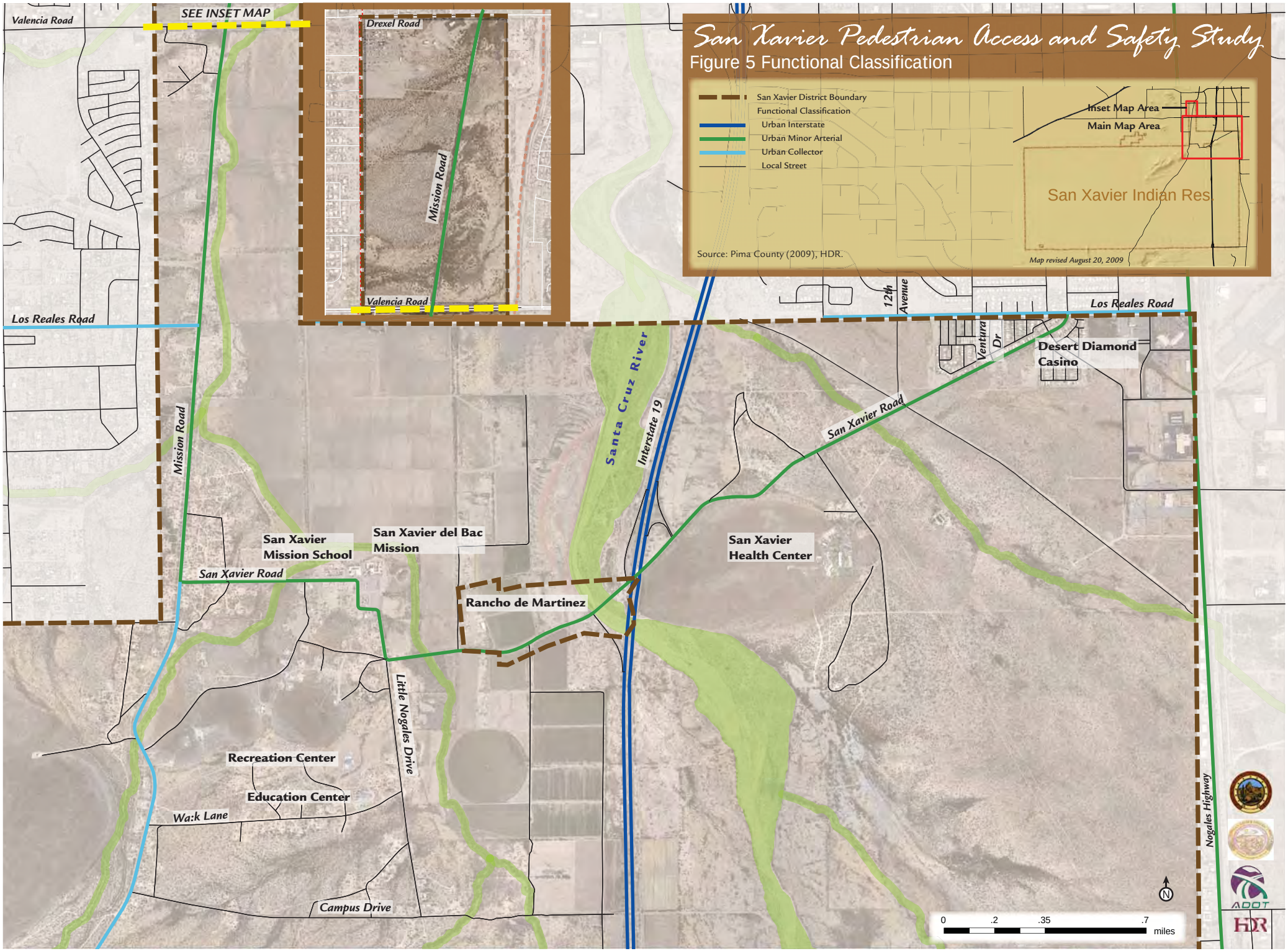
Table 2 Roadway Functional Classification

Roadway	From	To	Functional Classification
I-19	NA	NA	Urban Interstate
San Xavier Rd.	Mission Rd.	Los Reales Rd.	Urban Minor Arterial
Mission Rd.	Drexel Rd.	San Xavier Rd.	Urban Minor Arterial
Mission Rd.	San Xavier Rd.	Campus Dr.	Urban Collector
12th Ave. alignment	San Xavier Rd.	Valencia Rd.	Urban Collector
Los Reales Rd.	Cardinal Ave.	Mission Rd.	Urban Collector
Los Reales Rd.	Santa Clara Ave.	Nogales Hwy.	Urban Collector
Nogales Hwy.	Valencia Rd.	Hughes Access Rd.	Urban Minor Arterial

Source: Tucson Urban Area Functionally Classified Roads Map, ADOT, 2008

Traffic Volumes

As part of this study, 24-hour daily traffic volumes were collected by *Accept Consulting Services* in the study area on a weekday (Thursday March 19, 2009) and a weekend day (Sunday March 22, 2009). On March 19, the traffic counts were collected at seven locations and on March 22 the counts were collected at four locations. From the data collected, it is observed that the weekday AM peak hour occurs from 7:15 to 8:15 AM and the PM peak hour occurs from 4:45 to 5:45 PM. On the weekend, the peak hours generally occurred between 10:30 to 11:30 AM and 12:15 to 1:15 PM.


San Xavier Pedestrian Access and Safety Study
Figure 5 Functional Classification
San Xavier District Boundary
Functional Classification
Urban Interstate
Urban Minor Arterial
Urban Collector
Local Street
Inset Map Area
Main Map Area
San Xavier Indian Res.
Source: Pima County (2009), HDR.
Map revised August 20, 2009
SEE INSET MAP
Valencia Road
Drexel Road
Mission Road
Los Reales Road
12th Avenue
Ventura Dr
Desert Diamond Casino
Santa Cruz River
Interstate 19
San Xavier Road
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Recreation Center
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Wa:k Lane
Campus Drive
Nogales Highway
0 .2 .35 .7 miles
N
ADOT
HDR

Table 3 and Figure 6 and Figure 7 show the traffic count locations and the traffic volumes for both Sunday and weekday daily AM and PM peak hours.

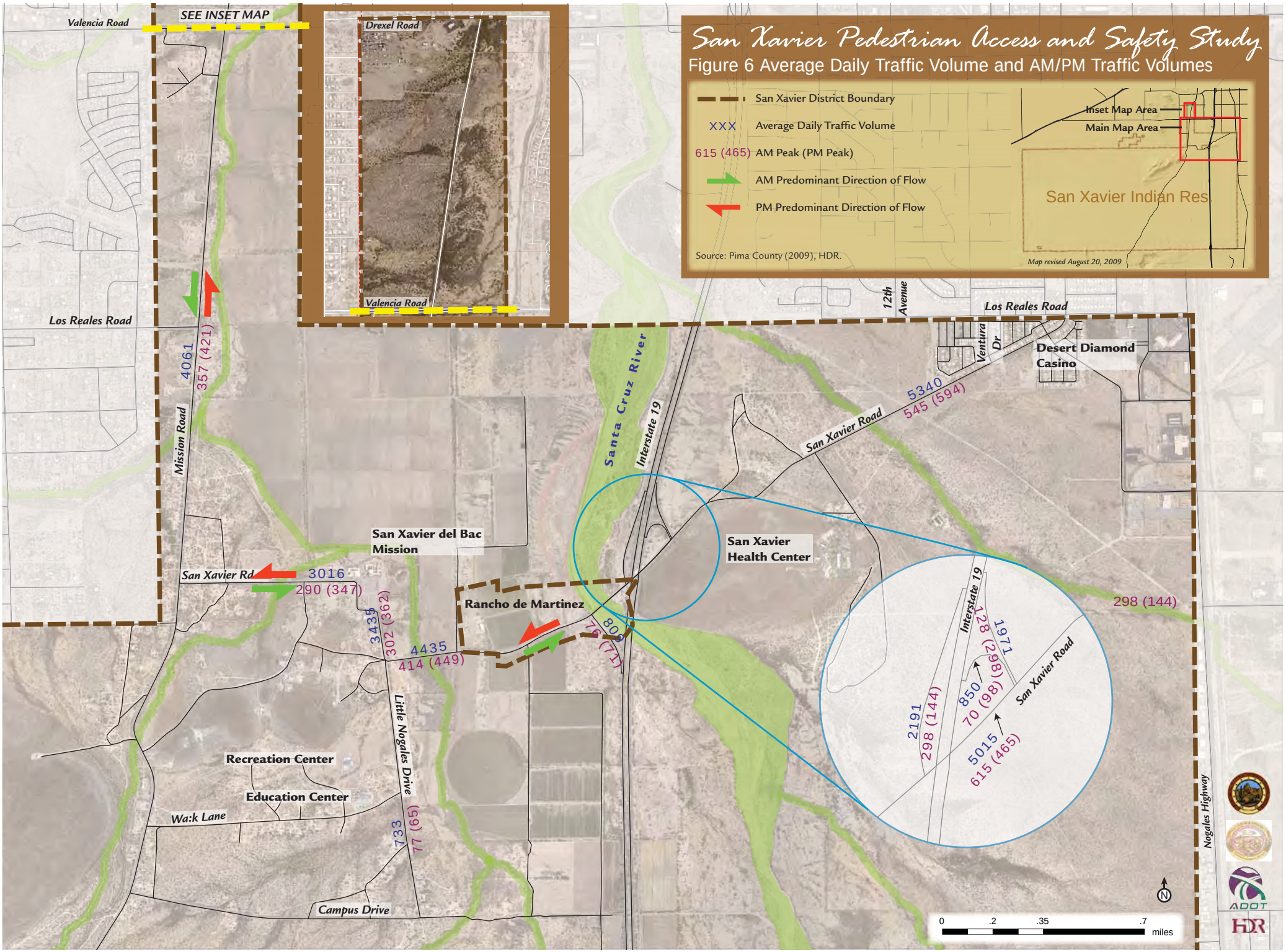
Table 3 Traffic Count Volumes for AM and PM Peak Hours

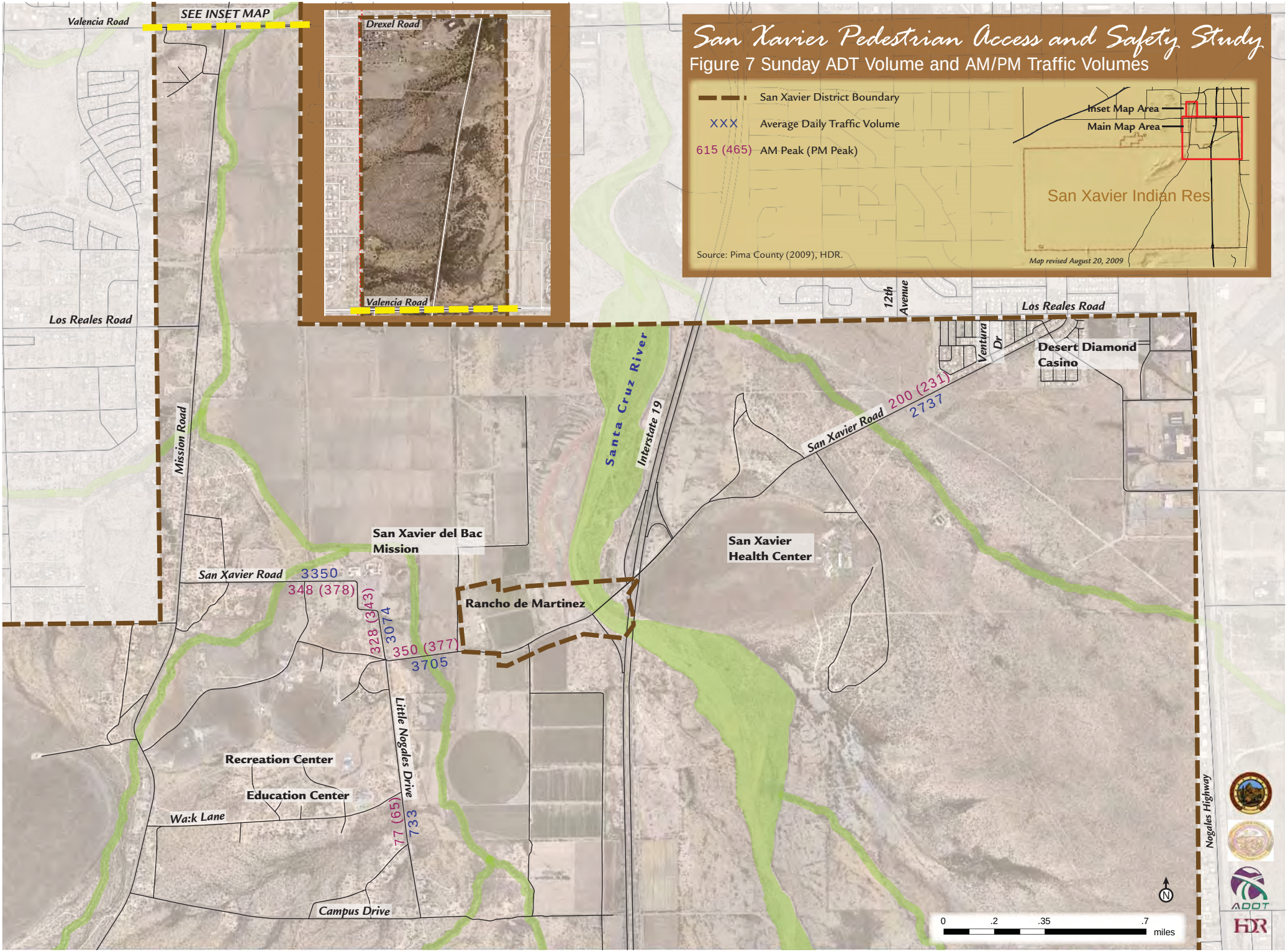
Location	Day	Direction	Traffic Volumes		
			Daily	AM Peak Hour	PM Peak Hour
San Xavier Rd. west of Ventura Dr.	Thursday	EB	2686	395	177
		WB	2654	150	417
		Total	5340	545	594
San Xavier Rd. under I-19	Thursday	EB	3141	507	224
		WB	1874	108	241
		Total	5015	615	465
San Xavier Rd. east of Little Nogales Dr. (on bridge)	Thursday	EB	2109	247	174
		WB	2326	167	275
		Total	4435	414	449
San Xavier Rd. east of Mission Rd.	Thursday	EB	1410	200	112
		WB	1606	90	235
		Total	3016	290	347
Mission Rd. north of San Xavier Rd.	Thursday	NB	2141	142	274
		SB	1920	215	147
		Total	4061	357	421
Little Nogales Dr. north of San Xavier Rd.	Thursday	NB	1831	137	215
		SB	1604	165	147
		Total	3435	302	362
Little Nogales Dr. south of Wa:k Ln.	Thursday	NB	311	52	21
		SB	422	25	44
		Total	733	77	65
San Xavier Rd. west of Ventura Dr.	Sunday	EB	1442	95	121
		WB	1295	105	110
		Total	2737	200	231
San Xavier Rd. east of Little Nogales Dr. (on bridge)	Sunday	EB	1760	158	188
		WB	1945	192	189
		Total	3705	350	377
San Xavier Rd. east of Mission Rd.	Sunday	EB	1610	182	174
		WB	1740	166	204
		Total	3350	348	378
Little Nogales Dr. north of San Xavier Rd.	Sunday	NB	1620	181	170
		SB	1454	147	173
		Total	3074	328	343

Source: Accept Consulting Services, 2009

San Xavier Pedestrian Access and Safety Study

Figure 6 Average Daily Traffic Volume and AM/PM Traffic Volumes




San Xavier Pedestrian Access and Safety Study
Figure 7 Sunday ADT Volume and AM/PM Traffic Volumes
San Xavier District Boundary
XXX Average Daily Traffic Volume
615 (465) AM Peak (PM Peak)
Inset Map Area
Main Map Area
San Xavier Indian Res.
Source: Pima County (2009), HDR.
Map revised August 20, 2009
SEE INSET MAP
Valencia Road
Drexel Road
Valencia Road
Los Reales Road
Mission Road
12th Avenue
Los Reales Road
Ventura Dr
Desert Diamond Casino
Santa Cruz River
Interstate 19
San Xavier Road
200 (231)
2737
San Xavier del Bac Mission
San Xavier Health Center
San Xavier Road
3350
348 (378)
328 (343)
3074
350 (377)
3705
Rancho de Martinez
Little Nogales Drive
Recreation Center
Education Center
Wa:k Lane
77 (65)
733
Campus Drive
Nogales Highway
N
0 .2 .35 .7 miles
ADOT
HDR

The traffic volumes for the I-19 and San Xavier Road interchange were obtained from ADOT. The counts were conducted in October 2006 and are reported in Table 4.

Table 4 Traffic Volumes

Location	Direction	Traffic Volumes		
		Daily	AM Peak Hour	PM Peak Hour
I-19 Off Ramp	NB	850	70	98
I-19 On Ramp	NB	1971	128	300
I-19 Off Ramp	SB	2191	298	144
I-19 On Ramp	SB	809	76	71
San Xavier Rd. under I-19	EB/WB	4950	607	440

Source: ADOT, 2006

2.2 Level of Service Analysis

Methodology

A commonly used grading system called Level of Service (LOS) is used to measure and describe the operations of a roadway network. The LOS grading system qualitatively characterizes traffic conditions associated with varying levels of traffic. For a two-lane highway, these levels range from LOS A, when the motorists are able to travel at their desired speed, to LOS F, which represents heavily congested flow with traffic demand exceeding capacity. LOS A, B, and C are generally considered to be satisfactory service levels, while the influence of congestion becomes more noticeable at LOS D. LOS E is undesirable and is considered by most agencies to be the limit of acceptable delay, and LOS F conditions are considered to be unacceptable to most drivers.

In the Transportation Research Board's Highway Capacity Manual (HCM, 2000), two-lane highways are further classified into Class I and Class II highways. In Class I highways motorists expect to travel at relatively high speeds. In Class II highways motorists do not necessarily expect to travel at high speeds. Class II highways function as access routes to Class I highways. Table 5 presents the LOS criteria for two-lane Class II highways.

Table 5 LOS Criteria for Two-Lane Class II Highways

Level of Service	Percent Time – Spent - Following
A	< 40
B	> 40 – 55
C	> 55 – 70
D	> 70 – 85
E	> 85

Source: Transportation Research Board's Highway Capacity Manual (HCM, 2000)

Existing LOS analysis for the study area roadways was conducted using the Highway Capacity Software (HCS+) based on the Transportation Research Board's HCM for a two–lane, Class II highway. The study area roadways were treated as two-lane highways for analysis purposes.

The following are additional assumptions used for conducting the analysis.

1. Peak Hour Factor = 0.92
2. Percent of Trucks, Bus and Recreational Vehicles = 2
3. Access Points per mile = 5
4. Class II Highway - (Per HCM Section 12, page 12-2)
5. Posted speed limits were used as measured speed
6. Traffic volumes were used as observed volumes

Table 6 below shows the LOS at various roadway segments in the study area. As shown in Table 6, all the segments operate at LOS B or better.

Table 6 Level of Service

Segment	From	To	Directional Split		Speed (mph)	LOS	
			AM (%)	PM (%)		AM	PM
San Xavier Rd.	I-19 NB On Ramp	Ventura Dr.	72	70	35	B	B
San Xavier Rd.	I-19 SB Off Ramp	I-19 NB On Ramp	82	52	35	B	A
San Xavier Rd.	Little Nogales Dr.	I-19 SB Off Ramp	60	61	35	A	A
San Xavier Rd.	Mission Rd.	Little Nogales Dr.	69	68	30*	A	A
Mission Rd.	Valencia Rd.	San Xavier Rd.	60	65	45	A	A
Little Nogales Dr.	San Xavier Rd. (north)	San Xavier Rd. (south)	55	59	30*	A	A
Little Nogales Dr.	Wa:k Ln.	Campus Dr.	68	68	30*	A	A

Source: HDR, 2009

* Although the posted speed limit is 25 mph, 30 mph was used as measured speed for analysis purposes as that is the lowest the software will calculate.

2.3 Traffic and Pedestrian Count Data

Pedestrian Traffic

Pedestrian counts and walking pattern observations were made by HDR on Sunday April 5, 2009, Monday April 6, 2009, and Sunday May 17, 2009. On Sunday April 5, 2009, counts and observations were taken at the Mission Church and on Mission Road north of San Xavier Road. On Monday April 6, 2009, counts and observations were taken at the Mission School, on Mission Road north of San Xavier Road, on San Xavier Road near the Santa Cruz Bridge, and at San Xavier Recreation Center. On Sunday May 17, 2009, additional counts were taken just west of the Santa Cruz Bridge on San Xavier Road. The observations, summarized by location and the data, are included in the Appendix A.

The locations where the pedestrian observations were made are listed here and are shown in Figure 8.

A. San Xavier del Bac Mission Church

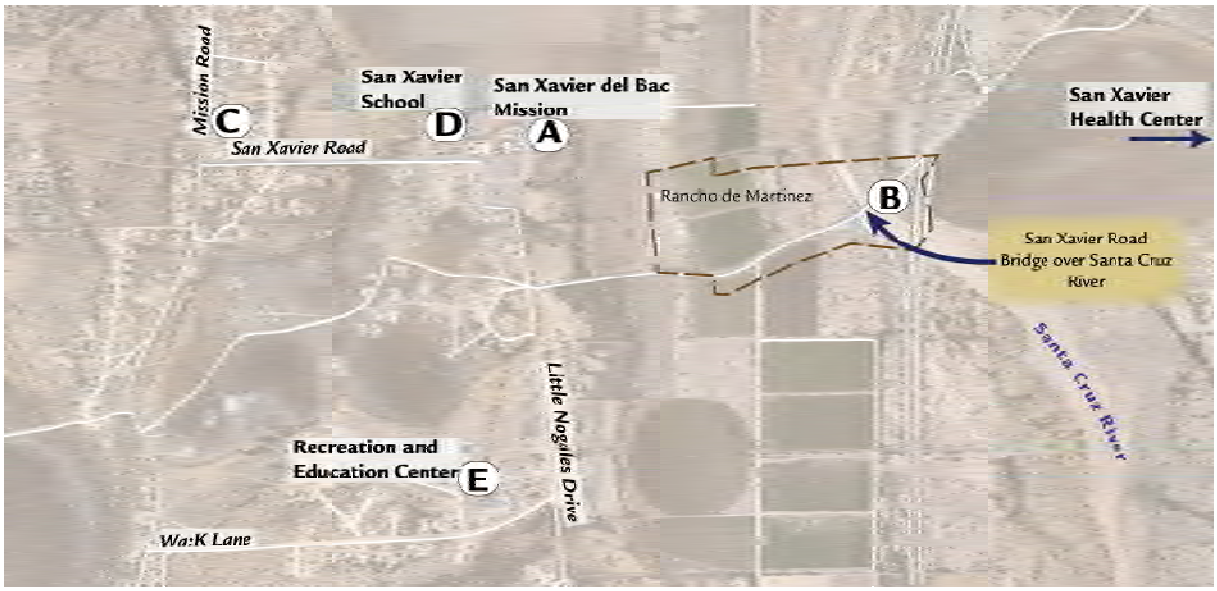
B. San Xavier Road Bridge

C. Mission Road North of San Xavier Road

D. San Xavier Mission School

E. San Xavier Recreation Center

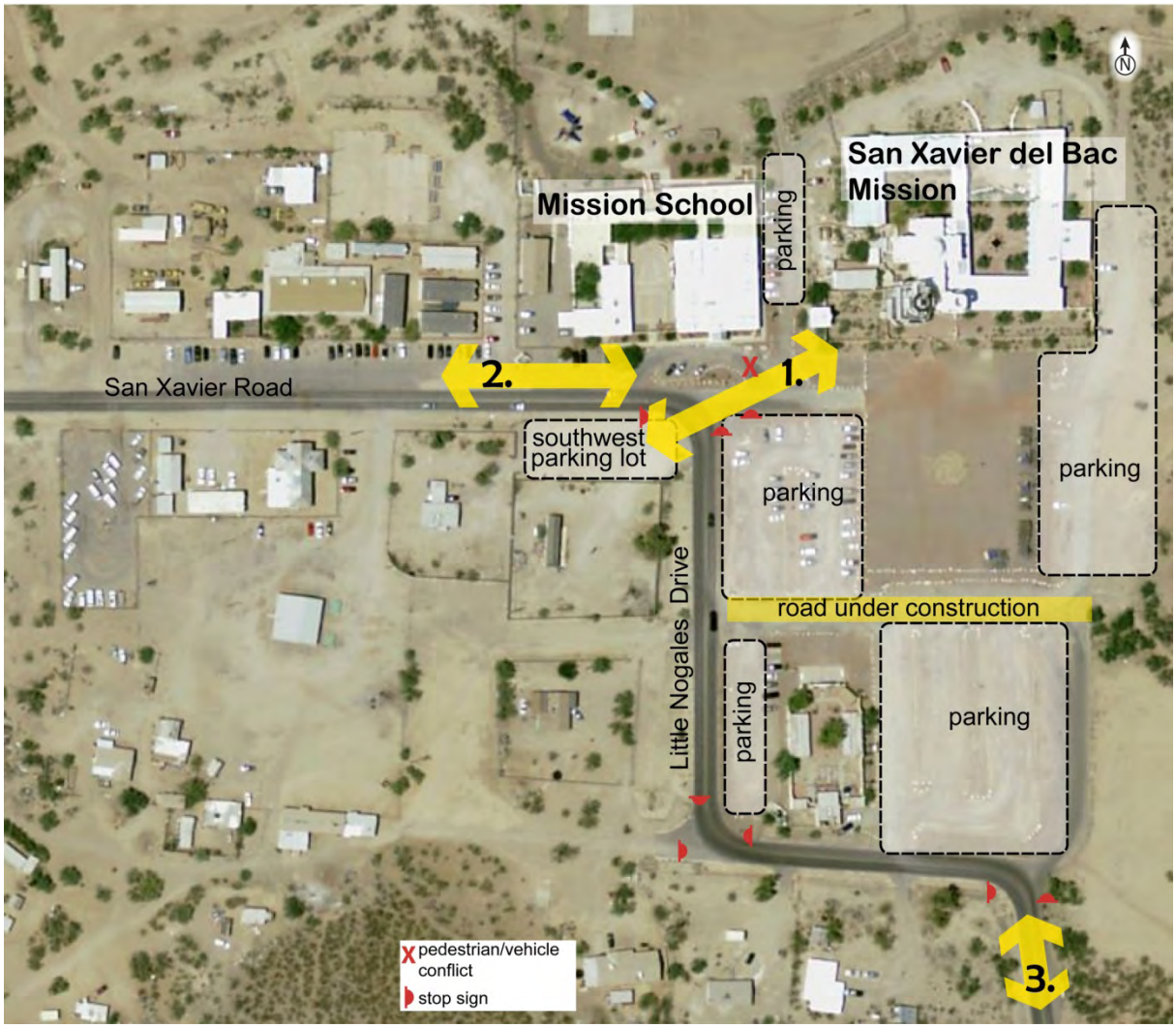
Figure 8. Pedestrian Count Locations



A. Mission Church

The San Xavier Mission Church (Church) was constructed around 1692 and is still a working church, attracting many parishioners and visitors, especially on Sundays. The Mission School (School), located immediately west of the Church, is run by the Mission. There are several parking lots near the Church and School premises, as shown in Figure 9.

Figure 9. San Xavier del Bac Mission Church Pedestrian Movements



Note: See next page for observations at 1, 2, and 3.

The Church has four services on Sunday beginning at 8:00 AM, 9:30 AM, 11:00 AM, and 12:30 PM with each service lasting an hour. The 9:30 AM service is unpublished and is primarily for the community members. Pedestrian movements were observed at the Church before and after the services on Sunday April 5, 2009 during the following periods:

- 7:30 AM to 8:30 AM
- 9:10 AM to 9:40 AM
- 10:30 AM to 11:15 AM
- 12:05 PM to 12:45 PM
- 1:20 PM to 2:00 PM

The following are observations at the Church. The numbered items relate to Figure 9:

1. Pedestrians walking between the southwest parking lot and the Church were crossing at the intersection of San Xavier Road and Little Nogales Drive. This was the heaviest pedestrian movement noted during the observation period.
2. Pedestrians walking on San Xavier Road to and from the Church were observed walking on the north side of San Xavier Road.
3. Pedestrians walking on Little Nogales Drive, south of the parking lot located east of San Xavier Arts, Crafts and Café, were observed walking on the east side of Little Nogales Drive.

- Some of the pedestrians walking on San Xavier Road to and from the Church were coming from Mission Road and were observed stopping at the Cemetery on San Xavier Road and then continuing.
- San Xavier Road and Little Nogales Drive are posted as 25 mph with speed humps on San Xavier Road. The observed speed near the Church on San Xavier Road and Little Nogales Drive is lower than the posted speed limit. This is due to the speed humps and closely spaced stop-controlled intersections as shown in Figure 9.
- Some of the non-Church vehicular traffic was observed using unpaved Community Lane and Gok Kawulk Wog to avoid the delays on San Xavier Road and Little Nogales Drive caused by Church vehicular traffic and existing traffic control.
- The existing crosswalk markings near the School and Church on San Xavier Road and Little Nogales Drive are in poor condition.
- Safety conflicts were observed between traffic entering and exiting the Church parking lot and pedestrians walking between the parking lots and the Church.
- Some of the Church staff were observed parking in the parking lot between the School and Church.

B. San Xavier Road Bridge at I-19

The San Xavier Road bridge is located on the west side of the I-19 and San Xavier Road service traffic interchange. Pedestrian and bicycle movements were observed on this bridge on Monday, April 06, 2009 from 10:00 AM to 2:00 PM and Sunday, May 17, 2009 from 8:00AM to 10:30AM (Figure 10).

Figure 10. San Xavier Road Bridge at I-19 Pedestrian Movements

The following are observations on San Xavier Road bridge:

- There is no sidewalk on the bridge. Pedestrians were observed walking close to the vehicular traffic on this narrow 26'-10" bridge, which is a safety concern.
- On Monday, April 6, 2009 all the pedestrians observed were walking westbound. Three of the pedestrians observed at this location were joggers.
- On Sunday, May 17, 2009, the majority of the pedestrians were headed westbound and the majority of cyclists were headed eastbound on San Xavier Road.
- On Sunday, May 17, 2009, three wild dogs were observed weaving in and out of traffic causing the traffic to use caution.

C. Mission Road North of San Xavier Road

Mission Road north of San Xavier Road is one of the high-volume arterial roadways in the San Xavier District. Pedestrian and bicycle traffic along Mission Road, north of San Xavier Road, was observed on Sunday April 5, 2009 (between 8:35 AM to 9:05 AM, 9:45 AM to 10:25 AM, and 11:15 AM to 12 PM) and Monday April 6, 2009 (from 8:00 AM to 10: 00 AM). The observation location on Mission Road was approximately one mile north of San Xavier Road (Figure 11). The speed limit at this location is 45 mph.

Figure 11. Mission Road North of San Xavier Road Pedestrian Movements

The following are observations on Mission Road north of San Xavier Road:

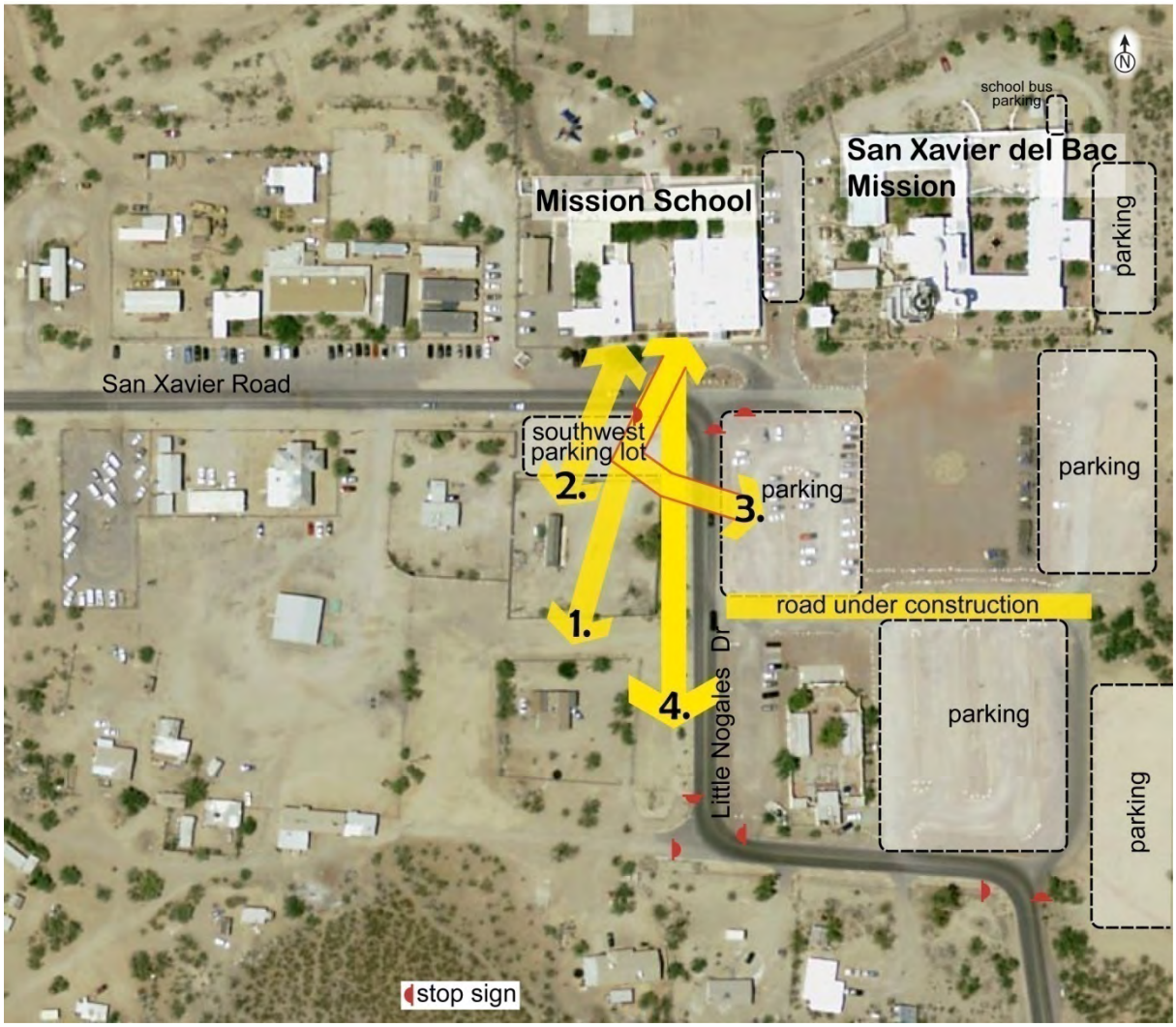
- The bicyclists traveling on this section of Mission Road were riding along with high-speed vehicular traffic, which is a safety concern.
- Pedestrians were observed walking on the unpaved shoulder on the east side of Mission Road.
- Most of the pedestrians walking on Mission Road were observed heading to San Xavier Road. A small number of them stopped at the Cemetery on San Xavier Road. Some of these same pedestrians were observed at the Church.
- Bicyclists were observed traveling in a queue and were not impacting vehicular traffic.
- On Monday, during this observation period, a group of bicyclists moved abreast for some distance and later split into smaller groups.

D. Mission School

The Mission School is located immediately west of the Church, north of the San Xavier Road and Little Nogales Drive intersection. The School currently serves grades K through 8. The School opens around 6:30 AM and classes begin at 7:50 AM. Most of the school traffic (parents, staff, buses, walkers) start arriving at school at 7:00 AM. School ends at 3:00 PM. During dismissal, children riding school buses and walking to adjacent neighborhoods are allowed to go first, followed by the rest of students who are picked up by their parents. There are two school bus trips to and from the School in the morning and evening.

The pedestrian and bicycle movements were observed at this location on Monday April 06, 2009 from 7:00 AM to 8:00 AM and 2:45 PM to 3:30 PM (Figure 12). The following are observations at the School:

Figure 12. Mission School Pedestrian Observations



Note: See next page for observations at 1, 2, 3, and 4.

General Pedestrian Movements. The numbered items relate to Figure 12:

1. Pedestrians were walking to and from homes located southwest of the San Xavier Road and Little Nogales Drive intersection.
2. Pedestrians walking between the southwest parking lot and School were crossing at the intersection of San Xavier Road and Little Nogales Drive.
3. Pedestrians walking between the southeast parking lot and School were crossing at the intersection of San Xavier Road and Little Nogales Drive.
4. Pedestrians were crossing San Xavier Road and then walking southbound in the ditch along the west side of Little Nogales Drive.

School Commencing Period (7:00 AM to 8:00 AM):

- The major pedestrian movements are students walking from homes located southwest of the San Xavier Road and Little Nogales Drive intersection. All pedestrian movements observed during the observation period were directly related to the school.
- The school bus arrived at school around 7:20 AM and dropped off the students in front of the School in the pick-up/drop-off loop. After dropping off the students, these buses parked in the parking lot on the west side of the Church (as shown in Figure 12).
- School staff parked in the parking lot on the east side of the school building. This parking lot had an approximate capacity of 15 vehicles.
- The intersection of San Xavier Road and Little Nogales Drive is a T-intersection with ALL-WAY Stop control. Pedestrian and vehicular traffic conflicts were observed at this intersection. There is no school guard at this location to assist pedestrians, which is a safety concern.
- Parents drop off their children in the pick-up/drop-off loop.
- During school bus or delivery truck drop-off at the School, a back up of three to four vehicles was observed in the pick-up/drop-off loop and at the intersection of San Xavier Road and Little Nogales Drive.

School Dismissal Period (2:45 PM to 3:30 PM):

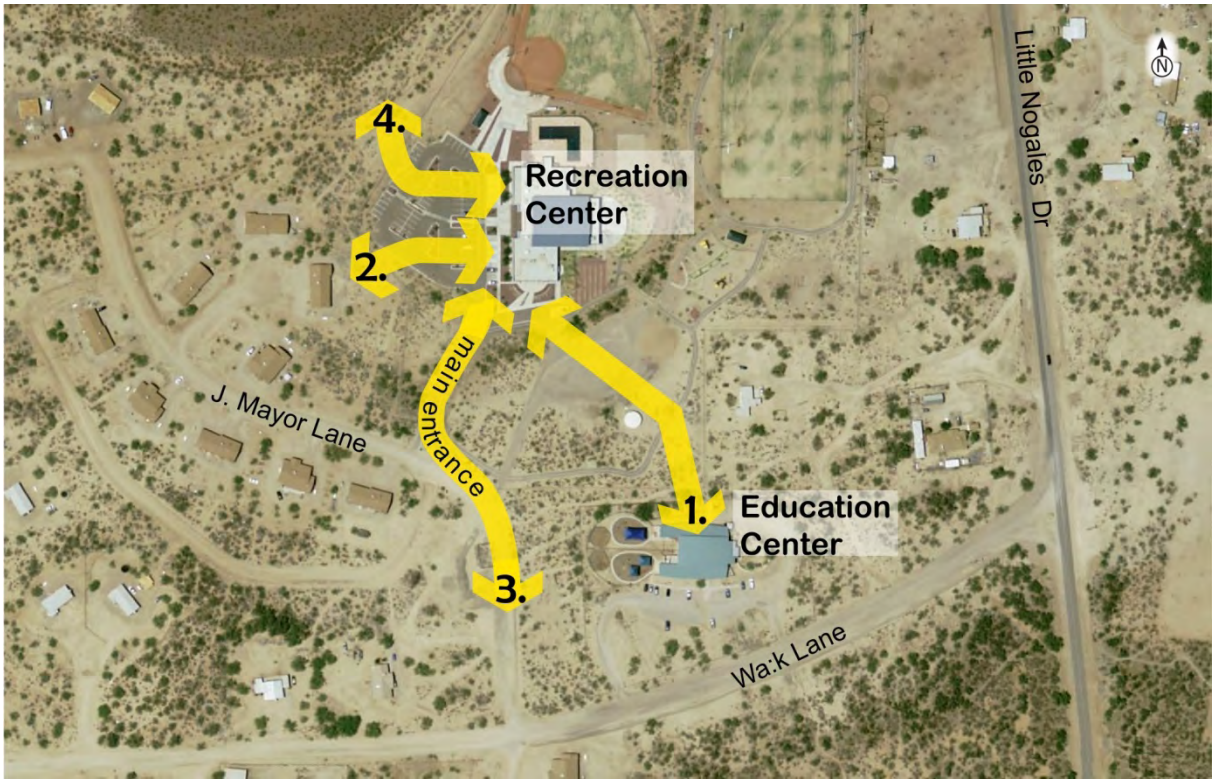
- The major pedestrian movements are students walking to homes located southwest of the San Xavier Road and Little Nogales Drive intersection.
- Two students were observed crossing San Xavier Road and then walking southbound in the ditch along the west side of Little Nogales Drive. Little Nogales Drive currently does not have sidewalks.
- The school bus and parents arrived around 2:50 PM to pick up students. The school bus left about 3:05 PM. During this time there was a back up of three to four vehicles observed in the pick-up/drop-off loop and at the intersection of San Xavier Road and Little Nogales Drive.
- Transit bus service was observed during this period near the School.
- Parents used the parking lots located at the southwest and southeast corners of the San Xavier Road and Little Nogales Drive intersection when the pick-up/drop-off loop in front of the School was backed up. Parents then drove closer to the available space on San Xavier Road near to the School to pick up their children.
- The San Xavier District Community van was observed picking up students from school and transporting them to the Education Center on Wa:k Lane.

E. San Xavier Recreation Center

The San Xavier Recreation Center is located on the north side of Wa:k Lane, adjacent to the San Xavier Education Center. This facility serves all the residents of the San Xavier District Community, including students. This center hosts various kinds of sports activities. The entire site is fenced. There are six gates to this facility, four of which are mainly used by pedestrian traffic (Figure 13). They are:

1. The south gate providing access between the Education Center and Recreation Center.
2. The west gate providing access to the residents living on the west.
3. The main entrance gate to the Recreation Center.
4. The north gate providing access to the residents living on the north.

Figure 13. San Xavier Recreation Center Pedestrian Observations



The pedestrian and bicycle movements to and from the Recreation Center were observed on Monday April 06, 2009 from 3:45 PM to 6:00 PM. The following are observations at the Recreation Center:

- The major pedestrian movement observed was between the Education Center and Recreation Center. A group of twelve students walked from the Education Center to the Recreation Center and back during the first 15 minute observation period.
- The pedestrians walking between the Education Center and Recreation Center (on route 1 as shown above) did not use the asphalt path, which follows the main entrance road south and then turns east toward the education center.
- Very few pedestrians were observed using the main entrance gate during observation period.
- Parents were observed dropping off and picking up their children in the Recreation Center parking lot during the observation period.

2.4 Crash History

A crash analysis was performed for the study area and can be read in its entirety in Appendix B. Both vehicular and pedestrian- or bicycle-related crashes were reviewed along the following segments:

- Mission Road from Drexel Road to Campus Drive
- Nogales Highway from Los Reales Road to Hermans Road (just south of Tucson International
- Airport)
- Valencia Road from Westover Avenue to Sandpiper Avenue
- Campus Drive from Mission Road to I-19
- San Xavier Road from Mission Road to Comobabi Street (just south of Los Reales Road)

There were 433 crashes listed between January 2004 and December 2008 of which seven (1.6 percent) were fatal. Six of the fatal crashes occurred on Mission Road and one on San Xavier Road. Of the seven fatal crashes, three involved alcohol. Of the 433 total crashes, 14 involved animals on or near the road and all of these were noted as occurring on Mission Road. Three of the 433 crashes involved a pedestrian (one) or bicycle (two). None of the three crashes resulted in death; however, two resulted in serious injury, one of them on Mission Road.

2.5 Transit and Bicycling

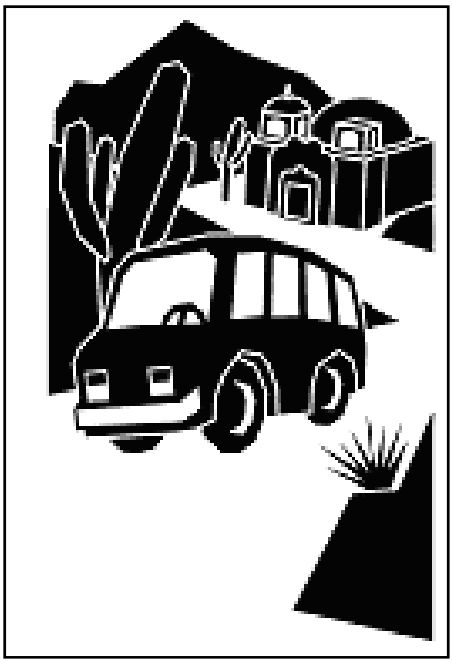
Transit

Many members of the Community are transit dependent. The Pima County Department of Transportation's Rural Transit Service operates a transit route serving the San Xavier District. This service is slated to be consolidated with transit services in Pima County under the Regional Transportation Authority.

This service provides residents of the San Xavier District with access to Tucson employment centers, medical facilities, and other activities and services. Rural Transit operates the San Xavier Route Expanded Service with ten round trips during the week and nine round trips on Saturday from the San Xavier area to the Laos Transit Center. The fare for a one-way ride is 50cents.

For the federal fiscal year 2008/2009 (the federal government fiscal year begins October 1 and ends September 30 of the following calendar year), ridership was 39,487. Ridership for the first half of the current fiscal year is tracking closely at 17,953 passengers. The Pima County Department of Transportation has contracted with Trax Transportation to provide this service using wheelchair accessible vans.

Sun Tran operates the public transit bus line, *Valencia Route 29*, every thirty minutes during peak hours east and westbound along Valencia Road at the northern edge of the Community, with stops at the Laos Transit Center with connections to the San Xavier Route. Figure 14 shows the existing transit routes and



Pima County Department of Transportation's Rural Transit Service operates the San Xavier Route Expanded Service, Monday through Saturday.

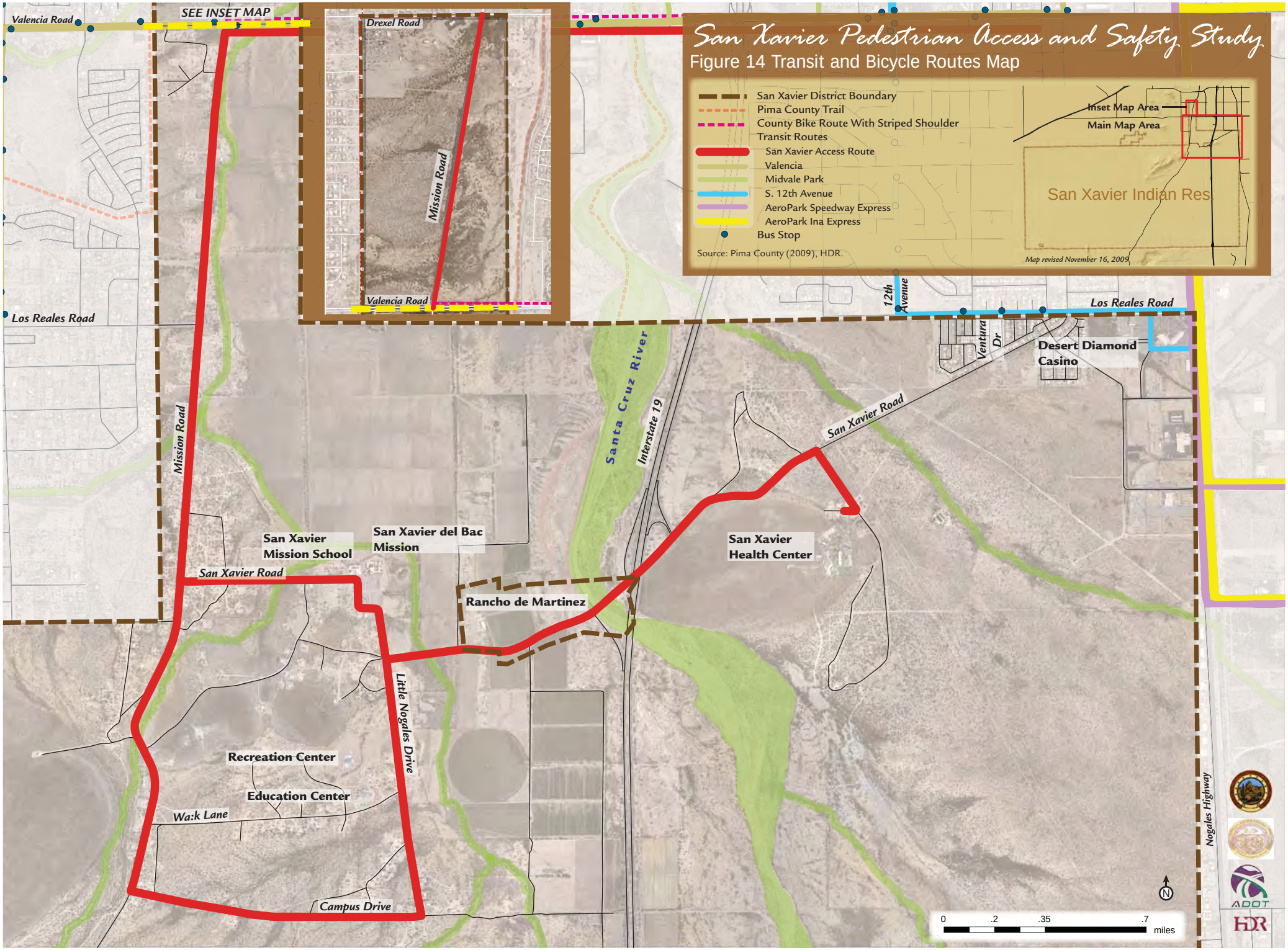
bikeways improvements in the study area.

Bicycling

During the pedestrian observations, bicyclists were only observed traveling along Mission Road. Mission Road is a popular route among recreational riders originating in Tucson. In its current state, the roadway does not provide a suitable bicycle environment due to the narrow roadway width and lack of roadway shoulders. The bicyclists observed during the pedestrian counts on Mission Road were observed traveling in the roadway lane with traffic. There are no County planned improvements along Mission Road as of the latest Tucson Metro Bike Map, prepared by Pima Association of Governments, which was issued September 2009.

Trails

Pima County has trails along the Santa Cruz River and West Branch of the Santa Cruz that stop at the Community border on the north and south. There is proposed greenway (path and trail) that follows the Community's western border from the north, near Westover Avenue, then turns west along the pipeline easement, just north of Los Reales Road, as a trail.


San Xavier Pedestrian Access and Safety Study
Figure 14 Transit and Bicycle Routes Map
San Xavier District Boundary
Pima County Trail
County Bike Route With Striped Shoulder
Transit Routes
San Xavier Access Route
Valencia
Midvale Park
S. 12th Avenue
AeroPark Speedway Express
AeroPark Ina Express
Bus Stop
Source: Pima County (2009), HDR.
Inset Map Area
Main Map Area
San Xavier Indian Res.
Map revised November 16, 2009
SEE INSET MAP
Valencia Road
Drexel Road
Mission Road
Valencia Road
Los Reales Road
12th Avenue
Los Reales Road
Ventura Dr
Desert Diamond Casino
Santa Cruz River
Interstate 19
San Xavier Road
Mission Road
San Xavier Mission School
San Xavier del Bac Mission
San Xavier Health Center
San Xavier Road
Rancho de Martinez
Little Nogales Drive
Recreation Center
Education Center
Wa:k Lane
Campus Drive
Nogales Highway
N
0 .2 .35 .7 miles
ADOT
HDR

2.6 Demographics

Approximately 18,000 of the tribe's 28,000 members live on the main section of the Tohono O'odham reservation. The San Xavier District 2000 Census population was 1,940. According to the Tohono O'odham Web site, the total enrollment for the San Xavier school district as of fall 2007 is 2,027 (1,249 on Reservation and 778 off Reservation).

The population of the Tohono O'odham Nation is younger than that of the state as a whole. The median age of the Tohono O'odham people is 26.2, compared with 34.2 for Arizona. Much of the population is young with 38 percent of the population under 18 years of age – 40 percent greater than the percentage of all Arizonans under the age of 18. This is important information because age helps dictate transportation mode choice and walking rates are drastically higher for younger age groups than older ones. The 5–15 year old age group has almost twice the percentage of walking trips as the 40–64 year old age group (Pucher and Renne, 2003[1]).

Poverty is a major concern of the Tohono O'odham Nation with the median per capita income of $7,000 (less than a third of the national per capita income of $22,000), the lowest of all U.S. reservations, per the 2000 Census. The percentage of the Nation population in poverty is 46 percent, three times that of the overall state poverty level of 14 percent. The poverty levels in the San Xavier District are much lower at 25 percent, but still markedly above the state level.

Whether related to poverty or not, the percentage of Tohono O'odham households without a motor vehicle available is 30 percent, more than four times that of Arizona overall. While the percentage of households without a motor vehicle available in the San Xavier district is half this rate at 14 percent, this is twice the percentage of households in Arizona without access to a motor vehicle.

Lack of households' access to a vehicle may be one reason the San Xavier District has such a high percentage of members who walk to work, 11 percent, almost four times the state rate.

The San Xavier District has one of the highest levels of owner-occupied housing in the state, with 91 percent of the occupied housing units being owner-occupied. The majority of housing is located within a two-mile radius of the District offices and the Mission San Xavier del Bac. This proximity to work and activity centers likely contributes to the high percentage of members who walk to work.

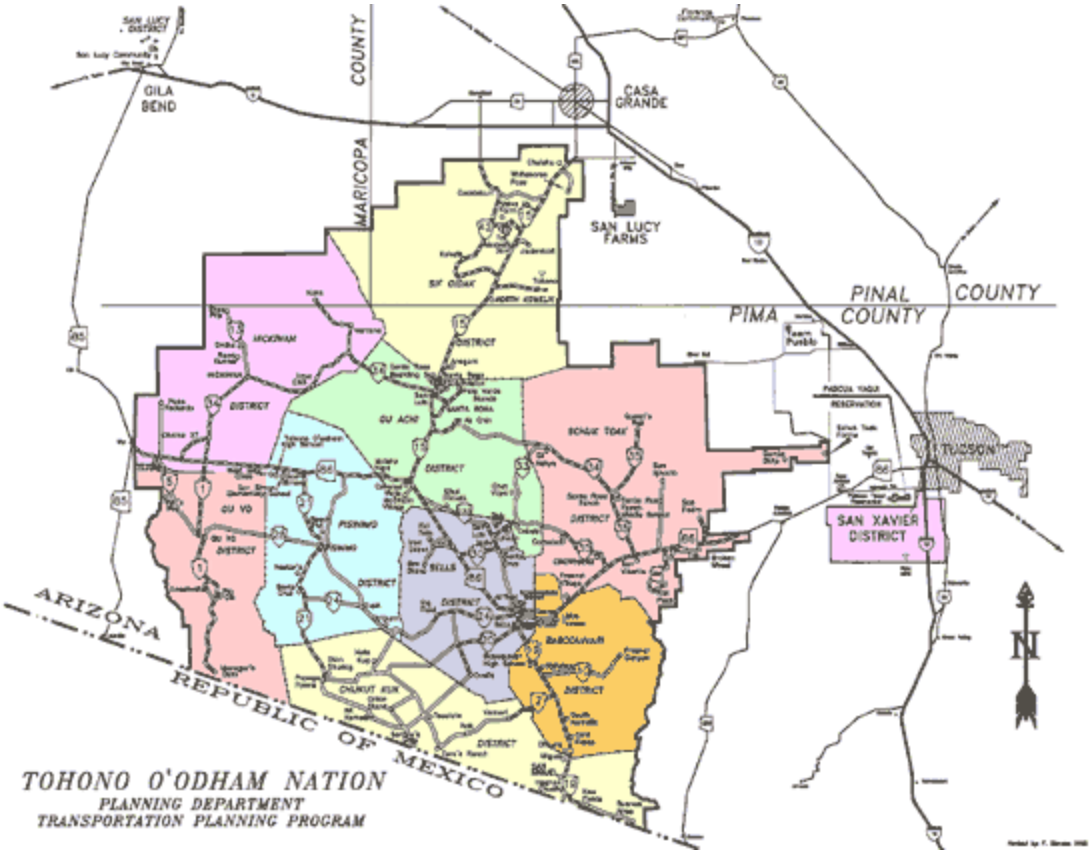
One reason that the need for a pedestrian and bicycle plan for the San Xavier District is great is the Tohono O'odham people have the highest rate of Type II (adult-onset) diabetes among Native American tribes. About 50 percent of the tribe's adults have adult-onset diabetes, compared with 4 to 6 percent of the overall U.S. population. A study by the Graduate School of Public Health, University of Pittsburgh, published in the Oct. 1, 2003 American Journal of Epidemiology[2], discovered that walking for 30 minutes a day cut diabetes risks for overweight as well as non-overweight men and women.

Additionally, providing for safer pedestrian routes serves the needs of youth and the elderly. Safe pedestrian routes from housing to activity centers allows seniors to remain in their homes while maintaining social interaction, health, safety, and a good quality of life. Improving the Community's walking routes allows more youth access to the Recreation Center where Community members can engage in activities such as fitness and nutrition classes, after-school recreation, and team sports.

[1] Pucher, J. and Renne, J. (2003). Socioeconomics of Urban Travel: Evidence from the 2001 NHTS. Transportation Quarterly, Vol. 57, No. 3, Summer 2003 (49–77).

[2] Andrea M. Kriska, Aramesh Saremi, Robert L. Hanson, Peter H. Bennett, Sayuko Kobes, Desmond E. Williams, and William C. Knowler."Physical Activity, Obesity, and the Incidence of Type 2 Diabetes in a High-Risk Population." American Journal of Epidemiology. 2003 158: 669-675.

2.7 Physical, Natural, and Cultural Environments



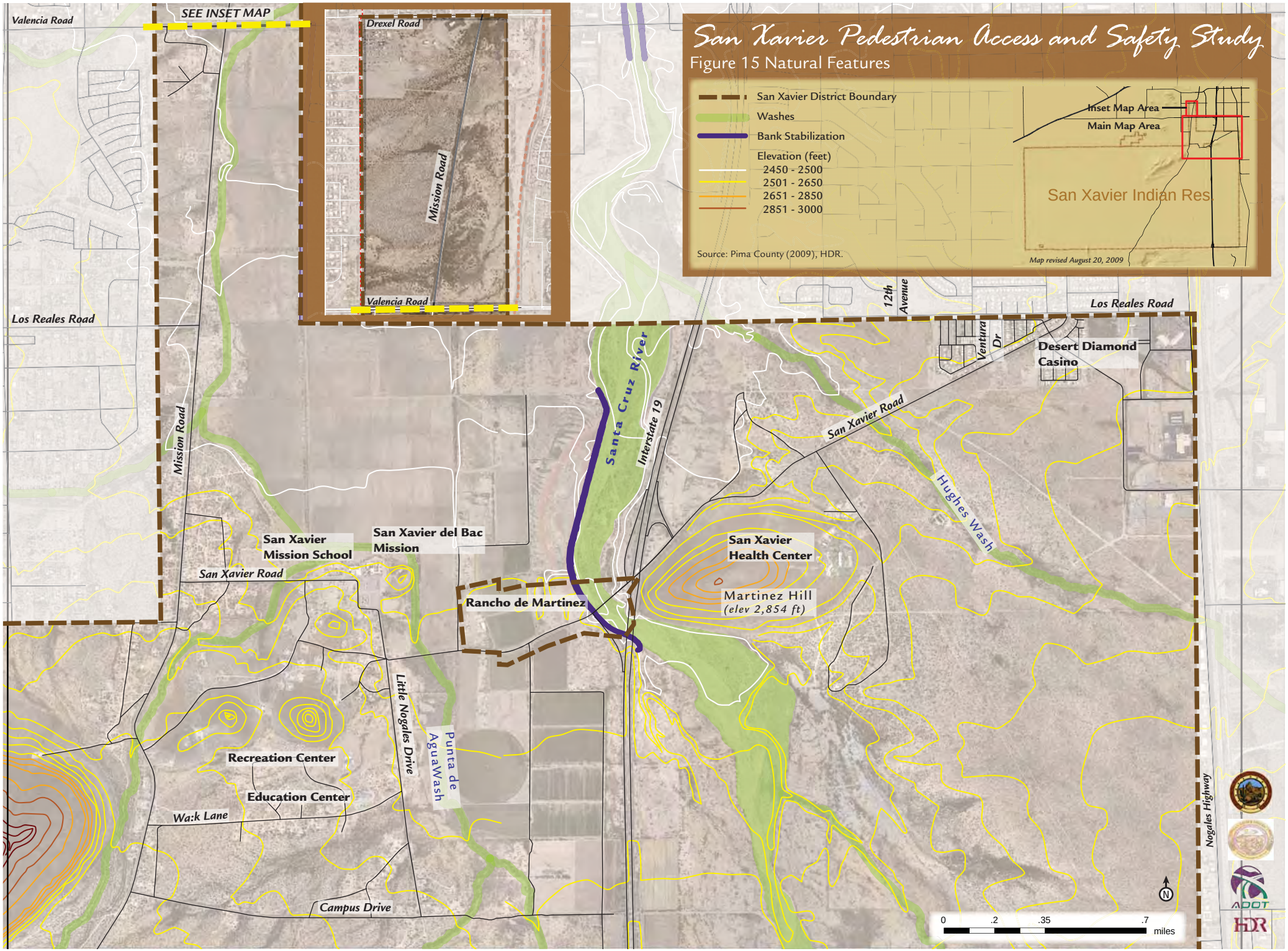
Map depicting the Tohono O'odham Nation. The San Xavier district is the most easterly, located ten miles south of Tucson. Source: http://www.tonation-nsn.gov/location.aspx

The San Xavier District is a Tohono O'odham Nation community centered on the historic San Xavier del Bac Mission, which was founded in 1699 by Jesuit missionary Father Eusebio Francisco Kino. It is known as the "place where water appears," because the Santa Cruz River surfaces from its underground channel nearby. The historic San Xavier del Bac Mission is a famous Arizona landmark. Visitors from around the world come to see "The White Dove of the Desert."

The Tohono O'odham Nation is located southwest of Tucson, AZ in the Sonoran Desert. The Nation encompasses nearly 4,600 square miles (larger than the state of Connecticut), the second-largest Indian reservation area in the United States (after the Navajo).

The San Xavier District is located approximately ten miles south of Tucson and contains nearly 72,000 acres of Sonoran desert, including a stretch of the ephemeral Santa Cruz River (refer to Figure 15). In addition, there are many smaller washes crossing the community that connect into the Santa Cruz River.

This area is the traditional homeland of the Tohono O'odham (Desert People); their ancestors, the Hohokam, lived here over 10,000 years ago. The Community is also known as Wa:k, and its people, as the Wa:k O'odham.


San Xavier Pedestrian Access and Safety Study
Figure 15 Natural Features
San Xavier District Boundary
Washes
Bank Stabilization
Elevation (feet)
2450 - 2500
2501 - 2650
2651 - 2850
2851 - 3000
Source: Pima County (2009), HDR.
Inset Map Area
Main Map Area
San Xavier Indian Res.
Map revised August 20, 2009
SEE INSET MAP
Valencia Road
Drexel Road
Mission Road
Valencia Road
Los Reales Road
Mission Road
Santa Cruz River
Interstate 19
12th Avenue
Ventura Dr
Los Reales Road
Desert Diamond Casino
San Xavier Road
Hughes Wash
San Xavier Mission School
San Xavier del Bac Mission
San Xavier Road
Rancho de Martinez
San Xavier Health Center
Martinez Hill
(elev 2,854 ft)
Little Nogales Drive
Punta de Agua Wash
Recreation Center
Education Center
Wa:k Lane
Campus Drive
Nogales Highway
N
0 .2 .35 .7
miles
ADOT
HDR

The Sonoran Desert, surrounding the Gulf of California in the southwestern United States and northwestern Mexico, covers some 320,000 square kilometers. It includes a part of the state of Arizona and a small portion of California in the United States, and western Sonora and the southern two-thirds of the peninsula of Baja California in Mexico. Historically, the Tohono O'odham people inhabited much of this area, referred to as the Papagueria[3].

Climatic conditions range from extremely arid, with a rainfall of less than three inches, to the boundary between arid and semi-arid, in the vicinity of fifteen inches of rainfall a year. The San Xavier District on average receives about twelve inches annually.

The Sonoran Desert is one of the most diverse environments and includes 60 mammal species, 350 bird species, 20 amphibian species, 100+ reptile species, 30 native fish species, and more than 2000 native plant species.

The Sonoran is the only place in the world where the famous saguaro cactus grows in the wild. The Saguaro produces a fruit at the top of the cactus that is harvested in the spring by the Tohono O'odham. The fruit is harvested when it is ripe, typically starting in late June, for the Nawait I'i (Rain Ceremony) that occurs during the monsoon season. The Tohono O'odham make saguaro wine, jams, and jellies out of the fruit and have a rain feast in honor of the coming monsoon[4]. Cholla, beavertail, hedgehog, fishhook, prickly pear, night blooming cereus, and organ pipe are other species of cactus found here. Cactus provide food and homes to many desert mammals and birds, with showy flowers in reds, pinks, yellows, and whites blooming most commonly from late March through June, depending on the species and seasonal temperatures.

Creosote bush and bur sage dominate valley floors. Indigo bush, Mormon tea, and mesquite are other shrubs that may be found. In addition to historically farming the arid lands with the use of elaborate canals, the Tohono O'odham continue to harvest the bean pods of the mesquite tree. Wildflowers include desert sand verbena, desert sunflower, and evening primroses.

Images from the desert, top to bottom: the desert landscape of the San Xavier District, saguaro cactus in bloom, creosote bush.

[3] Official Web Site of the Executive Branch of the Tohono O'odham Nation. "History and Culture". Accessed March 20, 2009 <2009 <http://www.tonation-nsn.gov/history_culture.aspx>.

[4] Arizona State Museum; The University of Arizona. "Saguaro Harvest Traditions of the Tohono O'odham". Accessed March 20, 2009 <http://www.statemuseum.arizona.edu/exhibits/saguaro/index.shtml>

Ascending from the valley up bajadas, various subtrees such as palo verde, ironwood, desert willow, and crucifixion thorn are common, as well as multi-stemmed ocotillo. Shrubs found at higher elevations include whitethorn acacia, fairy duster, and jojoba. (Source: http://en.wikipedia.org/wiki/Sonoran_Desert. Accessed March 3, 2009).

Wa:k Hikdañ Site

On the San Xavier District outside Tucson, the Tohono O'odham Community restored a section of the Santa Cruz River by recreating a wetland near the river channel and planting mesquite, hackberry, and desert willow on the higher flood terrace. During the design of the project, tribal elders were consulted to gain insight into what the area looked like during their youth.

Completed in 2003, the Wa:k Hikdañ site on the San Xavier District was the first to use Central Arizona Project (CAP) water in the Tucson basin for riparian restoration. In following years as much as 50,000 acre-feet of CAP water was put to restoration use on the Reservation.

Source: http://cals.arizona.edu/azwater/awr/marapr08/feature1.html

3. Survey

3.1 Stakeholder Survey

As part of the initial data collection, interviews were conducted with people representing various aspects of the community life; the Mission church and school, health services, gaming enterprise, planning commissioners, cooperative farm, and the Recreation Center. All were appreciative of the effort to improve the pedestrian and bicycle experience within the Community and offered comments and observations to assist in that endeavor. The notes for the interviews may be found in the Appendix C. The most salient points are summarized here.

Bicycling

- There are no bicycle facilities (racks) at the Church (sometimes bicycles are locked on the rail leading up to church, may also be parked immediately in front of church).
- Hordes of bicyclists ride on Mission Road – often several abreast impeding traffic.

Vehicular

- Get people to obey stop signs; traffic is speeding through the reservation on the way elsewhere. People apparently speed through as shortcut instead of going across on Valencia (especially in the morning and late afternoon); people are cutting across Community Lane to avoid stop signs in front of Mission.

Pedestrian

- Typically on Saturday and Sundays, people partake in "pilgrimages" from south Tucson on foot. They are coming from both directions (Mission Road and San Xavier Road).
- There is a lack of crosswalks and no clearly marked crosswalks.
- Dedicated pedestrian routes "would be good". People are forced to walk on road, sometimes walking two or three abreast (in street where there are trees on shoulder, too narrow, or too steep).
- People often walk from bus route (trailer park) to clinic, rather than ride bus long way around.

- The master plan for the Cooperative Farm envisions a walkway from the Santa Cruz River with tree lined path.
- Dedicated walking path traveling from the community to the Recreation Center would be beneficial.
- Sidewalks would be nice; there are currently no dedicated pedestrian routes (to the school).
- The distance to the Recreation Center from the school is approximately 1 mile, while the younger students are discourage from walking, some of the older students do (the bus does make a stop there and the Education Center).
- The Santa Cruz River crossing should be on north side – crossing as planned on south side will require pedestrians to cross San Xavier two times (this issue has been raised at the Planning Commission on March 4, 2009).

Lighting

- Lighting in the Community is inadequate.
- Lighting along pedestrian routes would be helpful.
- Lighting is an issue throughout the Community. This was an issue in Sells where they recently completed a 10 year lighting plan. In Sells they were experiencing a large number of pedestrian accidents (people crossing State Route 86). The Indian Health Center and Tohono O'odham addressed the problem with lighting and there have been no pedestrian accidents since.
- Darkness is part of what makes the community unique.

Other

- There are existing signs asking visitors to "stay on paved roads", discouraging them from walking into living area.
- There are issues with wash crossings during rain events (especially standing water at San Xavier Road).
- Community dogs create problems, strays can be found roaming around.
- Road work needed on San Xavier adjacent to the Cooperative Farm - low spot ponds (100') takes long time to evaporate.
- Headquarters of the Cooperative Farm is fenced - actually moved fence back ten feet to allow room for pedestrians to pass without being forced into road - doesn't help bicyclists.
- Speed bumps in front of Recreation Center have been effective in mitigating traffic impacts.
- There are several projects underway now (notably the sidewalks at the Mission and drainage on the south side of the street) that will disrupt and potentially impact the pattern of school drop-offs/pick-ups.

3.2 Comment Forms

This is a summary of the questionnaire that was distributed to Community members and made available at various locations. In addition, Community members that approached the team member conducting the pedestrian counts (April 5 and 6) and expressed an interest in the study were asked to complete a questionnaire. A total of eight questionnaires were completed.

1. Do you or anyone in your household walk to and from your home and

   a. San Xavier del Bac Mission – 5
   b. San Xavier Mission School – 4
   c. San Xavier District Offices – 4
   d. Recreation Center and/or Education Center – 6
   e. Indian Health Center – 4
   f. Desert Diamond Casino on Nogales Highway – 2

2. If yes, how often:

   a. Daily – 3
   b. Weekly – 1
   c. several times a month – 4

3. Do you feel safe walking in your community?

   a. Yes – 4
   b. No – 4

If No, please explain unsafe locations:

- Santa Cruz Bridge
- the road is too narrow, we have to walk on the side (dirt)
- along Mission Road
- vehicles drive too fast
- no walkways or pathways

4. Does anyone in your household ride a bicycle within the community?

   a. Yes – 4
   b. No – 4

Other Comments:

- I think there should be a walking path on the side of the pavement road
- Widen road and add bike lanes and sidewalks for pedestrians and bicyclists
- (make it) safe for everyone
- Bike trails, scenic walk areas away from roads
- Running trails and bike trails off road

B. Future Conditions

1. Demographic Projections

1.1 Socioeconomics

The Pima Association of Governments (PAG) is the metropolitan planning organization for Pima County jurisdictions as well as the Pascua Yaqui Tribe and Tohono O'odham Nation. PAG has developed population projections for Tucson and Pima County. Using these projections, and estimates of the population of the San Xavier District of the Tohono O'odham Nation, the following projections are provided. For the purposes of this study (study area shown in Figure 1), population growth for the San Xavier District is projected to be comparable to the City of Tucson, with approximately 1.5 percent compounded annual growth through the 2030 planning horizon.

Table 7 Population Projections for San Xavier District, Tucson, and Pima County

Year	San Xavier District	Tucson	Pima County
2008	2,050	543,959	1,014,023
2014	2,229	591,382	1,132,783
2020	2,455	651,553	1,283,210
2030	2,816	747,237	1,522,420

Limited information is available regarding development plans within the District. Discussions with the technical advisory committee indicate there is a proposed commercial development, located on the northern edge of the District at the intersection of Mission and Drexel roads. The development, proposed for the 160 acres straddling Mission Road, would include retail and office development. The consultant for the development has not resubmitted site plans to the Community for review as of the date of this report. Therefore, no detailed information is available to incorporate into this Plan.

1.2 Activity Centers

Activity centers that could potentially generate pedestrian activity and bicycle trips were identified. In addition, pedestrian observations and counts were done at several locations (refer to Section A Current Conditions). Observations revealed that the pedestrian and bicycle activity was greatest on Sundays at the San Xavier del Bac Mission Church, coinciding with the religious services.

The following summarizes the anticipated changes, if any, at several of these locations.

San Xavier Mission School

The current enrollment of the San Xavier Mission School is approximately 150 students. The school is anticipating that their enrollment will not exceed 200 students in the future.

San Xavier Coop Farm

The San Xavier Coop Farm has plans for future development that include improvements along San Xavier Road that would result in a much improved pedestrian environment. Plans envision planting fruit trees and a developed pathway along the northern edge of San Xavier Road. Employment at the Coop Farm, currently under 30, is not anticipated at this time to change significantly in the future.

Education and Recreation Center

With increases in the Community population over the coming years, it anticipated that the Education and Recreation Center will become busier, and that a greater number of Community members will be accessing these sites. At this time, there are no known expansion plans for the centers.

San Xavier Health Center

The interviews with stakeholders associated with the San Xavier Health Center conducted during the Existing Conditions portion of this study stated there is little pedestrian or bicycle traffic to the Center at this time. Future pedestrian and bicycle system improvements may reveal there is latent demand for these non-motorized routes.

2. Programmed and Planned Improvements

There are several projects in the area that are underway or planned. The PAG 2010-2014 Transportation Improvement Plan (TIP) notes the projects below. The TIP is a federally mandated, five-year capital improvement program for transportation projects throughout the region.

2.1 Roadway

San Xavier and Little Nogales Intersection Study

This intersection is along one of only two routes from off-reservation to the San Xavier del Bac Mission. This intersection floods almost every year during heavy storms. In order to build other improvements at the intersection, the flooding needs to be resolved. In January 2009, the Pima Association of Governments approved an amendment to the 2009-2013 TIP, which included $50,000 to conduct engineering and drainage studies.

2.2 Bicycle and Pedestrian

San Xavier Elderly/Pedestrian Safety Improvements at Mission Plaza

Visitors and community members were concerned about access to the Mission, especially for elderly and disabled individuals. To respond to these concerns, sidewalks and curb improvements are currently underway. Sidewalks encircle and cross the plaza area, providing alternative, accessible routes for visitors and church members to access the Mission entrance. An additional improvement is a new gateway sign at the north end of Little Nogales Drive where it enters the plaza. These improvements are an important component of pedestrian movement in the Mission area.

Pedestrian Bridge Project

The *San Xavier Loop Road Pedestrian Bridge Project* will provide a pedestrian crossing structure over the Santa Cruz River adjacent to the I-19 southbound on-ramp bridge. This project is one component of the District's Master Plan to create a pedestrian pathway connecting current and future social, historical, and recreational areas of the community. HDR prepared a Project Assessment report for this project in April 2009.

The proposed pedestrian bridge structure is parallel to, but far enough away from, the existing vehicular bridge to accommodate future widening or replacement of the existing vehicular bridge. The recommendation of the Project Assessment report is to place the new pedestrian bridge structure on the south side of the existing Santa Cruz River bridge. The typical section for the pedestrian bridge will have a 12-foot clear walkway.

Placing the new pedestrian structure on the south side of the existing bridge reduces the potential conflicts with existing site conditions. An important advantage to a south side alignment is the wider

ROW will allow the structure to be placed as far as possible from the existing bridge and minimize impacts to the existing substructure and project costs.

One conflict with the bridge being located on the south side would be the need for pedestrians to cross the southbound I-19 on-ramp, which is located approximately 60 feet from the end of the proposed bridge. The average daily traffic count reported during the current study was 800. The visibility is good for pedestrians at the on-ramp to allow for a safe crossing. There is existing guardrail on both shoulders of the on-ramp and a break in the guardrail would be designed to allow pedestrians to cross the ramp safely.

The recommended alternative is a prefabricated steel truss bridge at a cost of $1,998,000. Funding for this project has been identified in the Pima Association of Governments 5-Year Regional Transportation Improvement Program. The project will be funded from the Federal Surface Transportation Program (STP) in Fiscal Year 2012 and is currently programmed for $1,500,000.

This bridge is critical to overall safer pedestrian and bicycle movement across the Santa Cruz River. It will provide much needed access between the community facilities on the west side of the river and the east side.

3. Roadway Projections and Condition

Current traffic counts were collected by the HDR team and reported in Section A Current Conditions. Projected traffic volumes are from PAG and the projected population counts are noted in *Section 1. Demographic Projections*.

3.1 Current Traffic Conditions (2009)

Current traffic volumes were discussed in Section A Current Conditions. In summary, traffic volumes range from a high of 5,340 trips a day on San Xavier Road (east and west bound combined), from Ventura Drive to I-19, to a low of 733 on Little Nogales Drive, south of Wa:k Lane (north and south bound combined).

3.2 Future Traffic Projections (2014 and 2030)

Future year 2010-2014 Transportation Improvement Program (TIP) Projected Traffic Volumes and 2030 Regional Long Range Transportation Planning (RTP) Projected Traffic Volumes were obtained using the regional travel demand model developed by PAG, last updated on April 16, 2009[5]. PAG maintains a regional travel demand model to support and promote the best possible forecasting of future travel for the region. This model has been calibrated and validated using available traffic counts, national average modeling parameters, census and household survey data, and other available transportation data for the PAG region.

- Future year 2010-2014 TIP Projected Traffic Volumes are generated based on 2014 regional population/employment projections and the roadway/transit improvements adopted in the 2010-14 TIP.
- Future year 2030 RTP Projected Traffic Volumes are generated based regional population/ employment projections and the roadway/transit improvements adopted in 2030 RTP.

The model provided daily, two-hour morning (AM Peak, 6:30-8:30 AM) and two-hour afternoon (PM Peak, 4:00-6:00 PM) peak traffic volume estimates along study roadway segments. The following

[5] Projections were not done for 2020 as there is a decrease in traffic volume from 2014-2030 due to regional growth and planned roadway/transit improvement along the some of the reported roadway segments.

table shows the future year traffic volumes for daily, AM, and PM peak hours. Figures 16 and 17 illustrate the traffic count locations along with the traffic volumes.

Table 8 Years 2014 and 2030 Traffic Volumes

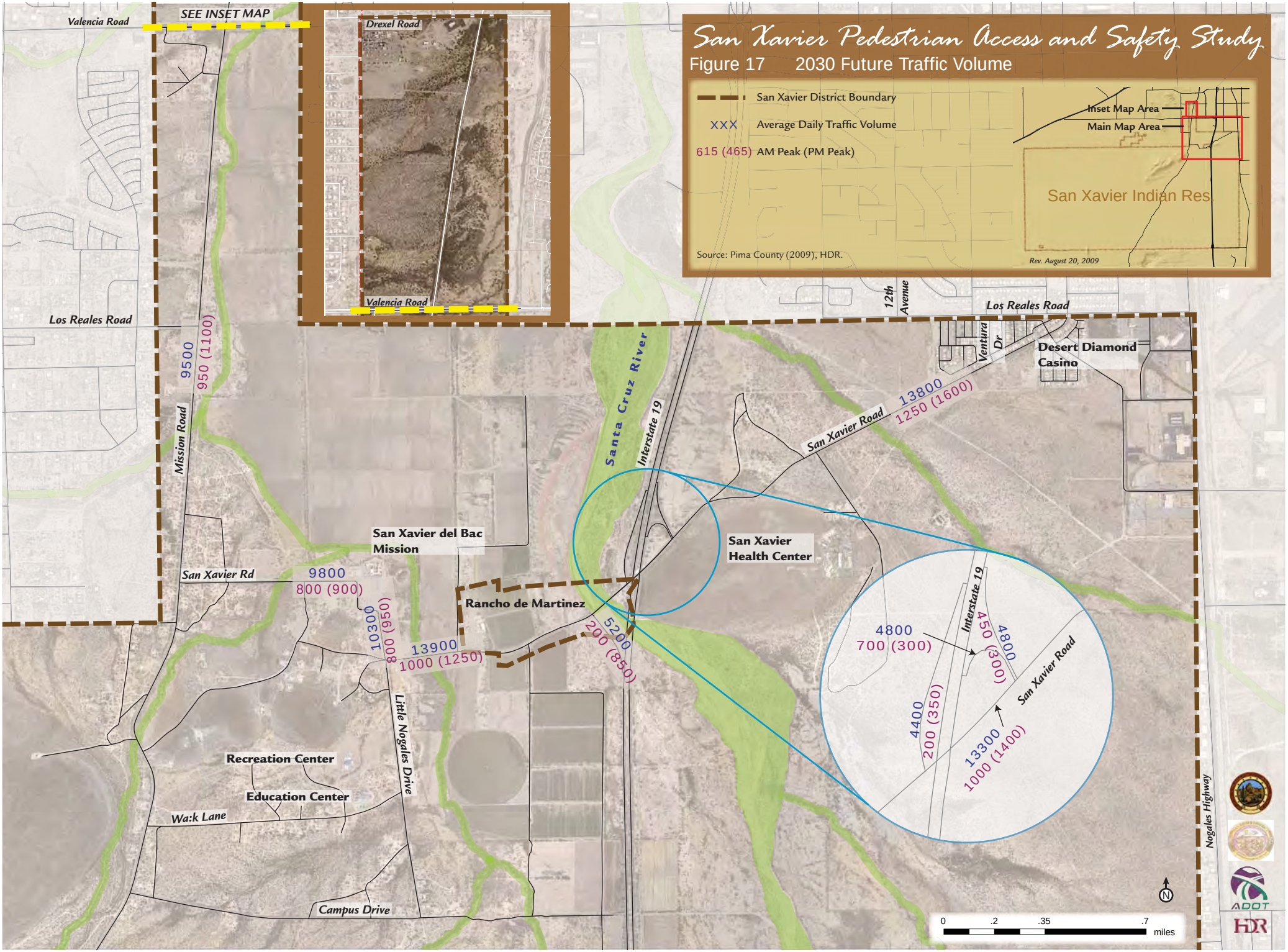
Segment	From	To	Daily Volumes		AM Peak		PM Peak	
			2010-2014	2030	2010-2014	2030	2010-2014	2030
San Xavier Rd	I-19 NB On Ramp	Ventura Dr	15,000	15,100	1,050	1,550	1,300	1,450
San Xavier Rd	I-19 SB Off Ramp	I-19 NB On Ramp	13,400	13,300*	1,100	1,000*	1,200	1,400
San Xavier Rd	Little Nogales Dr	I-19 SB Off Ramp	14,300	14,800	1,100	1,000*	1,450	1,700
San Xavier Rd	Mission Rd	Little Nogales Dr	10,500	9.800*	900	800*	1,250	900*
Mission Rd	Valencia Rd	San Xavier Rd	8,800	9,500	700	950	950	1,100
Little Nogales Dr	San Xavier Rd (N)	San Xavier Rd (S)	13,400	10,300*	1,100	800*	1,450	950*

Note: Volumes were obtained by equally dividing the PAG two-hour peak period volumes

* A decrease in 2030 projected volumes was observed compared to 2014 projected volumes. This could be due to regional growth in conjunctions with roadway/transit improvements planned in vicinity of the San Xavier Study Area.

Source: Pima Association of Governments (PAG) Regional Travel Demand Model, April 2009


San Xavier Pedestrian Access and Safety Study
Figure 16 2014 Future Traffic Volume
San Xavier District Boundary
XXX Average Daily Traffic Volume
615 (465) AM Peak (PM Peak)
Inset Map Area
Main Map Area
San Xavier Indian Res.
Source: Pima County (2009), HDR.
Rev. August 20, 2009
SEE INSET MAP
Valencia Road
Drexel Road
Valencia Road
Los Reales Road
Los Reales Road
12th Avenue
Ventura Dr
Desert Diamond Casino
Santa Cruz River
Interstate 19
Mission Road
8800
700 (950)
San Xavier Road
13900
1050 (1300)
San Xavier del Bac Mission
San Xavier Health Center
San Xavier Rd
10500
900 (1250)
13400
1100 (1450)
Rancho de Martinez
4600
150 (650)
13400
1100 (1450)
Little Noggles Drive
5100
700 (350)
Interstate 19
450 (450)
5800
San Xavier Road
3800
200 (400)
13400
1100 (1200)
Recreation Center
Education Center
Wa:k Lane
Campus Drive
Nogales Highway
N
0 .2 .35 .7
miles
ADOT
HDR


San Xavier Pedestrian Access and Safety Study
Figure 17 2030 Future Traffic Volume
San Xavier District Boundary
XXX Average Daily Traffic Volume
615 (465) AM Peak (PM Peak)
Inset Map Area
Main Map Area
San Xavier Indian Res.
Source: Pima County (2009), HDR.
Rev. August 20, 2009
SEE INSET MAP
Valencia Road
Drexel Road
Valencia Road
Los Reales Road
Los Reales Road
12th Avenue
Ventura Dr
Desert Diamond Casino
Mission Road
9500
950 (1100)
Santa Cruz River
Interstate 19
San Xavier Road
13800
1250 (1600)
San Xavier del Bac Mission
San Xavier Health Center
San Xavier Rd
9800
800 (900)
10300
800 (950)
Rancho de Martinez
13900
1000 (1250)
5200
200 (850)
Interstate 19
4800
700 (300)
4800
450 (300)
San Xavier Road
4400
200 (350)
13300
1000 (1400)
Little Noggles Drive
Recreation Center
Education Center
Wa:k Lane
Campus Drive
Nogales Highway
N
0 .2 .35 .7
miles
ADOT
HDR

In summary, the traffic volumes within the San Xavier District are anticipated to double over the next 20 years. Without pedestrian improvements to the roadways, the walking environment will become increasingly inhospitable.

3.3 Vehicular Level of Service Analysis

Methodology

LOS is used to measure and describe the operations of a roadway network. The LOS grading system qualitatively characterizes traffic conditions associated with varying levels of traffic. For a two-lane highway, these levels range from LOS A, when the motorists are able to travel at their desired speed, to LOS F, which represents heavily congested flow with traffic volume exceeding capacity. LOS A, B, and C are generally considered to be satisfactory service levels, while the influence of congestion becomes more noticeable at LOS D. LOS E is undesirable and is considered by most agencies to be the limit of acceptable delay, and LOS F conditions are considered to be unacceptable to most drivers.

In the Transportation Research Board's Highway Capacity Manual (HCM, 2000), two-lane highways are further classified into Class I and Class II highways. In Class I highways, motorists expect to travel at relatively high speeds; whereas, in Class II highways, motorists do not necessarily expect to travel at high speeds. Class II highways function as access routes to Class I highways. The study roadways were treated as two-lane Class II highways for analysis purposes. Table 9 presents the LOS criteria for two-lane Class II highways.

Table 9 LOS Criteria for Two-Lane Class II Highways

Level of Service	Percent Time – Spent - Following
A	< 40
B	> 40 – 55
C	> 55 – 70
D	> 70 – 85
E	> 85

Source: Transportation Research Board's Highway Capacity Manual (HCM, 2000)

Future year traffic LOS analysis for the study roadways was conducted using the Highway Capacity Software (HCS+) based on Highway Capacity Manual (HCM) for a two-lane Class II highway.

The following are some of the additional assumptions used for conducting the analysis.

1. Peak Hour Factor = 0.92
2. Percent of Trucks, Bus and Recreational Vehicles = 2
3. Access Points per mile = 5
4. Class II Highway - (per HCM Section 12, page 12-2)
5. Posted Speed limits were used as measured speed
6. Traffic volumes were used as observed volumes

Future Vehicular Level of Service

Roadway segment LOS analysis for future year 2014 and 2030 AM and PM peak periods was conducted using the PAG model estimates. AM and PM peak hourly traffic volumes were derived by splitting the two-hour model volumes equally. No further adjustment on the peak hour model volumes was conducted. As there are no planned roadway capacity improvements along study roadway segments, the existing roadway conditions and traffic control were used for future year analysis. The table below shows the LOS at various segments in the study area. As shown in Table 10, the study roadway segments would operate at an LOS D or better under years 2014 and 2030 conditions.

Table 10 Vehicular Level of Service

Segment	From	To	Speed (mph)	2014 LOS		2030 LOS	
				AM	PM	AM	PM
San Xavier Rd.	I-19 NB On Ramp	Ventura Dr	35	C	D	D	D
San Xavier Rd	I-19 SB Off Ramp	I-19 NB On Ramp	35	C	C	C	D
San Xavier Rd	Little Nogales Dr	I-19 SB Off Ramp	35	C	D	C	D
San Xavier Rd	Mission Rd	Little Nogales Dr	30*	C	C	B	C
Mission Rd	Valencia Rd	San Xavier Rd	45	B	C	C	C
Little Nogales Dr	San Xavier Rd (N)	San Xavier Rd (S)	30*	C	D	B	C

Note: Volumes were obtained by equally dividing the PAG two-hour Peak period volumes
* Although the posted speed limit is 25 mph, 30 mph was used as measured speed for analysis purposes due to the limitations of the software.
Source: Pima Association of Governments (PAG) Regional Travel Demand Model, April 2009

4. Pedestrian and Bicycle

4.1 Level of Service

Pedestrian and bicycle LOS were calculated along major roadways within the study area for years 2009, 2014, and 2030. The LOS discussed on the following pages do not reflect any changes to the pedestrian/bicycle environment. When the preferred alternative is developed, future pedestrian and bicycle LOS will be evaluated based on the proposed improvements. The methodology employed in this report is that used by the League of Illinois Bicyclists. The source of that methodology was two reports prepared by Bruce Landis *et al*. of Sprinkle Consulting for the Transportation Research Board in 1997 and 2001. The pedestrian and bicycle LOS (PLOS and BLOS, respectively) measures developed by Landis *et al*. are emerging national standards for quantifying the friendliness of a roadway. While other "level of service" indices relate to traffic capacity, the BLOS measures indicate bicyclist comfort level for specific roadway geometries and traffic conditions; similarly, PLOS measures the walking conditions.

PLOS and BLOS evaluation is useful in several ways; some are listed below:

1. Identify the most appropriate routes for inclusion in the community bicycle/pedestrian network.
2. Determine "weak links" in the network and prioritize needed site improvements.
3. Evaluate alternate treatments for improving pedestrian and bicycle friendliness of a roadway.
4. Include PLOS and BLOS in road selection formulas to encourage implementation of pedestrian and bicycle planning goals.
5. Tie these performance measures to goals and policies for all road projects. Policies can range from simply reporting pedestrian/bicycle impacts up to target LOS levels.

Definitions

Bicycle Level of Service

BLOS is a qualitative/quantitative measurement indicating the comfort level of a bicyclist relative to the specific roadway and traffic conditions. The BLOS measures on-road bicycling conditions, not separate trails, and midblock cross-sections rather than intersections. BLOS is also not applicable for sidewalks and side paths - paths parallel to and separated from the roadway. Roadways with a better (lower) score are more attractive (and usually safer) for cyclists.

BLOS is a function of set of parameters that affect the comfort and safety level of bicyclist. They are:

1. Motorized traffic, which constitute traffic volume, speed, percentage of trucks, and percentage of occupied parking;
2. Roadway elements, which include number of lanes, pavement condition, width of outside lane, and width of extra pavement (shoulder/parking/bike lanes).

Pedestrian Level of Service

PLOS measure the walker's perception of comfort and safety. PLOS is measured at mid-block crossings, including any sidewalks and buffers, but not at intersections. Table 11 describes the PLOS levels and scores for measurement.

PLOS is a function of a set of parameters that affect the comfort and safety level of pedestrians. They are:

1. Motorized traffic volume, speed, and percentage of occupied parking;
2. Roadway elements, which include number of lanes, width of outside lane, and width of extra pavement (shoulder/parking/bike lanes);
3. Sidewalk, which includes width of sidewalk, buffer width, and type (e.g., tree spacing).

Table 11 illustrates the thresholds for both BLOS and PLOS levels.

Table 11 Pedestrian Level of Service (PLOS) and Bicycle Level of Service (BLOS) Levels and Scores

Level of Service	PLOS and BLOS Score	Compatibility Level
A	≤ 1.5	Extremely High
B	> 1.5 and ≤ 2.5	Very High
C	> 2.5 and ≤ 3.5	Moderately High
D	> 3.5 and ≤ 4.5	Moderately Low
E	> 4.5 and ≤ 5.5	Very Low
F	> 5.5	Extremely Low

4.2 Analysis

Study Scenarios and Assumptions

The analysis was conducted along the major roadway segments in the San Xavier District study area. The scenarios are all based upon the existing roadway conditions, speed limits, and existing traffic control along the roadway segments. The following are the study scenarios:

Existing 2009: The BLOS and PLOS was conducted using the existing traffic volumes collected on March 19, 2009

Future 2014: The BLOS and PLOS were conducted using the PAG model future year 2014 traffic projections

Future 2030: The BLOS and PLOS were conducted using the PAG model future year 2030 traffic projections

Following are some additional assumptions used for conducting the analysis.

- Width of outside lane, to outside stripe = 12 feet
- Percentage of heavy vehicles = 2 percent
- The Federal Highway Administrations' (FHWA) pavement condition rating = 4 (where Default is 4-Good, 5-Best and 1-Worst)

Analysis Findings

Existing 2009

- The study roadway segments operate at BLOS D or better.
- The study roadway segments operate at PLOS D or better.

Future 2014

- The study roadway segments will operate at BLOS D.
- The study roadway segments will operate at PLOS E[6], while San Xavier Road between Mission Road and Little Nogales Drive will operate at PLOS D.

Future 2030

- The study roadway segments will operate at BLOS D.
- San Xavier Road between Little Nogales Drive and Ventura Drive, and Mission Road between Valencia Road and San Xavier Road will operate at PLOS E[7], while,
- San Xavier Road between Mission Road and Little Nogales Drive, where the speed limit is 25 mph, will operate at PLOS D or better.

Table 12 shows the BLOS and PLOS at various segments in the study area. The BLOS and PLOS analysis reports with input variables and the output results are included in the Appendix D. Appendix E summarizes the formulas developed by Bruce Landis *et al*. for the League of Illinois Bicyclists for calculating BLOS and PLOS.

Table 12 PLOS and BLOS Along Study Roadway Segments

Segment	From	To	Speed (mph)	Existing 2009			2014			2030		
				Traffic Volume	BLOS	PLOS	Traffic Volume	BLOS	PLOS	Traffic Volume	BLOS	PLOS
San Xavier Rd	I-19 NB On Ramp	Ventura Dr	35	5,340	D	D	15,000	D	E	15,100	D	E
San Xavier Rd	I-19 SB Off Ramp	I-19 NB On Ramp	35	5,015	D	D	13,400	D	E	13,300*	D	E
San Xavier Rd	Little Nogales Dr	I-19 SB Off Ramp	35	4,435	D	D	14,300	D	E	14,800	D	E
San Xavier Rd	Mission Rd	Little Nogales Dr	25	3,016	C	D	10,500	D	D	9,800*	D	D

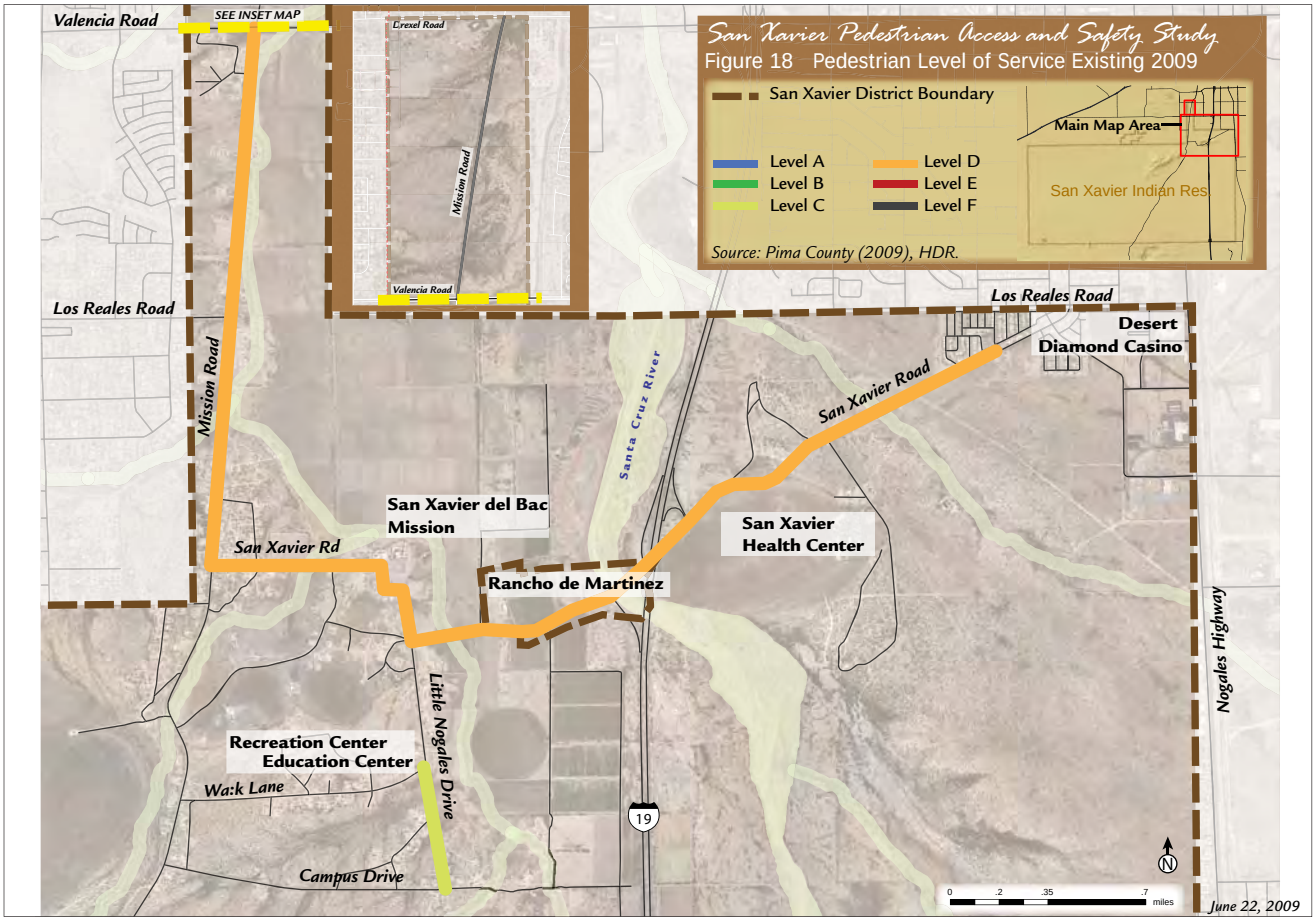
[6] Based on 2014 PAG projected traffic volumes with existing roadway and traffic control conditions.
[7] Based on 2030 PAG projected traffic volumes with existing roadway and traffic control conditions.

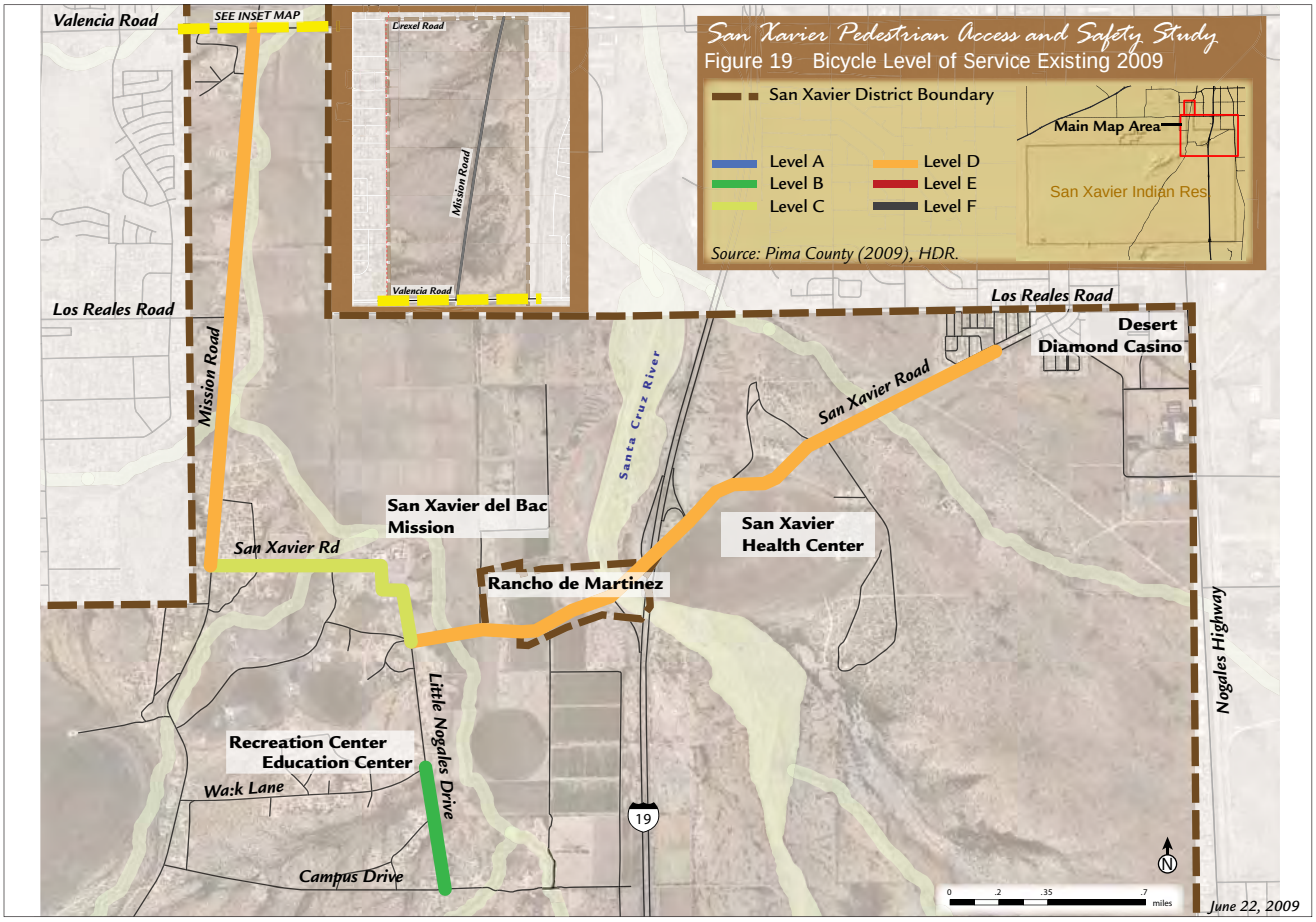
Segment	From	To	Speed (mph)	Existing 2009			2014			2030		
				Traffic Volume	BLOS	PLOS	Traffic Volume	BLOS	PLOS	Traffic Volume	BLOS	PLOS
Mission Rd	Valencia Rd	San Xavier Rd	45	4,061	D	D	8,800	D	E	9,500	D	E
Little Nogales Dr	San Xavier Rd (N)	San Xavier Rd (S)	25	3,435	C	D	13,400	D	E	10,300*	D	D
Little Nogales Dr	Wa:k Ln	Campus Dr	25	733	B	C	NA	NA	NA	NA	NA	NA

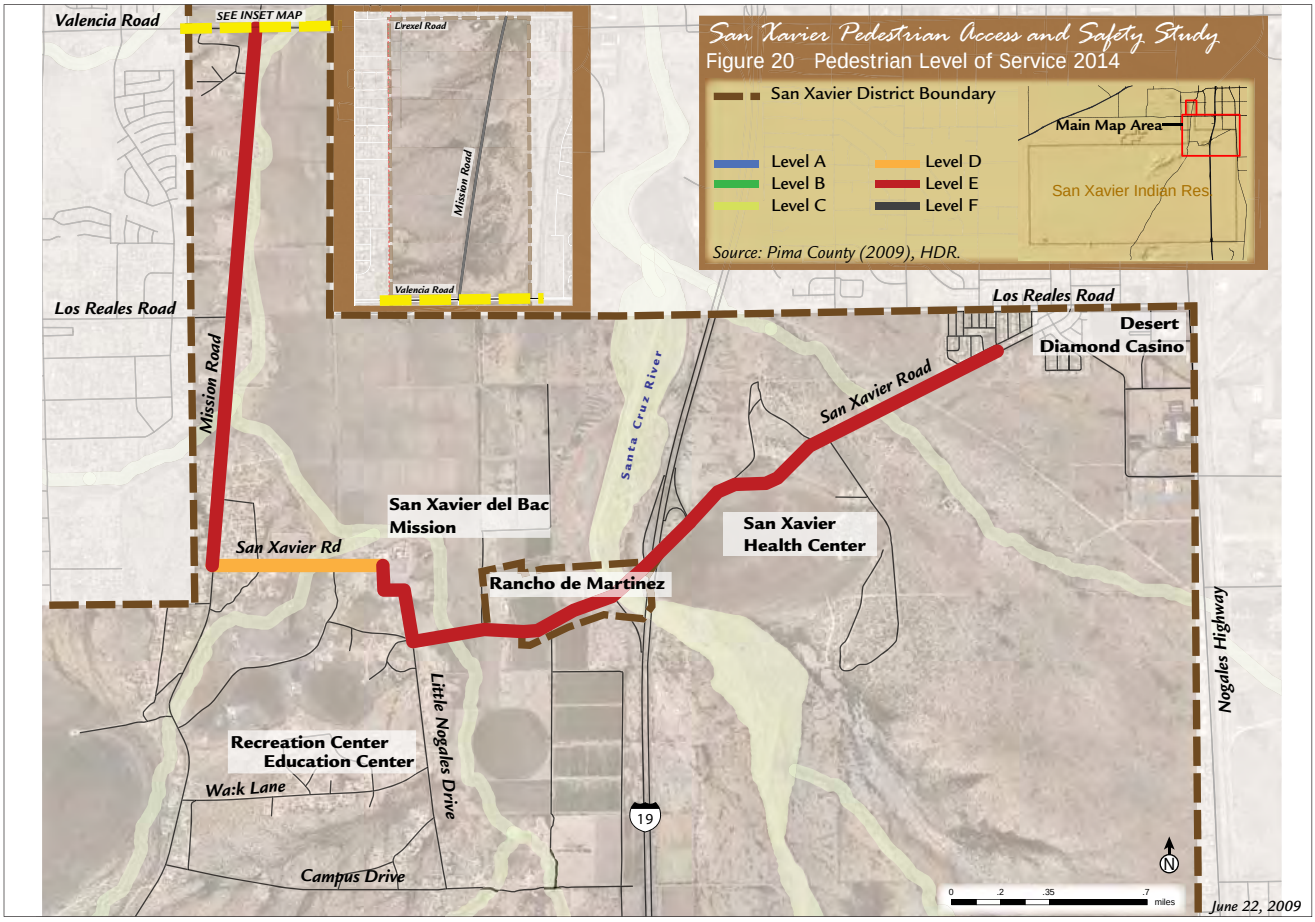
Note: NA-Roadway segment is not included in PAG model; hence, future projected volumes are not available.
*A decrease in 2030 projected volumes was observed compared to 2014 projected volumes. This could be due to regional growth in conjunction with roadway/transit improvements planned in the vicinity this project's study area.

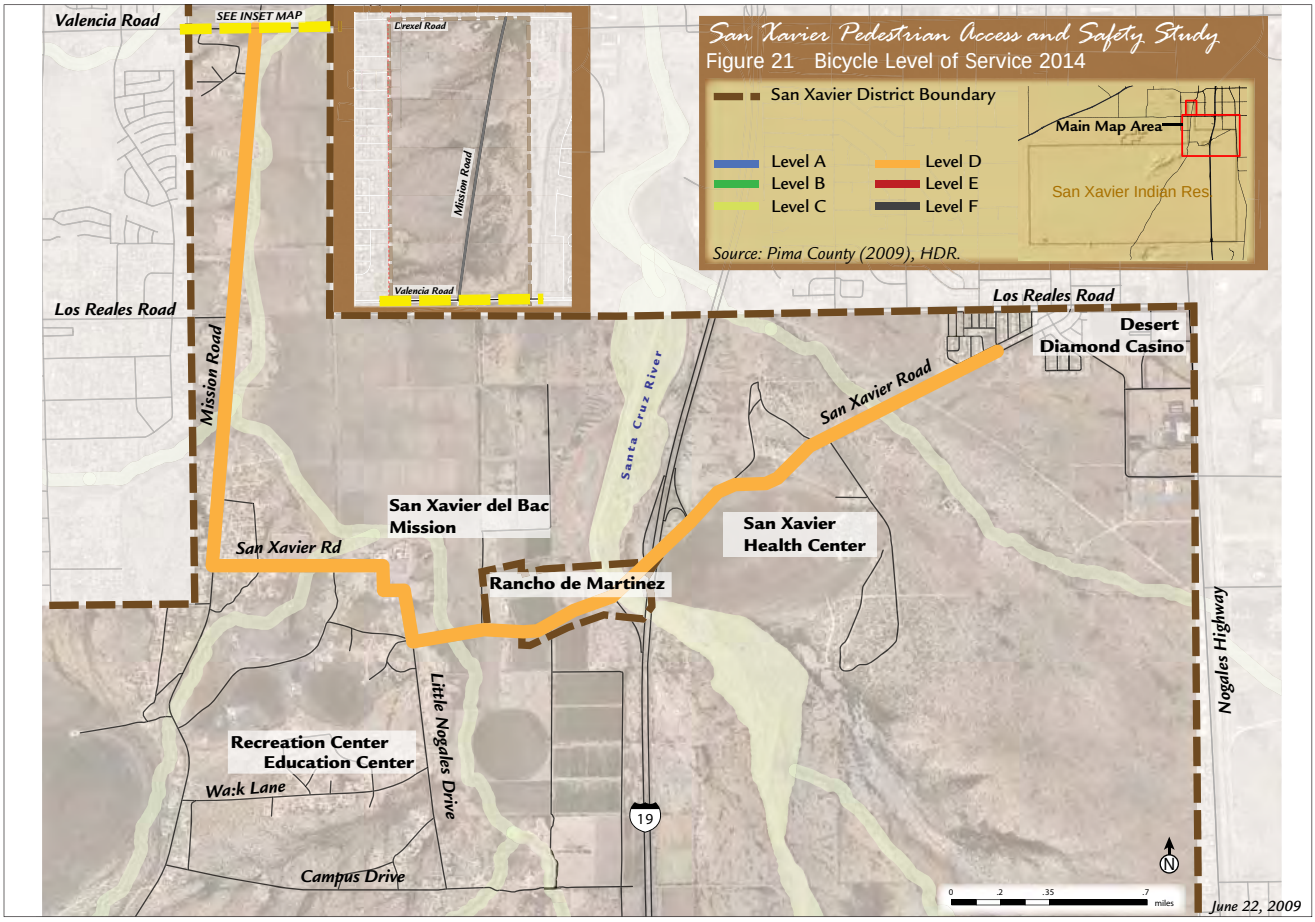
The anticipated traffic growth as a result of regional growth, in conjunction with roadway/transit improvements planned in and around the San Xavier study area, would reduce the compatibility level of existing roadways for bicyclists and pedestrians, along with vehicular traffic, to very low conditions. Roadway improvements should take into consideration the inclusion of sidewalks, paved shoulders, trails, and traffic calming elements because it will make the community more walkable by improving the bicyclist and pedestrian compatibility

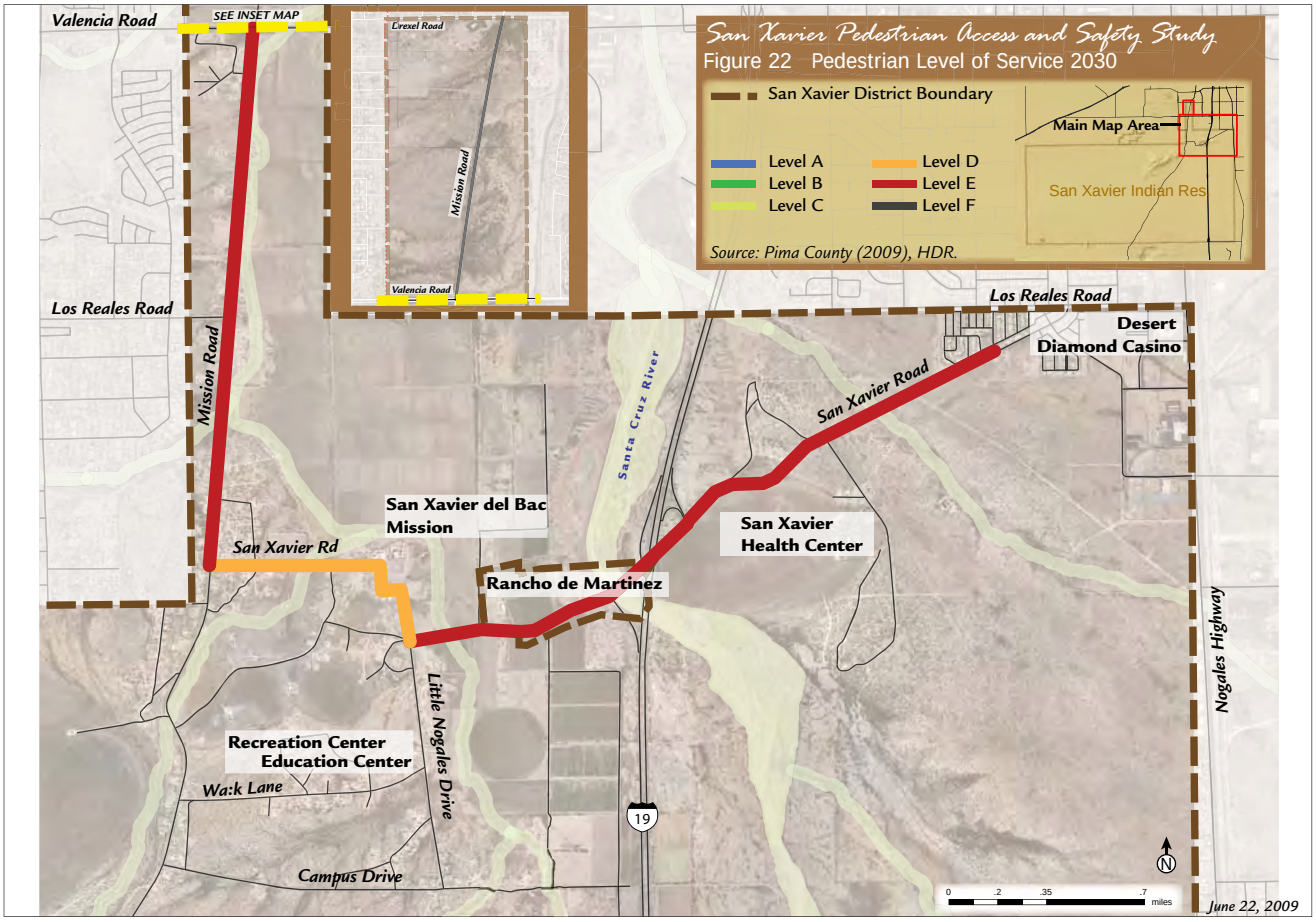
Figures 18 through 23 illustrate the existing (2009), 2014, and 2030 levels of service for pedestrians and bicyclists.

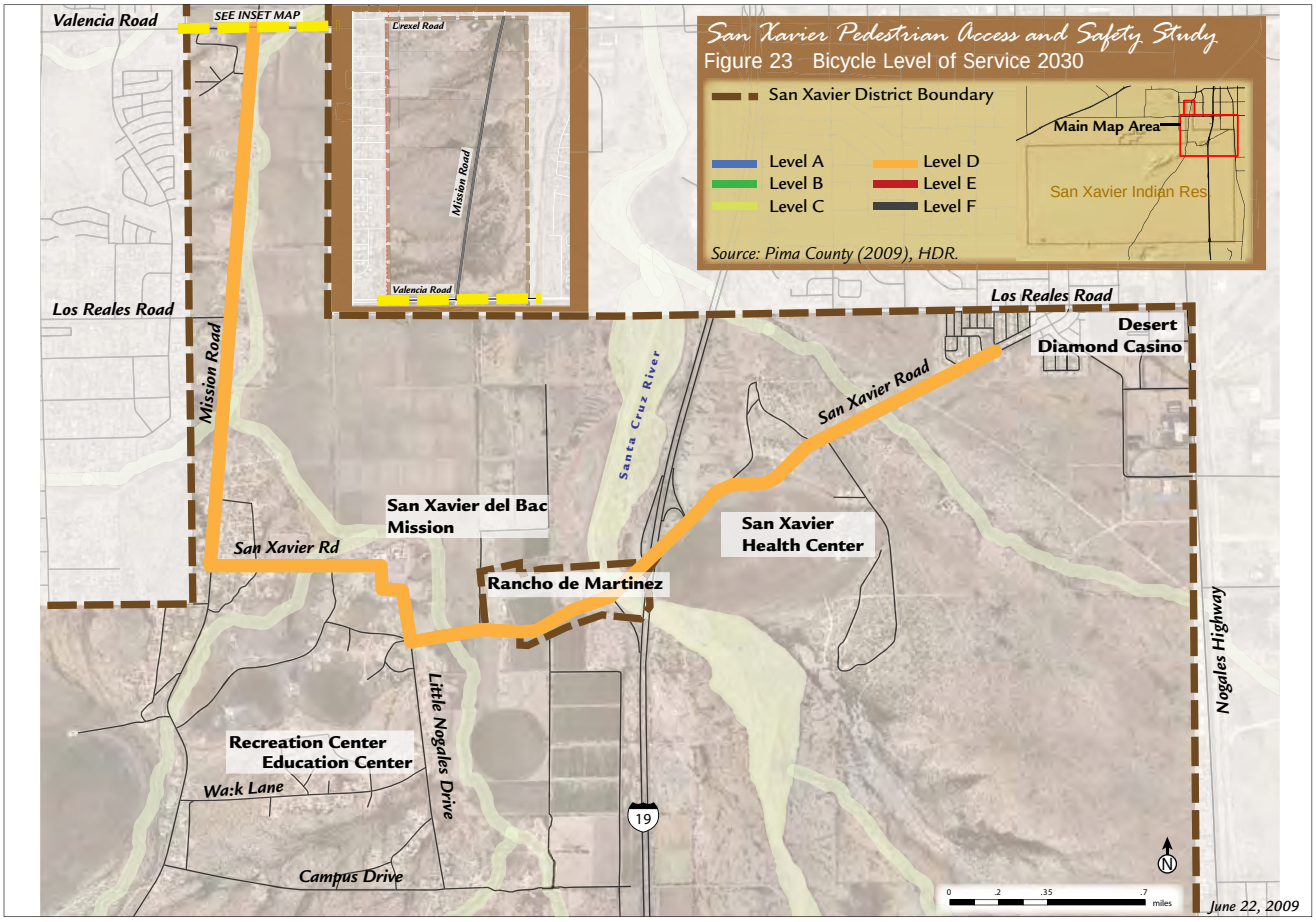

San Xavier Pedestrian Access and Safety Study
Figure 18 Pedestrian Level of Service Existing 2009
San Xavier District Boundary
Level A
Level B
Level C
Level D
Level E
Level F
Source: Pima County (2009), HDR.
Main Map Area
San Xavier Indian Res
SEE INSET MAP
Valencia Road
Drexel Road
Mission Road
Valencia Road
Los Reales Road
Mission Road
Santa Cruz River
San Xavier Road
Desert Diamond Casino
San Xavier del Bac Mission
San Xavier Rd
San Xavier Health Center
Rancho de Martinez
Nogales Highway
Little Nogales Drive
Recreation Center
Education Center
Wa:k Lane
Campus Drive
19
N
0 .2 .35 .7 miles
June 22, 2009


San Xavier Pedestrian Access and Safety Study
Figure 19 Bicycle Level of Service Existing 2009
San Xavier District Boundary
Level A
Level B
Level C
Level D
Level E
Level F
Source: Pima County (2009), HDR.
Main Map Area
San Xavier Indian Res
SEE INSET MAP
Valencia Road
Drexel Road
Mission Road
Valencia Road
Los Reales Road
Mission Road
Santa Cruz River
San Xavier Road
Desert Diamond Casino
San Xavier del Bac Mission
San Xavier Rd
San Xavier Health Center
Rancho de Martinez
Nogales Highway
Little Nogales Drive
Recreation Center
Education Center
Wa:k Lane
Campus Drive
19
N
0 .2 .35 .7 miles
June 22, 2009


San Xavier Pedestrian Access and Safety Study
Figure 20 Pedestrian Level of Service 2014
San Xavier District Boundary
Main Map Area
San Xavier Indian Res
Level A
Level B
Level C
Level D
Level E
Level F
Source: Pima County (2009), HDR.
Valencia Road
SEE INSET MAP
Drexel Road
Mission Road
Valencia Road
Los Reales Road
Mission Road
Los Reales Road
Desert Diamond Casino
San Xavier Road
Santa Cruz River
San Xavier del Bac Mission
San Xavier Rd
San Xavier Health Center
Rancho de Martinez
Nogales Highway
Little Nogales Drive
Recreation Center
Education Center
Wa:k Lane
19
Campus Drive
N
0 .2 .35 .7 miles
June 22, 2009


San Xavier Pedestrian Access and Safety Study
Figure 21 Bicycle Level of Service 2014
San Xavier District Boundary
Main Map Area
San Xavier Indian Res
Level A
Level B
Level C
Level D
Level E
Level F
Source: Pima County (2009), HDR.
Valencia Road
SEE INSET MAP
Drexel Road
Mission Road
Valencia Road
Los Reales Road
Mission Road
Los Reales Road
Desert Diamond Casino
San Xavier Road
Santa Cruz River
San Xavier del Bac Mission
San Xavier Rd
San Xavier Health Center
Rancho de Martinez
Nogales Highway
Little Nogales Drive
Recreation Center
Education Center
Wa:k Lane
19
Campus Drive
N
0 .2 .35 .7 miles
June 22, 2009


San Xavier Pedestrian Access and Safety Study
Figure 22 Pedestrian Level of Service 2030
San Xavier District Boundary
Level A
Level B
Level C
Level D
Level E
Level F
Main Map Area
San Xavier Indian Res.
Source: Pima County (2009), HDR.
Valencia Road
SEE INSET MAP
Drexel Road
Mission Road
Valencia Road
Los Reales Road
Mission Road
Santa Cruz River
Los Reales Road
Desert Diamond Casino
San Xavier Road
San Xavier del Bac Mission
San Xavier Rd
Rancho de Martinez
San Xavier Health Center
Nogales Highway
Little Nogales Drive
Recreation Center
Education Center
Wa:k Lane
Campus Drive
19
N
0 .2 .35 .7 miles
June 22, 2009


San Xavier Pedestrian Access and Safety Study
Figure 23 Bicycle Level of Service 2030
San Xavier District Boundary
Level A
Level B
Level C
Level D
Level E
Level F
Main Map Area
San Xavier Indian Res.
Source: Pima County (2009), HDR.
Valencia Road
SEE INSET MAP
Drexel Road
Mission Road
Valencia Road
Los Reales Road
Mission Road
Santa Cruz River
Los Reales Road
Desert Diamond Casino
San Xavier Road
San Xavier del Bac Mission
San Xavier Rd
Rancho de Martinez
San Xavier Health Center
Nogales Highway
Little Nogales Drive
Recreation Center
Education Center
Wa:k Lane
Campus Drive
19
N
0 .2 .35 .7 miles
June 22, 2009

C. PUBLIC INVOLVEMENT

1. Public Involvement Participation Summary

ADOT provides PARA funds to non-metropolitan communities for the purpose of conducting transportation planning studies. In partnership with the San Xavier District Planning Department, ADOT is conducting the San Xavier District Pedestrian Access and Safety Study for the development of a system of pathways that connects residential areas to important District facilities such as the District Center, Recreation and Education Centers, Indian Health Services, and the San Xavier del Bac Mission Church and School. This plan for both community members and visiting public, will balance the need for pedestrian travel and the community's desire for privacy.

Outreach efforts were conducted to engage members of the San Xavier District community in the Pedestrian Access and Safety Study. Materials were produced for outreach activities such as forums, stakeholder meetings, and public open house. Following is a description of the various avenues utilized by the Study Team to communicate the plan process, the current status of the study, and to encourage active participation. The Study Team includes ADOT, HDR, and Kaneen Advertising & Public Relations. Copies of outreach materials discussed below are shown in Appendix F.

2. Public Outreach Opportunities

2.1 Study Questionnaire

In March 2009, a Questionnaire was created to solicit input from community members on several potential projects being studied:

- Current safety issues on the Santa Cruz River Pedestrian Bridge
- The rebuilding of San Xavier Road to include a walking path for safe access to the Health Center
- Safe Route to School pathways for children to safely walk from their homes to San Xavier School
- Other pedestrian or bicycle route improvements in the District.

The Questionnaire, along with a three-quarter page description of the Pedestrian Access and Safety Study, was published in the March 2009 *Wa:k Newsletter*. The write-up described the project and encouraged the community members to participate by answering the Questionnaire, which was attached to the monthly newsletter, and returning it to the District office in order for the Study Team to compile and analyze the information. Also, on the back side of the Questionnaire was a map of the District area on which participants could mark the paths they or family members use on a regular basis to walk from their home to another destination in the community.

In order to encourage more participation from the community, reminder flyers, along with the Questionnaire and map on the reverse, were posted on community bulletin boards located throughout the San Xavier District. For some residents, this method of communication is the most convenient because they can stop and read about District updates on their daily travels, since walking is the main form of transportation in the community. Also, for some, this is the only way residents become informed.

2.2 Public Involvement Overview with San Xavier District Chairman

On January 29, 2009, Community Outreach staff met with Chairman Austin Nuñez to discuss different methods of reaching San Xavier District community members. Community outreach within the District is different from the usual methods used in the Tucson community, because of privacy issues and lack of exact addresses to contact residents by regular mail. The *Wa:k Newsletter* was determined to be the best way to disseminate information; however, not all community members read the newsletter. Other options discussed with the Chairman were posting information on the community bulletin boards and releasing information through group and neighborhood leaders who would in turn inform their special interest groups about the study and encourage their members' participation. Other options discussed were using comment or opinion forms at the public open house, creating a fact sheet or other visual materials for distribution, and meeting directly with leaders of the special interest or event groups.

2.3 Meeting With Pow Wow Committee Members

With a recommendation from Chairman Nuñez, the Study Team met with the Pow Wow Event Committee to discuss the Study Team's participation at the 27th Annual Wa:k Pow Wow on March 14 and 15, 2009. The goal was to be represented in a booth at the Pow Wow to be available to discuss and give out information regarding the Pedestrian and Safety Study. After talking with the Committee, it was determined that this would probably not be a good idea since most of the people attending the Pow Wow would be visitors and members of the District Community would be working in the food booths or participating in other Pow Wow events. The Team briefed the Pow Wow Committee on the Pedestrian and Access Safety Study and handed out 200 Questionnaires for committee members to distribute to their friends, neighbors and others with instructions to return them to the District Office for review by the Planning Department staff and Study Team.

2.3 Public Open House

On July 14, 2009, the Public Open House was held at the San Xavier District Center. A full-page meeting notice was published in the June and July *Wa:k Newsletter* and the notice was posted on community bulletin boards.

After welcoming attendees and introducing the Study Team, the San Xavier Planning Department presented the Study's purpose and how community members could help by giving their suggestions and opinions about the type of pathways and locations for pathways needed in the Community. ADOT then presented the Study overview, and HDR made a presentation of the overall San Xavier Pedestrian Access and Safety Study. Comment cards were available for participants to fill out and return at the meeting or return later to the District office.

Attendance was small, but those who were there were there were very interested and had good questions for the staff. During table discussions, they were encouraged to provide additional information about issues and concerns for the project area.

The table discussions had community leaders/residents in attendance that were enthusiastic and knowledgeable about the pedestrian safety and access needs within the District. The project team got to spend more than an hour with the group at the table maps, where many diagrams were written on the map with verbal discussion as to what the drawings represented in terms of needs and areas of concern. The design team agreed that this was highly valuable and informative opportunity to gauge the needs and issues related to pedestrian safety and access. Meeting minutes are transcribed in Appendix G.

2.4 Additional Outreach

Two maps were posted on foam core board with a marker attached and easy-to-read instructions on how to provide comments on the maps using the marker. The maps were posted in the lobby of the San Xavier administration building from July 24 to August 4, 2009. The lobby secretary received additional comment cards and instructions. The second map was circulated throughout several District departments for one to two days at a time. The departments included Water Rights, Southern Arizona Water Rights Settlement Act, Council, Housing, Human Resources, Finance, and Elders.

Comments written on the maps included:

Dead Man's Curve (the curve in San Xavier Road between I-19 and J. Stock Road) is a safety concern.

The curve in Mission Road (just north of Gok Kawulk Wo:g and the intersection of Little Nogales and San Xavier Road) is a safety concern.

San Xavier Road (between Little Nogales and I-19) is a safety concern.

A recommendation was made for speed bumps or speed tables on Little Nogales Drive.

D. Pedestrian Access Improvement Plan

1. Introduction

The San Xavier District of the Tohono O'odham Nation is home to approximately 2,000 people. Numerous others come to the District to visit the San Xavier del Bac Mission Church. The San Xavier District Pedestrian Access and Safety Study is being prepared to improve the walking and bicycling environment on the San Xavier District for Community members and visitors alike.

The study is being funded by ADOT Multimodal Planning Division's PARA program. The PARA program provides federal funds to non-metropolitan communities for the purpose of conducting transportation planning studies. All Native American tribes in Arizona are eligible for funding and PARA funds may be applied to address a broad range of planning issues related to roadway and non-motorized transportation modes. ADOT encourages communities to focus their requests for funding on the most critical transportation planning needs identified in their communities; hence the focus here on pedestrians and bicyclists.

The Community desires to establish a system of pathways that connects residential areas with community centers in safety and privacy. In 2006, the San Xavier District Planning Department prepared a Pedestrian Access Concept Plan that identified a 5.5-mile network of pathways linking residential areas with community activity centers. The HDR Engineering, Inc. Project Team built on this first effort to prepare a pedestrian improvement plan that prioritizes needs and links projects to specific funding sources. This study encompasses the most densely populated region of the District, generally that area of the District north of Campus Drive and east of Mission Road. Refer to Figure 1 Study Area.

2. Alternatives

Three alternatives were developed for the study area. The plans included combinations of paths and trails of varying widths and routes that connected the primary destinations in the Community. All of the alternatives included improved routes between the Mission, Mission School, Recreation and Education centers, and the Health Center because is was determined based on public outreach and traffic analysis that these were critical destinations.

For the plans, and to adopt a growing consensus on terminology, paths are paved routes and trails are unpaved routes. Paved path material can be asphalt, concrete, or other similar material. Unpaved trails can be the native surface with large rocks removed, stabilized granite, or other similar material.

2.1 Clear Zones

The ROW width of the major roads in the study area is 60 feet. Pavement widths are either 22 or 24 feet. This leaves 18 to 19 feet on either side of the road for a path or trail. Because the pavement is flush with the surrounding grade (there are no curbs or gutters), this area beyond the pavement is also the clear zone for vehicular traffic, based on American Association of State Highway and Transportation Officials standards. Clear zones are unobstructed, relatively flat areas beyond the edge of the traveled way that allow a driver to stop safely or regain control of a vehicle that leaves the traveled way. Clear zones should have as few walls, barriers, piers, sign and signal supports, mature trees, landscaping items, and power poles as possible.

Clear zone standards for roads in the study area are shown in the table below:

Design Speed	ADT	1V:6H or flatter*
40 mph or less	Under 750 750 – 1500 1500 – 6000 Over 6000	7 – 10 10 – 12 12 – 14 14 – 16
45 - 50 mph	Under 750 750 – 1500 1500 – 6000 Over 600	10 – 12 14 - 16 16 - 18 20 - 22
V = vertical, H = horizontal Source: AASHTO Roadside Design Guide (3).		

Paths and trails were kept as far from the road and clear zone as possible. In cases where the clear zone did not encompass the entire ROW, the path or trail was moved closer to the road to allow for an area of landscaping between path or trail and the ROW. These landscape areas can include shade trees because they are out of the clear zone.

Segment	From	To	Speed (mph)	ADT	Recommended Clear Zone Width (ft)
San Xavier Rd.	I-19 NB On Ramp	Ventura Dr.	35	5340	12 to 14
San Xavier Rd.	I-19 SB Off Ramp	I-19 NB On Ramp	35	5015	12 to 14
San Xavier Rd.	Little Nogales Dr.	I-19 SB Off Ramp	35	4435	12 to 14
San Xavier Rd.	Mission Rd.	Little Nogales Dr.	25	3016	12 to 14
Mission Rd.	Valencia Rd.	San Xavier Rd.	45	4061	16 to 18
Little Nogales Dr.	San Xavier Rd. (north)	San Xavier Rd. (south)	25	3435	12 to 14
Little Nogales Dr.	Wa:k Ln.	Campus Dr.	25	733	7 to 10

2.2 Crossings

In addition to crosswalks, the alternatives proposed a variety of crossings to allow pedestrians to cross roads as safely as possible and to slow down vehicular traffic, especially in areas of higher pedestrian traffic. Three types of crossings are proposed:

1. speed tables
2. high visibility crossings, and
3. HAWK crossings.

1) Speed tables are a traffic calming device designed as a long speed hump with a flat section in the middle. The long, flat design allows cars to pass without slowing as significantly as with speed humps or cushions. The speed tables for this project should include marking and signing that indicate it is a pedestrian crossing. 2) High visibility crossings have highly visible pavement markings and signs indicating the presence of pedestrians. 3) HAWK stands for High-intensity Activated crossWalK. The HAWK uses traditional traffic and pedestrian signal heads but in a different configuration. It includes a sign instructing motorists to "stop on red" and a "pedestrians" overhead sign.

Speed table Crossing

Source: Pedestrian Policies and Design Guidelines, 2005, MAG.

High-visibility Crossing

Source: Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations, Sept. 2005, FHWA.

HAWK Crossing

Source: Michael Cynecki

3. Preferred Alternative

The technical advisory committee reviewed the alternatives and developed a preferred alternative which was presented to the public at an open house on July 14, 2009. The preferred alternative, Figure 24, was a combination of the three concept alternatives. The preferred alternative has: 10-foot concrete multiuse paths, 6-foot concrete paths, 8-foot asphalt paths, 6-foot asphalt paths, and 8-foot trails. Figure 25 illustrates the cross section of each facility relative to the roadway, indicating the clear zones.

Comments from the public open house and returned comment cards included:

- Prefer trails over paths
- Prefer no paths or trails on Mission Road – feel it is unsafe
- Path/trail lighting in the area around the Mission and down to the recreation center
- Add amenities at locations where people are waiting for the circulator bus
- Reroute the path at Dead Man's curve to an alignment just north of San Xavier Road
- Consider speed tables on Mission Road
- Provide a HAWK crossing at Mission and Los Reales roads rather than a crosswalk
- With the current traffic flow running through the community, I believe the changes recommended should be done. We sometimes forget how important safety is to the community of San Xavier.
- I think adding safe walking paths around the community would be very helpful and safe. Biking areas would also be helpful.
- No vehicles of any kind driving on the road shoulder throwing dust (illegal). Designated bus stops with canopy (for bad weather) with benches.
- Speed humps are needed on community land; people drive by like it's a freeway and create a lot of dust.

There were comments provided beyond the scope of this pedestrian improvement project:

- Traffic improvements at the intersection of Mission Road and Los Reales Road.

Cut through traffic on McCabe Drive between Valencia Road and Mission Road.

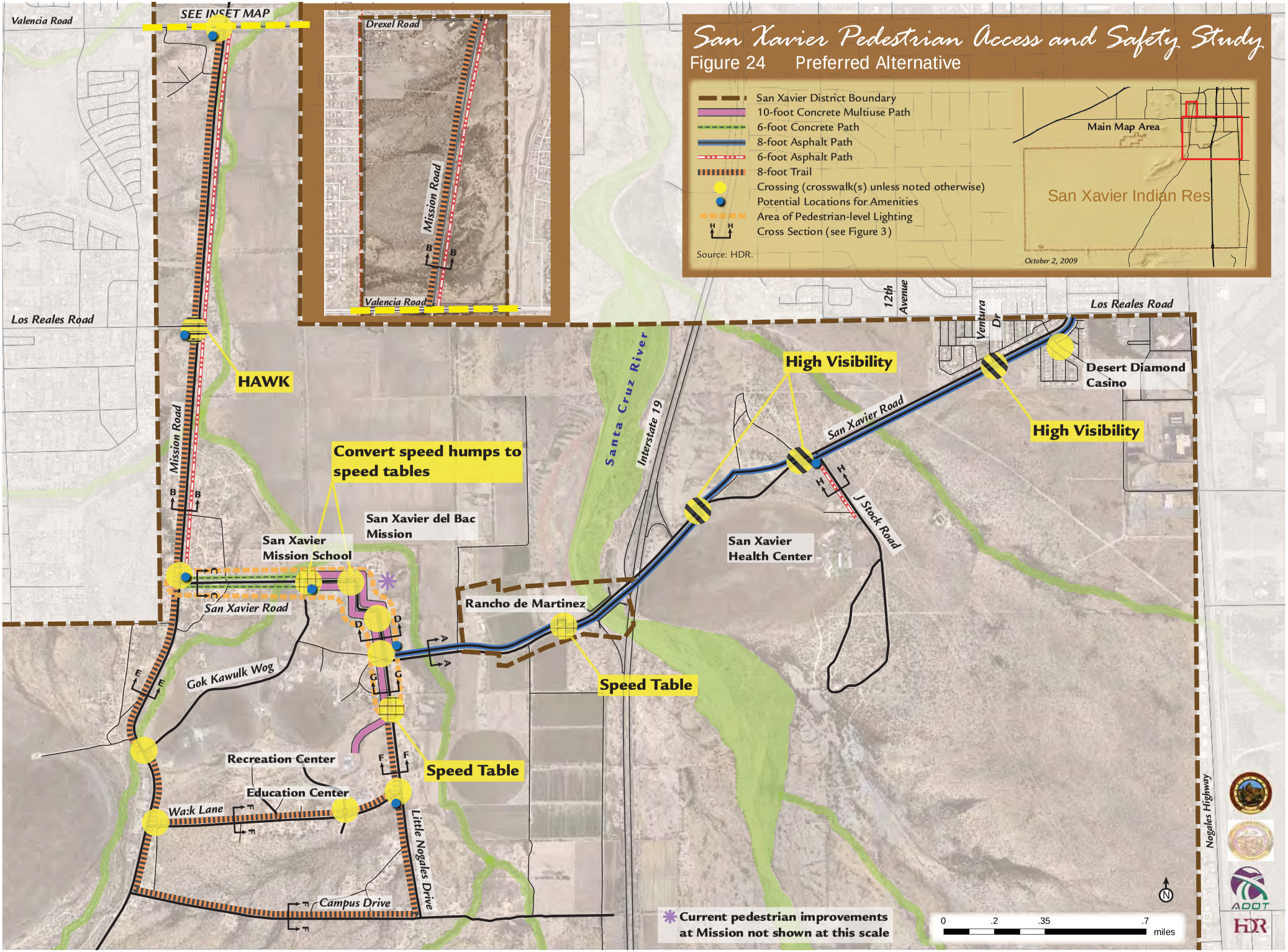
Comments were noted on maps that were posted or circulated in the District between July 24 and August 4, 2009 (see 6.1 Outreach Opportunities this section). They included:

Dead Man's Curve (the curve in San Xavier Road between I-19 and J. Stock Road is a safety concern).

Other safety concerns include the curve in Mission Road just north of Gok Kawulk Wo:g and the intersection of Little Nogales and San Xavier Road.

San Xavier Road, between Little Nogales and I-19, has also been labeled as "unsafe."

A recommendation was made for speed bumps or speed tables on Little Nogales Drive.


San Xavier Pedestrian Access and Safety Study
Figure 24 Preferred Alternative
San Xavier District Boundary
10-foot Concrete Multiuse Path
6-foot Concrete Path
8-foot Asphalt Path
6-foot Asphalt Path
8-foot Trail
Crossing (crosswalk(s) unless noted otherwise)
Potential Locations for Amenities
Area of Pedestrian-level Lighting
Cross Section (see Figure 3)
Source: HDR.
Main Map Area
San Xavier Indian Res.
October 2, 2009
SEE INSET MAP
Valencia Road
Drexel Road
Mission Road
Valencia Road
Los Reales Road
12th Avenue
Ventura Dr
Los Reales Road
HAWK
Mission Road
Santa Cruz River
Interstate 19
High Visibility
Desert Diamond Casino
San Xavier Road
High Visibility
Convert speed humps to speed tables
San Xavier del Bac Mission
San Xavier Mission School
San Xavier Health Center
J Stock Road
San Xavier Road
Rancho de Martinez
Gok Kawulk Wog
Speed Table
Recreation Center
Speed Table
Education Center
Wa:k Lane
Little Nogales Drive
Campus Drive
Nogales Highway
Current pedestrian improvements at Mission not shown at this scale
0 .2 .35 .7 miles
N
ADOT
HDR

San Xavier Pedestrian Access and Safety Study

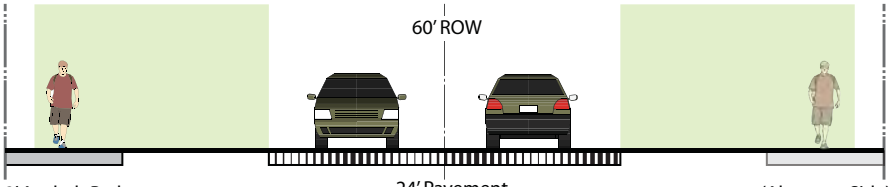
Figure 25 Preferred Alternative Roadway Cross Sections

Right-of-way Line
Roadway Centerline
Clear Zone (no vertical obstructions allowed)

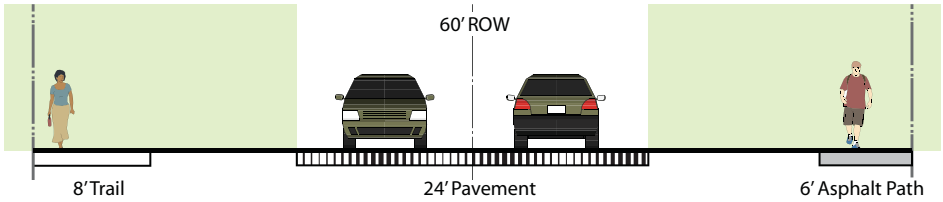
Note: Sections are shown facing north or east, respective of street direction

Source: HDR

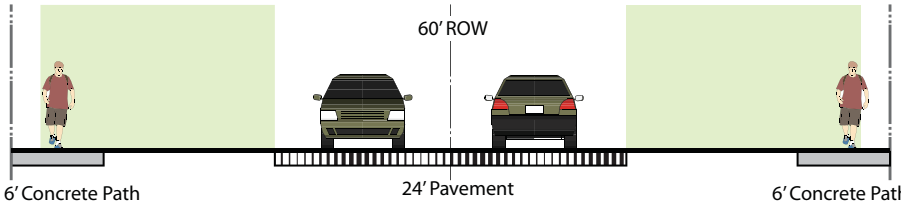
October 2, 2009



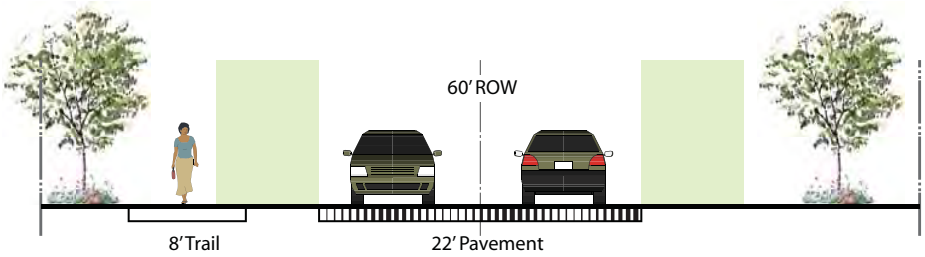
SECTION A-A: San Xavier Road - Little Nogales Drive to Los Reales Road



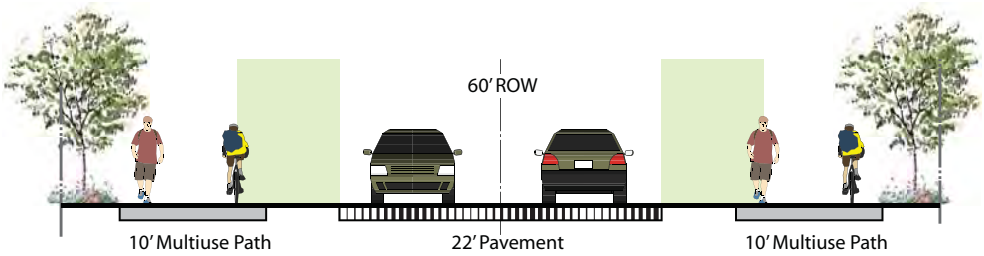
SECTION B-B: Mission Road - San Xavier Road to Drexel Road



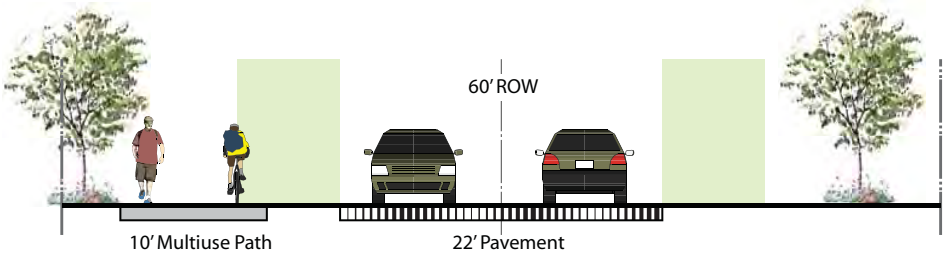
SECTION C-C: San Xavier Road - Mission Road to Gok Kawulk Wog



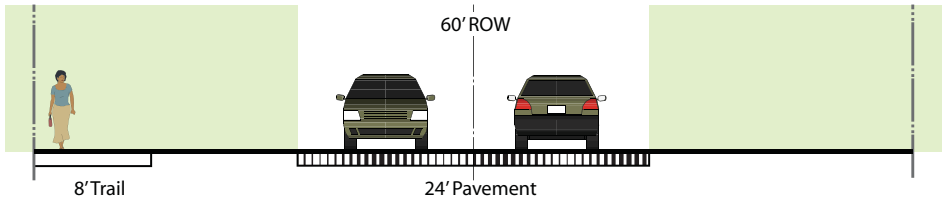
SECTION F-F: Wa:k Lane and Campus Drive - Mission Road to Little Nogales Drive
Little Nogales Drive - Campus Drive to Path to Recreation Center



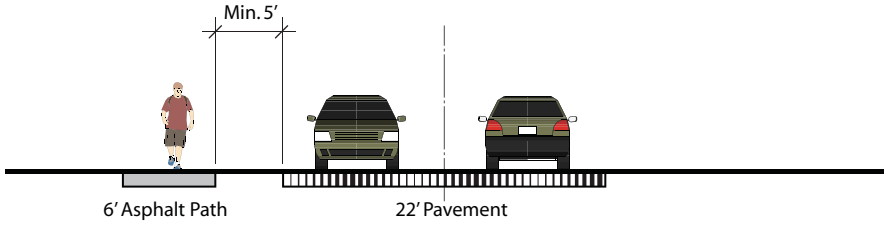
SECTION D-D: San Xavier Road and Little Nogales Drive - Gok Kawulk Wog to San Xavier Road



SECTION G-G: Little Nogales Drive - Path to Recreation Center to San Xavier Road



SECTION E-E: Mission Road - Campus Drive to San Xavier Road

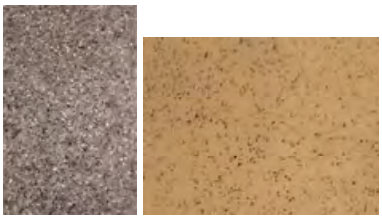


SECTION H-H: J Stock Road - South of San Xavier Road

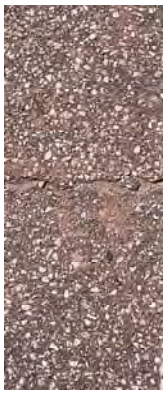
3.1 Proposed Materials and Amenities

The preferred alternative has paths and trails. The proposed materials for the path are concrete or asphalt. Concrete is proposed in the core area of the community as it is the most durable and maintenance-free material for a heavy-use area. Concrete and asphalt paths are accessible and accommodate walkers, joggers, bicyclists, roller bladers, skate boarders, and wheelchairs. They appear more rigid and geometric (i.e., man-made) in the natural environment. The other paths are proposed as asphalt because the material is less intrusive. Trails are proposed as stabilized granite in a color to blend with the surrounding natural landscape. Stabilized granite provides a firm material that can accommodate bicycles, stroller, and wheelchair users to some degree. Trails will integrate the most into the landscape but are also most subject to erosion and damage.

Concrete was recommended for the areas of highest potential use and asphalt for medium use. Trails were recommended where most expected users would be walkers.



Concrete



Asphalt

Stabilized Granite

3.2 Lighting

Lighting is proposed in the core area - San Xavier Road from Mission Road east to Little Nogales Drive and down Little Nogales to the path to the recreation center. The recommended solution is a low level, slender bollard similar to the ones shown below. Provided in a dark brown color, the fixture will blend better with the background during the day.

Bollard Light

Bollard Light

Bollard Light

3.3 Amenities

Amenities are recommended at several locations along the paths and trails. Many of the locations correspond to places that people currently wait for the local circulator bus. A simple shade structure is

recommended; one based on the new kiosks at the Mission or the indigenous shade structures, also seen at the Mission. A bench should also be provided at these locations. It is recommended that the bench be of sturdy material such as concrete (such as the one shown below). Trash receptacles could be considered; however, they should only be installed if there will be regular trash collection. As paths and trails are installed, bike racks should be installed at the major destinations (administration complex, Mission school, Mission, recreation center, education center, casino, and Indian Health Services complex) to encourage bicycle riding. Currently, there is one rack at the education center and one at the casino. As bicycle ridership increases, the number of racks also should increase. Racks should be sturdy (as shown below) but can also be custom designed to reflect an indigenous character. Bike racks are sometimes available through regional funds and this option should be explored.

Kiosk at Mission

Shade Structure at Mission

Bench

Bike Racks – simple and custom

3.4 Design Standards

This report recommends that the San Xavier District consider developing and adopting streetscape design standards that would apply to District projects and projects developed within the District by others. The standards should include the installation of paths or trails along the roads as shown in the preferred plan or as updated by staff; shade trees where clear zones allow; indigenous shrubs or seeding; and amenities such as bus shelters, benches, and bike racks as recommended by staff.

The pedestrian improvement projects listed in this report, when designed, should not impede drainage. Drainage impacts need to solved as part of the improvements or avoided. If paths or trails cross drainages at low-flow, cut-off walls should be considered to reduce potential damage to the crossings.

Once these projects go into final design, the following should be revisited: Pima County Standards, new Pima County improvements, Intergovernmental Agreements, and clear zone widths.

4. Level of Service

Pedestrian and bicycle levels of service were calculated with the proposed pedestrian access and safety improvements along major roadways as shown in Figure 24, the preferred alternative, for years 2014 and 2030 respectively.

The methodology employed is that used by the League of Illinois Bicyclists. The source of the methodology was two reports prepared by Bruce Landis *et al.* of Sprinkle Consulting for the Transportation Research Board in 1997 and 2001. The pedestrian and bicycle levels of service (PLOS and BLOS, respectively) measures developed by Landis *et al.* are emerging national standards for quantifying the friendliness of a roadway.

4.1 Definitions

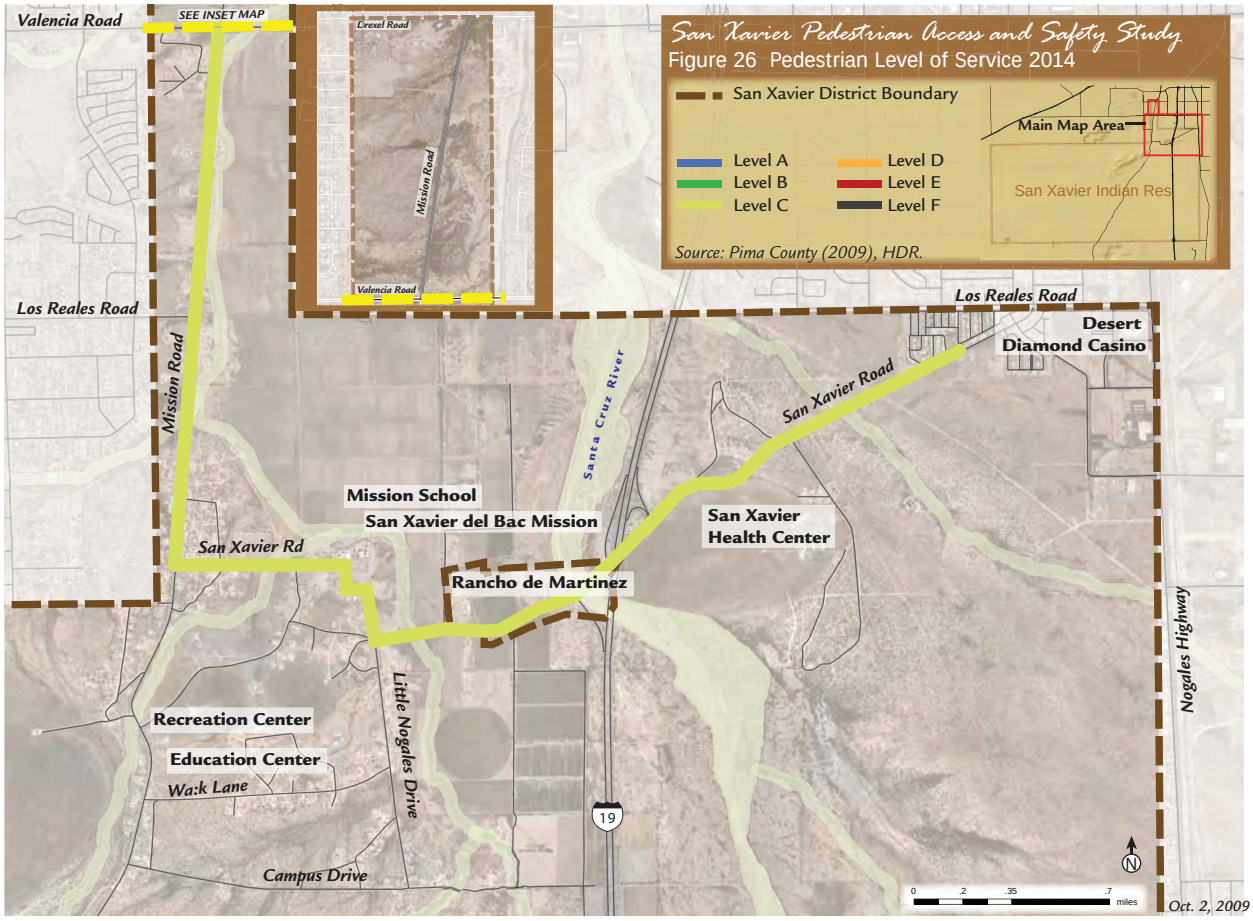
Pedestrian Level of Service (PLOS) measures a walker's perception of comfort and safety. PLOS is measured at mid-block crossings, including any sidewalks and buffers, but not at intersections.

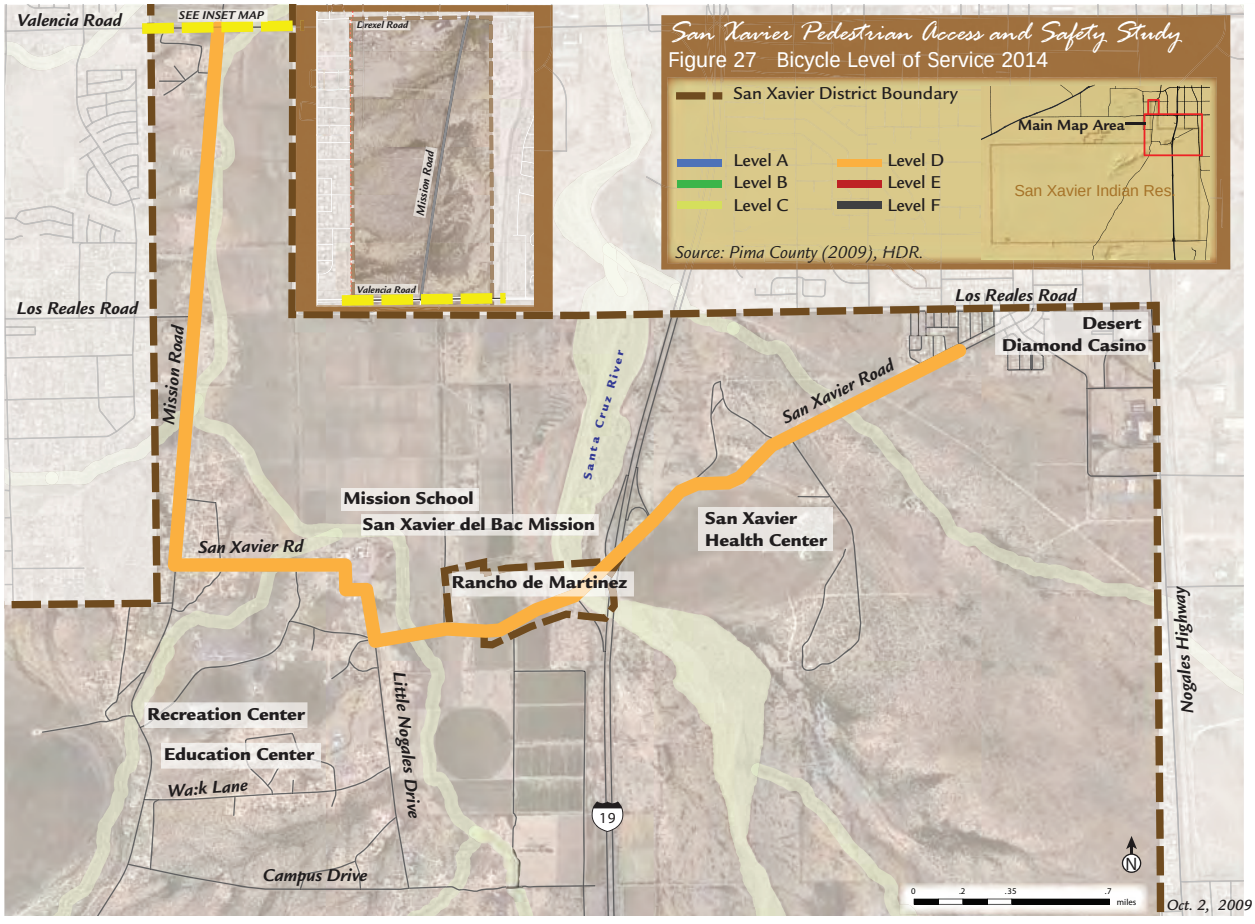
Bicycle Level of Service (BLOS) is a qualitative/quantitative measurement indicating the comfort level of a bicyclist relative to the specific roadway and traffic conditions. Roadways with a better (lower) score are more attractive (and usually safer) for cyclists.

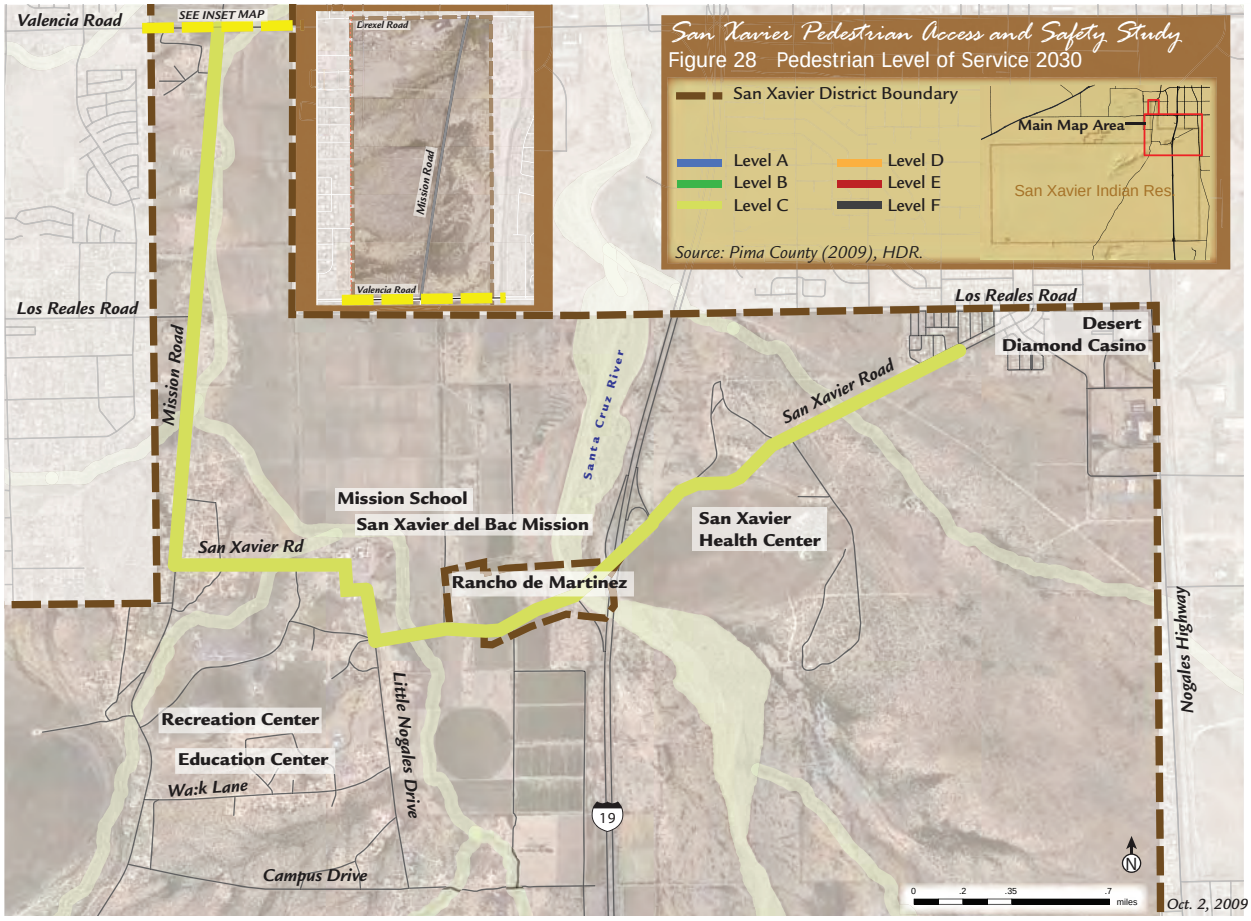
Pedestrian and bicycle level of service is described in more detail in Sections A and B – Current and Future Conditions, respectively.

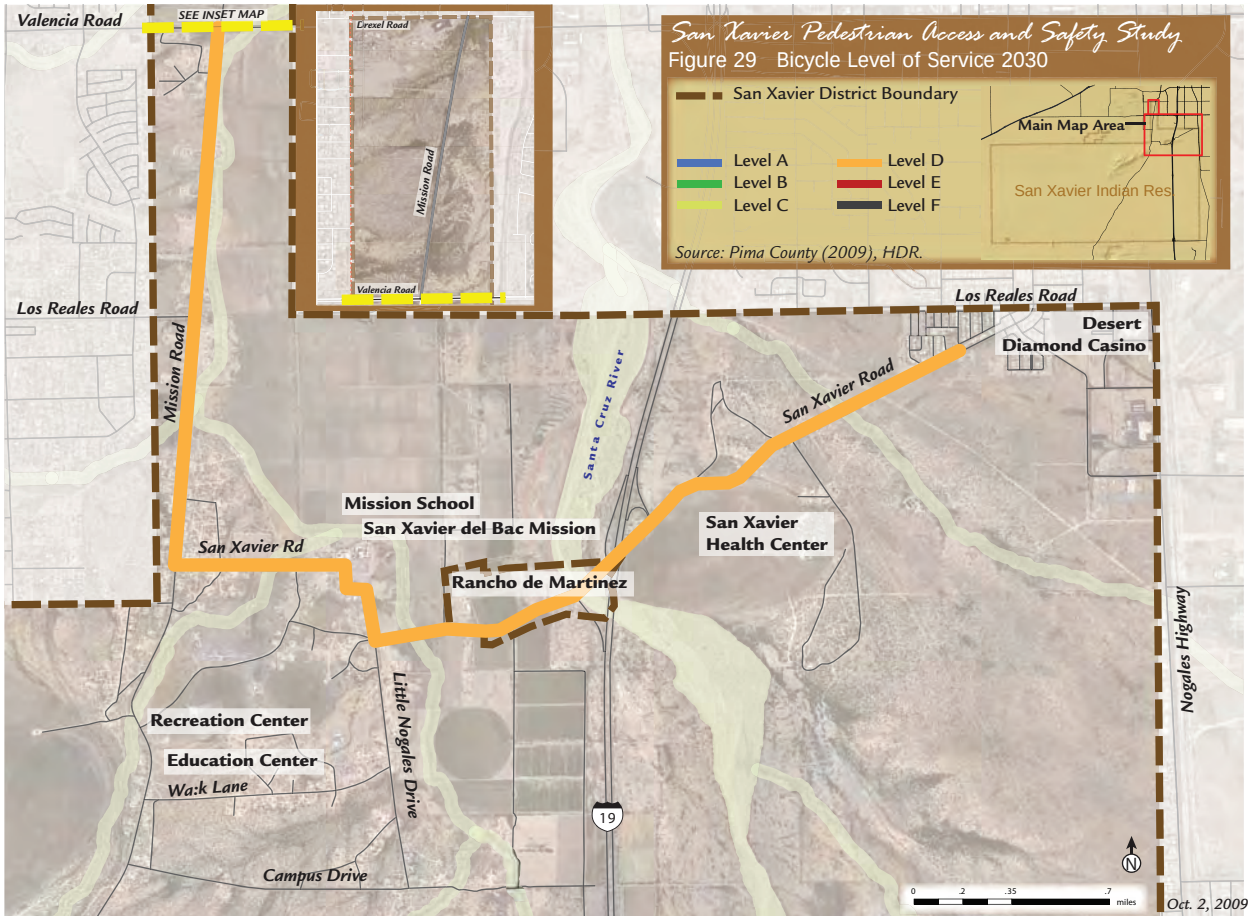
4.2 Study Scenarios and Assumptions

A LOS analysis of the preferred alternative was conducted. The future year scenarios are all based upon the proposed improvements, as shown in Figures 26 through 29, speed limits, and traffic control along the roadway segments where the improvements occur. Following are the study scenarios:


San Xavier Pedestrian Access and Safety Study
Figure 26 Pedestrian Level of Service 2014
San Xavier District Boundary
Level A
Level B
Level C
Level D
Level E
Level F
Main Map Area
San Xavier Indian Res
Source: Pima County (2009), HDR.
Valencia Road
SEE INSET MAP
Lirexel Road
Mission Road
Valencia Road
Los Reales Road
Mission Road
Santa Cruz River
San Xavier Road
Desert Diamond Casino
Mission School
San Xavier del Bac Mission
San Xavier Health Center
San Xavier Rd
Rancho de Martinez
Nogales Highway
Little Noggales Drive
Recreation Center
Education Center
Wa:k Lane
Campus Drive
19
N
0 .2 .35 .7 miles
Oct. 2, 2009


San Xavier Pedestrian Access and Safety Study
Figure 27 Bicycle Level of Service 2014
San Xavier District Boundary
Level A
Level B
Level C
Level D
Level E
Level F
Main Map Area
San Xavier Indian Res
Source: Pima County (2009), HDR.
Valencia Road
SEE INSET MAP
Lirexel Road
Mission Road
Valencia Road
Los Reales Road
Mission Road
Santa Cruz River
San Xavier Road
Desert Diamond Casino
Mission School
San Xavier del Bac Mission
San Xavier Health Center
San Xavier Rd
Rancho de Martinez
Nogales Highway
Little Noggales Drive
Recreation Center
Education Center
Wa:k Lane
Campus Drive
19
N
0 .2 .35 .7 miles
Oct. 2, 2009


San Xavier Pedestrian Access and Safety Study
Figure 28 Pedestrian Level of Service 2030
San Xavier District Boundary
Level A
Level B
Level C
Level D
Level E
Level F
Main Map Area
San Xavier Indian Res
Source: Pima County (2009), HDR.
Valencia Road
SEE INSET MAP
Lirexel Road
Mission Road
Valencia Road
Los Reales Road
Mission Road
Santa Cruz River
Los Reales Road
Desert Diamond Casino
San Xavier Road
Mission School
San Xavier del Bac Mission
San Xavier Rd
San Xavier Health Center
Rancho de Martinez
Nogales Highway
Little Noggales Drive
Recreation Center
Education Center
Wa:k Lane
Campus Drive
19
N
0 .2 .35 .7 miles
Oct. 2, 2009


San Xavier Pedestrian Access and Safety Study
Figure 29 Bicycle Level of Service 2030
San Xavier District Boundary
Level A
Level B
Level C
Level D
Level E
Level F
Main Map Area
San Xavier Indian Res
Source: Pima County (2009), HDR.
Valencia Road
SEE INSET MAP
Lirexel Road
Mission Road
Valencia Road
Los Reales Road
Mission Road
Santa Cruz River
Los Reales Road
Desert Diamond Casino
San Xavier Road
Mission School
San Xavier del Bac Mission
San Xavier Rd
San Xavier Health Center
Rancho de Martinez
Nogales Highway
Little Noggales Drive
Recreation Center
Education Center
Wa:k Lane
Campus Drive
19
N
0 .2 .35 .7 miles
Oct. 2, 2009

Future 2014: The BLOS and PLOS were conducted using the Pima Association of Governments (PAG) model future year 2014 traffic projections using the preferred alternative improvements.

Future 2030: The BLOS and PLOS were conducted using the PAG model future year 2030 traffic projections using the preferred alternative improvements.

Following are some assumptions used for conducting the analysis.

1. Width of outside lane, to outside stripe = 12 feet
2. Percentage of heavy vehicles = 2 percent
3. The Federal Highway Administrations' (FHWA) pavement condition rating = 4 (where Default is 4-Good, 5-Best and 1-Worst)
4. Percentage of road segment with sidewalks = 100 percent
5. Sidewalk and buffer width information are per the preferred alternative, Figure 24.

4.3 Analysis Findings

The anticipated traffic as a result of regional growth, in conjunction with roadway/transit improvements planned in and around the San Xavier District study area, would reduce the compatibility level of existing roadways for bicyclists and pedestrians to very low conditions. As discussed Section B Future Conditions, most of the major roadways in the community were operating at PLOS "E" based on future 2014 and 2030 traffic projections and no pedestrian or bicycle improvements.

The proposed pedestrian and bicycle improvements include multiuse paths, paths, trails, and traffic calming elements to help make the community more walkable by improving pedestrian accessibility and safety.

Table 13 shows the BLOS and PLOS along major roadway segments with the proposed improvements. The individual BLOS and PLOS analysis reports, with input variables and the output results, are included in Appendix H.

Table 13 PLOS and BLOS Along Study Roadway Segments

Segment	From	To	Speed (mph)	Sidewalk Width (ft)	Buffer Width (ft)	2014			2030		
						Traffic Volume	BLOS	PLOS	Traffic Volume	BLOS	PLOS
San Xavier Rd	I-19 NB On Ramp	Ventura Dr	35	8	10	15,000	D	C	15,100	D	C
San Xavier Rd	I-19 SB Off Ramp	I-19 NB On Ramp	35	8	10	13,400	D	C	13,300*	D	C
San Xavier Rd	Little Nogales Dr	I-19 SB Off Ramp	35	8	10	14,300	D	C	14,800	D	C
San Xavier Rd	Mission Rd	Gok Kawulk Wog	25	6	12	10,500	D	C	9,800*	D	C
San Xavier Rd	Gok Kawulk Wog	Little Nogales Dr	25	10	4.5	13,400	D	C	10,300*	D	C

Segment	From	To	Speed (mph)	Sidewalk Width (ft)	Buffer Width (ft)	2014			2030		
						Traffic Volume	BLOS	PLOS	Traffic Volume	BLOS	PLOS
Mission Rd	Valencia Rd	San Xavier Rd	45	8	10	8,800	D	C	9,500	D	C
Little Nogales Dr	San Xavier Rd (N)	San Xavier Rd (S)	25	10	4.5	13,400	D	C	10,300*	D	C
Little Nogales Dr	Wa:k Ln	Campus Dr	25	8	5.5	NA	NA	NA	NA	NA	NA

Note: NA-Roadway segment is not included in PAG model; hence, future projected volumes are not available.
*A decrease in 2030 projected volumes was observed compared to 2014 projected volumes. This could be due to regional growth in conjunction with roadway/transit improvements planned in the vicinity of the project's study area.

Future 2014

- The study roadway segments will operate at BLOS D.
- The study roadway segments will operate at PLOS C.

Future 2030

- The study roadway segments will operate at BLOS D.
- The study roadway segments will operate at PLOS C

C and D are both considered acceptable levels of service by the League of Illinois Bicyclists. Bicycle levels of service for 2014 and 2030 do not change from the levels of service that are represented in Section A Current Conditions. This is because there are no bicycle improvements proposed, such as bicycle lanes, which would generate a higher score. Proposed improvements benefit pedestrians and the casual bicyclist who would use the paths and trails.

5. Environmental Justice

There are three fundamental environmental justice principles:

1. To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.
2. To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
3. To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

The San Xavier District of the Tohono O'odham Reservation is nearly 90 percent minorities, compared to 39 percent for Pima County as a whole. Additionally, according to the 2000 Census, 25 percent of the population of the San Xavier District is in poverty, two-thirds higher than the percentage of Pima County residents in poverty. The percent of female head of households with their own children under 18 years of age is 11 percent, 60 percent higher than that of Pima County. The percent of the San Xavier District population identified as disabled (18 percent) is comparable to that of Pima County (20 percent). Elderly populations (those age 65 and older) make up just 7 percent of the population, one-half that of Pima County. These groups make up the protected populations considered in this analysis.

The San Xavier District Pedestrian Access and Safety Study recommendations for pedestrian and bicycle improvements provides a reasoned, safer and more pleasing pedestrian and bicycle environment for residents and visitors to the San Xavier District. The recommendations do this

without imposing upon private property by limiting the improvements to within the existing ROW. Therefore, the benefit derived from the improved non-motorized trail system is shared without the burden impacting private property.

Additionally, the San Xavier District Pedestrian Access and Safety Study was developed through a comprehensive public involvement program (discussed below), involving stakeholders and residents alike. The outreach methods were a critical element of the project, and the comments and ideas received were considered in the development of the Plan.

The benefit of improved pedestrian and bicycle facilities is particularly meaningful in the Community as diabetes impacts the lives of a significant portion of the population. The O'odham people have the highest rate of Type II (adult-onset) diabetes among Native American tribes. About 50 percent of the tribe's adults have adult-onset diabetes, compared with 4 to 6 percent of the overall U.S. population. A study by the Graduate School of Public Health, University of Pittsburgh, published in the Oct. 1, 2003 American Journal of Epidemiology , discovered that walking for 30 minutes a day cut diabetes risks for overweight as well as non-overweight men and women.

Additionally, providing for safer pedestrian routes serves the needs of the youth and the elderly. Safe pedestrian routes from housing to activity centers allows seniors to remain in their homes while maintaining social interaction, health, safety, and a good quality of life. And, while not a protected population, per se, youth under 18 years of age make up a third of the San Xavier District population (compared to only 25 percent County wide). Improving the Community's walking routes allows more youth access to the Recreation Center where Community members can engage in activities such as fitness and nutrition classes, after-school recreation, and team sports.

6. Public Involvement

Outreach efforts were conducted to engage members of the San Xavier District community in the study. Materials were produced for outreach activities such as forums, stakeholder meetings, and public open house. Following is a summary of the various methods used by the Study Team to communicate the plan process, the current status of the study, and to encourage active participation. A full review of the involvement process can be found in Section C Public Involvement.

6.1 Outreach Opportunities

Public Involvement Overview with San Xavier District Chairman
On January 29, 2009, Community Outreach staff met with Chairman Austin Nuñez to discuss different methods of reaching San Xavier District community members. The *Wa:k Newsletter* was determined to be the best way to disseminate information. Other methods used included: posting information on the community bulletin boards; releasing information through group and neighborhood leaders who would in turn inform their special interest groups about the study; using comment or opinion forms at the public open house; creating a fact sheet or other visual materials for distribution; and meeting directly with leaders of the special interest or event groups.

Questionnaire
In February 2009, a questionnaire was created to solicit input from community members on several potential projects being studied:

1. current safety issues on the Santa Cruz River Pedestrian Bridge
2. rebuilding San Xavier Road to include a walking path for safe access to the Health Center

3. Safe Route to School pathways for children to safely walk from their homes to San Xavier School
4. other pedestrian or bicycle route improvements in the District

The questionnaire, along with a three-quarter page description of the Study, was published in the March 2009 *Wa:k Newsletter*. To encourage more participation from the community, reminder flyers, along with the questionnaire and map, were posted on community bulletin boards located throughout the San Xavier District.

Pow Wow Committee Meeting
With a recommendation from Chairman Nuñez, the Study Team met with the Pow Wow Event Committee to discuss the Study Team's possible participation at the 27th Annual Wa:k Pow Wow on March 14 and 15, 2009. It was determined this would probably not be a productive method since most of the people the Study Team would like to reach would be working in the food booths or participating in other Pow Wow events.

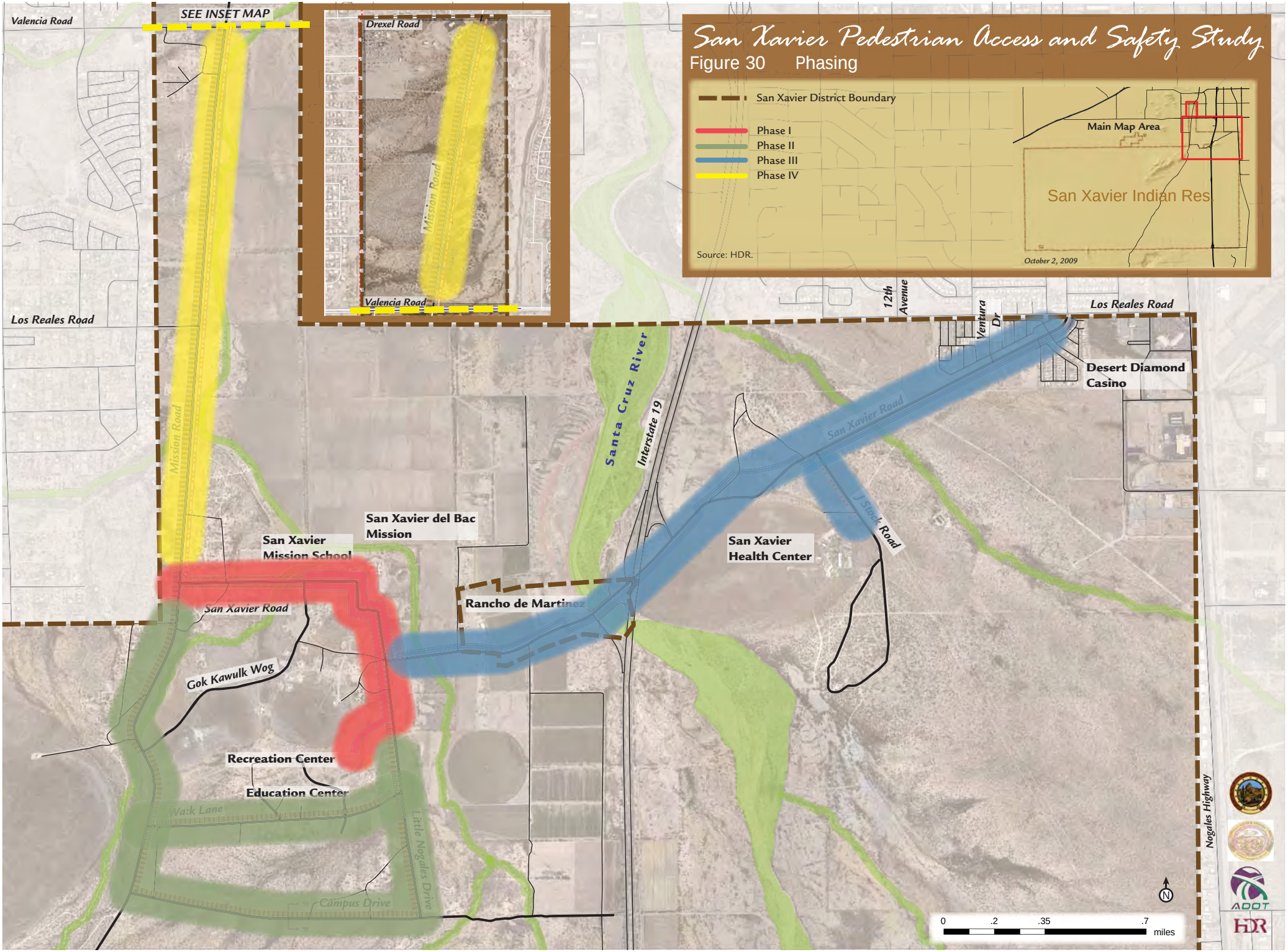
Public Open House
On July 14, 2009, the Public Open House was held at the San Xavier District Center. Attendance was small, but those who attended were very interested and had good questions for the Study Team. During table discussions, they were encouraged to provide additional information about issues and concerns for the project area. Numerous comments were noted for the record on the Plan Maps. A community member was available at the meeting to provide translation.

Supplemental Outreach
The District Planning Department conducted additional outreach to obtain input. From July 24 to August 3, one map was posted in the lobby of the Administration building, and the secretary was provided with additional self-mailing comment cards and instructions. A second map was circulated through the various District Departments. Each department had the display for one day (or two days if there were two departments in the same building). Departments receiving a map display included: Water Rights, Council, Housing, SAWRSA, Human Resources, Finance, and Elders. In both cases, instructions were taped to the board, in large type, and a marker provided for making comments. Comments provided are noted in *Section 3. Preferred Alternative*.

7. Phasing

Phasing of the project was based on providing improvements in the community core area first for children traveling between the school and recreation center. The improvements would make the route safer and more accessible for children to ride bicycles between the two destinations. The proposed phasing is described below and shown in Figure 30. The phasing plan should be considered flexible. Often times, opportunities or funding arise that allow for later phases of a project to occur earlier in the schedule. These opportunities should be taken whenever possible and the phasing plan revised.

Phase 1	The multiuse paths between the school and recreation center, the paths along San Xavier Road between Mission Road and Gok Kawulk Wog, and the pedestrian bridge* over the Santa Cruz River. Time Frame: Next 2 to 5 years *The pedestrian bridge is a project already under design and is not a new improvement as part of this study so does not appear in the Phasing Plan (Figure 30). However, it is a major component of the pedestrian system so is listed here as an element.
Phase 2	The trails along Mission Road (San Xavier Road to Campus Drive), Wa:k Lane and Campus Drive (Mission Road to Little Nogales Drive), and Little Nogales Drive (Campus Drive to multiuse path connection). These segments would complete loops in the core area. Time Frame: Next 3 to 6 years
Phase 3	The path along San Xavier Road from Little Nogales Drive to Los Reales Road. Time Frame: Next 5 to 8 years
Phase 4	The paths and trails along Mission Road between San Xavier Road and Drexel Road. Time Frame: Next 6 to 10 years


San Xavier Pedestrian Access and Safety Study
Figure 30 Phasing
San Xavier District Boundary
Phase I
Phase II
Phase III
Phase IV
Main Map Area
San Xavier Indian Res.
Source: HDR.
October 2, 2009
SEE INSET MAP
Drexel Road
Mission Road
Valencia Road
Los Reales Road
12th Avenue
Ventura Dr
Desert Diamond Casino
Santa Cruz River
Interstate 19
San Xavier Road
I Stock Road
San Xavier del Bac Mission
San Xavier Mission School
San Xavier Health Center
Rancho de Martinez
Gok Kawulk Wog
Recreation Center
Education Center
Va:k Lane
Little Nogales Drive
Campus Drive
Nogales Highway
N
0 .2 .35 .7 miles
ADOT
HDR

8. Cost Estimate

Costs for the project are broken down by phase and are in 2009 dollars. The total estimated cost for all the improvements is $10,593,000.

PHASE	ITEM	QTY	UNIT COST (in thousands of dollars)	TOTAL COST (in thousands of dollars)
Phase I				
	10' Concrete Path[1]	0.9 miles	451	406
	6' Concrete Path[1]	0.8 miles	274	219
	Pedestrian Bridge[2]	1 each	2,000	2,000
	Grant project – TE path[3]	1 each	890	890
	Grant project – SRTS path[3]	1 each	920	920
	20% contingency for drainage and slope conditions for paths/trails (for 1.7 miles)	1 each	145	145
	Speed Tables (raised crosswalk)	3 each	4	12
	Revegetation[4]	2.2 miles	100	220
	Crosswalk	2 each	1	2
	Amenities[5]	3 each	12	36
	Lighting[6]	1.3 miles	1,530	1,989
	Subtotal			**6,839**
Phase II				
	8' Trail[1]	3.6 miles	60	214
	20% contingency for drainage and slope conditions for paths/trails (for 3.6 miles)	1 each	12	12
	Revegetation[4]	3.6 miles	100	360
	Crosswalk	4 each	1	4
	Amenities[5]	1 each	12	12
	Subtotal			**602**
Phase III				
	8' Asphalt[1]	2.5 miles	362	905
	6' Asphalt[1]	0.3 miles	274	82
	20% contingency for drainage and slope conditions for paths/trails (for 2.8 miles)	1 each	128	128
	Revegetation[4]	3 miles	100	300
	Speed Table (raised crosswalk)	1 each	4	4
	High Visibility Crossing	3 each	3	9
	Crosswalk	1 each	1	1
	Amenities[5]	1 each	12	12
	Subtotal			**1,441**

PHASE	ITEM	QTY	UNIT COST (in thousands of dollars)	TOTAL COST (in thousands of dollars)
Phase IV				
	8' Trail[1]	2.9 miles	60	174
	6' Asphalt[1]	2.9 miles	274	795
	20% contingency for drainage and slope conditions for paths/trails (for 5.8 miles)	1 each	66	66
	Revegetation[4]	5.8 miles	100	580
	HAWK Crossing	1 each	70	70
	Crosswalk	2 each	1	2
	Amenities[5]	2 each	12	24
	Subtotal			**1,711**
	TOTAL			**10,593**

[1]Path/trail costs include general signing. Costs also presume projects may be funded with federal dollars and several percentage of construction costs are added (3% topography survey + 15% PS&Es + 5% drainage report + 1% SWPP plan + 8% mobilization + 5% traffic control + 1% survey control + 18% administrative costs + 5% contingencies = 61%)
[2]The pedestrian bridge is a project already under design and is not a new improvement as part of this study. However, it is a major component of the pedestrian system so is listed in the cost estimate. The preliminary construction cost of the bridge is shown here and includes contingencies and administrative fees but not design or environmental fees.
[3]The District recently applied for and was granted funding for two path projects in the community. The Transportation Enhancement (TE) project is a quarter-mile long, 6-foot wide path from the east side of the future pedestrian bridge to the east side of the I-19 interchange. The project costs are $891,550 of which $788,820 are funded by the grant. The Safe Routes To School (SRTS) project is a half–mile long, 10-foot wide path along San Xavier Road/Little Nogales Drive from the Mission to one-quarter mile north of Wa:k Lane. The project costs are $917,893 of which $500,000 are funded by the grant. The project costs include the incidental costs associated with a federal project such as design, environmental clearance, contingencies, and administrative costs.
[4]Revegetation includes seeding areas disturbed by construction, generally 5 feet on either side of the path/trail, and trees where clear zones allow.
[5]Amenities include installation of a ramada, bench, and trash receptacle.
[6]Lighting includes bollard level lighting at 50 feet on center, both sides of the road. The contingency items noted in 1 above are also added to this item.

9. Funding

There are a multitude of potential funding sources for the plan. This discussion will focus on "outside" funding mechanisms that require minimal preparation and are most likely to be awarded. The following criteria will assist in choosing the best funding mechanisms for the plan.

Recommendations of funding mechanisms must consider:

1. Funding requirements (various "strings" that may be attached)
2. Caps enforced on funds requested
3. Likelihood of success
4. Relative ease or difficulty in obtaining the necessary funds

Funding Requirements

There is an overall advantage to gain the necessary funding by partitioning the project into phases. Additionally, success of obtaining Phase I funding will normally aid gaining funding for future phases. Most of the available funds for construction of the pathways are under federal auspices. This means that federal requirements need to be followed throughout the process to gain funding.

Caps Enforced on Funds Requested
This criterion focuses on choosing mechanisms for the plan's phases that fit the phase budget. Several mechanisms' caps fall too short to construct even the smallest phase of the plan. Other mechanisms may have a floor that is too high for the phased project. For example, Transportation Enhancement funds for local projects, currently capped at $500,000, will be capped at 750,000 in the future. Currently, only Phase II of this project is within this cap. The cap for State projects (those located on a minimum of 75 percent ADOT right-of-way) will continue to be $1.0 million. Safe Routes to School funding has a total state budget of $2.5 million per year.

Likelihood of Success
Applying for a multitude of funding sources can be time consuming and ineffective if not strategically approached. The key is to determine which source(s) are most likely to fund this plan and take the necessary steps to achieve success when going after them. In any given year, a single particular source may be earmarked for other projects and be a more likely source the following year. Hence, knowing what is in the queue on any specific funding cycle will save time and effort by not generating an application that won't be approved.

9.1 Potential Funding Sources

Various phases of this project qualify for at least three federal funding programs. The programs fund annually which is beneficial for the applicant. If an application is rejected on the first attempt, updates to better qualify for funding in the next round are simpler than preparing a new application.

Transportation Enhancements Funds
Annually, some twenty projects statewide are awarded Transportation Enhancement funding. The cap for local projects, currently at $500,000 per project, will be increased to $750,000 in 2010 which would only fully fund Phase II of the plan. However, this mechanism may be useful to augment other funding for subsequent phases. The application process is moderately difficult but most of the data needed to complete the application is contained in this plan. This is a likely source of funding for at least part of the plan. The cap for State projects (those located on a minimum of 75 percent ADOT right-of-way) will continue to be $1.0 million. The District has been approved for $788,820 under an application submitted in the spring of 2009 for state projects. The project is on San Xavier Road from the east side of the future pedestrian bridge to the east side of the I-19 interchange. Total project costs are $891,500. The District has also been approved for $500,000 under an application submitted in the spring of 2009 for local projects. The project is along San Xavier Road/Little Nogales Drive from the Mission to one-quarter mile north of Wa:k Lane. Total project costs are $917,893.

Safe Routes to School
These funds can only be used to assist children in gaining safe, reliable pedestrian/bicycle routes to school from their residences. The Congressional apportionments of Safe Routes to School funding for Arizona, over the life of SAFETEA-LU bill, is $11,295,446. The infrastructure cap is $300,000; the non-infrastructure cap is $45,000. This is an annual source and very competitive.

Indian Reservation Roads Funds
These funds are only available to Tribal communities. The funds are available annually and the funding limitations are less strict then the two funding mechanisms discussed above. Since these are awarded to Tribal communities, they are competing with other needs within the Tohono O'odham Nation. Hence, gaining support from the other districts is key when using this mechanism to fund this plan.

Other Funds

This plan is phased over multiple years. There are numerous opportunities that present themselves annually such as the TIGER (Transportation Investment Generating Economic Recovery) grants which were a part of the stimulus package. A second stimulus package focusing on infrastructure is possible within the next 12 months. For stimulus funding, much of the data contained in this report can be used for the application. Additional data such as employment and economic benefit are required for this application. It should be noted that constant vigilance of funding opportunities over the next several years is recommended to fully fund all the phases of the plan.

9.2 Strategic Implementation Recommendations

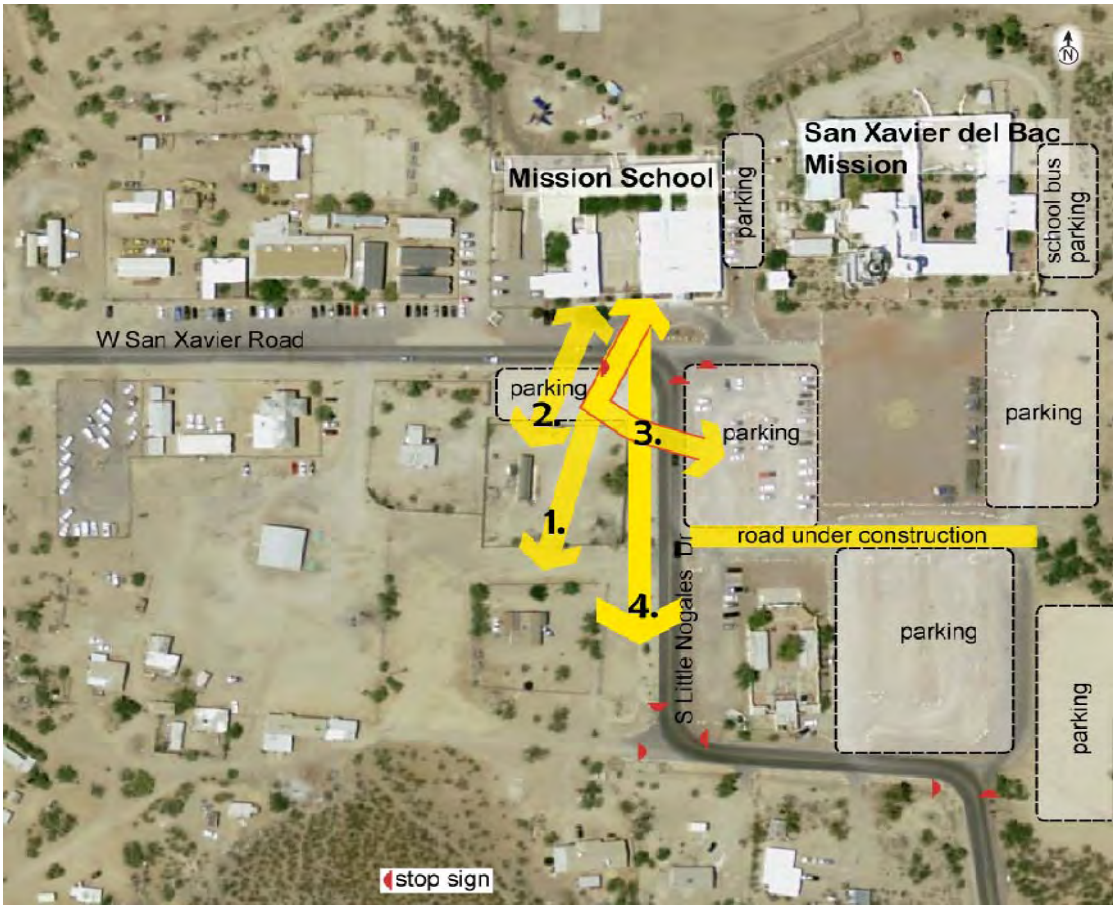
There are workshops for both Transportation Enhancement and Safe Routes to School funding. Attending these workshops and gaining knowledge about the process is vital. Learning what is in the queue and positioning to gain funding is crucial. Building relationships with key people involved with the funding is also important. These relationships will not in themselves gain funding, but understanding the nuances beyond the printed requirements is most beneficial.

Appendix A – Traffic and Pedestrian Count Data

Pedestrian Counts on San Xavier Road at Mission School (Monday, April 06, 2009)

Observation Periods 7 AM to 8 AM & 2:45 PM to 3:30 PM

	Pedestrians from Southwest corner crossing the San Xavier Rd.	Pedestrians from school crossing the San Xavier Rd.
7:15 AM	0	0
7:30 AM	4	0
7:45 AM	2	0
8:00 AM	0	0
3:00 PM	0	0
3:15 PM	1	7
3:30 PM	0	0



Pedestrian Counts on Mission Road to North of San Xavier Road (Monday, April 06, 2009)

Observation Period 8 AM to 10 AM

	Southbound on Mission Road	Northbound on Mission Road
8:15 AM	0	0
8:30 AM	0	0
8:45 AM	0	0
9:00 AM	3 B	1
9:15 AM	7 B	2
9:30 AM	1 B	0
9:45 AM	0	0
10:00 AM	0	0

Note: B - Bike

San Xavier Pedestrian Access and Safety Study

Pedestrian counts on San Xavier Road Bridge @ I 19 Traffic Interchage (Exit 92)
(Monday, April 06, 2009)

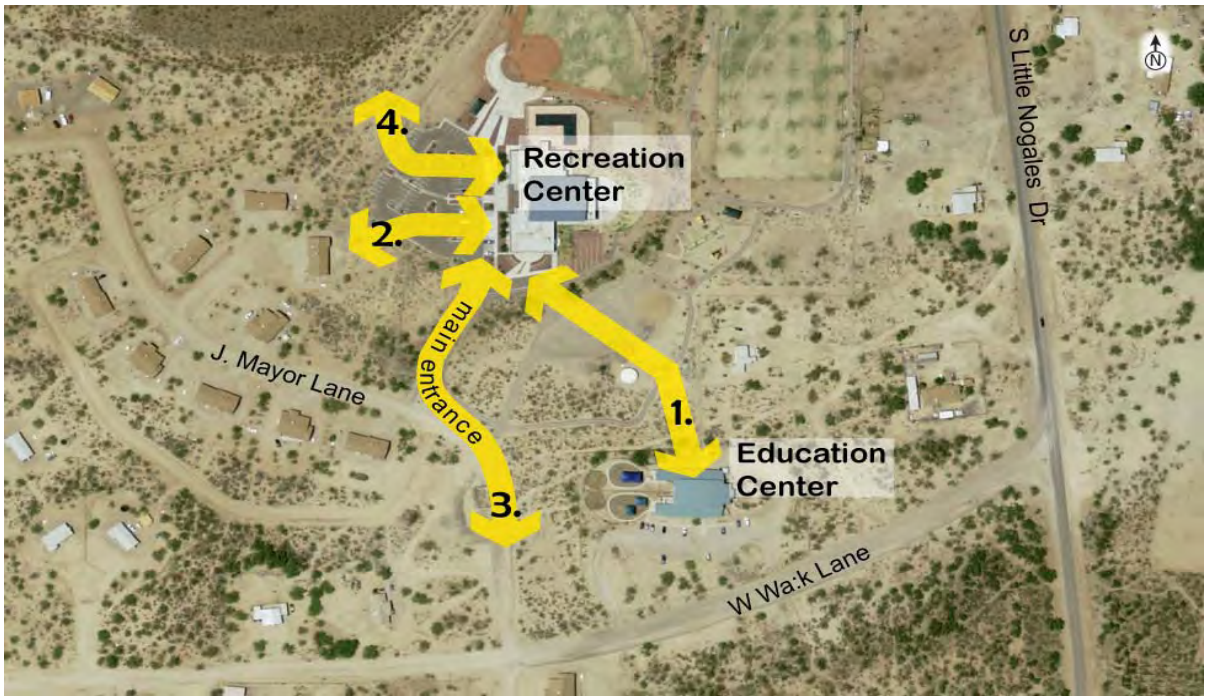
Observation Period 10 AM to 2 PM

	EB on San Xavier Rd. Bridge	WB on San Xavier Rd. Bridge
10:15 AM	0	0
10:30 AM	0	0
10:45 AM	0	1
11:00 AM	0	0
11:15 AM	0	0
11:30 AM	0	0
11:45 AM	0	0
12:00 PM	0	0
12:15 PM	0	1
12:30 PM	0	0
12:45 PM	0	0
1:00 PM	0	0
1:15 PM	0	0
1:30 PM	0	0
1:45 PM	0	0
2:00 PM	0	3

Observation Period 3:45 PM to 6 PM

	Education Center (#1)		Main Entrance (#3)		Local community (#2 & #4)	
	To Recreation center	From Recreation center	To Recreation center	From Recreation center	To Recreation center	From Recreation center
4:00 PM	22	12	0	1 B*	6	0
4:15 PM	0	0	0	1	0	0
4:30 PM	0	1	0	0	0	2
4:45 PM	0	0	1	0	6	8
5:00 PM	2	0	1	3	1	0
5:15 PM	4	0	0	1	0	2
5:30 PM	0	0	4	1	2	3
5:45 PM	0	0	0	0	0	0
6:00 PM	0	0	2	0	0	0

Note: *B - Bike



Pedestrian Counts on Mission Road to North of San Xavier Road (Sunday, April 05, 2009)

Observation periods 8:35 AM to 9:05 AM; 9:45 AM to 10:25 AM; 11:15 AM to 12 PM

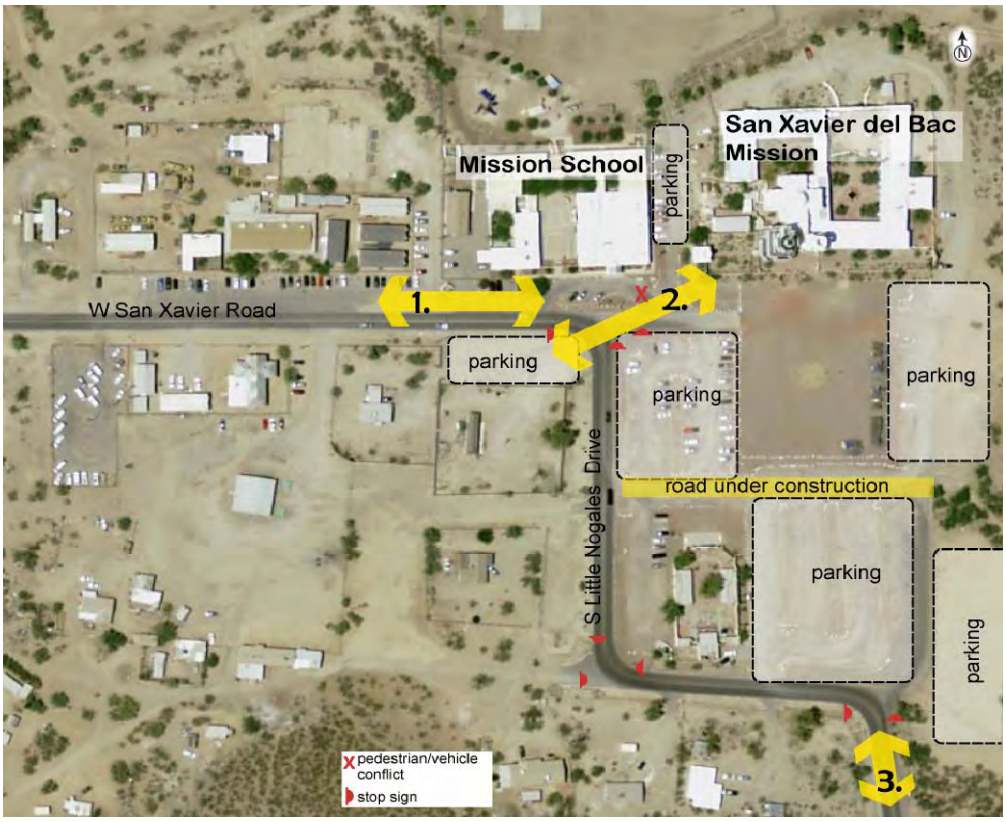
	Southbound on Mission Road	Northbound on Mission Road
8:50 AM	10	0
9:05 AM	5	2
10:00 AM	9	4
10:15 AM	1	5, 1 B
10:25 AM	5	2
11:30 AM	6	0
11:45 AM	3	2 B
12:00 PM	1 B	0

Note: B - Bike

Pedestrian counts on San Xavier Road at Mission Church (Sunday, April 05, 2009)

Observation Periods 7:30 AM to 8:30 AM; 9:10 AM to 9:40 AM; 10:30 AM to 11:15 AM, 12:05 PM to 12:45 PM; 1:20 PM to 2:00

	Mission Church					
	From Southwest Parking Lot	To Southwest Parking Lot	From San Xavier Road	To San Xavier Road	From Little Nogales Dr	To Little Nogales Dr
	#2		#1 and #3		#4	
7:45 AM	7	0	5	2	6	2
8:00 AM	17	0				
8:15 AM	10	0				
8:30 AM	12	0				
9:25 AM	7	29	2	1	4	5
9:40 AM	12	14	11	2		
10:45 AM	5	11	0	1	0	3
11:00 AM	18	13	0	3		
11:15 AM	7	5	0	2		
12:15 PM	16	14	0	0	0	0
12:30 PM	38	18	4	3		
12:45 PM	10	12	0	2		
1:30 PM	11	15	0	0	0	0
1:45 PM	8	41	3	0		
2:00 PM	13	12	0	0		



Appendix B – Crash Analysis Memo

Introduction

As part of the San Xavier Pedestrian Access and Safety Study, HDR conducted a crash analysis within the San Xavier study area. The purpose of the analysis is to study the crash patterns occurring in the study area and understand the roadway safety issues.

Study Area

The statistical analysis was focused on the major roadway segments listed below.

- Mission Road from Drexel Road to Campus Drive
- Nogales Highway from Los Reales Road to Hermans Road (just south of Tucson International
- Airport)
- Valencia Road from Westover Avenue to Sandpiper Avenue
- Campus Drive from Mission Road to I-19
- San Xavier Road from Mission Road to Comobabi Street (just south of Los Reales Road)

Crash Analysis

The crash data for the five year period from January 1, 2004 to December 21, 2008 was obtained from the Arizona Department of Transportation (ADOT) and San Xavier District of the study area. The crash data contained information regarding crash locations, types, severity, and parameters related to roadway geometry, drivers, and environmental conditions. There were a total of 433 crashes reported in the study area during the study period.

Statistical analysis of the crash data was performed to identify crash characteristics like injury severity, collision manner, and crash contributing factors like light and roadway conditions.

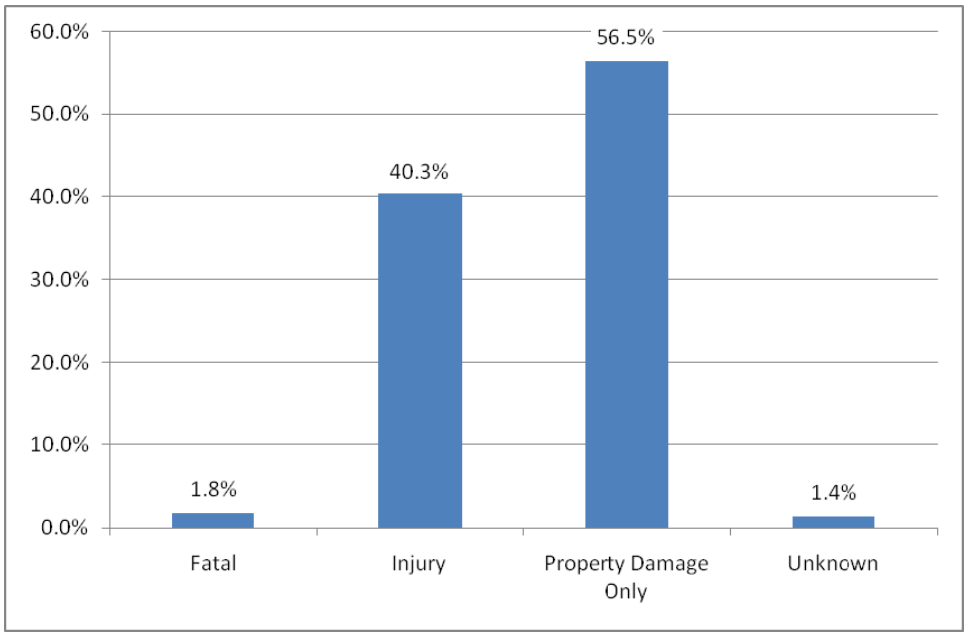
Crash Characteristics

Crash Severity

Based on the crash analysis by severity, following are some observations. A considerable number of alcohol-related crashes were recorded in the study area during the study period. Figures 1 and 2 present the percentage of crashes by severity and crash frequency by injury severity along major roadway segments respectively.

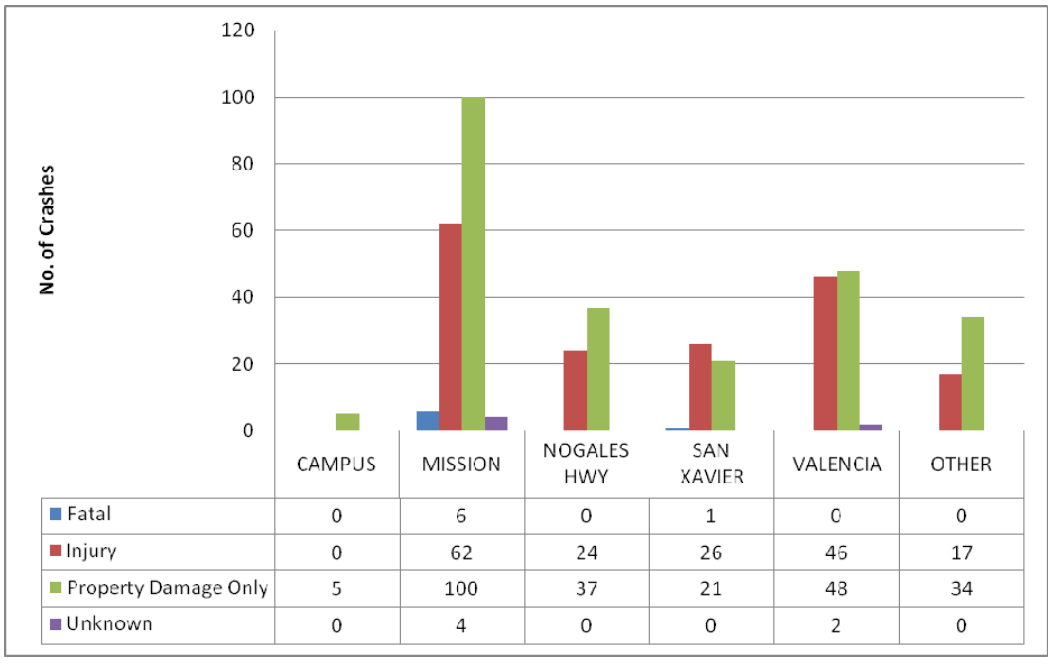
- There were seven (1.6 percent) fatal crashes, 175 (40.3 percent) injury crashes, and the remaining 251 (57.9 percent) were property damage or unknown (not reported) crashes.
- Six fatal crashes occurred on Mission Road and one fatal crash occurred along San Xavier Road.
- Mission Road recorded the highest number of crashes (172) followed by Valencia Road (96), Nogales Highway (61), and San Xavier Road (48).

Figure 1 Percentage of Crashes by Severity



Source: Arizona Department of Transportation, Traffic Safety Division, April 2009.
Notes: 1. Crash Analysis Period: January 1, 2004 through December 31, 2008.

Figure 2 Crash Frequency by Roadway Segment by Injury Severity



	CAMPUS	MISSION	NOGALES HWY	SAN XAVIER	VALENCIA	OTHER
Fatal	0	6	0	1	0	0
Injury	0	62	24	26	46	17
Property Damage Only	5	100	37	21	48	34
Unknown	0	4	0	0	2	0

Source: Arizona Department of Transportation, Traffic Safety Division, April 2009.
Notes: 1. Crash Analysis Period: January 1, 2004 through December 31, 2008.

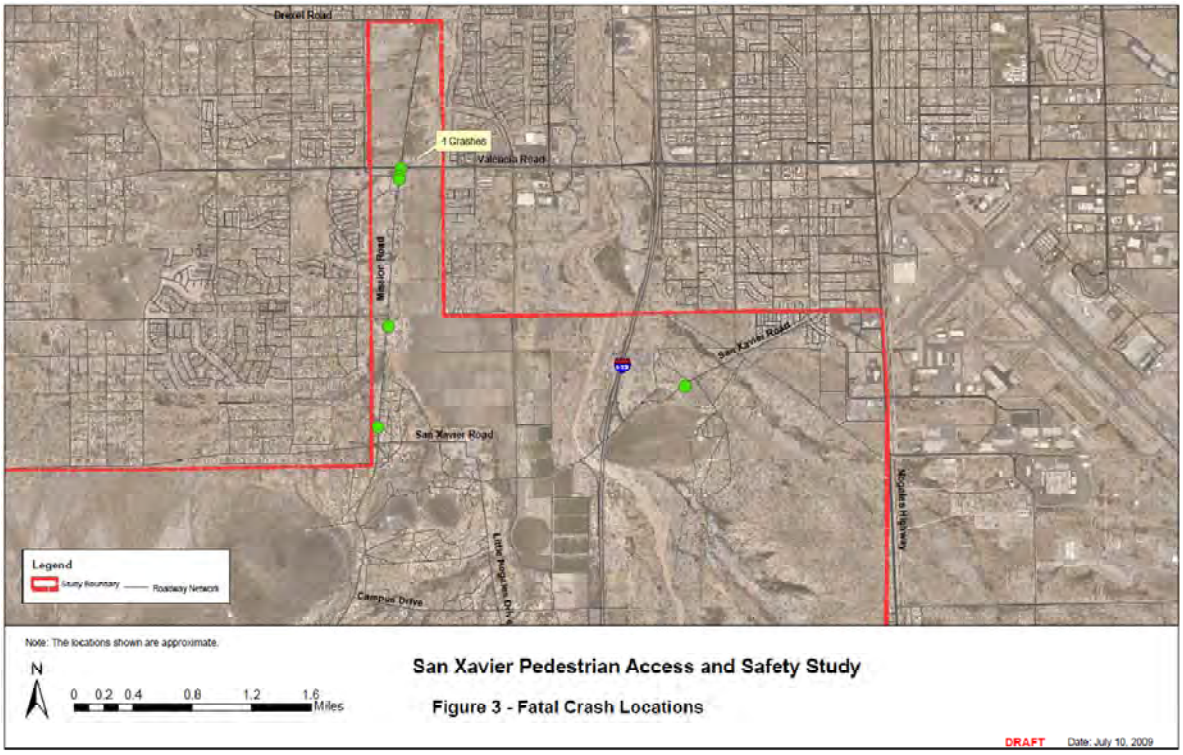
Fatal Crashes

As noted above, there were seven fatal crashes in the study area during the study period. Six of the crashes occurred along Mission Road and one crash occurred along San Xavier Road. The approximate locations of these crashes are shown in Figure 3.

Following are the location specific fatal crash characteristics:

- One crash occurred at the Mission and Valencia roads intersection on 7/23/2008. The crash was a rear-end crash and resulted in one fatality. The crash occurred on a rainy day.
- One crash occurred along Mission Road, approximately 1,300 feet north of Valencia Road, on 12/21/2007. This was a single-vehicle crash and resulted in one fatality. This crash occurred due to overturning of the vehicle on a rainy day.
- One crash occurred along Mission Road, approximately 200 feet south of Los Reales Road, on 10/21/2006. This single-vehicle crash resulted in one fatality.
- One crash occurred along Mission Road, approximately 600 feet south of Valencia Road, on 9/6/2006. This single-vehicle crash resulted in one fatality. The crash occurred in dark conditions and due to overturning of the vehicle.
- One crash occurred along San Xavier Road, approximately 200 feet west of J. Stock Road, on 11/23/2005. This single-vehicle crash occurred under dark conditions and was reported as an alcohol-related crash.
- One crash occurred along Mission Road, approximately 200 feet to the north of unknown road, (possibly near Hermans Road), on 9/27/2005. This single-vehicle crash occurred under daylight conditions and was reported as an alcohol-related crash.
- One crash occurred at the intersection of Mission and Valencia roads on 9/29/2004. There was one fatality. This two-vehicle collision crash was reported as an alcohol-related crash.

Figure 3 Fatal Crash Locations



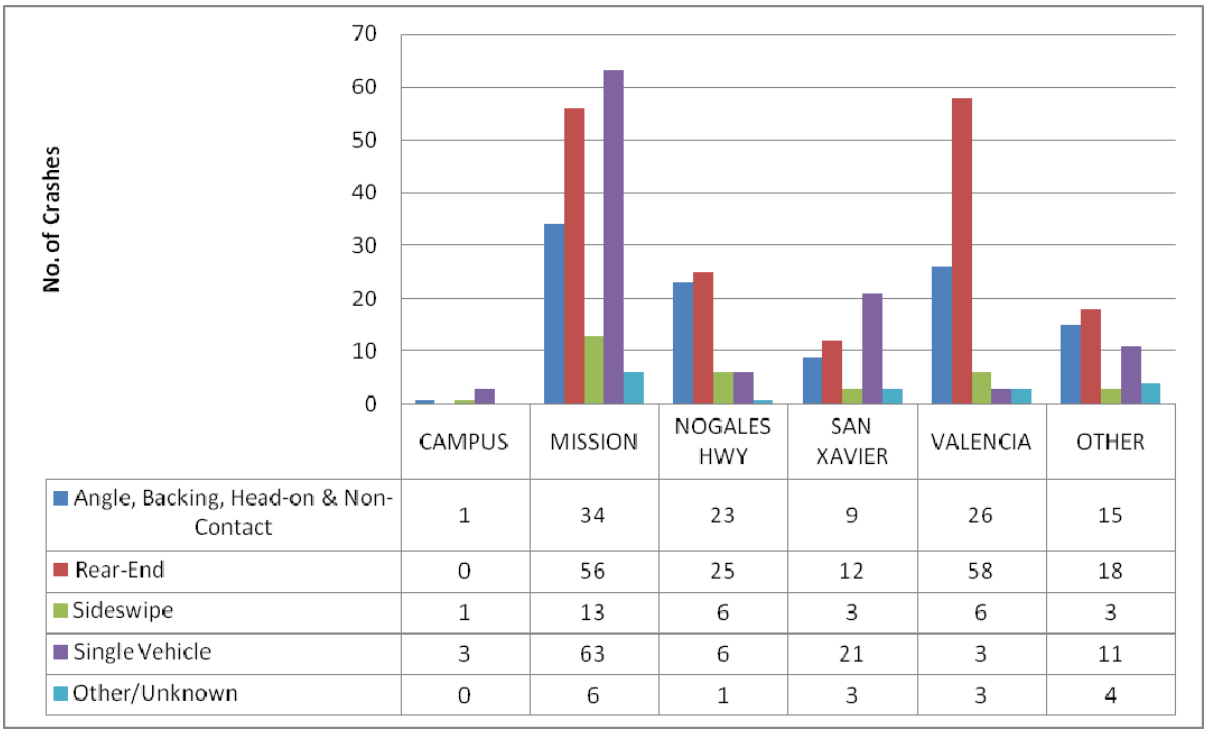
Source: Arizona Department of Transportation, Traffic Safety Division, April 2009.
Notes: 1. Crash Analysis Period: January 1, 2004 through December 31, 2008.

Collision Manner

The crash frequency by roadway segment and percentage of crashes by collision manner are shown in Figures 4 and 5 respectively. Following are the observations:

- Out of the 433 total crashes, about 39 percent of the crashes recorded were due to rear-end collision. Valencia Road recorded the highest number (58) of rear-end crashes.
- About 25 percent of the crashes were single-vehicle crashes. Mission Road recorded the highest number (63) of single-vehicle crashes.
- About 25 percent of the crashes were angle, backing, head-on, or non-contact collisions. Mission Road recorded the highest number (34) of this type of crash.

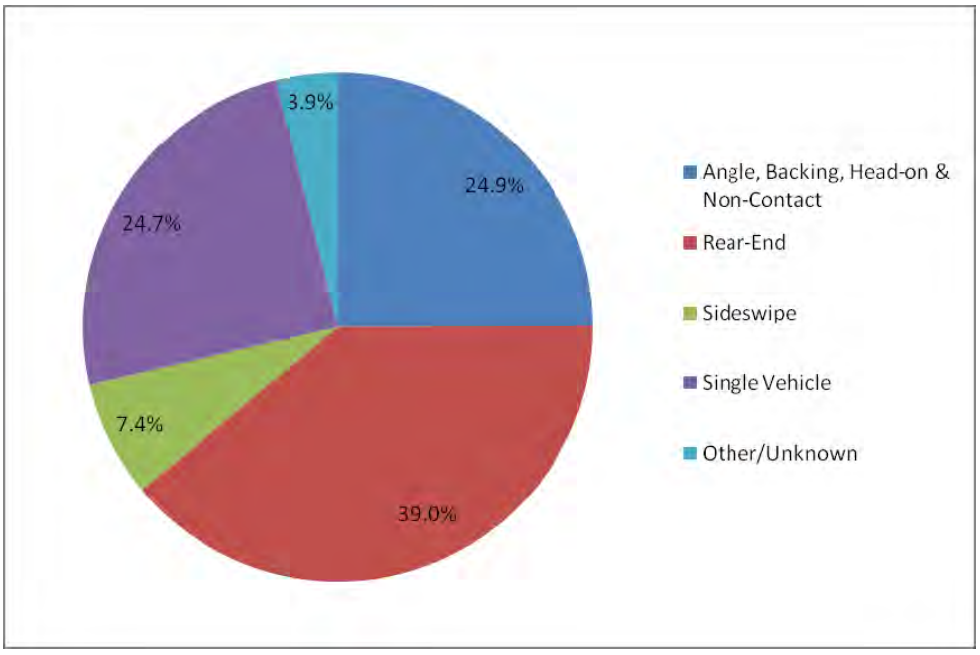
Figure 4 Crash Frequency by Roadway Segment Collision Manner



	CAMPUS	MISSION	NOGALES HWY	SAN XAVIER	VALENCIA	OTHER
Angle, Backing, Head-on & Non-Contact	1	34	23	9	26	15
Rear-End	0	56	25	12	58	18
Sideswipe	1	13	6	3	6	3
Single Vehicle	3	63	6	21	3	11
Other/Unknown	0	6	1	3	3	4

Source: Arizona Department of Transportation, Traffic Safety Division, April 2009.
Notes: 1. Crash Analysis Period: January 1, 2004 through December 31, 2008.

Figure 5 Percentage of Crashes by Collision Manner



Source: Arizona Department of Transportation, Traffic Safety Division, April 2009.
Notes: 1. Crash Analysis Period: January 1, 2004 through December 31, 2008.

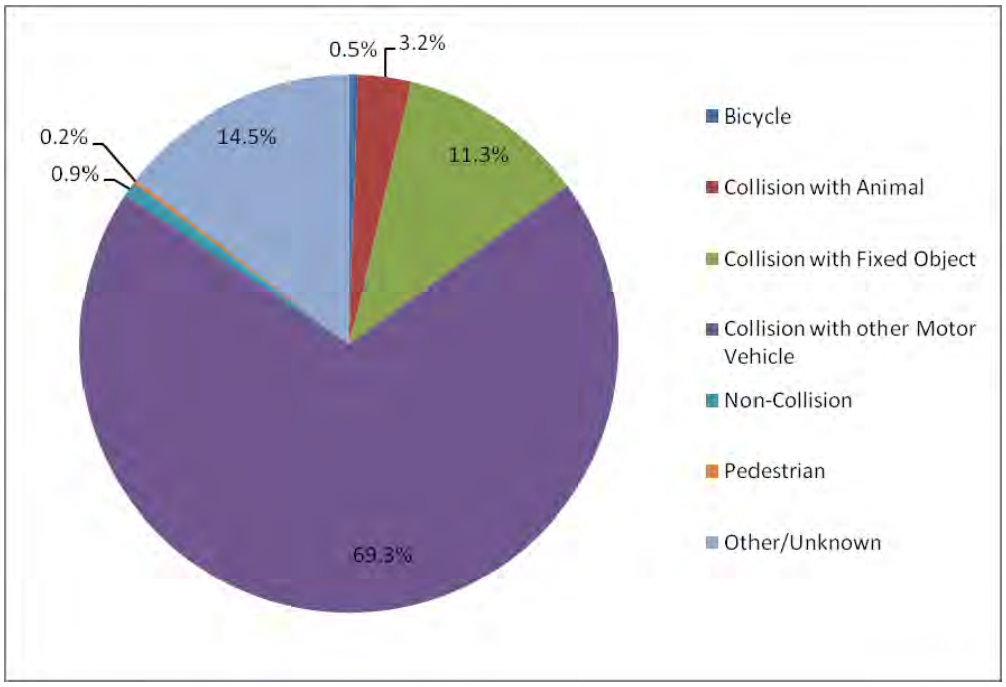
First Harmful Contact

The crash data is further categorized as first harmful contact, which is defined as the first hazard encountered by the initial vehicle in a crash. Figures 6 and 7 graphically portray these characteristics.

Following are some observations:

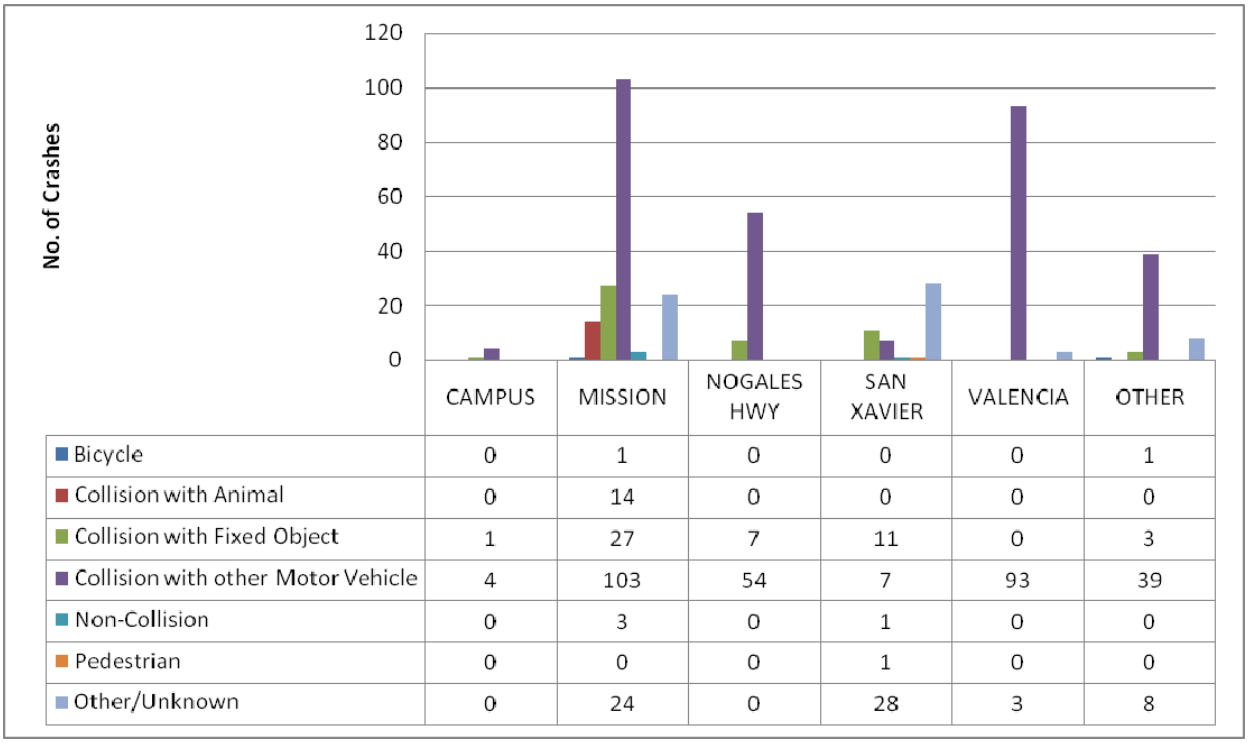
- Most common first harmful contact is with another motor vehicle (69.3 percent or 300 crashes).
- Mission Road recorded the highest number (103) of crashes due to collision with another motor vehicle, followed by Valencia Road at 93 crashes.
- 11.3 percent of crashes were due to collision with fixed objects.
- There were 14 crashes involving animals.
- There were two bicycle-involved crashes and one pedestrian-involved crash.

Figure 6 Percentage of Crashes by First Harmful Contact



Source: Arizona Department of Transportation, Traffic Safety Division, April 2009.
Notes: 1. Crash Analysis Period: January 1, 2004 through December 31, 2008.

Figure 7 Crash Frequency by First Harmful Contact by Roadway Segment



	CAMPUS	MISSION	NOGALES HWY	SAN XAVIER	VALENCIA	OTHER
Bicycle	0	1	0	0	0	1
Collision with Animal	0	14	0	0	0	0
Collision with Fixed Object	1	27	7	11	0	3
Collision with other Motor Vehicle	4	103	54	7	93	39
Non-Collision	0	3	0	1	0	0
Pedestrian	0	0	0	1	0	0
Other/Unknown	0	24	0	28	3	8

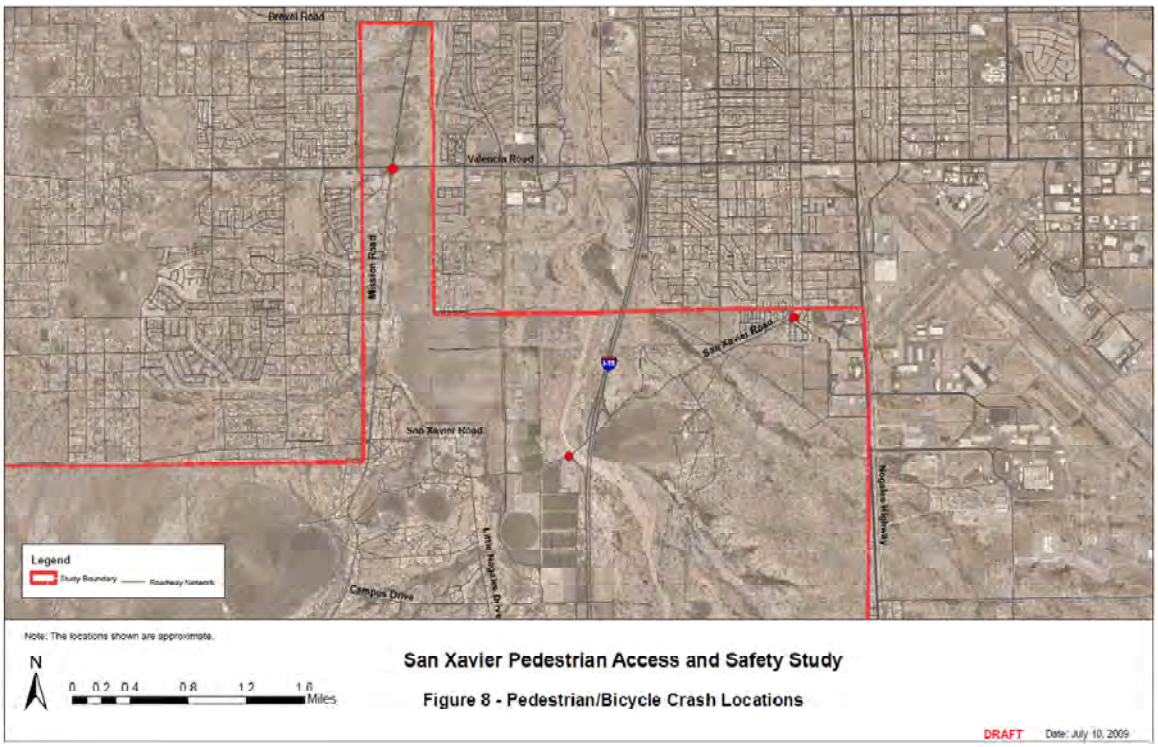
Source: Arizona Department of Transportation, Traffic Safety Division, April 2009.
Notes: 1. Crash Analysis Period: January 1, 2004 through December 31, 2008.

Pedestrian/Bicycle Crashes

As noted above, there were three pedestrian- and bicycle-related crashes reported in the study area during the study period. Figure 8 shows approximate locations of the crashes. Following are some of the general characteristics of these crashes:

- One bicycle-related crash occurred on Comobabi Road at the intersection with San Xavier Road. There were no injuries reported for this crash. The crash occurred under dark conditions on 7/14/2005.
- One bicycle-related crash occurred on Mission Road at the intersection with San Xavier Road. The crash occurred on 9/22/2007 under daylight conditions and resulted in a serious injury.
- One pedestrian-related crash occurred on San Xavier Road at the intersection with the Interstate19 southbound entrance ramp. The crash occurred on 1/9/2008 and resulted in a serious injury.

Figure 8 Pedestrian/Bicycle Crash Locations



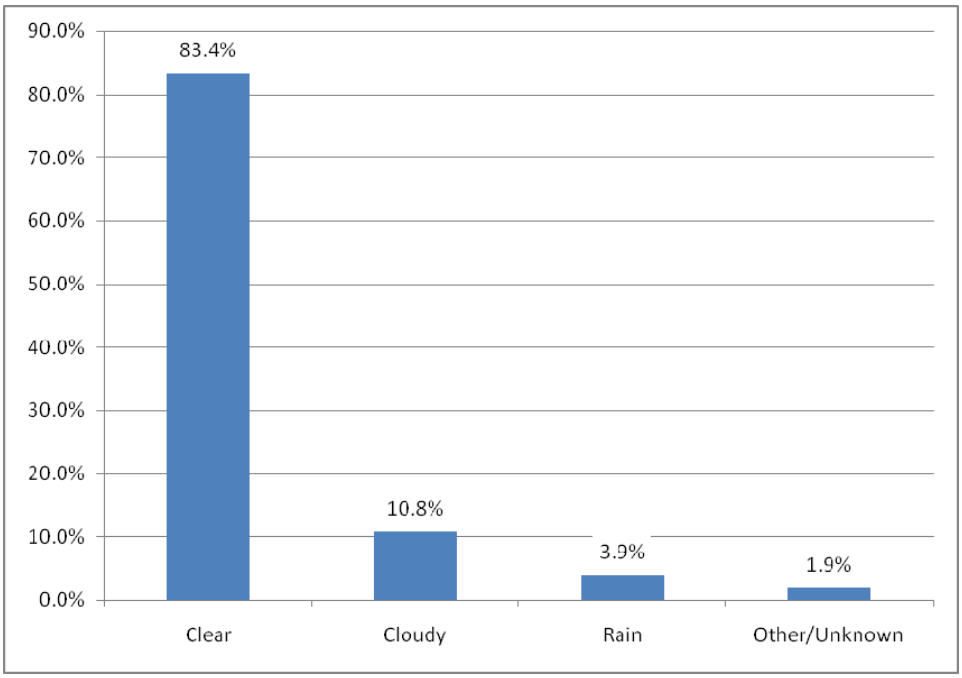
Source: Arizona Department of Transportation, Traffic Safety Division, April 2009.
Notes: 1. Crash Analysis Period: January 1, 2004 through December 31, 2008.

Crash Contributing Factors

Weather Conditions: In the study period, 83.4 percent of the crashes occurred in clear weather conditions, 10.0 percent occurred in cloudy weather, 3.9 percent occurred during rain, and the remaining 1.9 percent occurred during other weather conditions. The percentage of crashes by weather is summarized in Figure 9.

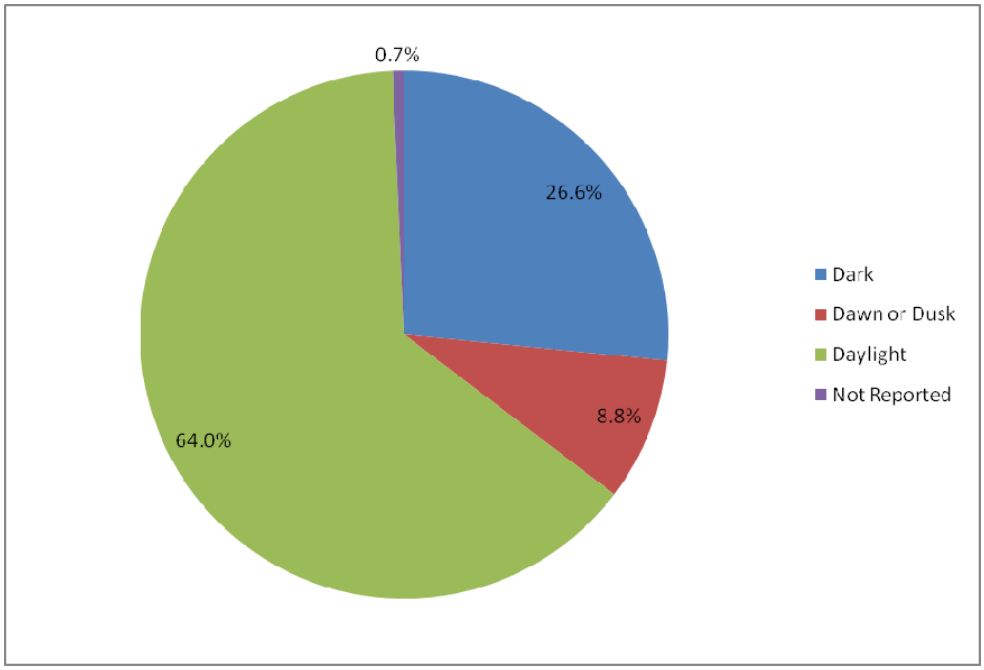
Light Conditions: In the study period, 64.0 percent of the crashes occurred during daylight, 26.6 percent occurred in night or dark conditions, and 8.8 percent occurred during dawn or dusk. These percentages are illustrated in Figure 10.

Figure 9 Percentage of Crashes by Weather Conditions



Source: Arizona Department of Transportation, Traffic Safety Division, April 2009.
Notes: 1. Crash Analysis Period: January 1, 2004 through December 31, 2008.

Figure 10 Crashes by Lighting Condition



Source: Arizona Department of Transportation, Traffic Safety Division, April 2009.
Notes: 1. Crash Analysis Period: January 1, 2004 through December 31, 2008.

Appendix C – Survey Forms

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Survey Instrument

revised 02/26/09

Interviews with Stakeholders

Date:	March 17, 2009	Meeting Location:	Phone Interview
Interviewee:	Stephen Barnufsky	Association:	Pastor, San Xavier Mission Church

What facility/activity center is respondent associated with:	Pastor, San Xavier Mission Church Has been with the Mission for 6 years
What are the facility hours of activity/operation	Mon – Fri, 7am to 5pm, Sunday 8am – 3pm There are services that are attended outside of this window (e.g., 5:30pm Saturday), on Sunday there are four services in the am Tourists generally come between 10am and 4pm
What is the peak time(s)	See above
What causes this peak(s) (school lets out, church traffic)	Church services and tourism
What is the mode by which people arrive at the facility?	Employees and Users: cars, bicycles, and walking, couple tour busses each day Typically on Saturday and Sundays, people partake in "pilgrimages" from south Tucson on foot. They are coming from both directions (Mission Road and San Xavier Road)
From what direction/route do pedestrians and or bicyclists arrive?	Both directions
Do you have any suggestions for how we can improve the safety/connectivity of the facility/activity center?	Improve Santa Cruz River crossing (and then other bridge immediately to the west)
Do you have any additional comments or ideas for us?	There are no bicycle facilities (racks) at the Church (sometimes they are locked on rail leading up to church, may also be parked immediately in front of church) Get people to obey stop signs, a lot of traffic speeding through reservation on way elsewhere People speed through as shortcut instead of going across on Valencia (especially in the morning and late afternoon) Lack of crosswalks and no clearly marked crosswalks There are existing signs asking visitors to "stay on paved roads", discouraging them from walking into living area

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Interviews with Stakeholders			
Date:	March 17, 2009	Meeting Location:	Phone Interview
Interviewee:	Michael Corella	Association:	San Xavier Ranger Department

What facility/activity center is respondent associated with:	San Xavier Ranger Department ("environmental police")
What are the facility hours of activity/operation What is the peak time(s) What causes this peak(s) (school lets out, church traffic) What is the mode by which people arrive at the facility? From what direction/route do pedestrians and or bicyclists arrive? Do you have any suggestions for how we can improve the safety/connectivity of the facility/activity center?	n/a
Do you have any additional comments or ideas for us?	A lot of people walk on Mission Road to the Church (Pilgrimage), see as many as 1 – 50 people a weekend, often in groups 2 to 5 Not adequate shoulder width, shoulder steep – end up walking into the street Lots of traffic around church and administration building during Council meetings and workday Significant pass through traffic – speed bumps help to mitigate, but people often driving around them. This traffic causes problems for the Community. People are cutting Community Lane to avoid stop signs in front of Mission Dedicated pedestrian routes would be good. People are forced to walk on road, sometimes walking two or three abreast (in street where there are trees on shoulder, too narrow, or too steep) Pima County was asked to do a traffic study (results? Done?) Many people coming for services, WIC, funerals and are crossing road – dangerous with speeding cut-through traffic. Parking is inadequate at Community Building Wak Lane, SJ Mayor Drive both dirt, kids walking on them all the time. NO crosswalks Community dogs create problems, lots of strays… Hordes of bicyclists ride on Mission Road – often several abreast impeding traffic

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Interviews with Stakeholders			
Date:	March 18, 2009	Meeting Location:	Phone Interview
Interviewee:	Linda Preston	Association:	Planning Committee Member Planning Committee Secretary

What facility/activity center is respondent associated with: What are the facility hours of activity/operation What is the peak time(s) What causes this peak(s) (school lets out, church traffic) What is the mode by which people arrive at the facility? From what direction/route do pedestrians and or bicyclists arrive?	n/a
Do you have any suggestions for how we can improve the safety/connectivity of the facility/activity center?	See notes below
Do you have any additional comments or ideas for us?	See many people walking, trailer park (Irvington) to Mission - Pilgrimage Lighting is inadequate, washes (esp. standing water at San Xavier Road) Alot of bicyclists take up entire Mission Road, don't allow vehicles to pass, groups of 10-20 Community members bicycling largely youth - some ride all the way to University (such as her son) People often walk from bus route (trailer park) to clinic, rather than ride bus long way around Stray dogs dropped off from off-reservation, problem

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Interviews with Stakeholders			
Date:	March 18, 2009	Meeting Location:	Phone Interview
Interviewee:	Bill Worthey	Association:	San Xavier Cooperative Farm Manager

What facility/activity center is respondent associated with:	San Xavier Cooperative Farm
What are the facility hours of activity/operation	7am to 5 pm 8am to 5 pm (Sales of Hay etc. to public) 4am to 5 pm (summer)
What is the peak time(s)	n/a
What causes this peak(s) (school lets out, church traffic)	n/a
What is the mode by which people arrive at the facility?	Most come by own vehicle or by bus
From what direction/route do pedestrians and or bicyclists arrive?	n/a
Do you have any suggestions for how we can improve the safety/connectivity of the facility/activity center?	Road work needed on San Xavier adjacent to the Coop - low spot ponds (100') takes forever to evaporate. Master plan envisions walk way from river with tree lined path
Do you have any additional comments or ideas for us?	Observes significant pedestrian traffic on San Xavier Road, tremendous amount of bicycle traffic. Not safe for ped or bike Headquarters fenced - actually moved fence back ten feet to allow room for peds to pass without being forced into road - doesn't help bicyclists

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Interviews with Stakeholders			
Date:	March 18, 2009	Meeting Location:	Phone Interview
Interviewee:	Anthony Jose	Association:	Recreation Center

What facility/activity center is respondent associated with:	Recreation Center
What are the facility hours of activity/operation	Mon – Friday 8am – 9pm Saturday 11am – 8pm Sunday 12pm – 7pm
What is the peak time(s)	Mon – Friday 3pm – 9pm
What causes this peak(s) (school lets out, church traffic)	School lets out
What is the mode by which people arrive at the facility?	Drive, drop-off. Majority of the youth arriving walk, some (small number) bicycle. There are bicycle racks at the center (sufficient number for users). There is a program to promote bicycling. Location of the centers (there are five on the Tohono O'odham Nation) is centralized to community to facilitate walking.
From what direction/route do pedestrians and or bicyclists arrive?	The majority of visitors are coming from the north/west. Walk along roads (all unpaved) such as Wak Lane and SJ Mayor Drive. Some are walking through the "two hill" area
Do you have any suggestions for how we can improve the safety/connectivity of the facility/activity center?	Lighting would be helpful Dedicated walking path would be beneficial Speed bumps in front of center to mitigate traffic impacts
Do you have any additional comments or ideas for us?	Anthony Jose phone (520) [redacted], best way to reach – feel free to call back with follow-up questions.

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Interviews with Stakeholders			
Date:	March 24, 2009	Meeting Location:	Phone Interview
Interviewee:	Don Williams	Association:	Indian Health Services

What facility/activity center is respondent associated with:	San Xavier Health Center, Indian Health Services The San Xavier Health Center operated by the Indian Health Services is a full service ambulatory health service provider. A hospital is located in Sells. The Center provides care to all individuals eligible for services through Indian Health Services (i.e., any "enrolled" Native American).
What are the facility hours of activity/operation	8am – 5pm, Monday through Friday, Friday AM is closed for administrative purposes. Pima County Rural Transit Service runs the San Xavier Access Route Monday through Saturday with connections to employment centers, the Indian Health Center, and other activity centers. Sun Van is available to individuals with disabilities with a current ADA Eligibility Card issued by the City of Tucson (where within ¾ mile complimentary area), County special needs also applies
What is the peak time(s)	Throughout the day
What causes this peak(s) (school lets out, church traffic)	n/a
What is the mode by which people arrive at the facility?	Private vehicle, Pima County Rural Transit Service, County special needs dial-a-ride
From what direction/route do pedestrians and or bicyclists arrive?	n/a, very little ped/bike traffic
Do you have any suggestions for how we can improve the safety/connectivity of the facility/activity center?	Lighting is an issue. This was an issue in Sells. They recently completed a 10 year lighting plan in Sells where they were experiencing a large number of pedestrian accidents (people crossing Route 86). IHS and Tohono O'odham addressed problem with lighting and there have been no pedestrian accidents since.
Do you have any additional comments or ideas for us?	Talk to the Education/Recreation and Head Start Center Phyllis Spears, IHS, should also be contacted for additional information on Safe Routes to Schools

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Interviews with Stakeholders

Date:	March 30, 2009	Meeting Location:	Phone Interview
Interviewee:	Shirley Kalinowski	Association:	Principal San Xavier del Bac Mission School

What facility/activity center is respondent associated with:	San Xavier Mission School Grades: kindergarten through 8th grade. The school primarily serves Tohono O'odham children from the San Xavier District (Village of Wa:k) and surrounding areas, however it is not exclusively Native American
What are the facility hours of activity/operation	7am – 4pm, Monday through Friday
What is the peak time(s)	AM Period – 7- 8, peak at 7:15, PM Period – 2:45 – 3:45, peak 2:45 – 3:15
What causes this peak(s) (school lets out, church traffic)	School start/dismissal
What is the mode by which people arrive at the facility?	Majority students come by school bus. Typically, 10-15 students walk to campus daily. Only occasionally will a student ride a bicycle to school. Staff arrive by personal vehicles.
From what direction/route do pedestrians and or bicyclists arrive?	[All]
Do you have any suggestions for how we can improve the safety/connectivity of the facility/activity center?	Sidewalks would be nice, no dedicated pedestrian routes. The distance to the rec center is approximately 1 mile, while the younger students are discourage from walking, some of the older students do (the bus does make a stop there and the education center). There are several projects underway now (notably the sidewalks at the Mission and drainage on the south side of the street) that will disrupt and potentially impact the pattern of school drop-offs/pick-ups
Do you have any additional comments or ideas for us?	There is a stop sign in front of the school – not everyone stops (safety concern for pedestrians) Crossing the wash and river is unsafe, given the narrow bridge The darkness is part of what makes the community unique, very little light anywhere Kids tend to wear dark clothes, compounding the visibility problem Pilgrimage time is October, however, there are people walking regularly to the church (and the Santa Cruz crossing is dangerous)

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Interviews with Stakeholders			
Date:	March 25, 2009	Meeting Location:	Phone Interview
Interviewee:	Melvin Moreno	Association:	Planning Committee Member, Vice-Chair

What facility/activity center is respondent associated with:	Indian Health Services
What are the facility hours of activity/operation	7am – 5pm
What is the peak time(s)	Peak hours 12pm – 5p
What causes this peak(s) (school lets out, church traffic)	
What is the mode by which people arrive at the facility?	Employees – private vehicle, Clients privately owned vehicle, "rural transit"
From what direction/route do pedestrians and or bicyclists arrive?	n/a
Do you have any suggestions for how we can improve the safety/connectivity of the facility/activity center?	Santa Cruz crossing should be on north side – crossing as planned on south side will require pedestrians to cross San Xavier two times. (have raised the issue at the Planning Commission on March 4) Lighting is an issue (at the bridge and also recreation center)
Do you have any additional comments or ideas for us?	Few bicycles through reservation, especially across bridge Valencia recently improved to 4 lanes has created increased traffic along Mission. Would like to see traffic counts north and south of Los Reales on Mission, there are always accidents at Los Reales Road.

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Survey Instrument

revised 02/26/09

Interviews with Stakeholders		
Date:	Meeting Location:	[Indicate Phone Interview or Live]
Interviewee:	Association:	

[Introduction – to be read prior to questions] *The Arizona Department of Transportation (ADOT) is conducting a Pedestrian Access and Safety Study for the San Xavier District of the Tohono O'odham Nation. Our firm, HDR, was hired as a consultant to ADOT and to complete the study. The plan will balance the need for facilitating pedestrian travel for both community members and visitors with the community's desire for privacy. The major product of the study will be a final report which will contain a plan for improvements over five- and ten-year periods.*

What facility/activity center is respondent associated with: _____

What are the facility hours of activity/operation: (from) _____ am / pm - _____ am / pm

What is the peak time(s) (from) _____ am / pm - _____ am / pm

(from) _____ am / pm - _____ am / pm

What causes this peak(s) (school lets out, church traffic) _____

_____

What is the mode by which people arrive at the facility?

Employees ☐ Car_____ ☐ Bicycle_____ ☐ Walk_____ ☐ Other (indicate mode) _____

Clients (i.e. users)

☐ Car_____ ☐ Bicycle_____ ☐ Walk_____ ☐ Other (indicate mode)

_____

From what direction/route do pedestrians and or bicyclists arrive? _____

Do you have any suggestions for how we can improve the safety/connectivity of the facility/activity center?

_____

_____

Do you have any additional comments or ideas for us? _____

_____

_____

Appendix D – BLOS and PLOS Analysis Reports With No Pedestrian Improvements

San Xavier - I19NB OnRamp - Ventura Drive

2009 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	5340 (veh/day)
Posted speed limit:	35 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	3.74	D (3.51-4.50)	Moderately Low
PLOS:	4.1	D (3.51-4.50)	Moderately Low

San Xavier - I19 SB OffRamp - I19NB OnRamp

2009 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	5015 (veh/day)
Posted speed limit:	35 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	3.71	D (3.51-4.50)	Moderately Low
PLOS:	4.07	D (3.51-4.50)	Moderately Low

San Xavier - Little Nogales Dr - I19 SB OffRamp

2009 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	4435 (veh/day)
Posted speed limit:	35 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	3.65	D (3.51-4.50)	Moderately Low
PLOS:	4	D (3.51-4.50)	Moderately Low

San Xavier - Mission Rd - Little Nogales Dr

2009 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	3016 (veh/day)
Posted speed limit:	25 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	3.09	C (2.51-3.50)	Moderately High
PLOS:	3.6	D (3.51-4.50)	Moderately Low

Mission Rd - Valencia Rd - San Xavier Rd

2009 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	4061 (veh/day)
Posted speed limit:	45 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	3.77	D (3.51-4.50)	Moderately Low
PLOS:	4.28	D (3.51-4.50)	Moderately Low

LittleNogalesDr - San Xavier Rd (N) - San Xavier Rd (S)

2009 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	3435 (veh/day)
Posted speed limit:	25 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	3.16	C (2.51-3.50)	Moderately High
PLOS:	3.64	D (3.51-4.50)	Moderately Low

LittleNogalesDr - Walk Ln - Campus Dr

2009 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	733 (veh/day)
Posted speed limit:	25 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	2.38	B (1.51-2.50)	Very High
PLOS:	3.33	C (2.51-3.50)	Moderately High

San Xavier - I19NB OnRamp - Ventura Drive

2014 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	15000 (veh/day)
Posted speed limit:	35 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	4.26	D (3.51-4.50)	Moderately Low
PLOS:	5.22	E (4.51-5.50)	Very Low

San Xavier - I19 SB OffRamp - I19NB OnRamp

2014 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	13400 (veh/day)
Posted speed limit:	35 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	4.21	D (3.51-4.50)	Moderately Low
PLOS:	5.04	E (4.51-5.50)	Very Low

San Xavier - Little Nogales Dr - I19 SB OffRamp

2014 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	14300 (veh/day)
Posted speed limit:	35 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	4.24	D (3.51-4.50)	Moderately Low
PLOS:	5.14	E (4.51-5.50)	Very Low

San Xavier - Mission Rd - Little Nogales Dr

2014 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	10500 (veh/day)
Posted speed limit:	25 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	3.73	D (3.51-4.50)	Moderately Low
PLOS:	4.46	D (3.51-4.50)	Moderately Low

Mission Rd - Valencia Rd - San Xavier Rd

2014 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	8800 (veh/day)
Posted speed limit:	45 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	4.16	D (3.51-4.50)	Moderately Low
PLOS:	4.83	E (4.51-5.50)	Very Low

LittleNogalesDr - San Xavier Rd (N) - San Xavier Rd (S)

2014 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	13400 (veh/day)
Posted speed limit:	25 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	3.85	D (3.51-4.50)	Moderately Low
PLOS:	4.8	E (4.51-5.50)	Very Low

San Xavier - I19NB OnRamp - Ventura Drive

2030 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	15100 (veh/day)
Posted speed limit:	35 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	4.27	D (3.51-4.50)	Moderately Low
PLOS:	5.23	E (4.51-5.50)	Very Low

San Xavier - I19 SB OffRamp - I19NB OnRamp

2030 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	13300 (veh/day)
Posted speed limit:	35 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	4.2	D (3.51-4.50)	Moderately Low
PLOS:	5.03	E (4.51-5.50)	Very Low

San Xavier - Little Nogales Dr - I19 SB OffRamp

2030 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	14800 (veh/day)
Posted speed limit:	35 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	4.26	D (3.51-4.50)	Moderately Low
PLOS:	5.2	E (4.51-5.50)	Very Low

San Xavier - Mission Rd - Little Nogales Dr

2030 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	9800 (veh/day)
Posted speed limit:	25 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	3.69	D (3.51-4.50)	Moderately Low
PLOS:	4.38	D (3.51-4.50)	Moderately Low

Mission Rd - Valencia Rd - San Xavier Rd

2030 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	9500 (veh/day)
Posted speed limit:	45 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	4.2	D (3.51-4.50)	Moderately Low
PLOS:	4.91	E (4.51-5.50)	Very Low

LittleNogalesDr - San Xavier Rd (N) - San Xavier Rd (S)

2030 - BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	10300 (veh/day)
Posted speed limit:	25 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	0%

	Score	Level-of-service	Compatibility Level
BLOS:	3.72	D (3.51-4.50)	Moderately Low
PLOS:	4.44	D (3.51-4.50)	Moderately Low

Appendix E – Level of Service Formulas for Pedestrian and Bicycle

The BLOS analysis was performed using the BLOS/PLOS Calculator Form developed by Bruce Landis *et al*. for the League of Illinois Bicyclists. This form uses the BLOS model and PLOS model, which are based on the equations below:

BLOS = $0.507 \ln(Vol_{15}/L) + 0.199 SP_t(1+10.38HV)^2 + 7.066(1/PR_5)^2 - 0.005 W_e^2 + 0.760$

Vol_{15}	=	volume of directional traffic in 15 minute time period
L	=	total number of through lanes
SP_t	=	effective speed limit = 1.1199 ln(SPp-20) + 0.8103, where SPp is posted speed
HV	=	percentage of heavy vehicles
PR_5	=	FHWA's 5-point surface condition rating (5=best)
W_e	=	average effective width of outside through lane = $W_t + W_l - \Sigma W_r$
W_t	=	total width of outside lane and shoulder/parking pavement
W_l	=	width of paving from outside lane stripe to pavement edge
ΣW_r	=	width reduction due to encroachments in outside lane

PLOS = $-1.227 \ln(W_{ol} + W_l + f_P \times \%OSP + f_b \times W_b + f_{SW} \times W_S) + 0.009 (Vol_{15}/L) + 0.0004 SPD^2 + 6.046$

W_{ol}	=	width of outside lane
W_l	=	width from outside lane stripe to pavement edge (shoulder, parking, bike lanes)
F_p	=	on-street parking effect coefficient
%OSP	=	percent of segment with on-street parking
F_b	=	buffer area barrier coefficient
W_b	=	buffer width (between edge of pavement and sidewalk)
f_{SW}	=	sidewalk presence coefficient
W_S	=	width of sidewalk
Vol_{15}	=	volume of directional traffic in 15 minute time period
L	=	total number of through lanes
SPD	=	average running speed of traffic

Appendix F – Outreach Documents

Project Issues

"Dead Man's Curve"
- Curve safety
- Bad visibility
- Hazardous to pedestrians

Potential Plan Extension
Consider increasing the master plan path on Mission Road to Valencia

Indian Health Services
Connectivity to important destination for the community

San Xavier Mission School
Connecting 200 students to the Recreation & Education Center

San Xavier Mission
Need to acquire data (Task 2) of number of visitors

Recreation & Education Center
Connectivity to the school

Little Nogales Drive
Major drainage issues from San Xavier Mission School to Recreation & Education Center

Santa Cruz Pedestrian Bridge
Vehicular bridge restricts pedestrians and creates a major safety hazard

GENERAL ISSUES THROUGHOUT PROJECT AREA
- Drainage challenges
- Visual Safety
- Signage to aid privacy of residences
- Linkage of pedestrians to bus stops
- Discourage non-community travel to sacred areas

Dear Community Member:

The Arizona Department of Transportation (ADOT) is conducting a Pedestrian Access and Safety Study for the San Xavier District of the Tohono O'odham Nation. This study will determine what the requirements are for safe and useful walking paths within the District that benefit the community. To aid in the development of this walking path, your assistance in responding to the following questions is greatly appreciated:

1. Do you or anyone in your household walk to and from your home and (Please circle all that apply)
   a. San Xavier del Bac Mission
   b. San Xavier Mission School
   c. San Xavier District Offices
   d. Recreation Center and/or Education Center
   e. Indian Health Center
   f. Desert Diamond Casino on Nogales Highway

2. If yes, how often:
   a. daily
   b. weekly
   c. several times a month

3. Do you feel safe walking in your community? Yes ____ No ____

   If No, please explain unsafe locations: _____

_____

4. Does anyone in your household ride a bicycle within the community?

   Yes ____ No ____

Please write in the area below if you have other comments or suggestions:

_____

_____

_____

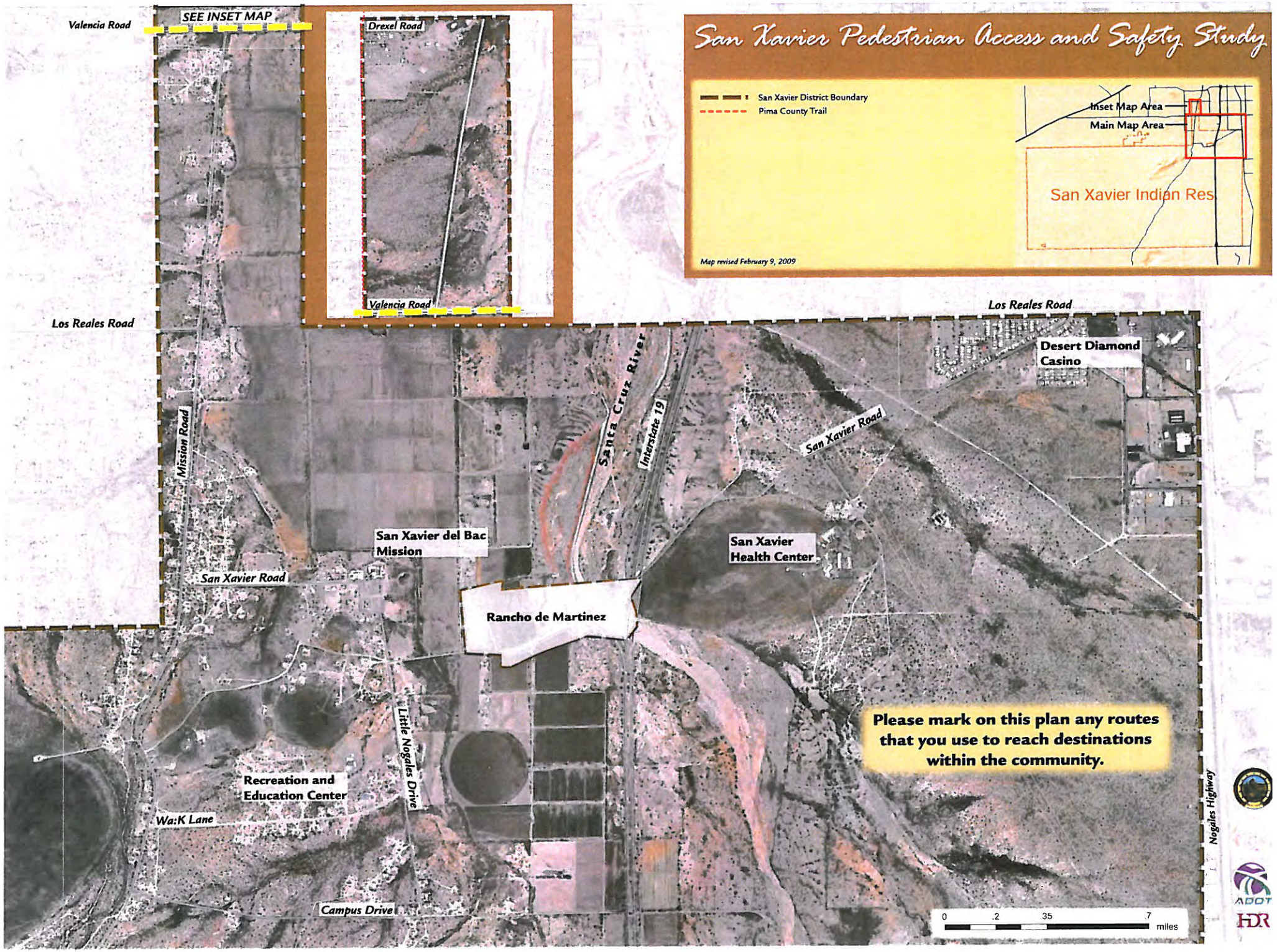
_____

_____

If you have any questions, please contact Evelyn at 885-9009 or evelyn@kaneenpr.com

Thank you for your assistance.
The ADOT Pedestrian Access and Safety Study Team

San Xavier Pedestrian Access and Safety Study



San Xavier District Boundary

Pima County Trail

Map revised February 9, 2009

ADOT

HDR

Comment Forms

This is a summary of the questionnaire that was distributed to Community members and made available at various locations. In addition, Community members that approached the team member conducting the pedestrian counts (April 5 and 6) and expressed an interest in the study were asked to complete a questionnaire. A total of eight questionnaires were completed.

1. Do you or anyone in your household walk to and from your home and

   a. San Xavier del Bac Mission – 5
   b. San Xavier Mission School – 4
   c. San Xavier District Offices – 4
   d. Recreation Center and/or Education Center – 6
   e. Indian Health Center – 4
   f. Desert Diamond Casino on Nogales Highway – 2

2. If yes, how often:

   a. Daily – 3
   b. Weekly – 1
   c. several times a month – 4

3. Do you feel safe walking in your community?

   a. Yes – 4
   b. No – 4

   If No, please explain unsafe locations:

   - Santa Cruz Bridge
   - the road is too narrow, we have to walk on the side (dirt)
   - along Mission Road
   - vehicles drive too fast
   - no walkways or pathways

4. Does anyone in your household ride a bicycle within the community?

   a. Yes – 4
   b. No – 4

Other Comments:

- I think there should be a walking path on the side of the pavement road
- Widen road and add bike lanes and sidewalks for pedestrians and bicyclists
- (make it) safe for everyone
- Bike trails, scenic walk areas away from roads
- Running trails and bike trails off road

SAN XAVIER DISTRICT PEDESTRIAN ACCESS AND SAFETY STUDY

The San Xavier Planning Department, in partnership with the Arizona Department of Transportation (ADOT), would like your thoughts and suggestions on designing safe and functional walking paths for the San Xavier District.

In response to a request by the San Xavier Planning Department, ADOT is beginning a Pedestrian Access and Safety Study for the San Xavier community. The study will highlight issues related to pedestrian access and safety throughout the community and propose improvements for protecting the health and safety of community members.

The study will focus on pedestrian travel to homes in the community, to District facilities (District Center, Recreation Center, etc.), and the San Xavier del Bac Mission.

We would also like your input on the following potential projects:

- The Santa Cruz River Pedestrian Bridge which would allow community members to walk safely across the Santa Cruz River to reach the Indian Health Center.
- San Xavier Road being rebuilt with a walking path for pedestrians to safely reach the Health Center.
- A Safe Route to School pathways that will create a safe walking path for children to walk safely between the Mission School and the Education Center, or to create other safe routes between student's homes and school.
- Any other pedestrian or bicycle improvement in the District.

Please take a moment to fill out the questionnaire included with the March edition of the Wa:k Community Newsletter. Completed questionnaires may be returned to the District Receptionist. Extra copies of the questionnaire will be available from the District Receptionist.

Upon receiving your comments and concerns, the Study Team will compile, analyze, and develop alternatives outlining pedestrian and bicycle improvements. Your input is essential to the development of a successful pedestrian safety study.

Later this year, there will be other meetings and opportunities for you to review these proposed alternatives and make additional comments. Please look for meeting announcements in the Wa:k Community Newsletter and attend the meetings with your family and friends. Your participation is greatly appreciated!

If you have any questions or need more questionnaires, please contact Evelyn Urrea at 885-9009, or at evelyn@kaneenpr.com.

You can also contact Nathan Barrett, San Xavier Planning Department, at 573-4073 or at nbarrett@waknet.org

PLEASE SEE THE FLYER INSERTED IN THIS NEWSLETTER

Photo Taken by: Amy Harjoche

A job well done by the We:s Hemajkam Kaw:li:ya dam on their best performance. The group placed second in Group/Organization category and was also awarded the Best Overall trophy at this year's 71st Tohono O'odham Nation Rodeo and Fair Parade. I would like to recognize the following members for their participation and in working together towards this event. The group also performed at the Rodeo & Fair complex and all had a very enjoyable time. From the bottom of our hearts we would like to extend our great appreciation to the TO Combo Band representing the Hickiwan District, who provided the music.

Ernie Reyes
Alan Encinas
Vernon Scott
Terry Encinas
Gilbert Jose
Alan Reyes
Brandon Havier
Floyd Rios
Jaron Gonzales
Larry Campus
Eddie Miguel Sr.
Verna Miguel
Geri Antone
Millie Scott
Clarice Norris
Margie Garcia
Linda Pablo
Debbie Jose
Lynn Pablo
Marissa Jose
Brenda Campus
Wynonna Peters

Thank you ~ Ernie Reyes

Your Input Is Needed!

The San Xavier Planning Department, in partnership with the Arizona Department of Transportation (ADOT) and HDR, would like your thoughts and suggestions on what types of walking paths are needed for the San Xavier Community. HDR is the engineering firm hired by ADOT to perform this study.

If you have received a map with a questionnaire/comment sheet from a relative, neighbor, or the March Wa:k Newsletter, we would appreciate it if you would complete the questionnaire/ comment sheet, mark the map on the back with routes that you take as you walk through the Community, and return it to the District Office Receptionist.

If you have any questions, please contact Nathan Barrett, San Xavier Planning Department, at 573-4073.

Thank you for your time and participation in enhancing the connectivity within the community!

HDR

ARIZONA DEPARTMENT OF TRANSPORTATION

PUBLIC OPEN HOUSE

San Xavier District Pedestrian Access and Safety Study

Tuesday, July 14, 2009
San Xavier District Center
5:30 – 7:00 p.m. / Brief Presentation at 6:00 p.m.
Refreshments Will Be Served

The Arizona Department of Transportation (ADOT), in partnership with the San Xavier Planning Department and the HDR Engineering Project Team, is currently working on a study to plan safe and accessible walking paths for community members living in the San Xavier District. The focus of the plan is to design pedestrian travel from residential areas to various District facilities such as the District Center, Recreation Center, and the San Xavier del Bac Mission.

The purpose of this Open House is to present information and to receive comments from community members regarding a pedestrian walkway design that will preserve community privacy while balancing the needs of community members and visitors. Displays will be available for viewing. Project team members will be available to answer your questions and gather your input.

For additional technical information or to submit comments in writing, please contact **Nathan Barrett, San Xavier Planning Department, at (520) 573-4000 or nbarrett@waknet.org, or Heidi Schneider, P.E., at (520) 584-3600 or heidi.schneider@hdrinc.com**.

ADOT

Americans with Disabilities Act: Persons with a disability may request a reasonable accommodation, such as a sign language interpreter, by contacting Evelyn by e-mail: evelyn@kaneenpr.com, phone: (520) 885-9009, fax: (520) 885-0311. This document is available in alternative formats by contacting Evelyn at (520) 885-9009.

Michael Sanders
ADOT Project Manager

Greg Gentsch
ADOT Tucson District Engineer

Floyd Roehrich, Jr.
ADOT State Engineer

ADOT Task Assignment MPD 11-09

San Xavier District
Pedestrian Access and Safety Study

PUBLIC OPEN HOUSE

Tuesday, July 14, 2009
District Office Conference Room
5:30 to 7:00 p.m.

AGENDA

5:30 p.m.	Start of Open House
5:45 p.m.	Welcome and Introductions ▪ Linda Ritter, ADOT
5:50 p.m.	Study Purpose and How You Can Help ▪ Nathan Barrett, San Xavier District
5:55 p.m.	Study Overview ▪ Michael Sanders, ADOT
6:00 p.m.	Presentation of the San Xavier Pedestrian Access and Safety Study ▪ Heidi Schneider, HDR
6:15 p.m.	Questions and Answers
6:30 p.m.	Table Discussions
6:50 p.m.	Table Discussion Summaries
7:00 p.m.	Adjourn

ADOT

Dear Community Member,

Thank you for coming to the Pedestrian Safety Plan Open House. We value your opinions and hope you feel free to share them with us tonight. This plan can only succeed if we know how you, the Community, feel about these proposals. As you make comments, ask questions, and share your opinions with us tonight, please remember the following:

- What you will see tonight is a long-range plan. **None of the proposed projects that will be presented have been funded.** These projects will not be built within the next couple of years. Many of these proposals may not be constructed for another ten or twenty years.

- Plans are subject to change. We hope that your comments tonight will help us to change this plan for the better. Other changes may be necessary at a later date because of funding constraints, engineering difficulties, or a different community priorities in the years ahead.

- Plans tonight are at a conceptual level. If a project receives future funding and moves forward to construction, it will be thoroughly reviewed according to the processes set forth in the "Development Review Manual." This review will include reviews by the Community, the Planning Committee, and the District Council. No project from tonight's presentation will be constructed unless it receives a full development review.

Thank you for your participation tonight. I hope that you leave tonight's open house knowing that you have helped us to plan for a safer community for your family and friends.

For more information call Nathan Barrett in the Planning Department at 573-4073

San Xavier District Pedestrian Access and Safety Study

COMMENT CARD

Your Comment/Question:

* NO! Vehicles of any kind driving on the Road shoulder throwing dust! - (ILLEGAL)
* Designated bus stops with canopy (for bad weather) with benches.

Name (optional):

Address:

Phone:

HDR

San Xavier District Pedestrian Access and Safety Study

COMMENT CARD

Your Comment/Question:

With the current traffic flow running through the community, I believe the changes recommended should be done. We sometimes forget how important safety are to the community of San Xavier!

Name (optional): Fr. Ignacio

Address: 8560 S. Toby Wos

Phone: 295-2921

HDR

San Xavier District Pedestrian Access and Safety Study

COMMENT CARD

Your Comment/Question:

I think adding safe walking paths around the community would be very helpful and safe. Biking areas would also be helpful

Name (optional):

Address: 6216 W Calle Garcia

Phone: 903-1510

HDR

San Xavier District Pedestrian Access and Safety Study

COMMENT CARD

Your Comment/Question:

SPEED HUMPS ARE NEEDED ON COMMUNITY LANE
PEOPLE DRIVE BY LIKE ITS A FREEWAY AND CREATE ALOT OF DUST!

Name (optional):

Address:

Phone:

HDR

SAN XAVIER PEDESTRIAN SAFETY PLAN

This map shows a proposed network of pathways, trails, and sidewalks that could be constructed within the San Xavier District within the next ten to twenty years. Please note the following:

- None of these projects have been funded.
- None of these projects will be constructed without further review by the community and council
- These plans can change as the community expresses their hopes, desires, and concerns.

WHAT YOU CAN DO:

- Use a marker or pen to write your concern on the map
- Use a marker of pen to indicate areas of the community you feel are unsafe for pedestrians
- Write your comments and concerns on a comment card and give it to the secretary

Thank you for helping us plan for a safe future for your family and friends in the San Xavier Community.

If you have questions about this plan, please contact Nathan Barrett in the Planning Department at 573-4073.

Appendix G – Transcribed Comments

Q & A:

1) Did you look at Los Reales area?

   Southbound acceleration lane and turning lane
   Reason: when northbound and turning into Los Reales cars have issue of going around on dirt, so, if thinking of sidewalk there, someone could get hit.

2) Can we take comment cards home—pass them out?
   Absolutely.

3) Is everyone for this?
   That's what trying to find out.

4) Los Reales—needs STOP signs.

5) If put sidewalks—are you going to put lights?
   We want to know what you want.

6) What are sidewalks for? Don't see anyone walking. I'm so used to desert—like it better than concrete.

7) How will this go around? (trail shown)
   Perhaps concrete for students going to school, but trails being concrete will make for more intruders.

8) How wide will these sidewalks be?
   Sidewalks 10' wide: we need them wide enough (widths were explained—6' would be the narrowest.)
   "That should work (6 feet.)"

9) Lights in areas important where questionable-type people frequently seen roaming (asked them to show us on map where (lights) should be.

10) Questions answered about where asphalt was to be used.

11) Will there be any exercise areas—along these ways? (audience laughing)

12) Who will maintain these?
    (Funding builds it and Mission maintains—" again, this all conceptual.")

13) How far from road is sidewalk planned?
    We will get a large buffer—we have the intent to get a far from road as possible.

Table Session:

General Comment: Mission & Valencia = lighting requested (see map and notes)

Outsiders come from Los Reales and we don't want to encourage them to walk on sidewalks.

We just like to walk through the desert.

San Xavier Mission and Mission Plaza through Rec Center—where the sidewalks should be.

Have a "natural trail" coming off San Xavier Road.

1. Los Reales' main concern (light or HAWK or no signal)—so, no controversy there as to what is wanted.
2. Everyone wants to see school kids go from Rec Center to school on a paved trail at Dead Man's Curve.
3. Safer route (see small black circle near San Xavier Road.) Keep trail natural (lots of accidents there.)
4. The intersection in the Dead Man's Curve needs to be straightened.
5. Frontage road along Mission Road is a natural path—everyone walks there anyway until . . . get up to bushy trees. The frontage road acts a driveway for homes in the area.
6. If you start developing must change lifestyle and chain dogs, etc.—have always run free in past.
7. Dog issue—dogs running free/dangerous but residents don't want to chain their dogs.
8. More foot traffic going to church—lots are outsiders.
9. Lots of bikes come through (all at own risk)—they ride on road (they have thought of changing district laws so bikes are more regulated.
10. ***Will there be any shade spots along the walks (especially bus stops need shade (Van Tran serves area.)

(END)

Appendix H – BLOS and PLOS Analysis Reports Based on Preferred Alternative

BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	15000 (veh/day)
Posted speed limit:	35 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	100%
Sidewalk width:	8 ft
Sidewalk buffer/parkway width:	10 ft

	Score	Level-of-service	Compatibility Level
BLOS:	4.26	D (3.51-4.50)	Moderately Low
PLOS:	3.45	C (2.51-3.50)	Moderately High

Year 2014: San Xavier Rd from I-19 NB On Ramp to Ventura Dr.

BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	13400 (veh/day)
Posted speed limit:	35 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	100%
Sidewalk width:	8 ft
Sidewalk buffer/parkway width:	10 ft

	Score	Level-of-service	Compatibility Level
BLOS:	4.21	D (3.51-4.50)	Moderately Low
PLOS:	3.27	C (2.51-3.50)	Moderately High

Year 2014: San Xavier from I-19NB to I-19SB

BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	14300 (veh/day)
Posted speed limit:	35 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	100%
Sidewalk width:	8 ft
Sidewalk buffer/parkway width:	10 ft

	Score	Level-of-service	Compatibility Level
BLOS:	4.24	D (3.51-4.50)	Moderately Low
PLOS:	3.37	C (2.51-3.50)	Moderately High

Year 2014: San Xavier from Little Nogales Dr. to I-19SB

BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	10500 (veh/day)
Posted speed limit:	25 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	100%
Sidewalk width:	6 ft
Sidewalk buffer/parkway width:	12 ft

	Score	Level-of-service	Compatibility Level
BLOS:	3.73	D (3.51-4.50)	Moderately Low
PLOS:	2.73	C (2.51-3.50)	Moderately High

Year 2014: San Xavier from Mission to Gok Kawulk Wog

BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	13400 (veh/day)
Posted speed limit:	25 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	100%
Sidewalk width:	10 ft
Sidewalk buffer/parkway width:	4.5 ft

	Score	Level-of-service	Compatibility Level
BLOS:	3.85	D (3.51-4.50)	Moderately Low
PLOS:	3.14	C (2.51-3.50)	Moderately High

Year 2014: San Xavier from Gok Kawulk Wog to Little Nogales Dr.

BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	8800 (veh/day)
Posted speed limit:	45 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	100%
Sidewalk width:	8 ft
Sidewalk buffer/parkway width:	10 ft

	Score	Level-of-service	Compatibility Level
BLOS:	4.16	D (3.51-4.50)	Moderately Low
PLOS:	3.05	C (2.51-3.50)	Moderately High

Year 2014: Mission from Valencia to San Xavier

BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	13400 (veh/day)
Posted speed limit:	25 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	100%
Sidewalk width:	10 ft
Sidewalk buffer/parkway width:	4.5 ft

	Score	Level-of-service	Compatibility Level
BLOS:	3.85	D (3.51-4.50)	Moderately Low
PLOS:	3.14	C (2.51-3.50)	Moderately High

Year 2014: Little Nogales Dr. from San Xavier North to San Xavier south

BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	15100 (veh/day)
Posted speed limit:	35 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	100%
Sidewalk width:	8 ft
Sidewalk buffer/parkway width:	10 ft

	Score	Level-of-service	Compatibility Level
BLOS:	4.27	D (3.51-4.50)	Moderately Low
PLOS:	3.46	C (2.51-3.50)	Moderately High

Year 2030: San Xavier from I-19NB to Ventura

BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	13300 (veh/day)
Posted speed limit:	35 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	100%
Sidewalk width:	8 ft
Sidewalk buffer/parkway width:	10 ft

	Score	Level-of-service	Compatibility Level
BLOS:	4.2	D (3.51-4.50)	Moderately Low
PLOS:	3.26	C (2.51-3.50)	Moderately High

Year 2030: San Xavier from I-19NB to I-19SB

BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	14800 (veh/day)
Posted speed limit:	35 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	100%
Sidewalk width:	8 ft
Sidewalk buffer/parkway width:	10 ft

	Score	Level-of-service	Compatibility Level
BLOS:	4.26	D (3.51-4.50)	Moderately Low
PLOS:	3.43	C (2.51-3.50)	Moderately High

Year 2030: San Xavier from Little Nogales Dr. to I-19SB

BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	9800 (veh/day)
Posted speed limit:	25 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	100%
Sidewalk width:	6 ft
Sidewalk buffer/parkway width:	12 ft

	Score	Level-of-service	Compatibility Level
BLOS:	3.69	D (3.51-4.50)	Moderately Low
PLOS:	2.65	C (2.51-3.50)	Moderately High

Year 2030: San Xavier from Mission to Gok Kawulk Wog

BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	10300 (veh/day)
Posted speed limit:	25 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	100%
Sidewalk width:	10 ft
Sidewalk buffer/parkway width:	4.5 ft

	Score	Level-of-service	Compatibility Level
BLOS:	3.72	D (3.51-4.50)	Moderately Low
PLOS:	2.78	C (2.51-3.50)	Moderately High

Year 2030: San Xavier from Gok Kawulk Wog to Little Nogales Dr.

BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	9500 (veh/day)
Posted speed limit:	45 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	100%
Sidewalk width:	8 ft
Sidewalk buffer/parkway width:	10 ft

	Score	Level-of-service	Compatibility Level
BLOS:	4.2	D (3.51-4.50)	Moderately Low
PLOS:	3.14	C (2.51-3.50)	Moderately High

Year 2030: Mission from Valencia to San Xavier

BLOS and PLOS for the following road segment

Lanes per direction:	1
Outside lane width:	12 ft
Paved shoulder/bike lane/marked parking width:	0 ft
Bidirectional ADT traffic volume:	10300 (veh/day)
Posted speed limit:	25 mph
Heavy vehicle percentage:	2%
FHWA's pavement condition rating:	4
% of segment with occupied parking:	0%
% of segment with sidewalks:	100%
Sidewalk width:	10 ft
Sidewalk buffer/parkway width:	4.5 ft

	Score	Level-of-service	Compatibility Level
BLOS:	3.72	D (3.51-4.50)	Moderately Low
PLOS:	2.78	C (2.51-3.50)	Moderately High

Year 2030: Little Nogales Dr. from San Xavier North to San Xavier south