BINATIONAL SAN LUIS

TRANSPORTATION STUDY

Working Paper No. 1

Existing and Future Conditions

July 2012

Prepared For:

ADOT

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TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (CONTINUED)

LIST OF FIGURES (CONTINUED)

1.0 INTRODUCTION

Purpose of the Study

The Binational San Luis Transportation Study is a joint effort by the City of San Luis, Municipal de San Luis Rio Colorado and the Arizona Department of Transportation (ADOT). The primary purpose of this study is to prepare a long-range multimodal transportation plan that will address the most critical current and future transportation issues for the cities of San Luis, Arizona and San Luis Rio Colorado, Sonora, Mexico. The study is being funded by the Federal Highway Administration's (FHWA) State Planning and Research Program and administered through ADOT's Multimodal Planning Division. Working Paper 1 consists of two reports - one for each of the two cities. The focus of this report is San Luis, Arizona.

Study Objectives

The principal focus of this study is to update the Transportation Plan identified in the *2009 City of San Luis Small Area Transportation Plan* to address the safety and mobility issues specific to the ever growing border region. The primary objectives for the study are as follows:

- Determine if the current and planned infrastructure are still valid and needed.
- Address pedestrian and bicycle needs.
- Enhance connectivity between modes - vehicles, transit, and pedestrians.
- Evaluate staging areas for vehicular transportation and transit service.
- Enhance the mobility and connectivity of the transportation system at an international, regional, and local level.
- Evaluate and identify infrastructure improvements at San Luis Land I Port of Entry (LPOE).
- Conduct an Origin and Destination survey to understand the travel pattern between the cities.
- Provide timely and early opportunities for comprehensive public input into the development of the transportation plan.
- Communicate with TAC, stakeholders, and public.

The study is guided by a Technical Advisory Committee (TAC). The role of the TAC is to provide guidance, support, advice, suggestions, and recommendations, and to perform document reviews throughout the study process. TAC members include representatives from:

- City of San Luis, Arizona
- Municipal de San Luis Rio Colorado, Sonora, Mexico
- ADOT – Multimodal Planning Division (MPD)
- ADOT – Communication and Community Partnerships (CCP)
- ADOT – Yuma District
- ADOT-Enforcement and Compliance Division
- Yuma Metropolitan Planning Organization (YMPO)
- Secretaria de Infraestructura y DesarraolloUrbano (SIDUR)
- Secretaria de Cominicaciones y Transporte (SCT)
- General Services Administration (GSA)
- Greater Yuma Port Authority (GYPA)
- Greater Yuma Economic Development Corporation (GYEDC)
- US Custom and Border Protection (CBP)
- Federal Highway Administration (FHWA)
- Cocopah Indian Tribe

Study Area Overview

Adjacent to both Mexico and California, the City of San Luis, Arizona is located in the southwest corner of the state..The City was established in 1930 when the U.S. San Luis I LPOE opened the Mexican border with the City of San Luis Rio Colorado, Sonora, which in 2010 had a population of approximately 175,000. Since its incorporation in 1979, the City has experienced tremendous growth making it one of the fastest growing communities in Yuma County. In 2000, the U.S. Census Bureau estimated the City of San Luis population at 15,322; by 2010 the City had a 66 percent increase in population with a total population of 25,505. In October 2010, a second LPOE in the City of San Luis was opened and currently services only commercial trucks.

Figure 1 illustrates the regional location of the City. San Luis is approximately 20 miles from the City of Yuma, which offers all the amenities of a metropolitan area such as a large shopping center, regional medical facilities, and a regional airport. The City is approximately 190 miles from San Diego, California and 75 miles from El Golfo de Santa Clara, Sonora, Mexico, which offers recreational driving, sailing, swimming, and tourist activities along the Sonoran Gold Coast.

FIGURE 1.1 REGIONAL LOCATION

FACT SHEET

Location: Approximately 20 miles south of the City of Yuma and 75 miles north of El Golfo de Santa Clara, Mexico.

Study Area: Approximately 28.8 square miles that includes portions of the City of San Luis and Municipal de San Luis Rio Colorado.

San Luis, AZ*: Founded in 1930, Incorporated in 1970
Elevation: 130 feet
2010 Population: 25,505[+]

*AZ Dept. of Commerce
[▲]2010 U.S. Census Bureau

As part of the Long Range Transportation Plan identified in the *2009 City of San Luis Small Area Transportation Study (SATS)*, it was recommend that a Binational Study be conducted to address the future travel exchange between the two Cities and the recreational traffic using the San Luis I LPOE. Due to the ever increasing population and economic interdependency of the two bordering cites, the resurgence of the maquiladora industry, and the opening of the second LPOE that could

potentially provide new economic opportunities for the area, a regionally integrated and coordinated transportation plan that includes both cities would be most beneficial.

For this study, the study area limits are approximately 28.8 square miles and include portions of the incorporated limits of San Luis and San Luis Rio Colorado. The study area is bounded by County 22nd Street/County 23th Street to the north, Avenue E to the east, and Merrill Avenue the west in San Luis. Within San Luis Rio Colorado, the study area is bounded by Nuevo León to the south, Libraminento to the east, Monterrey to west, and Nuevo Leon to the south. Within the City of San Luis, regional access to the study area is provided by US 95 and SR 195. US 95, a major north-south thoroughfare, connects San Luis I LPOE and downtown San Luis with I-8 in the City of Yuma through the City of Somerton, while SR 195 provides a direct route from I-8 in the City of Yuma to San Luis POE II via Avenue E.

Figure 1.2 shows the Binational study area boundary, which represents the limits of the transportation plan. Also, shown is the influence area which extends beyond the study area but has some impact on the study area transportation system by either daily use of the facilities or by proximity to the study area.

FIGURE 1.2: STUDY AND INFLUENCY AREA
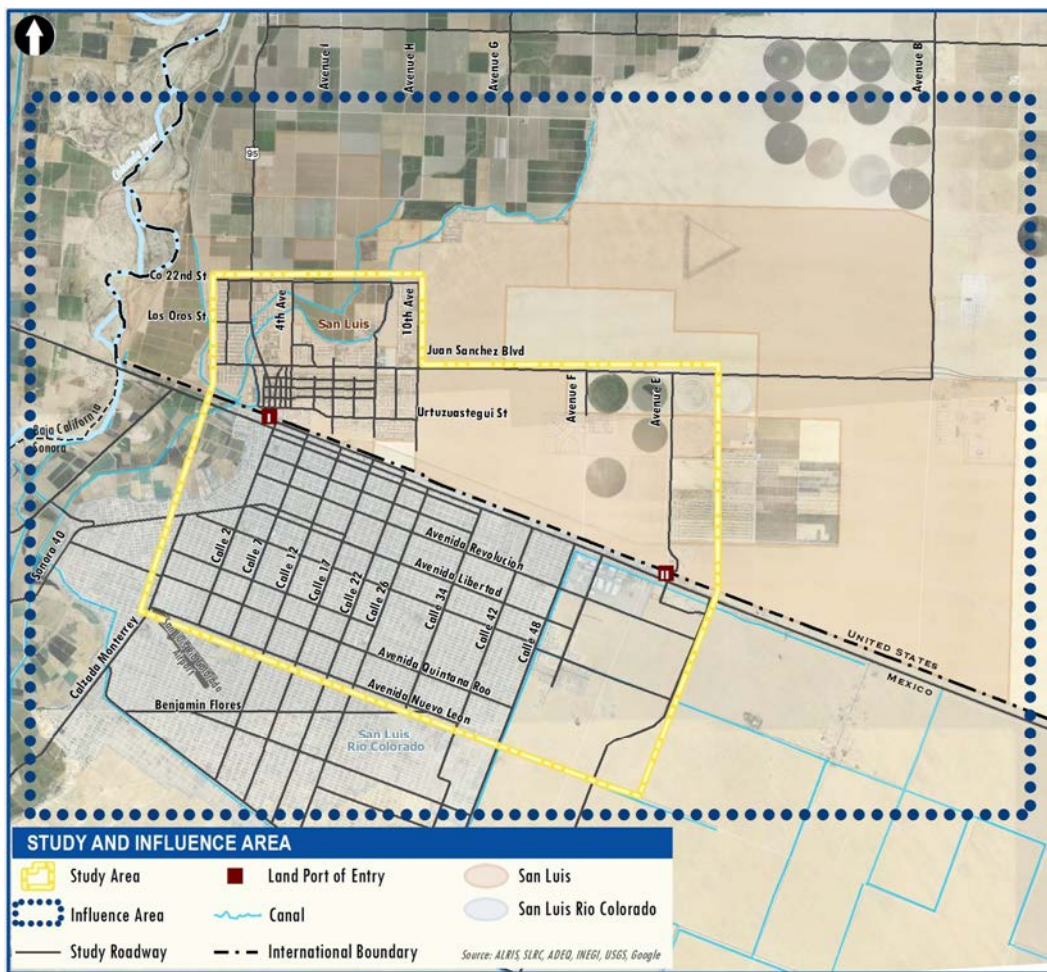
Study Process

Figure 1.3 illustrates the process utilized to conduct this study. Throughout the study process, consistent communication is made with the Technical Advisory Committee (TAC), which provides technical guidance, support, advice, suggestions, and recommendations, and performs document reviews.

FIGURE 1.3: STUDY PROCESS
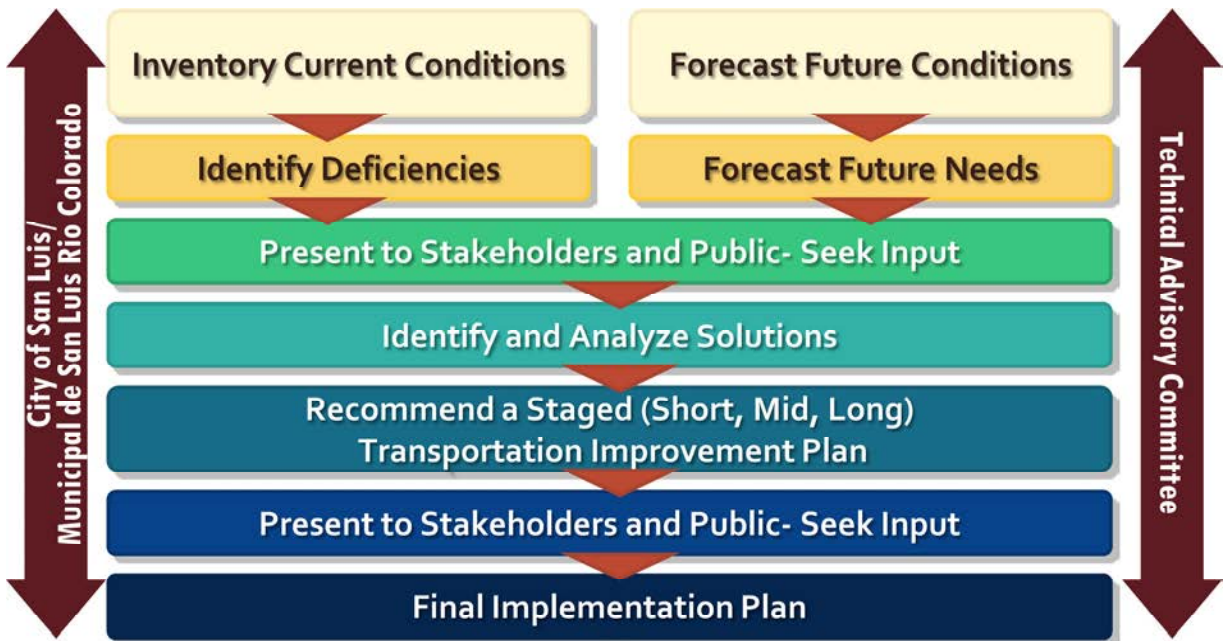
2.0   REVIEW OF STUDIES, REPORTS, AND PLANS

This chapter presents a review of studies, plans, and programs related to transportation in the study area. The purpose of this review is to gain awareness and understanding of the current transportation issues and potential future transportation plans from other agencies in the study area. In addition, this chapter also summarizes approved transportation improvements for the next five years within the study area.

Ongoing and Completed Studies

Table 2.1 lists recently completed or ongoing transportation related studies in the study area together with a brief synopsis of the findings.

TABLE 2.1: PREVIOUS STUDIES

Studies
San Luis General Plan 2020
San Luis Traffic Operational Study
US95 and US 95T, International Border - Juan Sanchez Blvd Project Assessment
San Luis Small Area Transportation Study Update
Yuma Regional Transit Study
2010 - 2033 YMPO Regional Transportation Plan
Public-Private Partnerships Potential for Arizona-Mexico Border Infrastructure Projects
Arizona Multimodal Freight Study

San Luis General Plan 2020

Completed in June 2011, the General Plan is a comprehensive, long-range Plan that will guide the development of San Luis over the next 15 to 20 years. By 2025, population is projected to be 50,100 with an estimated 25,000 jobs. Growth would be directed along two corridors, US 95 north and Juan Sanchez Boulevard east. Recommendations included:

- New Arterials include Avenue G (County 20th Street to U.S.-Mexico Border), Avenue E (SR 195 to north of County 18th Street), County 22nd Street (10th Avenue to Avenue F), County 21st Street (Avenue H to Avenue B), County 20th Street (Avenue F to Avenue B). Additional arterials are also planned for the southeast portion of the city limits.
- Make improvements to Juan Sanchez Corridor.
- Provide safe bicycle facilities and routes, preferably on new collectors or arterials.
- Promote construction of new pedestrian facilities such as sidewalks, overpasses, and pedestrian signals at major intersections, improve curb cuts at cross-walks, and pedestrian refugee areas.
- Minimize impact to wildlife and natural habitat.

San Luis Traffic Operational Study

Completed in April 2011, the study is a follow-up to the *San Luis Small Area Transportation Study*'s recommendation that an operational traffic study be conducted to develop a circulation plan that would address and mitigate the potential effects of the redesigned San Luis I LPOE in the downtown area. Recommendations included:

- Main Street to terminate north of Urtuzuastegui Street, and Archibald Street and 1st Avenue would be a one-way couplet that provides access to and from San Luis I LPOE for privately owned vehicles POVs (Alternative 1).
    - Main Street: two-lanes with right-in and right-out out only.
    - Archibald Street: two -three lanes (one-way)
    - 1st Avenue: two-lanes (one-way
- Traffic control includes seven traffic signals and two all-way stops. In addition, a traffic circle or roundabout may be used in place of traffic signals at a location like Main Street and D Street.
    - Traffic Signals: Main Street at Juan Sanchez Boulevard, Main Street at D Street, 1st Avenue at Juan Sanchez Boulevard, 1st Avenue at Urtuzuastegui Street, 1st Avenue at B Street, 1st Avenue at C Street, and Archibald Street at B Street.
    - All-way Stop: Main Street at B Street and Main Street at C Street
- Add an additional lane on Urtuzuastegui Street between Archibald Street and Main Street.

US 95 and US 95T, International Border-Juan Sanchez Blvd Project Assessment

The study, completed in May 2011, was initiated by ADOT Yuma District to resolve congestion and queuing as result of traffic and pedestrians approaching San Luis I LPOE prior to the turn back of US 95 and US 95T to the City of San Luis. It was concluded that reconfiguration of US 95 to a one-way couplet from D Street to Urtuzuastegui Street would best address the congestion and queuing in the downtown area. Key items included:

- Southbound and northbound traffic would be routed to Archibald Street and 1st Avenue, respectively.
- US 95 will be converted to a local street that will provide access to businesses with right-in and right-out turns only, and will accommodate pedestrians and bicyclists.
- Two transit stops; Main Street south of C Street, and 1st Avenue north of C Street.
- Pedestrian crossing, on-street parking, and raised medians have also been incorporated into the design of Main Street.

San Luis Small Area Transportation Study

Completed in April 2009, the purpose of the study was to develop a multimodal transportation plan that would address the current and future transportation needs relative to future growth, opening of the San Luis II LPOE , and the reconfiguration of the San Luis I LPOE. Recommendations pertinent to this study included:

- Conduct downtown circulation study
- Conduct binational study for southbound traffic on US 95
- Conduct a parking structure location feasibilty study
- Construct New Road from 8th Avenue to Avenue F
- Construct 6th Avenue from Union Street to County 22nd Street
- Widen Juan Sanchez Boulevard to five-lanes from US 95 to Avenue E
- Construct 9th Avenue from County 19th Street to SR 195
- Construct New Road from 6th Avenue to Avenue E
- Widen Avenue E to four-lane parkway
- Construct Avenue E from SR 195 to County 19th Street
- Construct County 22nd Street from 9th Avenue to Avenue E ½
- Convert Archibald Street and 1st Avenue to one-way couplet from C Street to Urtuzuastegui Street
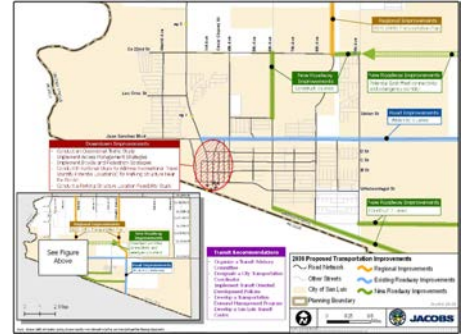
2010 - 2033 YMPO Regional Transportation Plan

The multimodal plan, completed in May 2011, is an update of the previous plan and is intended to guide YMPO over the next 20 years. By 2033, San Luis is projected to have a population of 58,696, a 120 percent increase from 2008. Recommendations relative to the study area included:

- Widen Avenue E to four-lanes from San Luis II LPOE to SR 195
- Construct County 22nd Street from 9th Avenue to Avenue E
- Construct County 24th Street from 10th Avenue to Avenue F
- Widen Juan Sanchez Boulevard to four-lanes from US 95 to 10th Avenue
- Construct 6th Avenue from Union St to County 22nd Street
- Construct Avenue H from County 19th Street to County 22nd Street
- Construct County 24½ Street from 6th Avenue to Avenue E

Two projects not included in RTP plan:

- Construct County 22nd Street from Avenue H to Avenue E ½
- Widening Juan Sanchez to four-lanes from 10th Avenue to Avenue E

Yuma Regional Transit Study

The recently completed study, January 2012, recommended transit improvements for southwestern Yuma County based on three different funding scenarios; with current funding sources, with 1/10 cent county-wide sales tax, and with 1/5 cent county-wide sales tax. The Yellow Route connects San Luis, Gadsden, and Somerton with downtown Yuma. It operates Monday through Saturday at one-hour intervals. Major stops include Yuma Palms Regional Center, Wal-Mart west, YRMC Hospital west, Yuma Library, Cocopah Casino, Gadsden, Wal-Mart and Community Center/Library in San Luis. Improvements pertinent to the study included:

- At the current funding sources the Yellow Route, using two buses, would operate at one-hour intervals Monday through Saturday.
- At 1/10 cent county-wide sales tax the Yellow Route, using five buses, would operate at 30-minute intervals Monday through Sunday with additional stops in San Luis at the High School, Library, and AWC Learning Center.
- At 1/5 cent county-wide sales tax the Yellow Route, using 10 buses on weekdays and 5 on weekends, would operate at 15-minute intervals with stops in San Luis at the High School, Library, and AWC Learning Center

Public-Private Partnerships Potential for Arizona-Mexico Border Infrastructure Projects

The study, completed in 2009, evaluated the feasibility of using public-private partnerships as an alternative to finance infrastructure projects in the Arizona-Mexico border region. The completed San Luis II LPOE is an example of the public-private partnerships in which Greater Yuma Port Authority aided in the acquisition and donation of land for the project. Identified potential public-partnership projects included:

- Project #1: Improvements to US 95 connecting to San Luis I
- Project #2: Improvements to US 95 Truck Route to San Luis I
- Project #3: Improvements to South Avenue E and SR 195 at San Luis II
- Project #4: Proposed Industrial Park at the San Luis II Port of Entry
- Project #5: Extension of SR 195 from Interstate 8 north to US 95
- Project #6: Improvements and Expansion of Juan Sanchez Boulevard
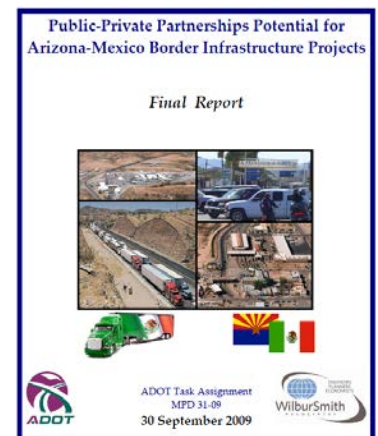
Arizona Multimodal Frieght Study

Completed in 2007, the objective of the study was to develop a strategic plan to incorporate freight analysis as an essential part of Arizona's long-range planning. Arizona's population is projected to reach 10.7 million by 2030, a 74 percent increase from 2006. With the increase of population, the demand for freight related services will also increase. Key observations included:
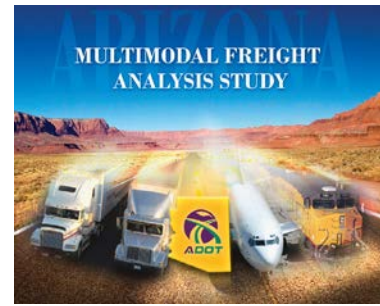
- Of the 557 million tons of freight transported in, out, and/or within Arizona in 2005 approximately 76 percent of tonnage was transported by trucks.

- By 2030 it is estimated freight tonnage transport by truck will increase to 712.7 million tons, a 69 percent increase.

- A sketch analysis of Potential Freight Logistics Center Locations, using criteria such as addressable market, rail network access, highway network access, and railroad cooperation, indicates that Yuma is a potential candidate for future railroad developments.

Programmed and Scoped Projects

The Intermodal Transportation Division at ADOT published the *Arizona State Transportation Improvement Program (STIP) Fiscal Years 2011-2014* in March 2011 that lists roadway improvement projects for the study area. Table 2.2 displays the improvement projects.

TABLE 2.2: ADOT STATE TRANSPORTATION IMPROVEMENT PROJECTS (STIP) FY 2011 – 2014

Year	Project Location	Type of Improvement, Type of Work, Equipment, Structure, etc.	Total Cost
2013	San Luis II Port of Entry	Construct new State Port of Entry	$5,000,000
2011	Juan Sanchez Boulevard	Overlay	$795,334
2011	City of San Luis	Program management /software	$23,330
Transportation Enhancement Projects			
-	US 95/Main Street - Urtuzuastegui Street to Juan Sanchez Boulevard	Design and construction	$1,147,000
Coordinated Border Infrastructure Program			
-	Juan Sanchez Boulevard - US 95 to Avenue E ½	Build out project assessment-Phase I	$1,285,000
-	Avenue E and County 25th Street	San Luis POE II staging area project assessment	$2,000,000
-	Avenue E - SR 195 and County 25th Street	Design and construct widening project	$6,500,000
-	Yuma County and San Luis Colorado, MX	Binational study	$1,000,000
-	Avenue E extension - north build out 4 ½ miles to Avenue D and County 14th Street	Corridor analysis alignment identification	$2,000,000
-	Juan Sanchez Boulevard - US 95 to Avenue E ½	Design and construct widening project-Phase II	$25,000,000
-	County 24 ½Street extension - 6th Avenue to Avenue E	Corridor analysis alignment identification	$7,000,000

Source: Multimodal Planning Division, ADOT

Table 2.3 lists the approved roadway improvement projects in the study area as identified by Yuma Metropolitan Planning Organization (YMPO) Transportation Improvement Program (TIP) for the fiscal Years 2011 to 2016.

TABLE 2.3: APPROVED ROADWAY IMPROVEMENT PROJECTS IN YMPO TIP

Year	Project Location	Type of Improvement, Type of Work, Equipment, Structure, etc.	Total Cost
2011	Juan Sanchez Boulevard	Design overlay	$48,269
2012	US 95 - Milepost 0 - Milepost 1.75	Pavement preservation, reconfigure traffic movement in and out of Mexican Border	$4,000,000
2012	US 95/Main Street	Main Street enhancement - landscape, irrigation, median, and lighting	$1,000,000
2012	Juan Sanchez Boulevard	Construction - pavement overlay	$477,637
Transportation Enhancement Projects			
-	US 95/Main Street from Urtuzuastegui Street to Juan Sanchez Boulevard	Design	$115,000
-	US 95/Main Street from Urtuzuastegui Street to Juan Sanchez Boulevard	Construction	$924,926
Coordinated Border Infrastructure Program			
2012	Avenue E and County 25th Street	San Luis POE II project assessment for staging/queuing area	$200,000
2012	US 95 to Avenue E 1/2	Project assessment II at 30% General Plan	$1,200,000
2012	Avenue E - County 25th Street to SR 195	Design - roadway widening	$232,540
2012	Avenue E - County 23rd Street to County 19th Street	Corridor analysis - roadway widening	$500,000
2013	Avenue E - County 25th Street to SR 195	Construction - roadway widening	$3,749,200

Source: YMPO 2011-2016 TIP Amendment #2

3.0 EXISTING LAND USE AND SOCIOECONOMIC CONDITIONS

This section summarizes current land use, socioeconomic conditions, characteristics of the physical and natural environments, environmental justice population review (Title VI), and cultural resources inventory for the study area.

Land Ownership Status

Figure 3.1 provides an overview of the land ownership within the City of San Luis study area. As illustrated in the figure, privately owned land accounts for 48 percent of all the land coverage within the City of San Luis study area. Bureau of Land Management covers approximately 24 percent of the remaining portion of the study area.

FIGURE 3.1: LAND OWNERSHIP
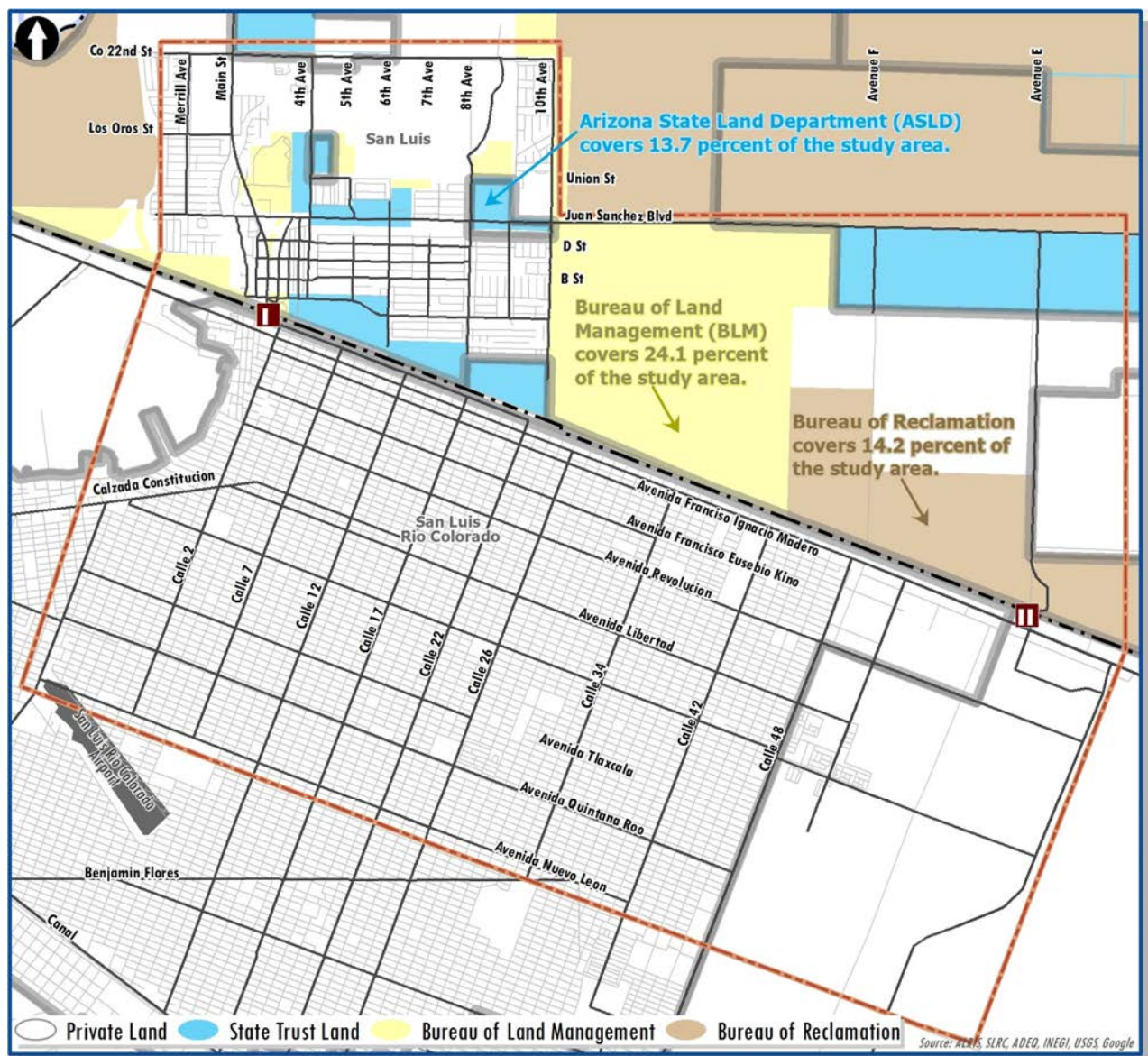
Socioeconomic Conditions

Creating an inventory of the study area's socioeconomic characteristics and understanding this data is a critical element for any transportation planning study. Socioeconomic data is one of the primary inputs to the travel demand modeling process that is used to forecast traffic demand in the study area.

Population and Housing Unit Growth Trends

According to the 2010 U.S. Census, the City of San Luis had a population of approximately 25,505 residents, 98 percent of which reside within the Binational study area. From 2000 to 2010 the study area experienced a significant amount of growth, with a population increased of 92.4 percent while the housing units nearly double from 3,327 to 6,378 (91.7%). The growth rate within the study area is higher than both the County and State. The average household size in 2010 in the study area was 4.5. By 2013, the total population and housing units in the study area is estimated to be 28,072 and 6,829 (a 11 and 7 percent increase respectively). Table 3.1 lists the population and housing growth trends from 2000 to 2013.

As shown in Figure 3.2, growth in the City of San Luis steadily increased from 2000, averaging 1,000 new residents per year using population estimates from the Arizona Department of Administration Office of Employment and Population Statistics.

Figure 3.3 illustrates the 2013 population density in the study area. As shown in the figure, the higher population densities occur in two locations; west of the US 95 in the northwest corner of the study area and south of Juan Sanchez east of 4th Avenue.

SOCIOECONOMIC CONDITIONS

- Land Area: 28.8 square miles
- Population (Year 2013): 28,072
- Total Housing Units (Year 2013): 6,829
- Occupied Housing Units (Year 2013): 6,227
- Average Household Size: 4.51
- Principal Economic Activities: Retail, Agriculture, and Manufacturing

FIGURE 3.2: POPULATION ESTIMATES FOR THE CITY OF SAN LUIS
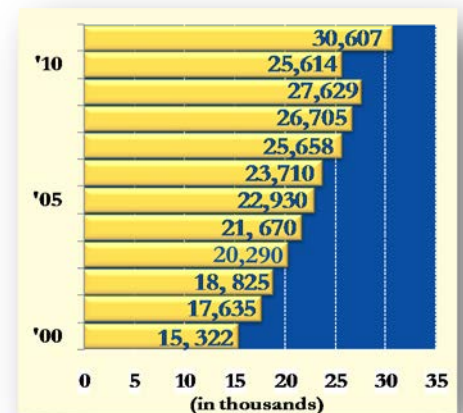
TABLE 3.1: POPULATION AND HOUSING UNIT GROWTH TRENDS

	Study Area		Yuma County		Arizona	
	Total Population	Total Housing Units	Total Population	Total Housing Units	Total Population	Total Housing Units
2000	13,036	3,327	160,026	74,140	5,130,632	2,189,189
2010	25,080	6,378	195,751	87,850	6,392,017	2,844,526
2013*	28,072	6,829	235,559	105,715	7,554,429	3,361,814
Average Annual Population Growth Rate						
2000 -2010	9.24%	9.17%	2.23%	1.85%	2.46%	2.99%
2010 -2013*	3.98%	2.36%	6.78%	6.78%	6.06%	6.06%

*Source: 2000 U.S. Census Bureau, 2010 U.S. Census Bureau, *Population estimates from the Arizona Department of Administration (AZDoA)*
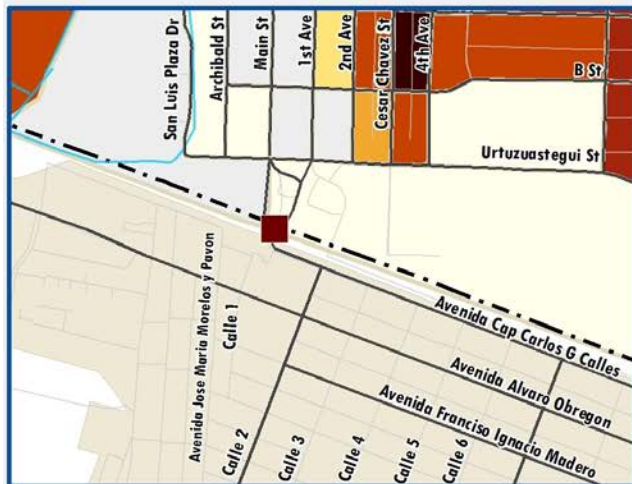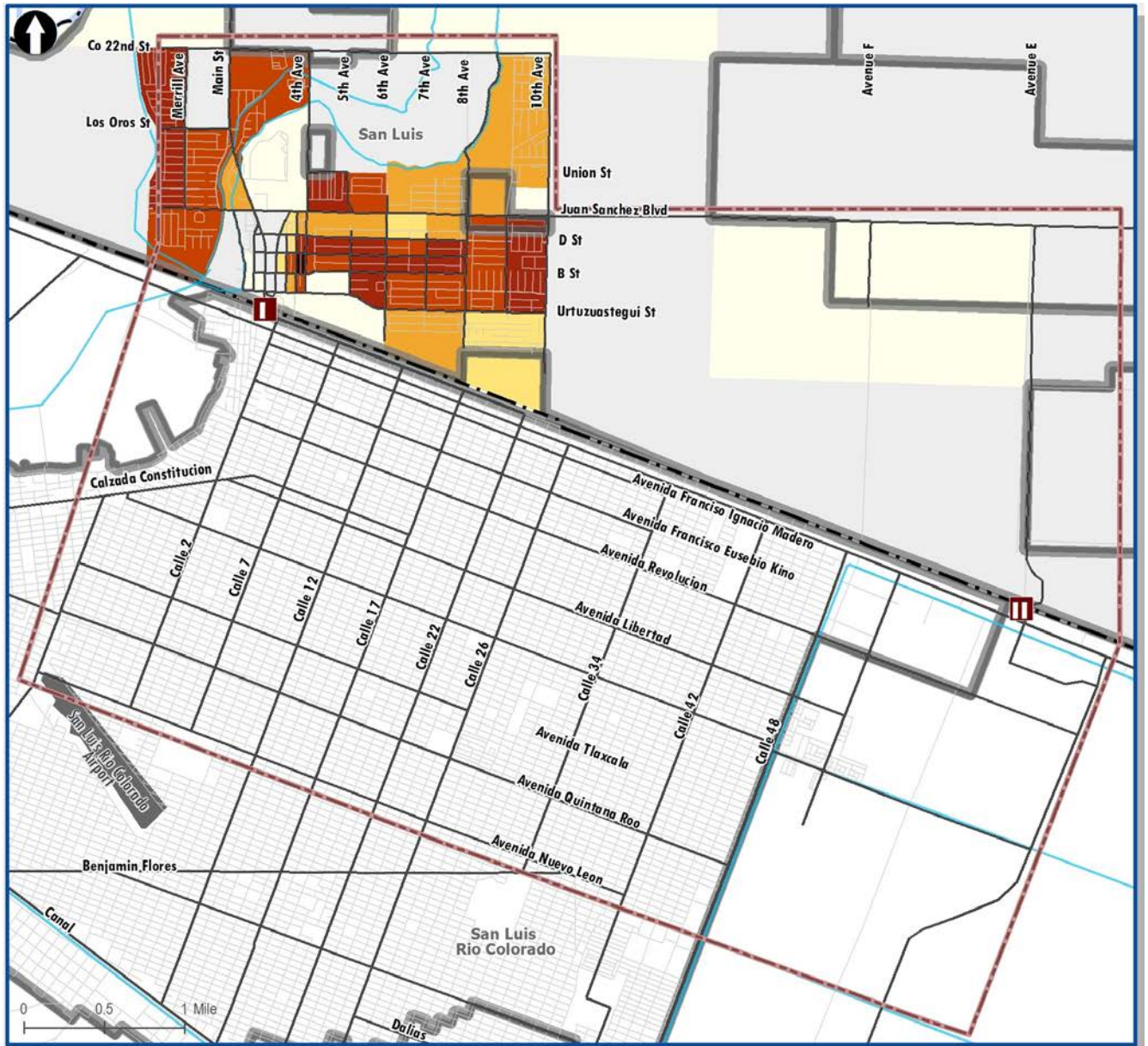
FIGURE 3.3: POPULATION DENSITY 2013
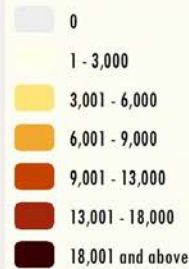
Population per Square Mile

- 0
- 1 - 3,000
- 3,001 - 6,000
- 6,001 - 9,000
- 9,001 - 13,000
- 13,001 - 18,000
- 18,001 and above

Land Port of Entry

Study Roadway

Canal

International Boundary

San Luis

San Luis Rio Colorado

Study Area

Source: U.S. Census 2010, ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, Arizona Dept. of Administration Office of Employment and Population Statistics

Employment Overview

Retail, agricultural, and manufacturing are the primary drivers of the economy in the study area. The largest employment center in the area, ACT Call Center, is located west of the downtown along San Luis Plaza Drive. However, many of the residents travel to the Yuma or other surrounding communities for employment. Figure 3.4 presents a visual depiction of the location of the major activity centers in the study area. The commercial area encompass nearly all of the downtown area from Juan Sanchez to Urtuzuastegui Street following Main Street. In addition, there are eleven schools within the study area; five elementary schools, two middle school, one high school, two charter schools, and a distant learning center associated with Arizona Western College. Table 3.2 lists the schools and the October 2011 student enrollment within the study area. Figure 3.5 displays employment densities for the study area.

EMPLOYMENT OVERVIEW

Major Employers (*total employees*):

- ACT Call Center (700)
- Corrections Department (755)
- Gadsden Elementary District (315)
- San Luis High School (200)
- Super Wal-Mart (270)
- City of San Luis (193)
- San Luis Detention Facility (120)
- Paranepics Technology (70)

* Source: InfoUSA database

TABLE 3.2: STUDY AREA SCHOOLS AND COLLEGES

School	Students
Gadsden Elementary District	**4,603**
- Arizona Desert Elementary	703
- Cesar Chavez Elementary School	741
- Desert View Elementary School	728
- Ed Pastor Elementary	314
- Rio Colorado Elementary School	802
- San Luis Middle School	620
- Southwest Jr. High School	695
Yuma Union High School District	
- San Luis High School	**2,593**
Harvest Preparatory Academy	223
PPEP TEC - Cesar Chavez Learning Center	120
Arizona Western College	-

Co 22nd St
Merrill Ave
Main St
Wal-Mart
4th Ave
San Luis
10th Ave
Los Oros St
City Complex
Joe Orduno Park
Padilla Community Center
Post Office
Sunset Community Health Center
City Facilities
IGA
Arnold Cordova Library
Jesse Cabello Park
Public Health Community
Juan Sanchez Blvd
Avenue F
Avenue E
Food City
Friendship Park
Oligo Ramirez Park
Urtuzuastegui St
Calzada Constitucion
Avenida Franciso Ignacio Madero
Avenida Francisco Eusebio Kino
Calle 2
Calle 7
Calle 12
Calle 17
Avenida Revolucion
Calle 22
Calle 26
Avenida Libertad
Calle 34
Calle 42
Calle 48
San Luis Rio Colorado Airport
Avenida Tlaxcala
Avenida Quintana Roo
Avenida Nuevo Leon
Benjamin Flores
Canal
San Luis Rio Colorado
0   0.5   1 Mile
Dalias

IGA
San Luis Plaza Dr
Archibald St
Main St
1st Ave
2nd Ave
4th Ave
B St
Food City
Urtuzuastegui St
Friendship Park
Avenida Jose Maria Morelos y Pavon
Calle 1
Avenida Cap Carlos G Calles
Avenida Alvaro Obregon
Calle 2
Calle 3
Calle 4
Calle 5
Calle 6
Avenida Franciso Ignacio Madero

FIGURE 3.4: MAJOR ACTIVITY CENTERS

Commercial Activity Area

✳ City Facility

H Hospitals/Health Center

Library

• Market

P Park

Post Office

School

Land Port of Entry

Study Roadway

International Boundary

San Luis

San Luis Rio Colorado

Study Area

Source: ALRIS, SLRC, ADEQ, INEGI; USGS
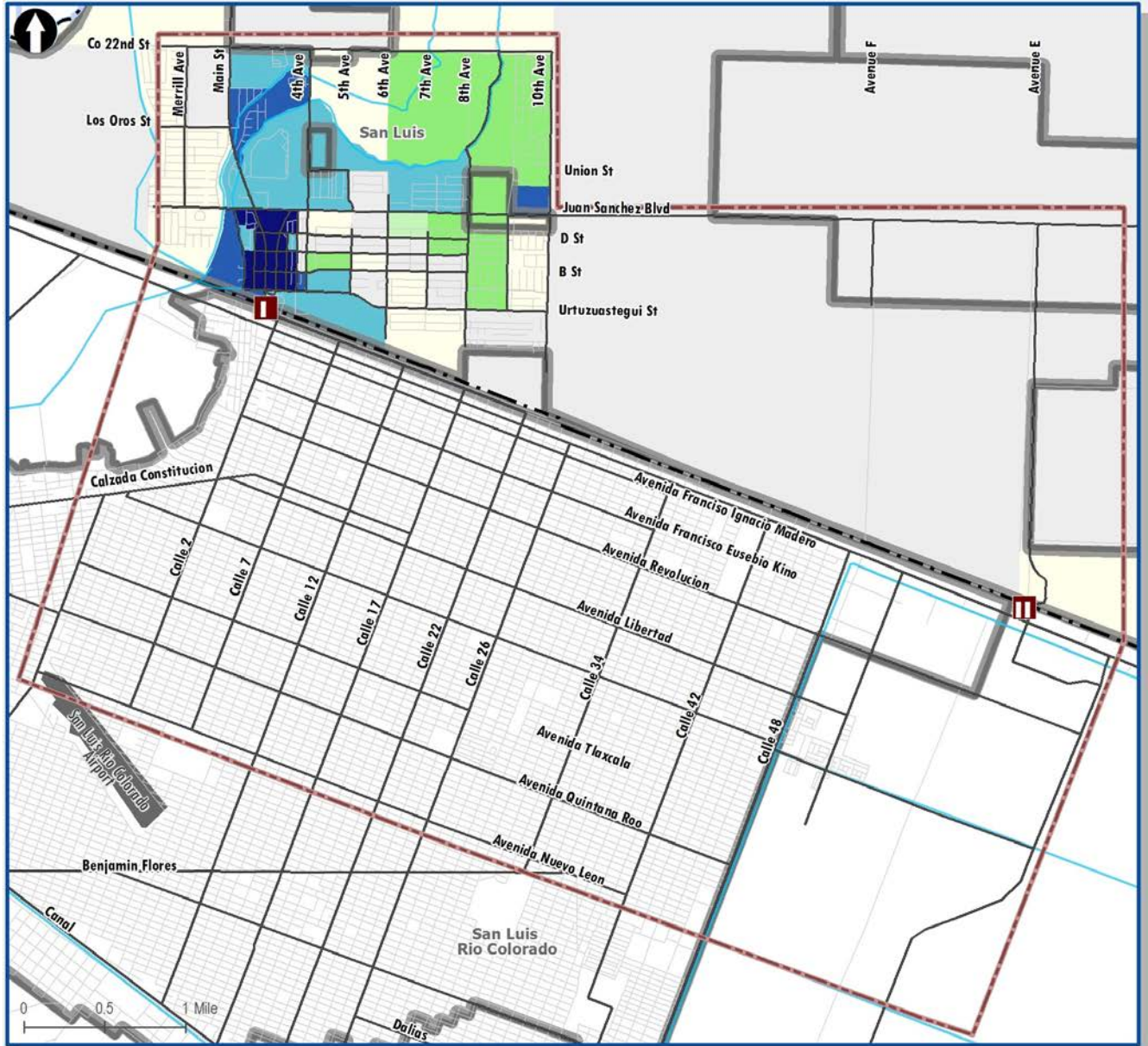
FIGURE 3.5: EMPLOYMENT DENSITY 2013
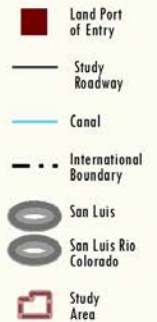
Employees per Square Mile

- 0
- 0 - 250
- 251 - 500
- 501 - 1,000
- 1,001 - 2,000
- 2,001 - 5,000
- 5,001 and above

Land Port of Entry

Study Roadway

Canal

International Boundary

San Luis

San Luis Rio Colorado

Study Area

Source: U.S. Census 2010, ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, Arizona Dept. of Administration Office of Employment and Population Statistics

Traffic Analysis Zones

Population, housing units, and various types of employment categories were inventoried for each Traffic Analysis Zones (TAZ) in the study area. TAZs are geographic subdivisions of the study area bounded by roads, political boundaries, natural and man-made geographical constraints (such as rivers, washes, etc.). For this study, the YMPO travel demand model was used to estimate current traffic volumes and forecast future traffic volumes on roadways in the study area. Table 3.3 summarizes the socioeconomic data utilized in the travel demand model.

TABLE 3.3: STUDY AREA SOCIOECONOMIC DATA SUMMARY

Socioeconomic Data Variable	Units	Study Area Total
Population	Persons	28,072
Occupied Dwelling Units	Dwelling Units	6,227
Retail	Employees	2,691
Office	Employees	337
Service	Employees	561
Industrial	Employees	196
Public	Employees	408
Manufacturing	Employees	205
Elementary/Junior High School	Employees	335
High School	Employees	238
Community College	Employees	12

Environmental Justice Review (Title VI)

Title VI of the Civil Rights Act of 1964 and related statutes require individuals not be discriminated against based on race, color, national origin, age, sex, or disability. Executive Order 12898 on Environmental Justice dictates that any programs, policies, or activities to be implemented are not to have disproportionately high adverse human health and environmental effects on minority populations. Environmental justice principles and procedures are followed to assure that transportation improvements do not adversely impact different socioeconomic groups. To assure that these policies are adhered to, a variety of possible alternatives should be developed and considered in order to make sure all groups are fairly represented in the amount and type of transportation services provided.

> **ENVIRONMENTAL JUSTICE (TITLE VI) OVERVIEW**
>
> **Percentage of Study Area Population:**
>
> Minority Population: 99.01%▲
>
> Age 65 and Older Population: 5.9%▲
>
> **Percentage of City of San Luis Population:**
>
> Mobility Limited: 10.1%*
>
> Below Poverty: 35.4%+
>
> *Source:* ▲*2010 U.S. Census Bureau*
> **2000 U.S. Census Bureau*
> +*2006 - 2010 American Community Survey*

Protected populations considered in this analysis include minority, elderly, low-income, and disabled populations. Figure 3.6 shows a graphical comparison of these protected populations relative to the study area. Table 3.4 summarizes the percentage of minority and elderly populations within the study area, Yuma County, and Arizona based on the 2010 U.S. Census. Updated 2010 U.S. Census data was unavailable for selected protected population; therefore 2000 U.S. Census data and five-year American Community Survey (2006 - 2010) estimates for the City of San Luis were used to identify mobility limited and below poverty level populations. Table 3.5 summarizes the percentage of mobility limited and below poverty level populations within the study area, Yuma County, and Arizona.

FIGURE 3.6:TITLE VI POPULATION GROUPS COMPARISON
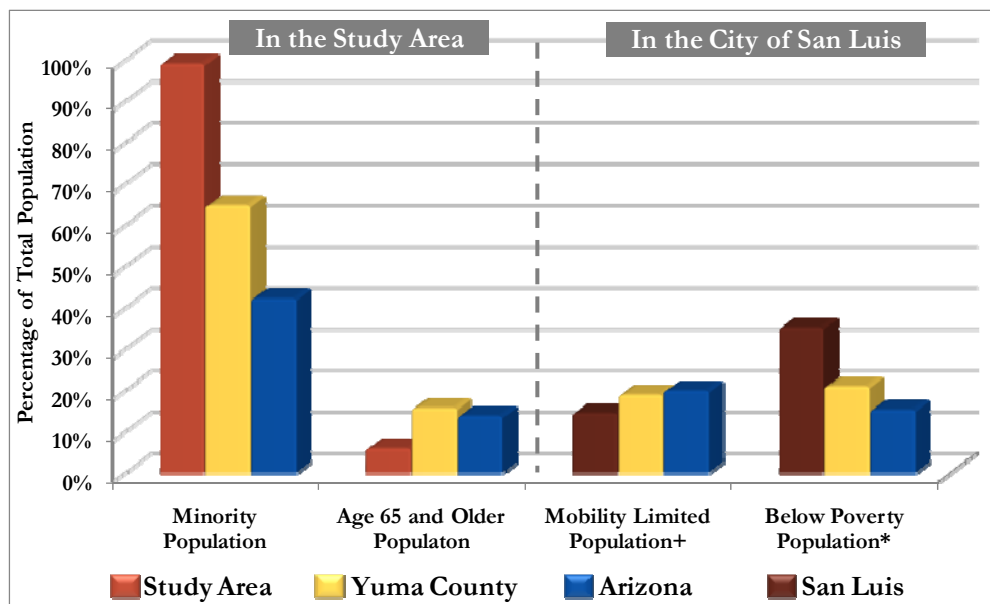
*Source: 2010 U.S. Census, +2006 - 2010 American Community Survey (ACS),*2000 U.S. Census*

TABLE 3.4: MINORITY AND AGE 65 AND OLDER POPULATION PERCENTAGES

	Study Area		Yuma County		State of Arizona	
	Total Pop	*% of Total Population*	Total Pop	*% of Total Population*	Total Pop	*% of Total Population*
Total Population *(Year 2010)*	**25,080**		**195,751**		**6,392,017**	
Minority Population	24,840	*99.0*	126,729	*64.7*	2,696,370	*42.2*
Age 65 and Older Population	1,485	*5.9*	30,646	*15.7*	881,831	*13.8*

Source: 2010 U.S. Census

Minority Population

Minority population consists of individuals who are members of the following population groups: Native American or Alaskan Native, Asian or Pacific Islander, Black, Hispanic, other race, or two or more races. The 2010 U.S. Census estimates that the minority population accounted for 99.0 percent of the study area population, with Hispanics as the largest minority group. Figure 3.7 illustrates the concentration of minority populations within the study area.

Population Age 65 and Over

Elderly populations, or persons who are over the age of 65, constitute 5.9 percent of the total population, which is less than the State (13.8%) and County (15.7%) estimates. Figure 3.8 displays the age 65 and over population concentrations.
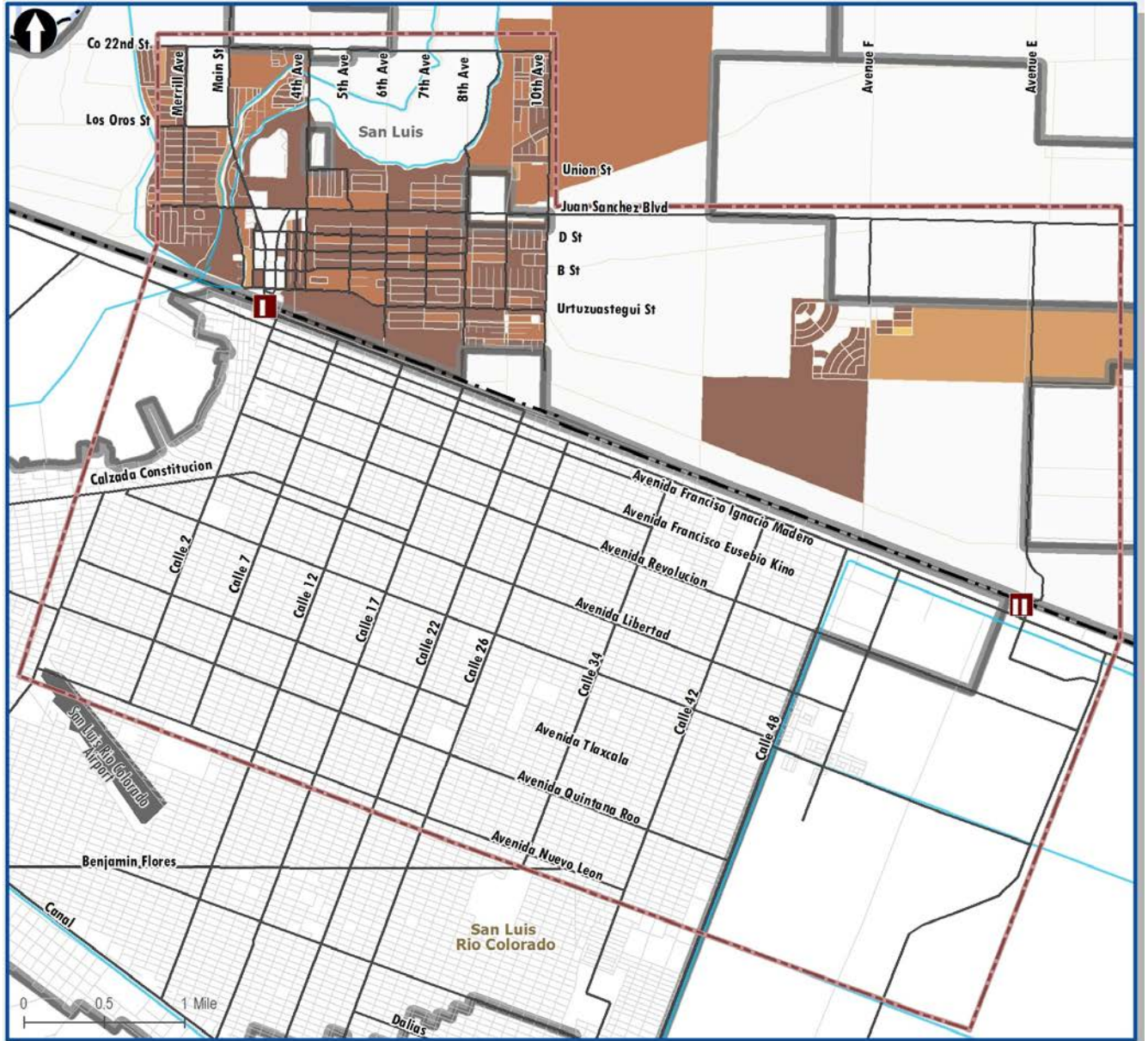
FIGURE 3.7: MINORITY POPULATION

Above Study Area Average

- 0.0%
- 0.1% - 25.0%
- 25.1% - 50.0%
- 50.1% - 75.0%
- 75.1% - 95.0%
- 95.1% - 99.0%

Below Study Area Average

- 99.1% - 100.0%

Percentage of Minority Population in:
Study Area: 99.0%
Yuma County: 64.7%
State of Arizona: 42.2%

Minority population consists of individuals who are members of the following population groups: Native American or Alaskan Native, Asian or Pacific Islander, Black, and Hispanic.

A high percentage of minority population does not necessarily mean that there is a large minority population in the area. The map shows what percentage of people living in the census block are minority.

For example if the census block has a:
Total population = 1 and
the minority population = 1 then the % of minority living in the census block = 100%

Land Port of Entry
Study Roadway
Canal
International Boundary
San Luis
San Luis Rio Colorado
Study Area

Source: U.S. Census 2010, ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS
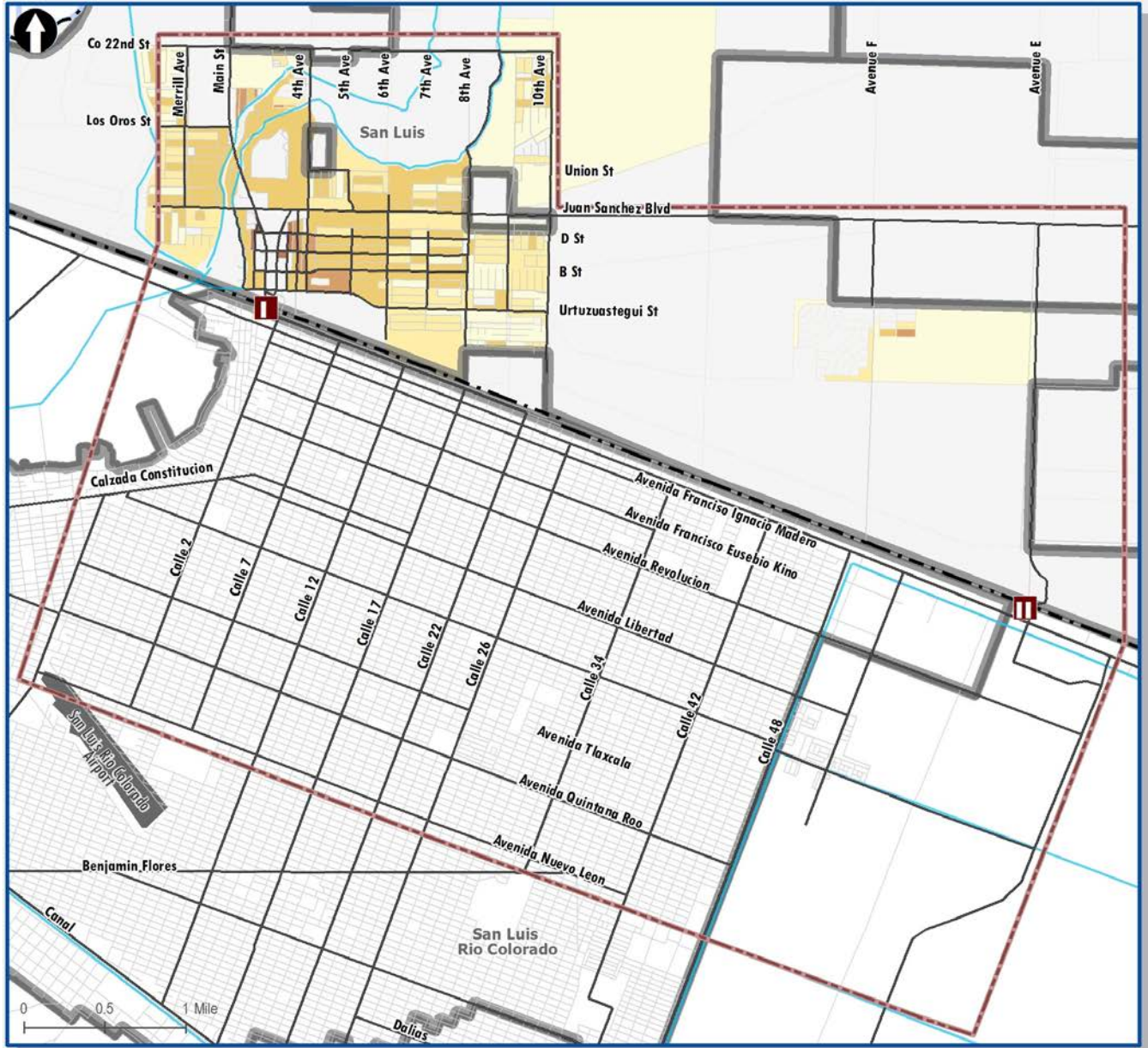
FIGURE 3.8: ELDERLY POPULATION

<u>Above Study Area Average</u>

0.0%

0.1% - 3.0%

3.1% - 6.0%

<u>Below Study Area Average</u>

6.1% - 20.0%

20.1% - 35.0%

35.1% - 50.0%

50.1% - 100.0%

Percentage of Elderly Population in:
   Study Area: 5.9%
   Yuma County: 15.7%
   State of Arizona: 13.8%

Elderly population consists of individuals who are age 65 years and older.

A high percentage of elderly population does not necessarily mean that there is a large elderly population in the area. The map shows what percentage of people living in the census block are elderly.

For example if the census block has a:
Total population = 1 and the
elderly population = 1 then the % of
elderly living in the census block = 100%

Land Port of Entry

Study Roadway

Canal

International Boundary

San Luis

San Luis Rio Colorado

Study Area

Source: U.S. Census 2010, ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS

TABLE 3.5: MOBILITY LIMITED AND BELOW POVERTY LEVEL POPULATION PERCENTAGES

	% of Total Population		
	City of San Luis	Yuma County	Arizona
Mobility Limited[+] (Age 16 - 64)	14.5	18.8	19.9
Below Poverty Level[**]	35.2	20.9	15.3

Source: [+] 2006 - 2010 American Community Survey (ACS), **2000 U.S. Census

Mobility-Limited Population

Mobility-limited population is comprised of individuals who have a physical or mental disability that prohibits them from operating an automobile and may require access to public transportation. Based on the 2006 - 2010 American Community Survey, the percentage of mobility-limited population in the study area is 14.5 percent, less the County (18.8%) and State (19.9%) estimates.

Below Poverty Population

Below poverty populations are individuals living in households that lie within a set of income thresholds, which vary by family size and composition, established by the U.S. Census Bureau. According to the 2000 U.S. Census, 35.2 percent of the study area population is below poverty; is more than both state (15.3%) and County (20.9%) estimates.

Environmental Overview

Inventory of the physical, natural, and cultural environment is an important component of the corridor planning process. When environmental conditions and historic and cultural concerns are reviewed in the early stages of the planning process, transportation solutions can be developed to lessen the negative impacts on the environment and cultural treasures.

Natural Environment

Figure 3.9 presents the natural environmental overview of the study area.

Vegetation: One type of vegetation exist within the study area; the Sonoran Desertscrub from the Lower Colorado River Subdivision.

Water Features: There are three canals, Main Drain Canal, East Main Canal, and West Main Canal, all of which drain into one canal that leads into Mexico west of the San Luis I LPOE.

Wildlife: The Arizona Wildlife Linkages Workgroup (AWLW) is a collaborative effort between ADOT and nine public and nonprofit organizations to identify large blocks of protected habitat, potential wildlife movement corridors, and factors that may disrupt these linkage zones. The AWLW developed the Arizona Wildlife Linkages Assessment, which identified wildlife habitat blocks and linkage zones that allow land managers and transportation planners to integrate wildlife needs into developments and land use plans. Wildlife habitat blocks are defined as large, contiguous areas of natural woodland with little or no human disturbance and are essential for maintaining a diverse and healthy population of wildlife. Wildlife linkage zones are areas of wildlife movement between habitat blocks. Roughly 25 percent of the total study area is located within a habitat block and covers nearly half of the U.S. portion of the study area starting east of 10th Avenue. The linkage zone extends into Mexico and covers 64 percent of the total study area. Less half of the linkage zone is located in the U.S. portion of the study area which follows the Juan Sanchez Boulevard throughout the study area.

Environmental Concerns

Figure 3.10 illustrates environmental issues within the study area.

Leaking Underground Storage Tanks: Environmental Protection Agency (EPA) defines underground storage tanks as any tank and any underground piping connected to the tank that stores petroleum or hazardous substances. The Arizona Department of Environmental Quality (ADEQ) has identified six leaking underground storage tanks in the study area.

Mines: Seven geothermal wells are located in the study area mainly in the rural portion of the study area. Farmers and ranchers use geothermal water for irrigation to produce citrus and table grapes for longer growing seasons.
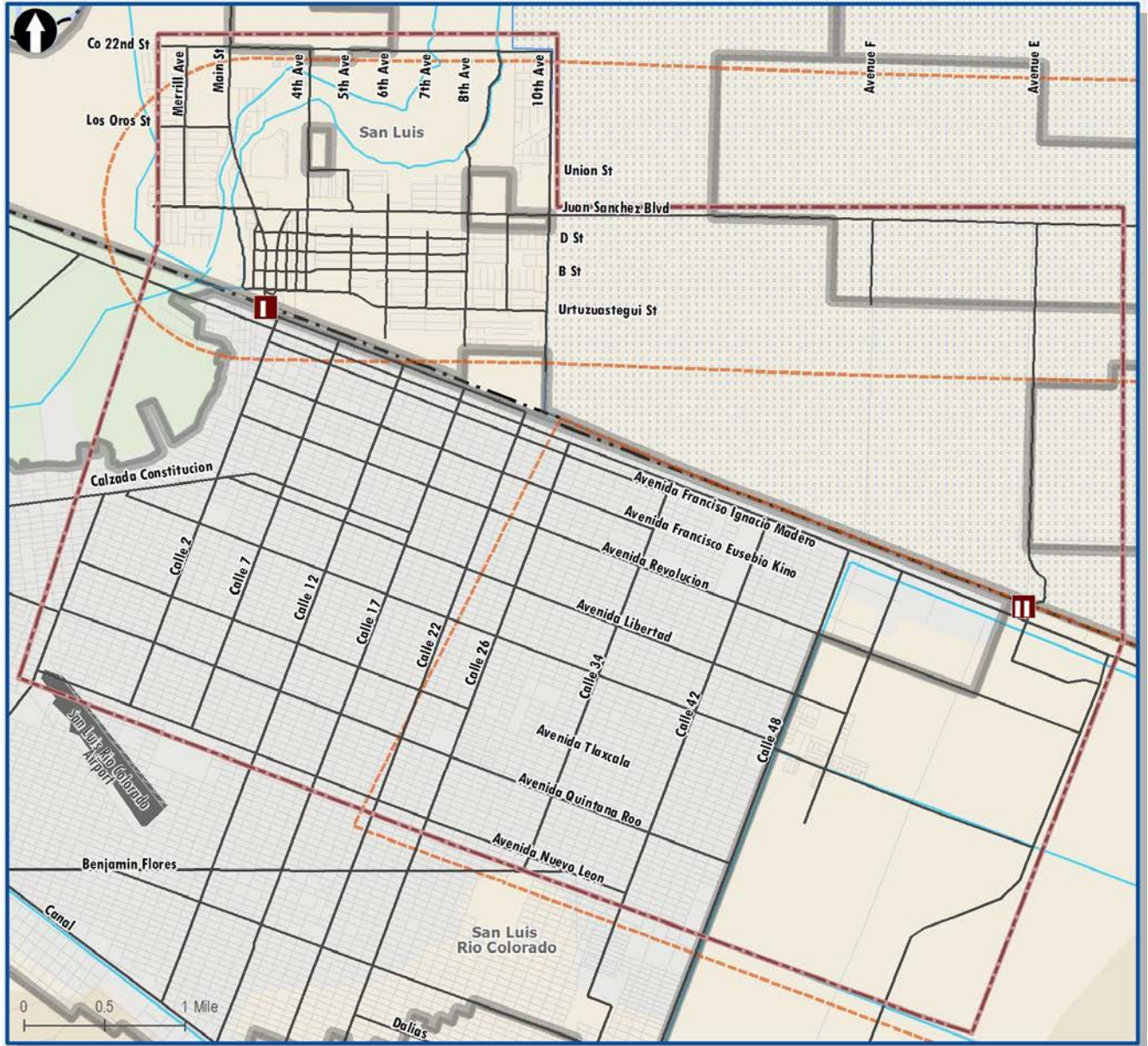
FIGURE 3.9: NATURAL ENVIRONMENT OVERVIEW

Wildlife Habitat Block	Land Port of Entry
Wildlife Linkage Zone	Study Roadway
Irrigated Agriculture	Canal
Urban Area	International Boundary
Sonoran Desertscrub	San Luis
Sandy Desert Vegetation	San Luis Rio Colorado
River	Study Area

Source: ADOT; ALRIS, SLRC, ADEQ, INEGI, USGS
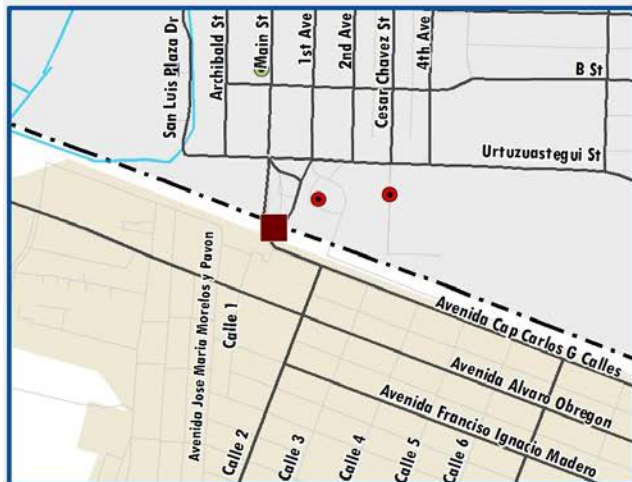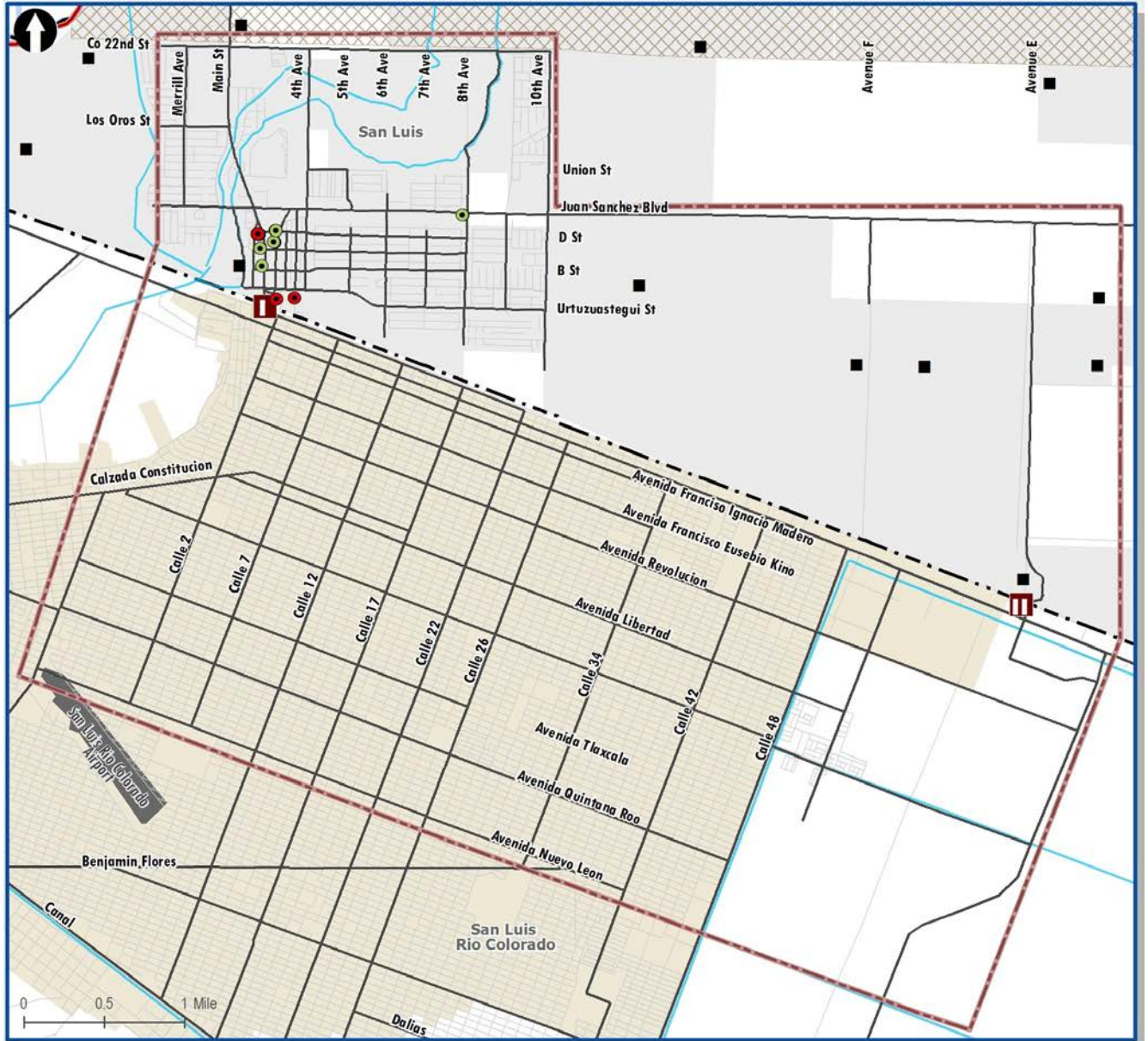
FIGURE 3.10: ENVIRONMENTAL CONCERNS

- Leaking Underground Storage Tanks
- Underground Storage Tanks
- Geothermal Well
- Impaired Streams
- PM10 Nonattainment Area
- Land Port of Entry
- Study Roadway
- Canal
- International Boundary
- San Luis
- San Luis Rio Colorado
- Study Area

Source: ADOT; ALRIS, SLRC, ADEQ; INEGI; USGS

Air Quality: Less than one percent of the northern portion of the study area is included in the Yuma Particle Matter (PM10) Nonattainment area

Endangered Species: The Arizona Game and Fish Department (AZGFD) identified several endangered species within the proximity of the study area. Endangered and threatened species within the study area include the Southwestern Willow Flycatcher and Yuma Clapper Rail. A full listing of endangered species within the study area is listed in Table 3.6.

TABLE 3.6: ARIZONA GAME AND FISH ENDANGERED AND THREATENED SPECIES

AZ Game & Fish Identified Species and Habitats within the Study Area	
Flat-tailed Horned Lizard (SC)	Yellow-billed Cuckoo(PS)
Sand Food (SC)	Yuma Clapper Rail (E)
Southwestern Willow Flycatcher (E)	Yuma Hispid Cotton Rat (SC)

E = Endangered under the Endangered Species Act   *SC= Species of Concern to the US Fish and Wildlife Service*
PS = Partial Status under the Endangered Species Act

4.0 TRANSPORTATION CONDITIONS

This section inventories major elements of the existing transportation system and documents the status/condition of each element. Major elements inventoried include bridges, pavement condition, crashes, traffic conditions, roadway performance, and other modes of transportation in the study area.

Roadway System

Within the next year, US 95 and the downtown area of San Luis are expected to undergo major roadway circulation improvements culminating in the turn back of US 95 to the City of San Luis. To ensure consistency with the new roadways configurations, the downtown improvements were included in the 2013 transportation system which was used as the base year scenario for this study.

Major Roadways

The study area is comprised of a network of major arterials, collectors, and local roadways. The following is a summary of characteristics of the major roadways that transverse the study area:

US-95/ Main Street
- ADOT owned north-south highway that serves as the connection between the U.S.-Mexico border at San Luis I LPOE in San Luis and other Yuma County jurisdictions to the north.
- In the Downtown area of San Luis, Main Street will be converted to two-lane roadway with street parking and a cul-de-sac at the intersection of Main Street and Urtuzuastegui Street. Archibald Street and First Avenue are converted to one-way streets that will provide access to and from San Luis I LPOE.
- The number of lanes transition from two-lanes (one-lane in each direction) in the vicinity of in the downtown area to a four-lane (two-lanes in each direction) highway north of Juan Sanchez Boulevard.
- Speeds range from 25 MPH in the downtown area to 55 MPH in the north.
- Two traffic signals located at Juan Sanchez Boulevard and at County 22nd Street and a potential roundabout located at D Street.

SR 195/ ASH:
- North-south principal arterial that provides a regional connection for commercial trucks from San Luis II LPOE via Avenue E to I-8 in Yuma. Provides an alternative route from San Luis to I-8 via Juan Sanchez Boulevard
- Four-lane (two-lanes in each direction) divided highway.
- Speeds range from 55 MPH to 65 MPH.

Juan Sanchez Boulevard:
- East-west arterial that provides local access to businesses and residences and regional access to SR 195 just west of Avenue E.
- Two-lane (one-lane in each direction) roadway with exception between 8th Avenue and 10th Avenue where the road widens to four-lanes (two-lanes in each direction.
- One traffic signal at US 95/Main Street located within the study area.
- Speeds range from 25 mph to 50 mph

Roadway Functional Classification

Functional Classification is the grouping of streets and highways by the character of service they intend to provide. Defining a street's functional classification, serves as a basis for establishing speed limits, design standards, and access controls. Approved FHWA functional classifications for the study area is presented in Figure 4.1. The figure also illustrates local roadways that do not have a FHWA functional classification, which makes them ineligible for federal funding.

Number of Lanes and Posted Speed Limits

A visual review was conducted to inventory the number of lanes and posted speed limits for major roadways in the study area. In addition, traffic control type (signals, roundabouts, stop signs, etc.) at major intersections was also inventoried. Figure 4.2 displays the number of lanes for each roadway, Figure 4.3 displays posted speed limits, and Figure 4.4 identifies traffic signal locations. The following are key observations noted during the review:

Number of Lanes:
- US 95/Main St: south of Juan Sanchez Boulevard to the northern study limits (four-lanes)
- Juan Sanchez Boulevard: 8th Avenue to 10th Avenue (four-lanes)
- SR 195: west of Avenue E to eastern study limits (four-lanes)
- 8th Avenue: Urtuzuastegui Street to San Luis High School (four-lanes)
- 6th Avenue: B Street to north of D Street (four-lanes)
- US 95/Main St: Archibald Street to D Street (three-lanes)
- Archibald Street: D Street to Urtuzuastegui Street (three-lanes, one-way)
- Archibald Street: Main Street to D Street (two-lanes, one-way)
- Urtuzuastegui Street: Archibald Street to entrance of San Luis I LPOE (two-lanes, one-way)
- Urtuzuastegui Street: San Luis I LPOE exit to 1st Avenue (two-lanes, one-way)
- 1st Avenue: Urtuzuastegui Street to D Street (two-lanes, one-way)
- D Street: 1st Avenue to US 95/Main Street (two-lanes, one-way)

Speed Limits:
- US 95/Main St ranges from 25 to 55 MPH
- Juan Sanchez Boulevard ranges from 25 to 55 MPH
- SR 195 is 55 MPH
- Avenue E is 40 MPH
- County 22nd Street is 35 MPH
- Majority of streets in the study area are 25 MPH or less

Traffic Signals:
- US 95/Main Street and County 22nd Street
- US 95/Main Street and Juan Sanchez Boulevard
- A roundabout will be constructed at US 95/Main St and D Street

Co 22nd St
Main St
Merrill Ave
4th Ave
5th Ave
6th Ave
7th Ave
8th Ave
10th Ave
Los Oros St
San Luis
Avenue F
Avenue E
Union St
Juan Sanchez Blvd
D St
B St
Urtuzuastegui St
Calzada Constitucion
Avenida Franciso Ignacio Madero
Avenida Francisco Eusebio Kino
Calle 2
Calle 7
Calle 12
Calle 17
Calle 22
Calle 26
Avenida Revolucion
Avenida Libertad
Calle 34
Calle 42
Calle 48
San Luis Rio Colorado Airport
Avenida Tlaxcala
Avenida Quintana Roo
Avenida Nuevo Leon
Benjamin Flores
Canal
San Luis Rio Colorado
0 0.5 1 Mile
Dalias

FIGURE 4.1: FUNCTIONAL CLASSIFICATION

San Luis Plaza Dr
Archibald St
Main St
1st Ave
2nd Ave
Cesar Chavez St
4th Ave
B St
Urtuzuastegui St
Avenida Cap Carlos G Calles
Avenida Jose Maria Morelos y Pavon
Calle 1
Calle 2
Calle 3
Calle 4
Calle 5
Calle 6
Avenida Alvaro Obregon
Avenida Franciso Ignacio Madero

— Principal Arterial
— Minor Arterial
— Minor Collector
— Collector

■ Land Port of Entry
-·- International Boundary
  San Luis
  San Luis Rio Colorado
□ Study Area

Source: ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, YMPO

FIGURE 4.2: NUMBER OF LANES

- 4 Lanes with Center Turn Lane Paved
- 4 Lanes Paved
- 3 Lanes Paved
- 3 Lanes Paved (one-way)
- 2 Lanes with Center Turn Lane Paved
- 2 Lanes Paved
- 2 Lanes Paved (one-way)
- 2 Lanes Unpaved

- Land Port of Entry
- International Boundary
- San Luis
- San Luis Rio Colorado
- Study Area

Source: ALRIS, SLRC, ADEQ, INEGI, USGS, SL,YMPO

FIGURE 4.3: SPEED LIMITS

San Luis Rio Colorado
- 50 KPH
- 40 KPH
- 35 KPH
- 25 KPH

San Luis
- 50 - 55 MPH
- 40 - 45 MPH
- 30 - 35 MPH
- 20 - 25 MPH
- 15 MPH
- 0 MPH

- Land Port of Entry
- International Boundary
- San Luis
- San Luis Rio Colorado
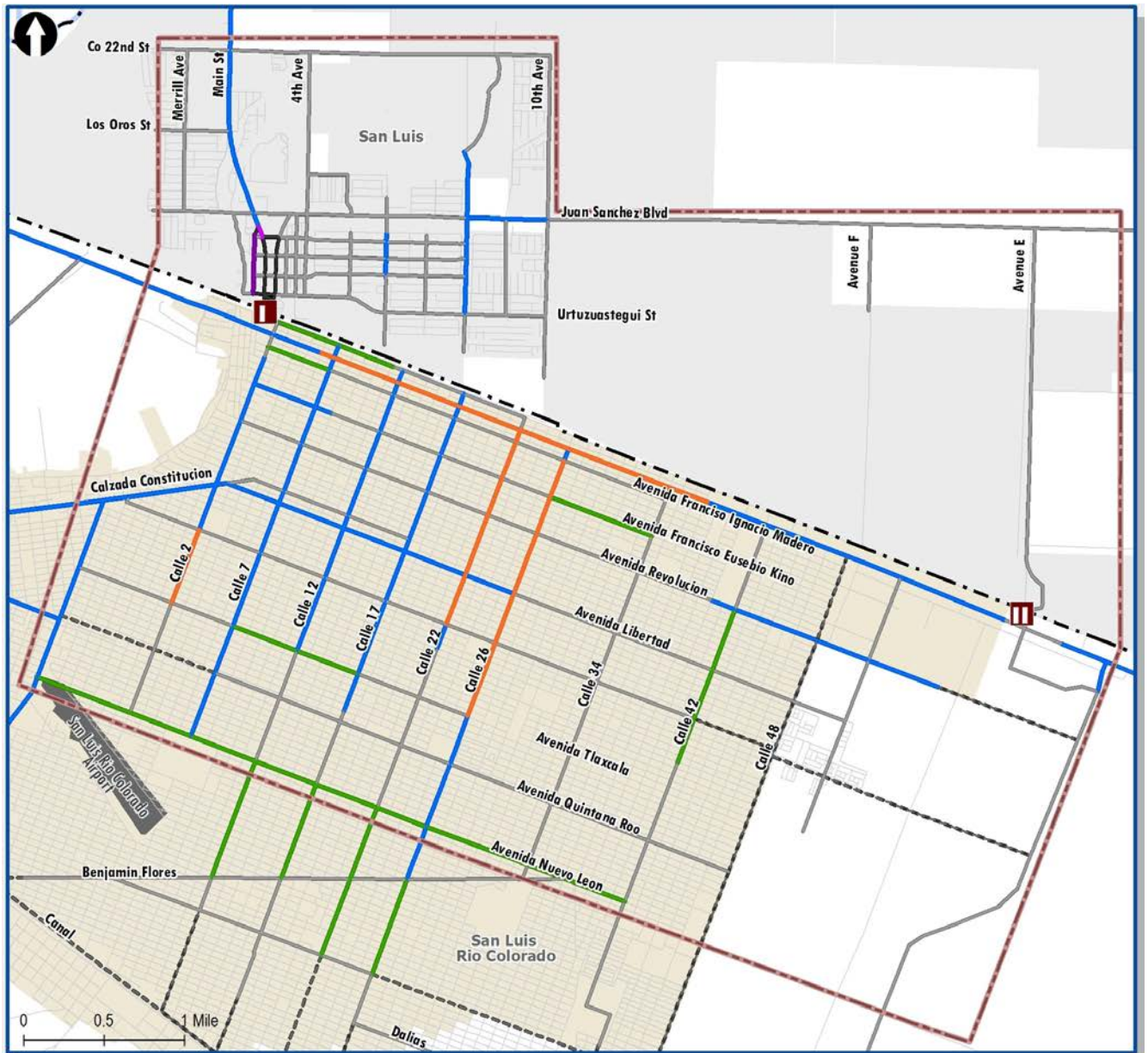- Study Area

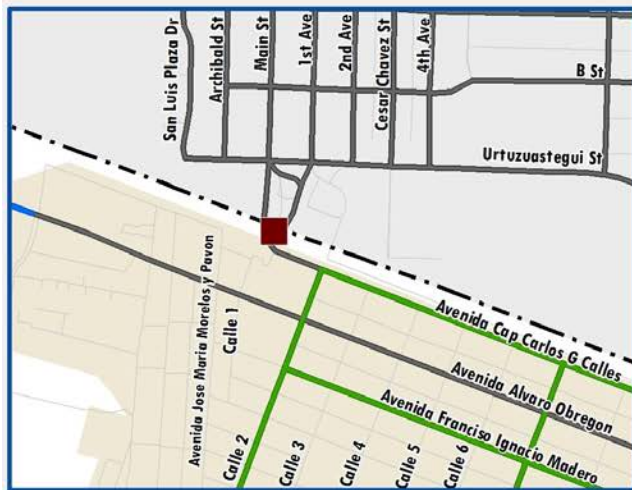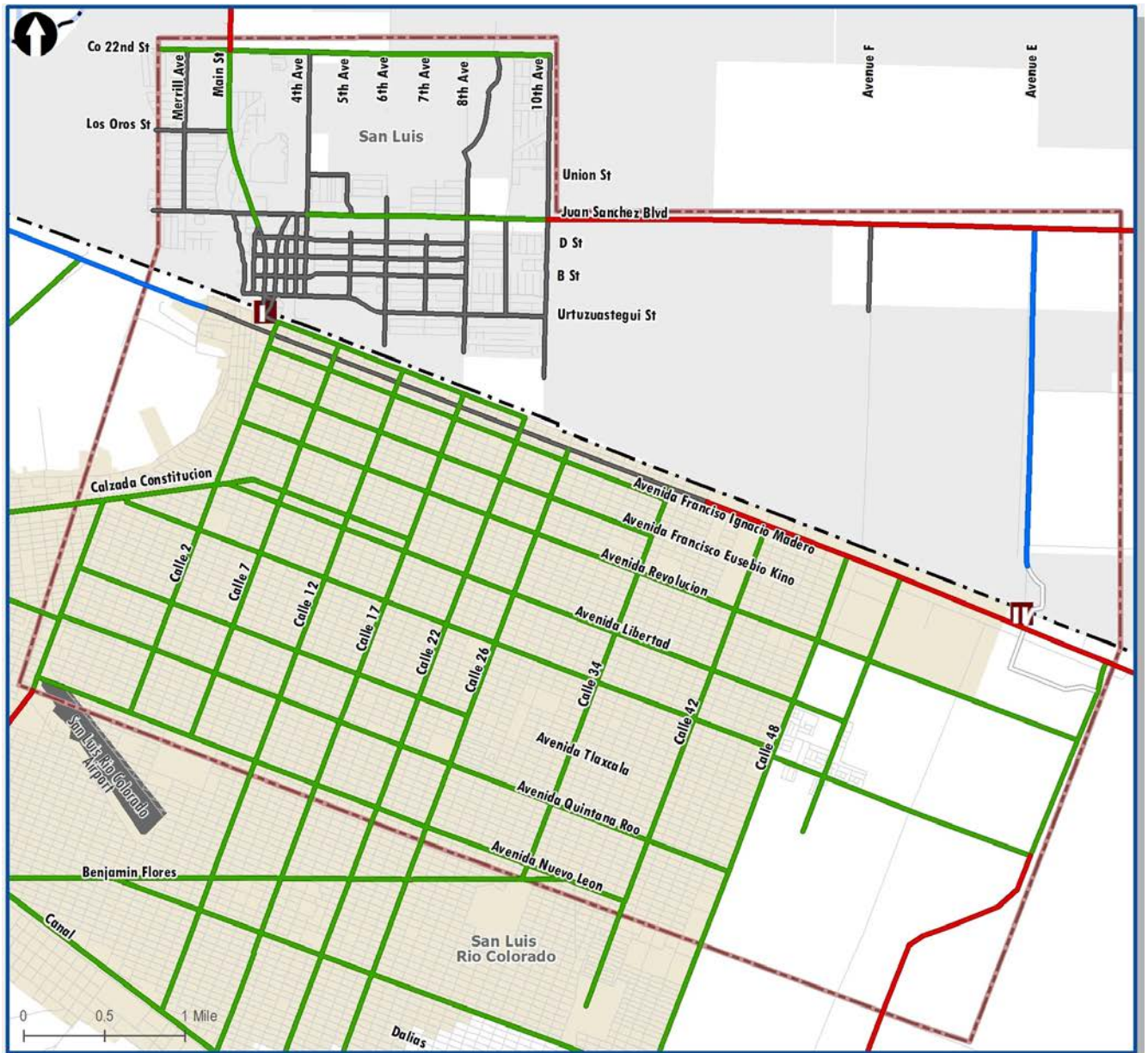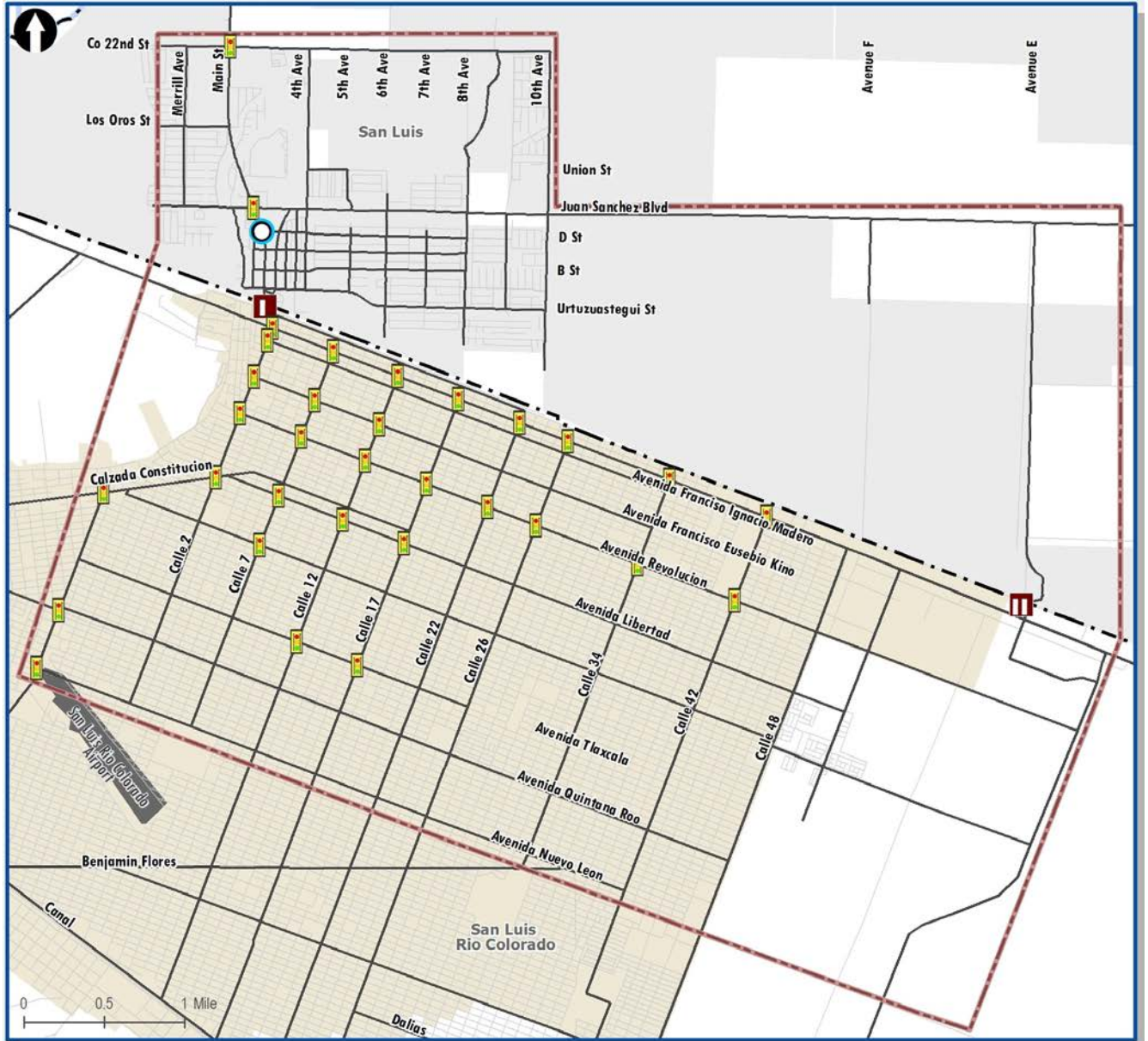Source: ALRIS, SLRC, ADEQ, INEGI, USGS, SL, YMPO

FIGURE 4.4: TRAFFIC CONTROL

- Roundabout
- Traffic Signal
- Land Port of Entry
- Study Roadway
- International Boundary
- San Luis
- San Luis Rio Colorado
- Study Area

Source: ALRIS, SLRC, ADEQ, INEGI; USGS

Pavement Condition

Pavement condition information for ADOT owned facilities was obtained from the ADOT Pavement Management System; US 95 and SR 195 are in good condition. Remaining study roadway pavement conditions was determined through visual inspection during the field review and showed to have ratings of acceptable to their functional classification.

Bridge Condition

FHWA's National Bridge Inventory database was used to identify the location of all bridges in the study area. A total of three bridges were identified within the study area and all have a sufficiency rating of good.

Freight

Located about five miles from downtown, San Luis II LPOE is the commercial port of entry that process large freight trucks since its opening in November 2010. As the only Port of Entry constructed in the last several years, San Luis II LPOE was built in an effort to lessen the congestion at San Luis I LPOE. Upon opening, the San Luis II LPOE was expected to process an estimated 150 trucks per day and potentially increase to 650 trucks per day by 2030. At the end of 2011 Fiscal Year, October 2010 to September 2011, the port of entry processed an average 95 trucks per day.

Crash Data Analysis

Crash analysis was conducted for major roadways in the study area to identify trends, patterns, predominant crash reasons, and high crash rate intersections and corridors. The purpose of the crash analysis is to identify safety hazard locations that need to be addressed to improve area safety. Data for crashes occurring between January 2006 and December 2011 was obtained from ADOT's Accident Location Identification Surveillance System (ALISS) database. As shown in Figure 4.5, the total number of crashes within the study area peaked in 2008 and has since steadily declined.

> **Binational - San Luis**
> **Crash Analysis**
>
> Total Crashes (6 year period): 346
>
> **Percentage of Crashes**
>
> - Rear End Collisions: 27.2%
> - Fatal Crashes: 0.74%
> - Pedestrian/Pedalcyclist: 5.2%
> - Intersection Related: 37.0%

It should be noted that the year 2007 presents an anomaly in the crash data, a review of the crashes location showed that nearly all of the crashes occurred beyond the study limits.

Figure 4.6 illustrates the location and number of collisions at each site during the analysis period, while Figure 4.7 displays the overall density of crashes and the location of collisions with pedalcyclist/pedestrians and fatal crashes.

FIGURE 4.5: CRASH TRENDS FROM JAN. 2006 - DEC. 2011
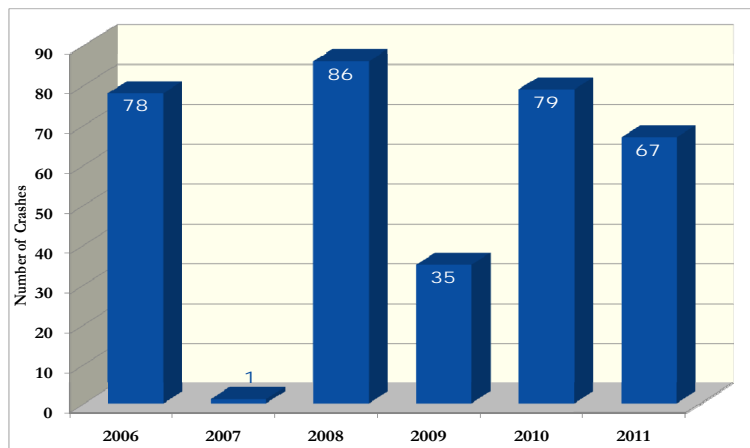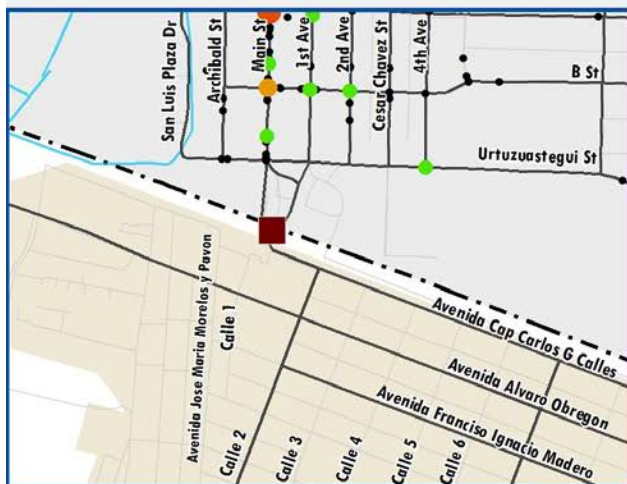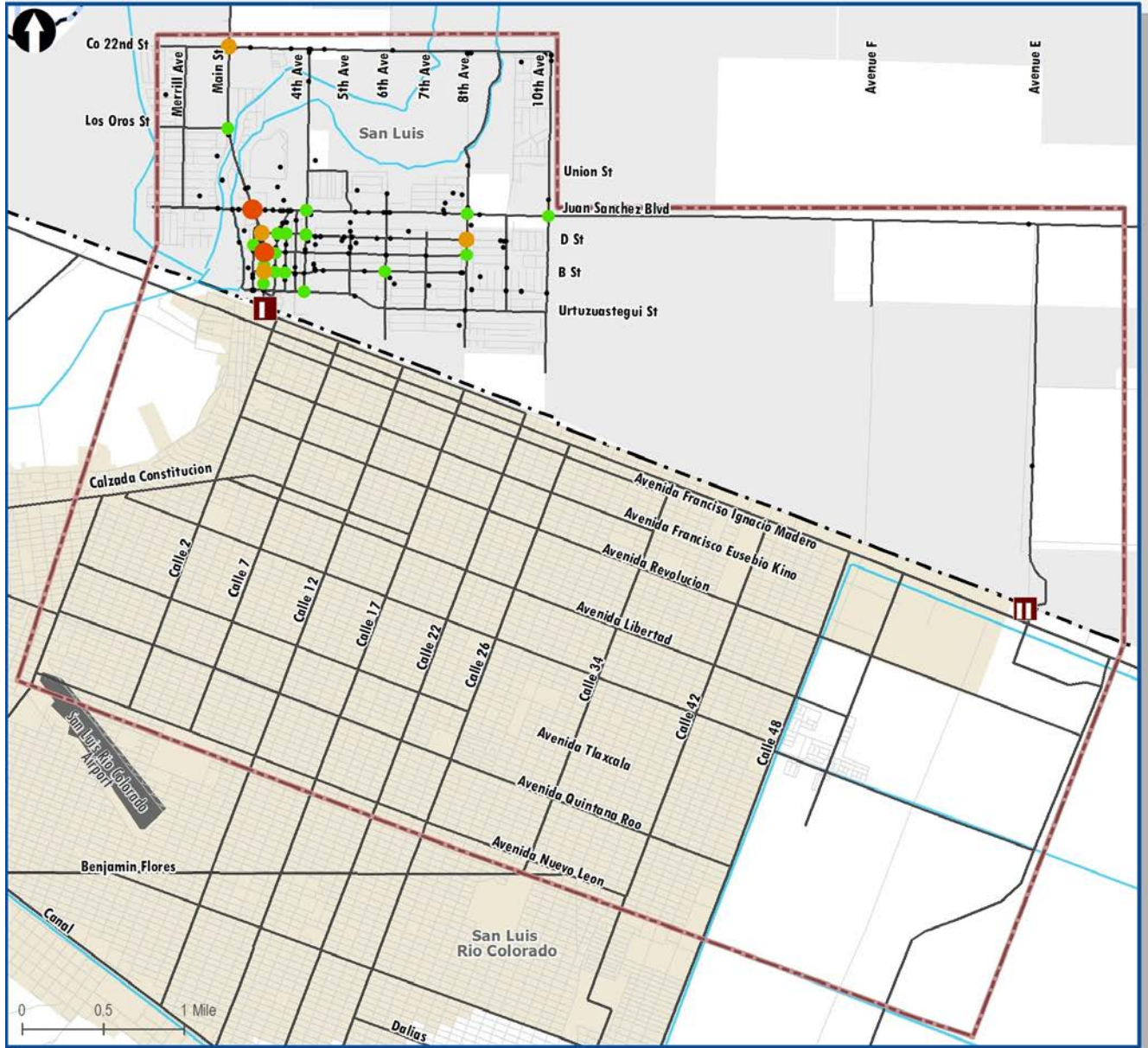
FIGURE 4.6: CRASH LOCATIONS

- • 1 crash
- 🟢 2 - 3 crashes
- 🟠 4 - 6 crashes
- 🔴 7 or more crashes

- 🟥 Land Port of Entry
- —— Study Roadway
- —— Canal
- —·—·— International Boundary
- San Luis
- San Luis Rio Colorado
- ⬛ Study Area

Source: U.S. Census 2010, ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, Accident Location Identification Surveillance System Database (January 2006 - December 2012)

FIGURE 4.7: CRASH DENSITY

Crash Density
Low
High

* Fatal Crash
● Pedalcycle Crash
● Pedestrian Crash

■ Land Port of Entry
— Study Roadway
— Canal
–·– International Boundary
San Luis
San Luis Rio Colorado
Study Area
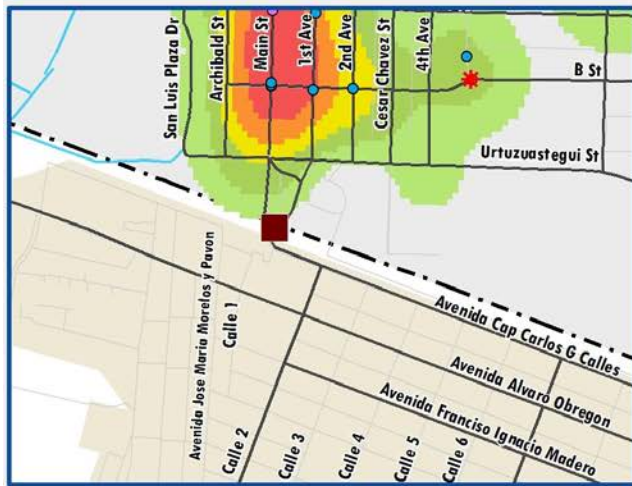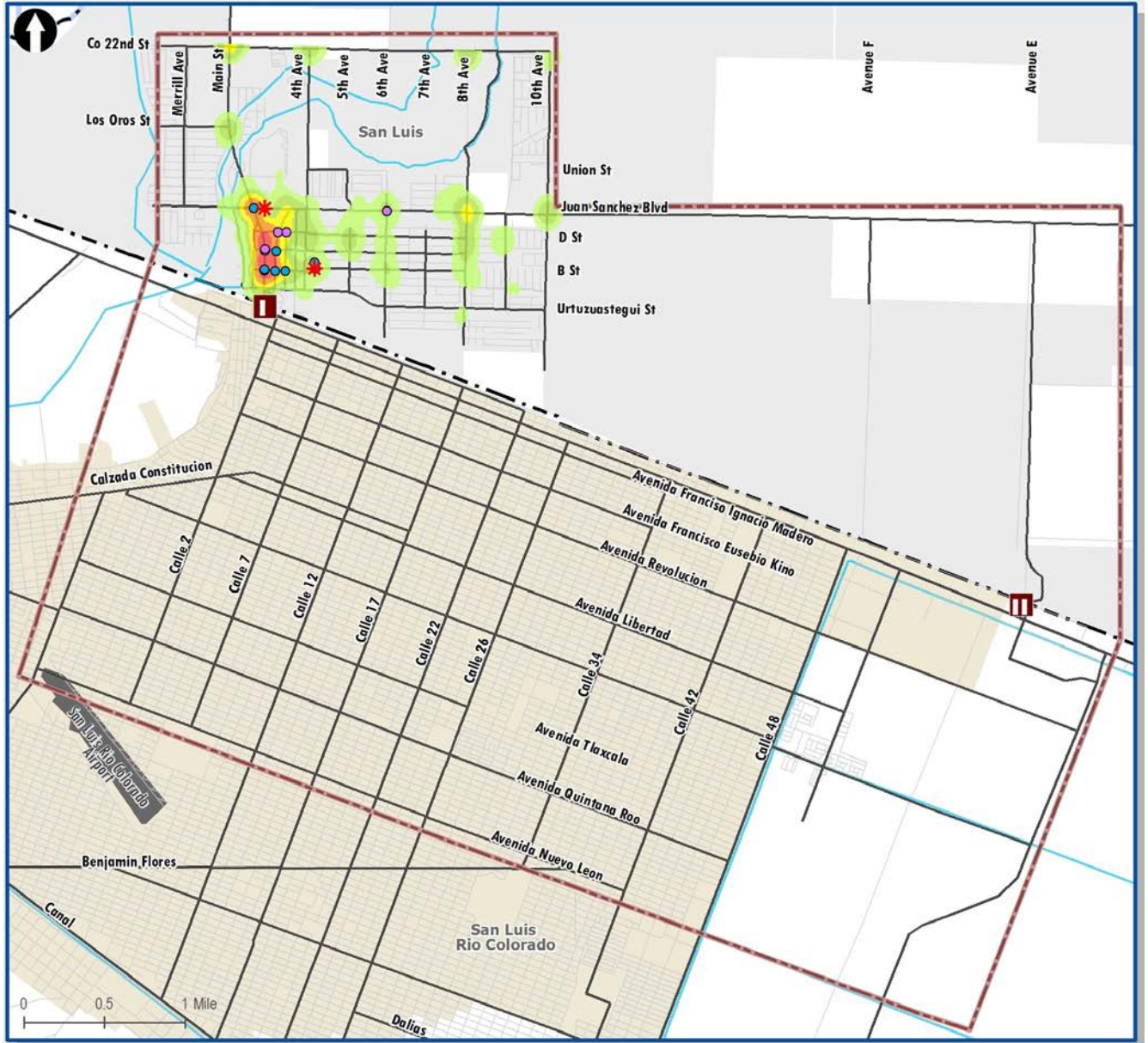
Source: U.S. Census 2010, ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, Accident Location Identification Surveillance System Database (January 2006 - December 2012)

A review of the two figures identifies the following issues:

- Higher instances of collisions occurred in the downtown area, with the highest concentrations along US 95/Main Street from B Street to Juan Sanchez Boulevard. Crashes were predominantly rear-ending collisions at intersections as result of inattention or distraction.

- Although the intersections of US 95/Main Street at Juan Sanchez Boulevard and C Street yield higher intersection crash densities, the intersection at B Street has more collisions with pedestrians or pedalcyclist than either of the two. Of the 11 crashes at B Street, there were four collisions with pedestrians and one collision with a pedalcyclist; the crashes were cited as inattention, other, unsafe passing, unknown, and no improper driving.
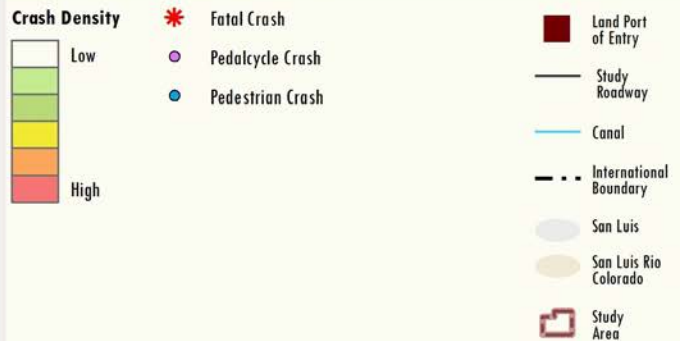
- The intersection of Juan Sanchez Boulevard and 8th Avenue also experienced a high amount of rear-end collisions, crashes were cited as other and following too closely.

- Pedestrians and pedalcyclist crashes, of which one crash was a fatality, accounted for five percent of the all crashes. Half of all the crashes occur in the downtown area along US 95/Main Street as a result of driver inattention or distraction.

- Two fatal crashes occurred within the study area and were cited as pedestrian collision and other.

Table 4.1 lists the location of fatal, pedestrians, and pedalcyclist crashes in the study area while Table 4.2 presents the top seven predominant violation types. Figure 4.8 summarizes the study area crashes by intersection type, collision type, collision manner, and injury severity. Note the crash data and information is not reflective of the roadway changes to US 95/Main Street, which could potentially impact the number and frequency of crashes along the roadway.

TABLE 4.1. FATAL, PEDESTRIAN, AND PEDALCYCLIST CRASHES

Fatal Crashes	
B Street at 4th Drive	Juan Sanchez Boulevard at Avenue D
Pedestrian and Pedalcyclist Crashes	
US 95/Main Street north of C Street	Juan Sanchez Boulevard east of 6th Avenue
US 95/Main Street at C Street (3 separate crashes)	D Street west of 1st Avenue
US 95/Main Street north of B Street	D Street at 2nd Avenue
US 95/Main Street south of B Street	C Street east of 1st Avenue
1st Avenue north of B Street	B Street at US 95/Main Street (3 separate crashes)
4th Drive north of B Street	B Street at 2nd Avenue
Juan Sanchez Boulevard west of US 95/Main Street	B Street at 4th Drive

TABLE 4.2: CRASHES - TOP SEVEN PREDONINANT VIOLATION TYPES

Violation Type	Percentage
Unknown	31.91%
Inattention/Distraction	18.91%
Other	17.73%
Failed to Yield Right of Way	12.53%
Speed too Fast for Conditions	4.73%
Unsafe Lane Change	2.84%
Followed Too Closely	2.84%

FIGURE 4.8: CRASH SUMMARY
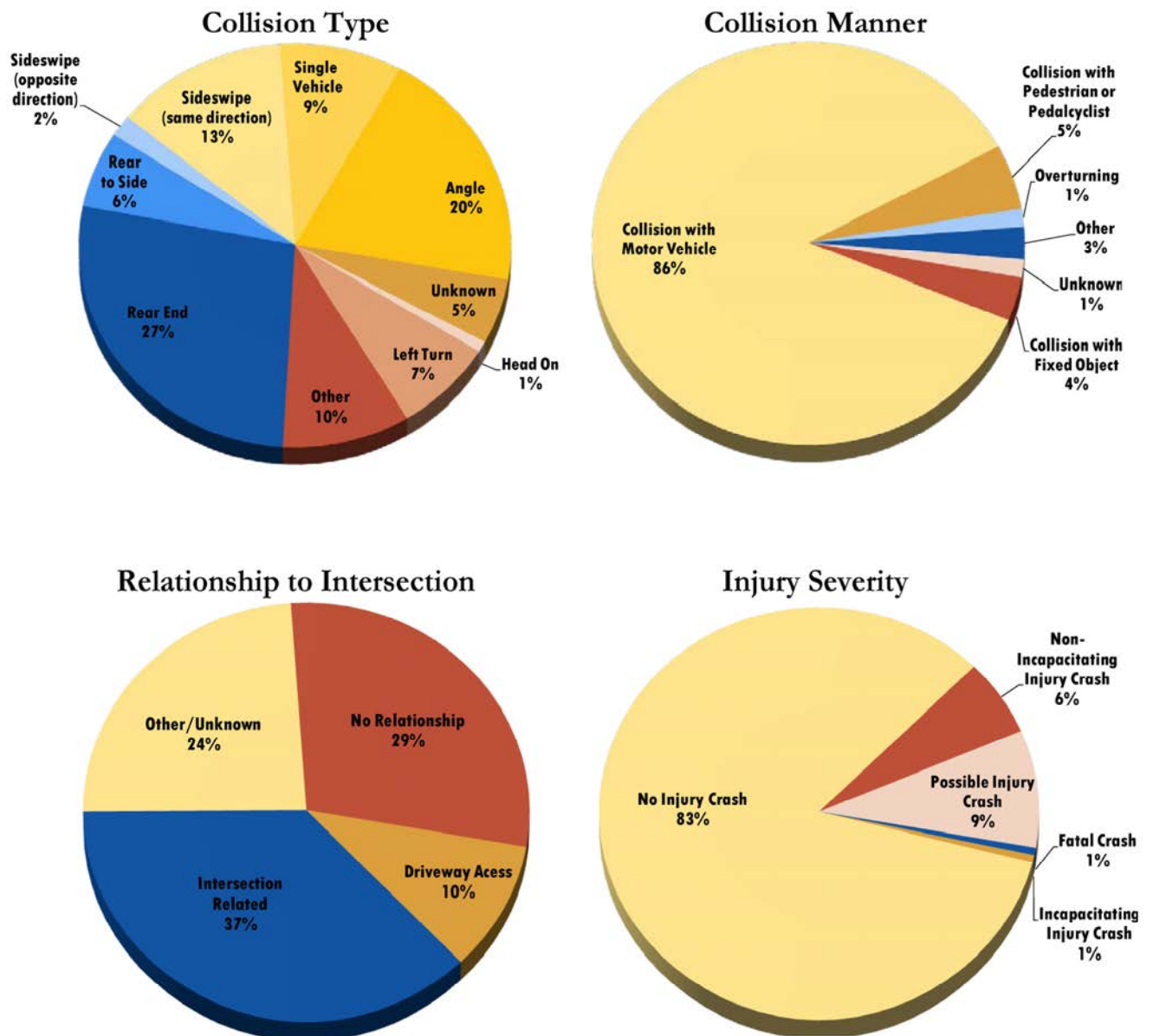
Traffic Conditions

Existing daily traffic count data was obtained from the YMPO and ADOT, and was used to validate the YMPO travel demand model with the current roadway configuration. Although the existing traffic dynamics will soon change in the downtown area, the travel pattern remains the same in other portions of the study area. Figure 4.9 displays the 2013 daily traffic volumes and key observations noted include:

- US 95/Main Street north of Archibald Street has the highest amount of traffic through the study area

- Juan Sanchez Boulevard has significant amount of traffic as it serves local and regional traffic.

- Juan Sanchez Boulevard east of US 95/Main Street to Mesa Street is heavily traveled; since there is no postal delivery for the city

FIGURE 4.9: TRAFFIC CONDITIONS 2013
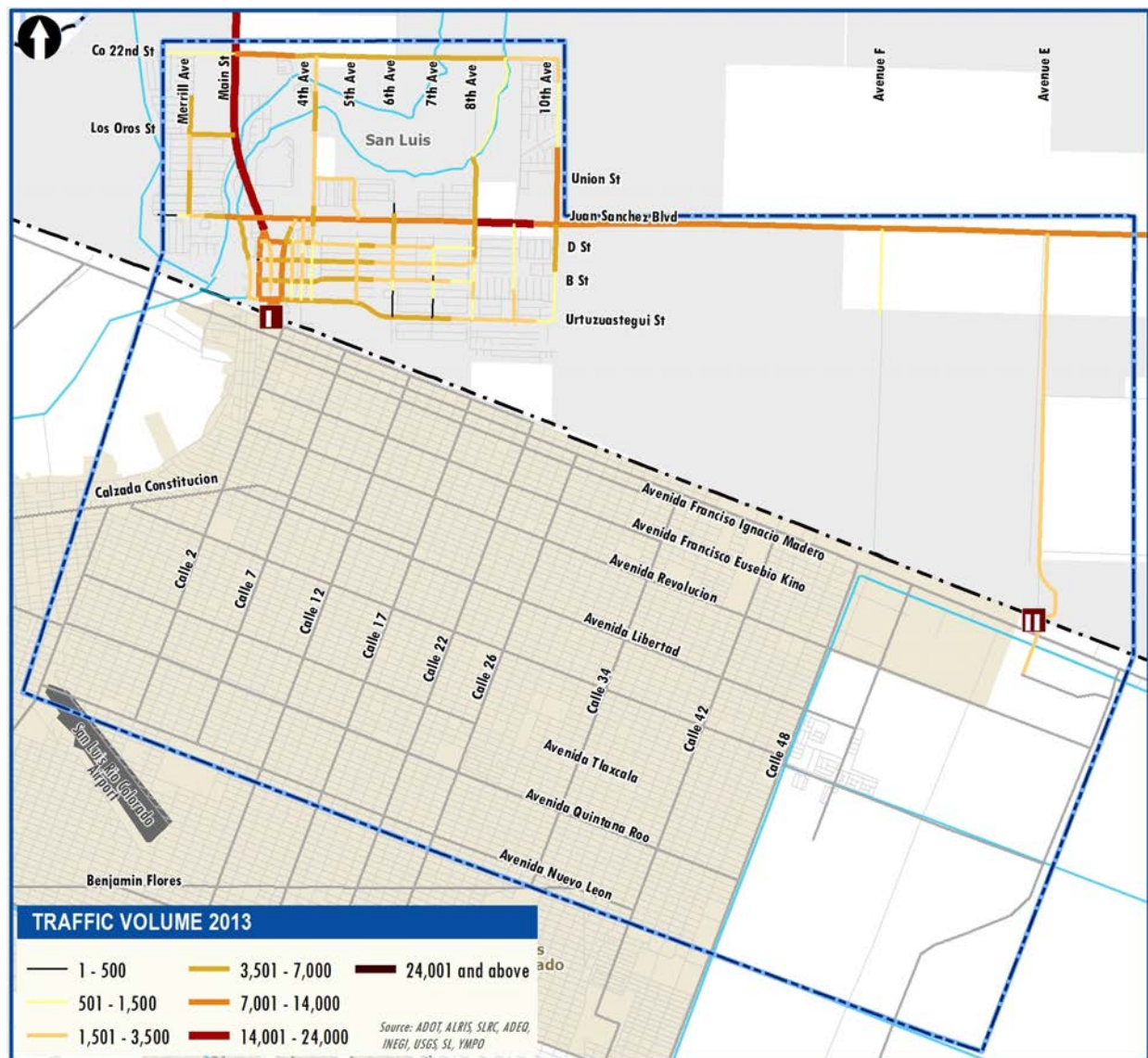
Level of Service

Traffic congestion levels of major roadways within the study area were estimated using existing traffic count data. The degree of traffic congestion is commonly expressed in terms of Level of Service (LOS). LOS is a measurement of traffic congestion conditions defined by the Transportation Research Board's (TRB) Highway Capacity Manual (HCM). For a planning level analysis, the roadway LOS is determined based on the ratio of traffic volume on the road to the capacity of the road. Capacity of the road is a function of the number of lanes, functional classification, speed, and roadway geometrics and provides thresholds for the maximum number of cars allowed to travel on a lane for the peak or daily conditions. Each level of service is given a letter grade based on its level of congestion, ranging from "A" through "F", with LOS A representing free flowing traffic conditions where vehicles experience minimal delays, and LOS F represents failure conditions where vehicles experience long delays.

Road segment LOS is characterized by the HCM as follows:

LOS A: Best, free flow operations (on uninterrupted flow facilities) and very low delay (on interrupted flow facilities). Freedom to select desired speeds and to maneuver within traffic is extremely high.

LOS B: Flow is stable, but presence of other users is noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within traffic.

LOS C: Flow is stable, but the operation of users is becoming affected by the presence of other users. Maneuvering within traffic requires substantial vigilance on the part of the user.

LOS D: High density but stable flow. Speed and freedom to maneuver are severely restricted. The driver is experiencing a generally poor level of comfort and convenience.

LOS E: Flow is at or near capacity. All speeds are reduced to a low, but relatively uniform value. Freedom to maneuver within traffic is extremely difficult. Comfort and convenience levels are extremely poor.

LOS F: Worse, facility has failed, or a breakdown has occurred.
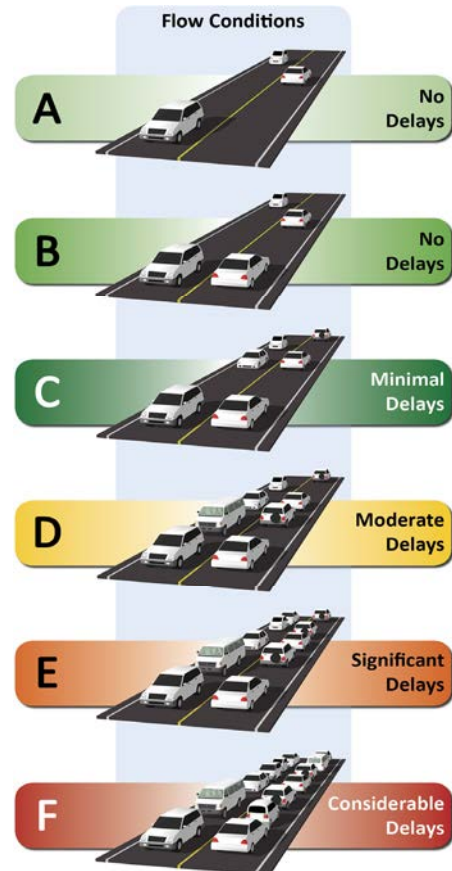
In general for rural areas, LOS A and B represent no or minimal congestion, LOS C represents moderate congestion, and LOS D, E, and F represent significant and considerable congestion.

Year 2013 Roadway Level of Service

Figure 4.10 displays the base year 2013 LOS for the study roadways. Currently, all roads located within the study area operate at a LOS A and B, except for the following:

LOS E

- Juan Sanchez Boulevard from Mesa Street to US 95/Main Street

LOS D

- Juan Sanchez Boulevard from US 95/Main Street to Cesar Chavez Street
- Juan Sanchez Boulevard from 7th Avenue to 8th Avenue
- Juan Sanchez Boulevard from east of 10th Avenue to Avenue F

LOS C

- Juan Sanchez Boulevard from east of Merrill Avenue to Mesa Street
- Juan Sanchez Boulevard from Cesar Chavez Street to 7th Avenue
- Juan Sanchez Boulevard from Avenue F to SR 195 east of Avenue E
- B Street from Archibald Street to Main Street
- B Street from west of 1st Avenue
- Urtuzuastegui Street from 4th Avenue to 5th Avenue
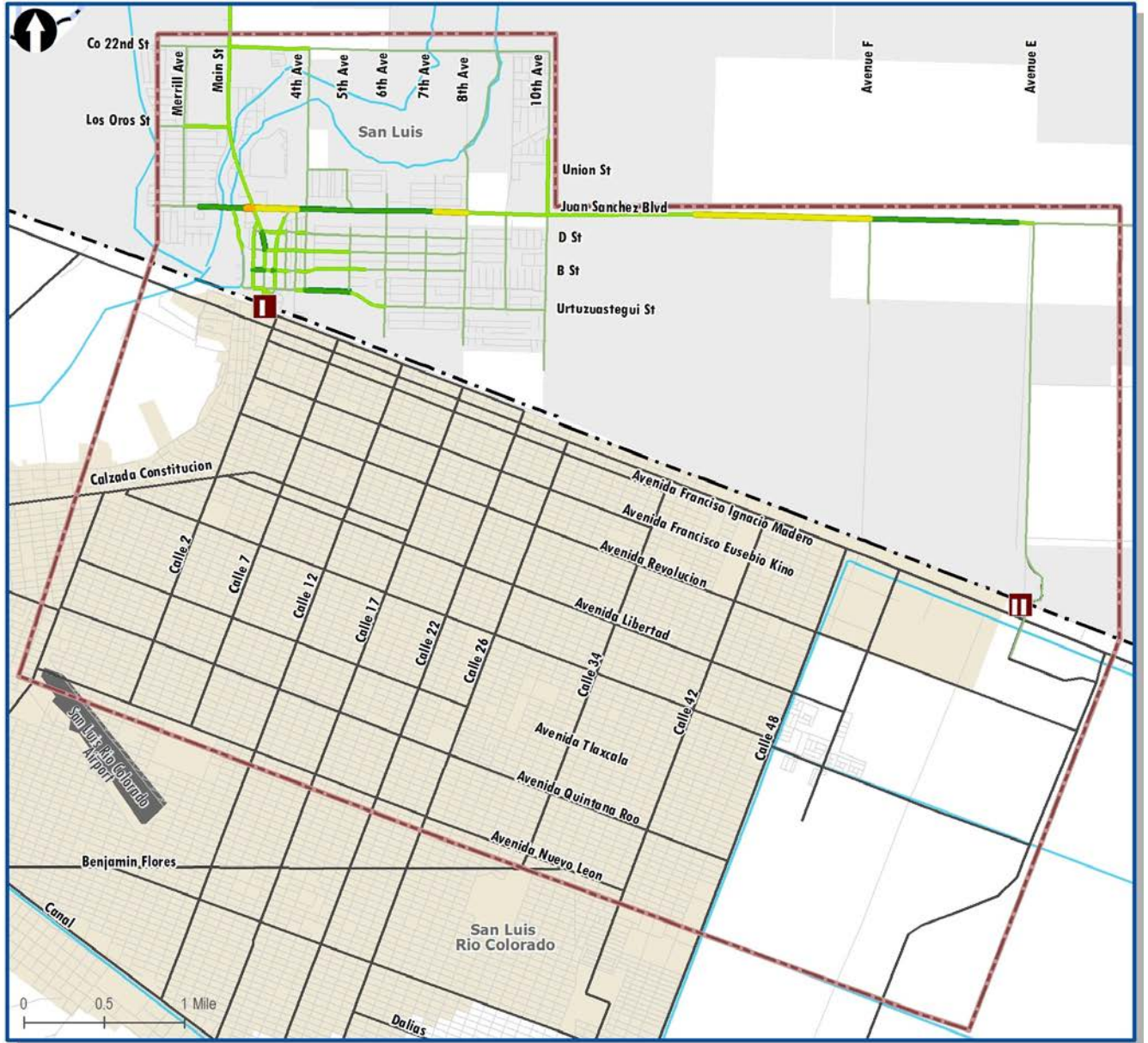- US 95/Main Street from C Street to D Street

FIGURE 4.10: LEVEL OF SERVICE 2013

Level of Service

- LOS A
- LOS B
- LOS C
- LOS D
- LOS E
- LOS F

Land Port of Entry

Study Roadway

Canal

International Boundary

San Luis

San Luis Rio Colorado

Study Area

Source: ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, YMPO

Other Modes of Transportation

Alternative modes of transportation are an important aspect of the multimodal transportation network as they provide mobility for those not able to operate or without access to a vehicle. Figure 4.11 illustrates the pedestrian facilities in study area.

Pedestrian and Bicycle Facilities

Large number of the pedestrians and bicyclist in the study area cross through San Luis I LPOE on a daily basis for shopping, work, and school. Just north of the I LPOE, the downtown area of San Luis experience intense pedestrian activity. A review of the pedestrian facilities concluded:

- Majority of the sidewalks are located throughout the downtown area, with some extending eastward to the residential area.

- As US 95/Main Street undergoes a transition in the next year or two, the new two-lane roadway would include new sidewalks, pedestrians refugee island, and improved curb cuts at crosswalks.

- The sidewalk connectivity is limited with other major activity center in the area such as the schools and shopping centers not in the proximity of the downtown area like Wal-Mart.

- There are no bicycle lanes or designated bike routes in the study area. In addition, bicycles are left at various locations throughout the city and are retrieved at the end of the day.

Transit Service

Figure 4.12 illustrates the current transit facilities available within the study area. Yuma County Intergovernmental Public Transportation Authority (YCIPTA) operates Yuma County Area Transit (YCAT) and Greater Area Dial-A-Ride throughout southwestern Yuma County. YCAT is a fixed-route public transit service that provides bus service to the region, including the City of San Luis. The Yellow Route connects Yuma with Somerton and San Luis seven days a week from 6:30 AM to 7:22 PM at one-hour intervals. As illustrated in Figure 4.12, the Yellow Routes follows US 95/Main Street and loops around 1st Avenue via B Street and Juan Sanchez Boulevard in the study area with stops including Wal-Mart (San Luis), San Luis Community Center/Library, and the downtown area. In addition, there are several taxi cab companies within and near San Luis that provide additional transportation services.

Yuma County, in conjunction with ADOT, initiated a separate transit study to identify transit corridors and develop an implementation based on three different funding scenarios for southwestern Yuma County. Results from the transit study will be incorporated into the final transportation improvements plan that will be developed at the end of this study.

Access Management

The City of San Luis does not have an access management policy in place. Access to the state highway system is managed through Arizona Administrative Rule R17-3-502, Highway Encroachment and Permits. Permits for driveways are granted by ADOT's Engineering Districts in accordance with Rule R17-3-502, when the request meets all engineering and safety standard.
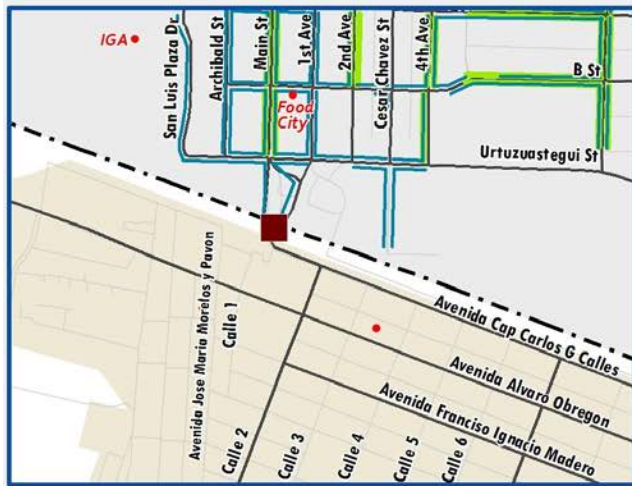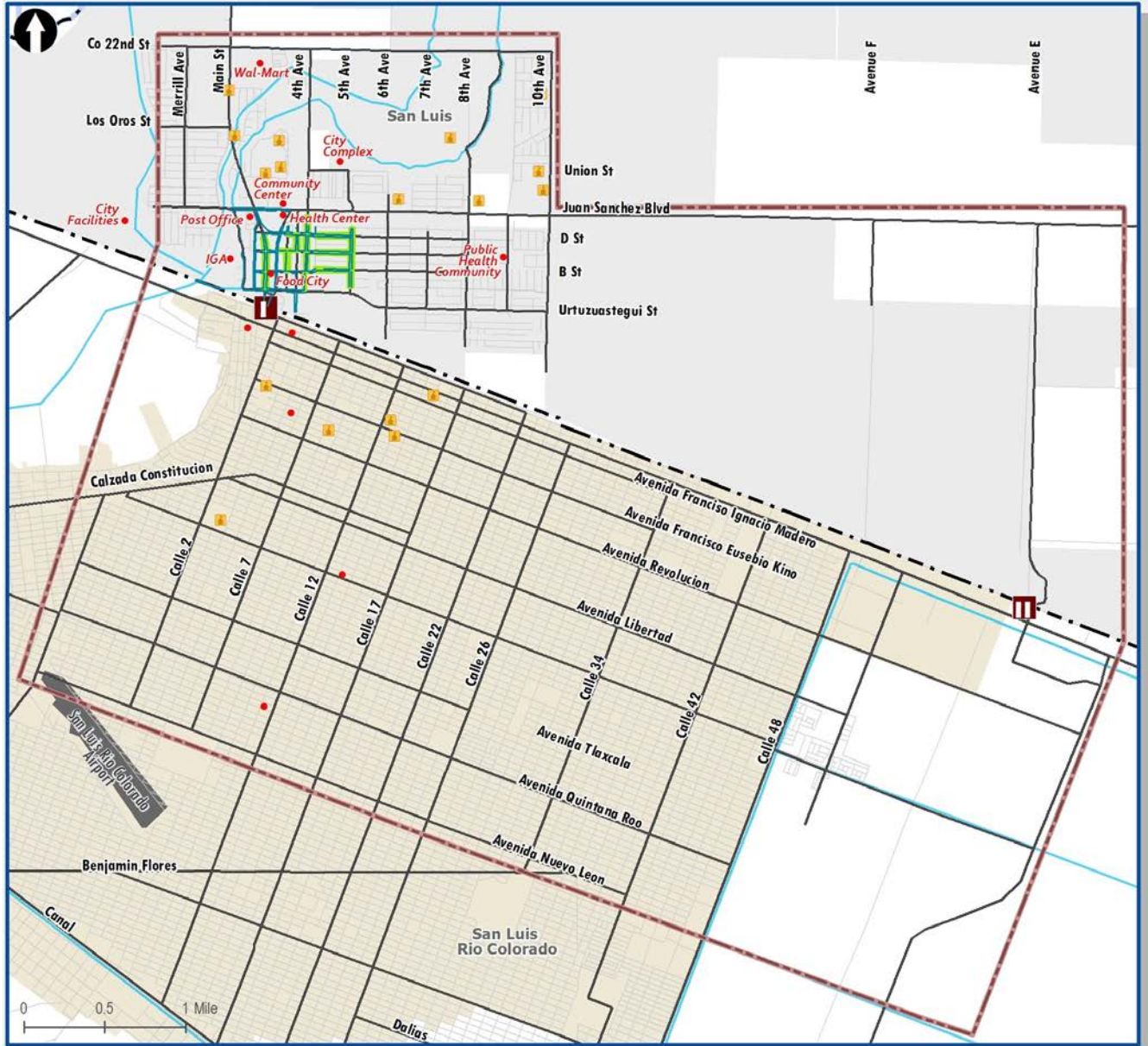
FIGURE 4.11: SIDEWALK AND ON STREET PARKING

- ● Major Activity Center
- ▨ Schools
- — Sidewalk
- — On Street Parking
- ■ Land Port of Entry
- — Study Roadway
- —·— International Boundary
- San Luis
- San Luis Rio Colorado
- ▱ Study Area

Source: ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, YMPO
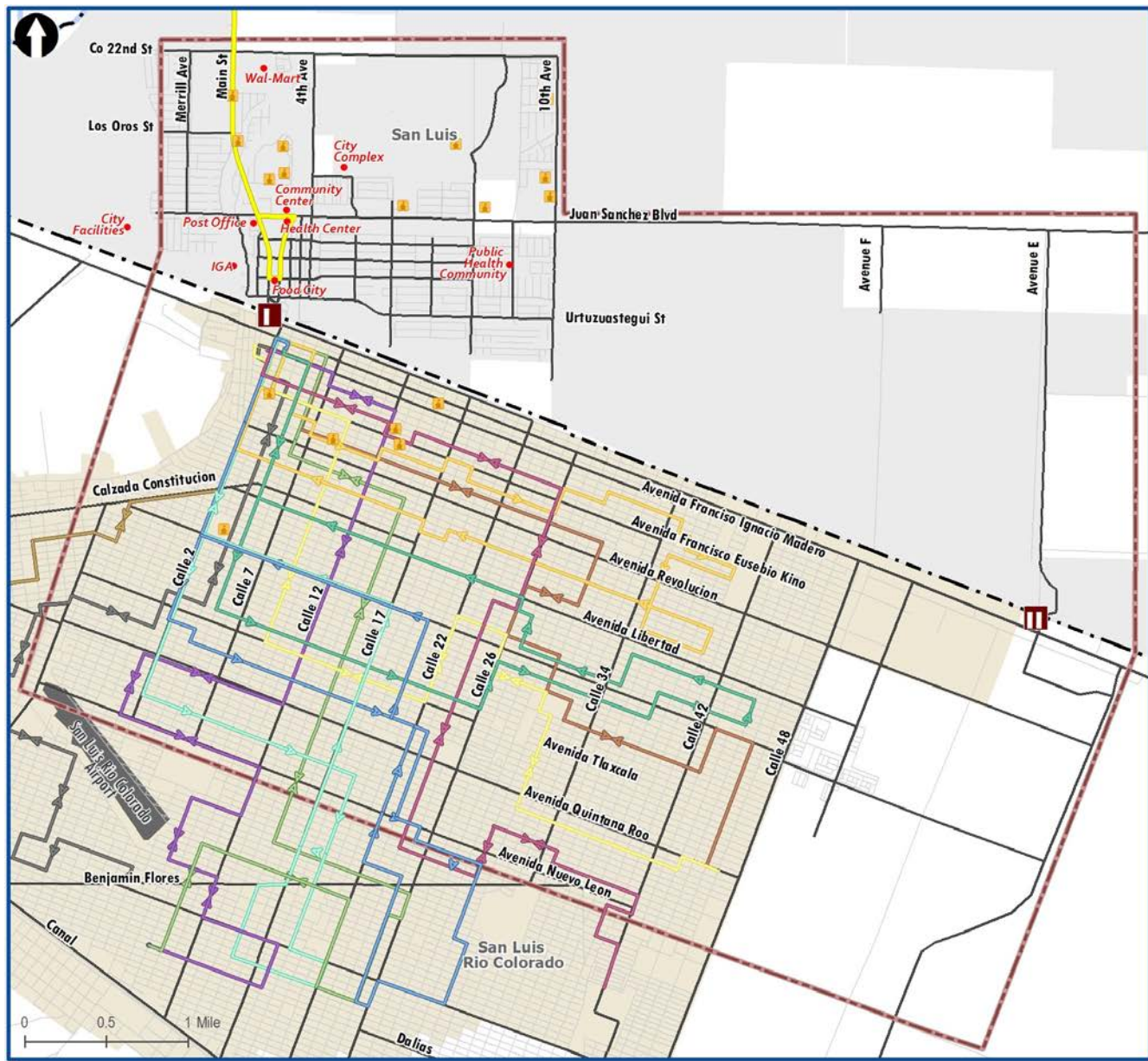
FIGURE 4.11: TRANSIT FACILITIES

- Major Activity Center
- School
- Yuma County Area Transit (YCAT) Route
- San Luis Rio Colorado Transit Routes

- Land Port of Entry
- Study Roadway
- International Boundary
- Study Area

Source: ADOT, ALRIS, SLRC, INEGI, USGS, SL,YMPO, YCAT

5.0 TRANSPORTATION ISSUES SUMMARY

Based on an inventory and analysis of existing conditions, transportation deficiencies and issues were identified. These issues and deficiencies form the basis for the next phase of the study, which is the development of the long range transportation plan. Figure 5.1 displays the current major transportation issues in the study area. Study area issues have been grouped into five categories and the key issues in each category are listed below.

Safety issues:

- Majority of the crashes occur in the downtown area, specifically along US 95/Main Street and 1st Avenue.
- US 95/Main Street and Juan Sanchez Boulevard intersection.
- US 95/Main Street and C Street intersection.
- Juan Sanchez Boulevard and 8th Avenue intersection.
- High number of pedestrian collisions at the intersection of US 95/Main Street and B Street.
- High number of intersection related crashes.

Mobility issues:

- Congestion on Juan Sanchez Boulevard from US 95/Main Street to Mesa Street.
- Moderate congestion along portions of Juan Sanchez Boulevard from US 95/Main Street to Avenue F.
- Narrow roadways and lack of striping.
- Access management issues in the downtown area.
- No local transit service.

Pedestrian, and bicycle issues:

- Lack of sidewalk connectivity.
- Limited sidewalk connection with other major activity center.
- Lack of bicycle lanes and designated bike routes.

Environmental issues:

- More than half of the study area is located in the wildlife habitat block.
- The area east of the 10th Avenue is with the wildlife linkage zone.

FIGURE 5.1: TRANSPORTATION ISSUES

Access Management Issues

Limited Sidewalk Connectivity to Major Activity Centers

REGIONAL ISSUES
- ✗ No Local Transit Service
- ✗ Narrow Roads and Lack of Striping
- ✗ Lack of Bicycle lanes and designated bike routes

Legend:
- 🏫 School
- • Major Activity Center
- ▱ Pedestrian Crash
- ✳ High Crash Intersections
- Sidewalk Connectivity
- Potential Linkage Zone
- Wildlife Habitat Block
- PM10 Non Attainment
- **Level of Service**
  - Moderate Congestion
  - High Congestion
- Land Port of Entry
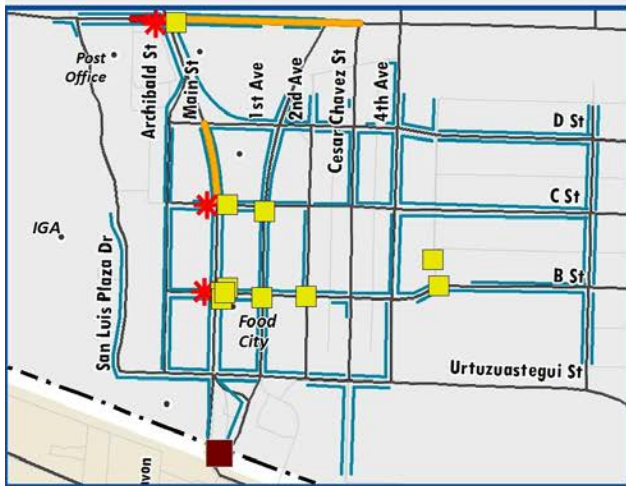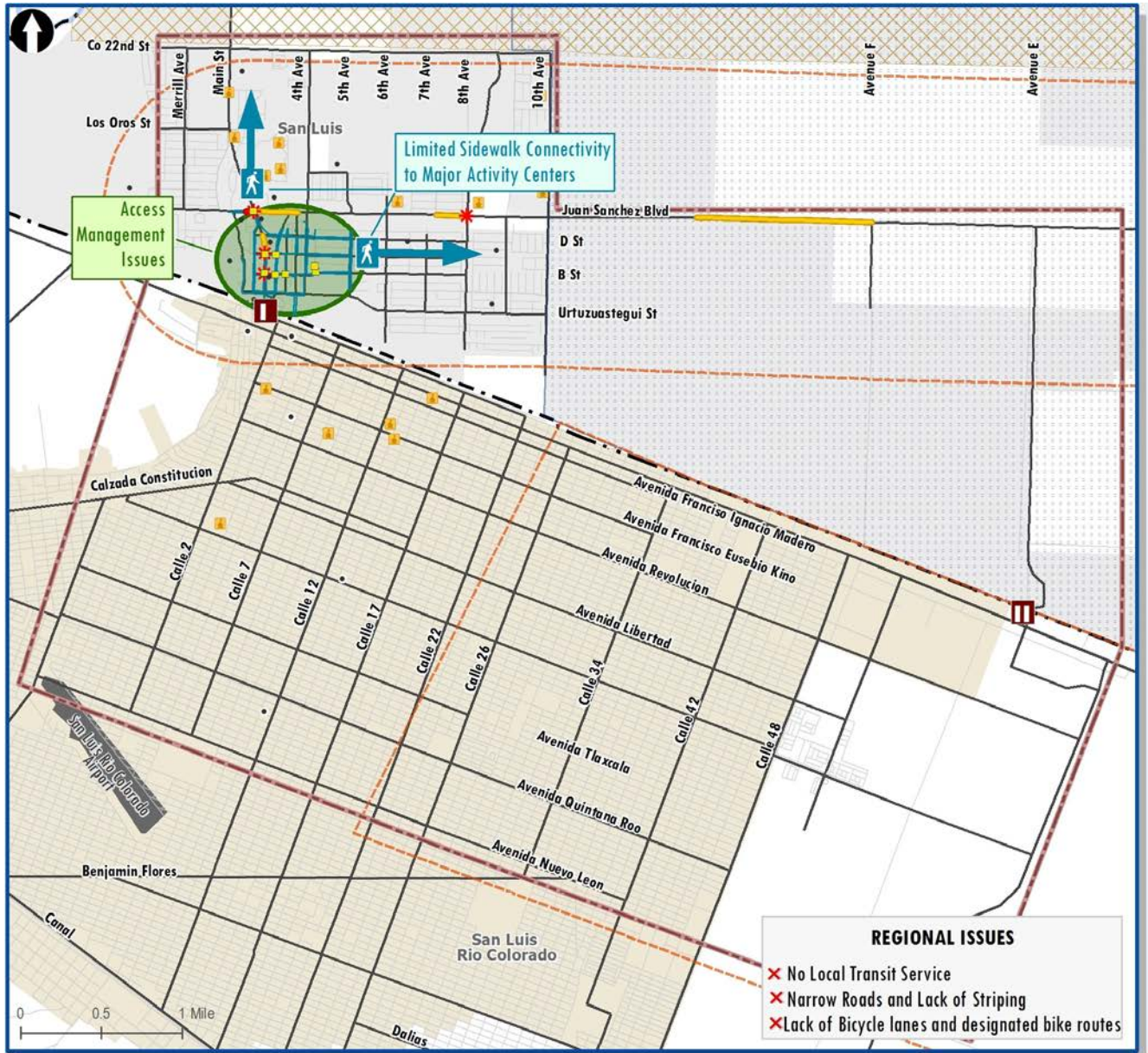- Study Roadway
- International Boundary
- San Luis
- San Luis Rio Colorado
- Study Area

Source: ADOT, ALRIS, SLRC, INEGI, USGS

6.0   FUTURE SOCIOECONOMIC CONDITIONS

Forecasting future socioeconomic conditions allows us to anticipate changes in future travel demand and travel patterns and to envision potential solutions. Development of rational projections for population, housing units, and employment is vital to the process of forecasting realistic future travel demand.

Population and Housing Unit Forecasts

Since the study area is located within the YMPO Planning Area, projections developed by YMPO in the development of the 2010-2033 Regional Plan Update were used for base population and housing unit projections. The data was then compared to the Arizona Department of Administration, Office of Employment and Population Statistics, population forecasts of 41,556 in 2018, 55,651 in 2030, and 64,728 in 2040for the City of San Luis. The *City of San Luis 2020 General Plan* projects the City population at 50,100 by the 2025. From 2000 to 2010, the City of the San Luis experienced a growth rate of 6.6 percent per year, and an 3.9 percent increase from the year 2010 to the base year 2013. With only a five difference between the base and the first horizon year (2018), the City would experience a 96 percent increase to reach a population of 41,556 (9.6 percent per year). The 2018 City population was adjusted to reflect a relative growth rate of 3.4 percent per year similar to the trend from 2010 to 2013. The study area, covering roughly 31 percent of the city boundary, will have a population of 32,501 by 2018, a population of 47,664 by 2030 and a population of 55,211 by 2040.

The forecast for housing units is assumed to retain the current population to occupied housing unit ratio for future horizon years resulting in an estimated 7,224 units by 2018, 10,507 units by 2030, and 11,988 by 2040 in the study area. Table 6.1 shows a tabular summary of the base year and projected population along with the number of housing units in the study area. Figures 6.1 to Figure 6.4 display the population densities for the years 2013, 2018, 2030, and 2040 horizon years respectively and provide a visual representation of the area growth trends. Figure 6.5 is a graphical depiction of the population and occupied housing units in the study area.

TABLE 6.1 PROJECTED POPULATION AND HOUSING UNITS

		2013	2018	2030	2040
Study Area	**Population**	28,072	32,501	47,664	55,211
	Occupied Housing Unit	6,227	7,224	10,507	11,988
	Average Household Size	*4.51*	*4.50*	*4.54*	*4.61*
City of San Luis	**Population**	28,413	33,355	55,651	64,728
	Occupied Housing Unit	6,317	7,412	12,376	14,384
	Average Household Size	4.50	4.50	4.50	4.50
YMPO Region	**Population**	195,683	222,455	295,892	330,161
	Occupied Housing Unit	76,011	80,497	101,208	113,018
	Population/ Total HU Ratio	2.57	2.76	2.92	2.92
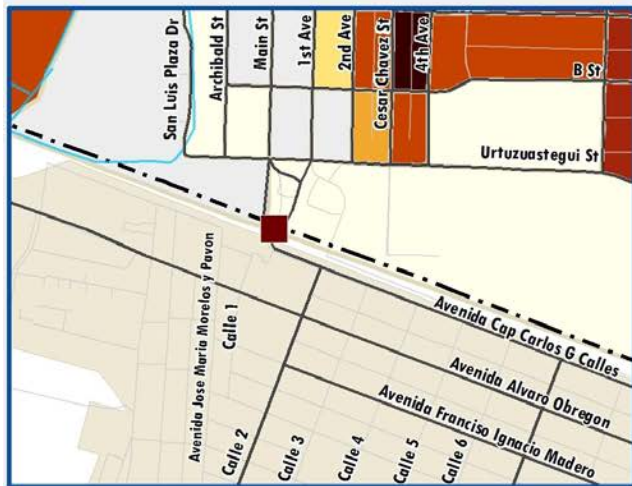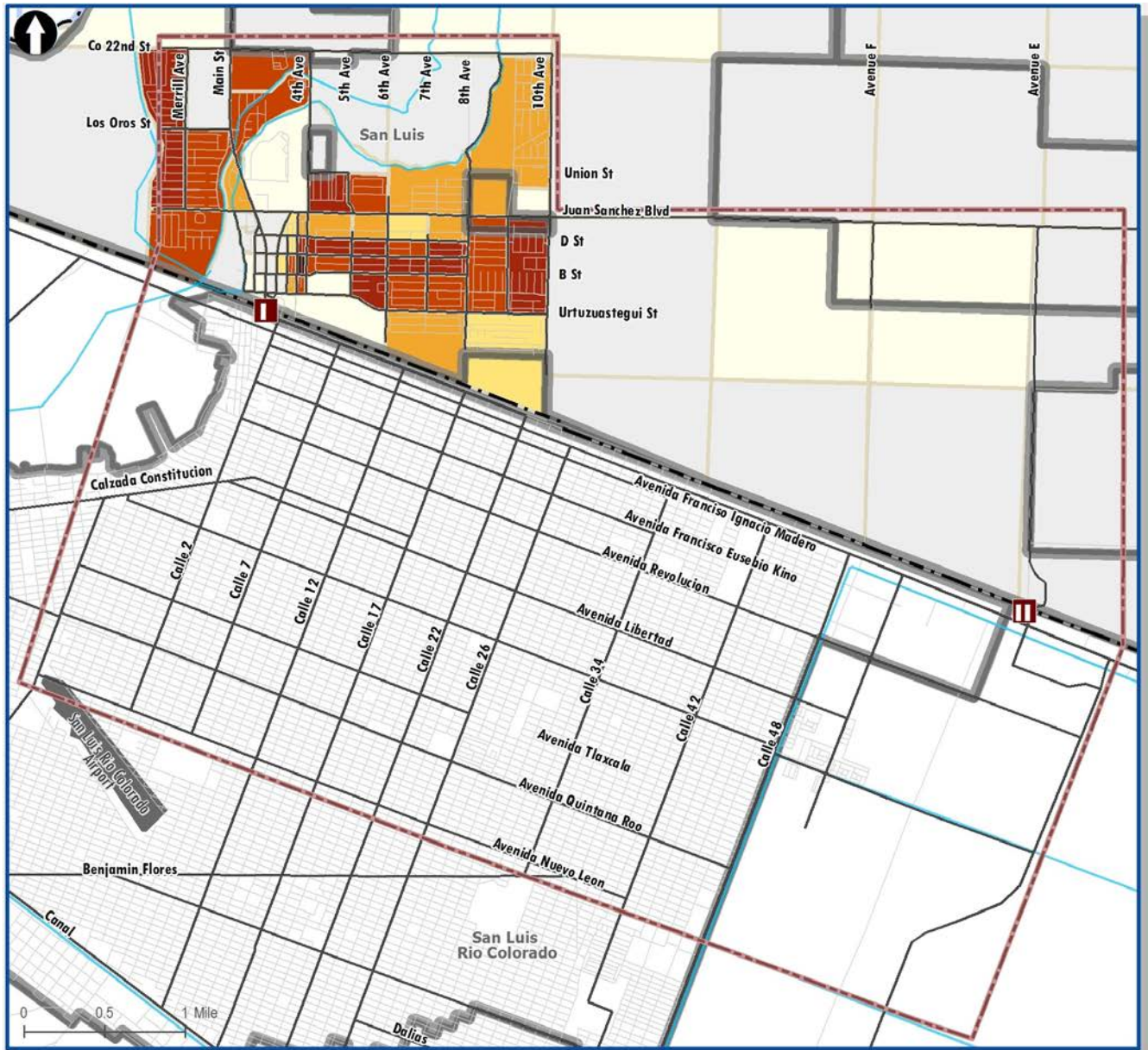
FIGURE 6.1: POPULATION DENSITY 2013

Population per Square Mile

- 0
- 1 - 3,000
- 3,001 - 6,000
- 6,001 - 9,000
- 9,001 - 13,000
- 13,001 - 18,000
- 18,001 and above

- Land Port of Entry
- Study Roadway
- Canal
- International Boundary
- San Luis
- San Luis Rio Colorado
- Study Area

Source: U.S. Census 2010, ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, Arizona Dept. of Administration Office of Employment and Population Statistics
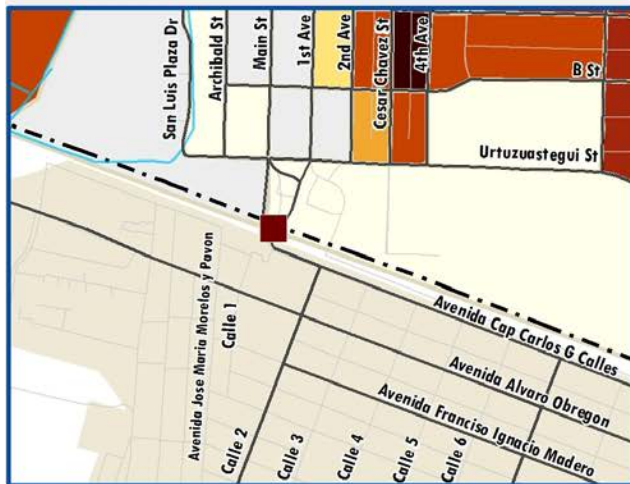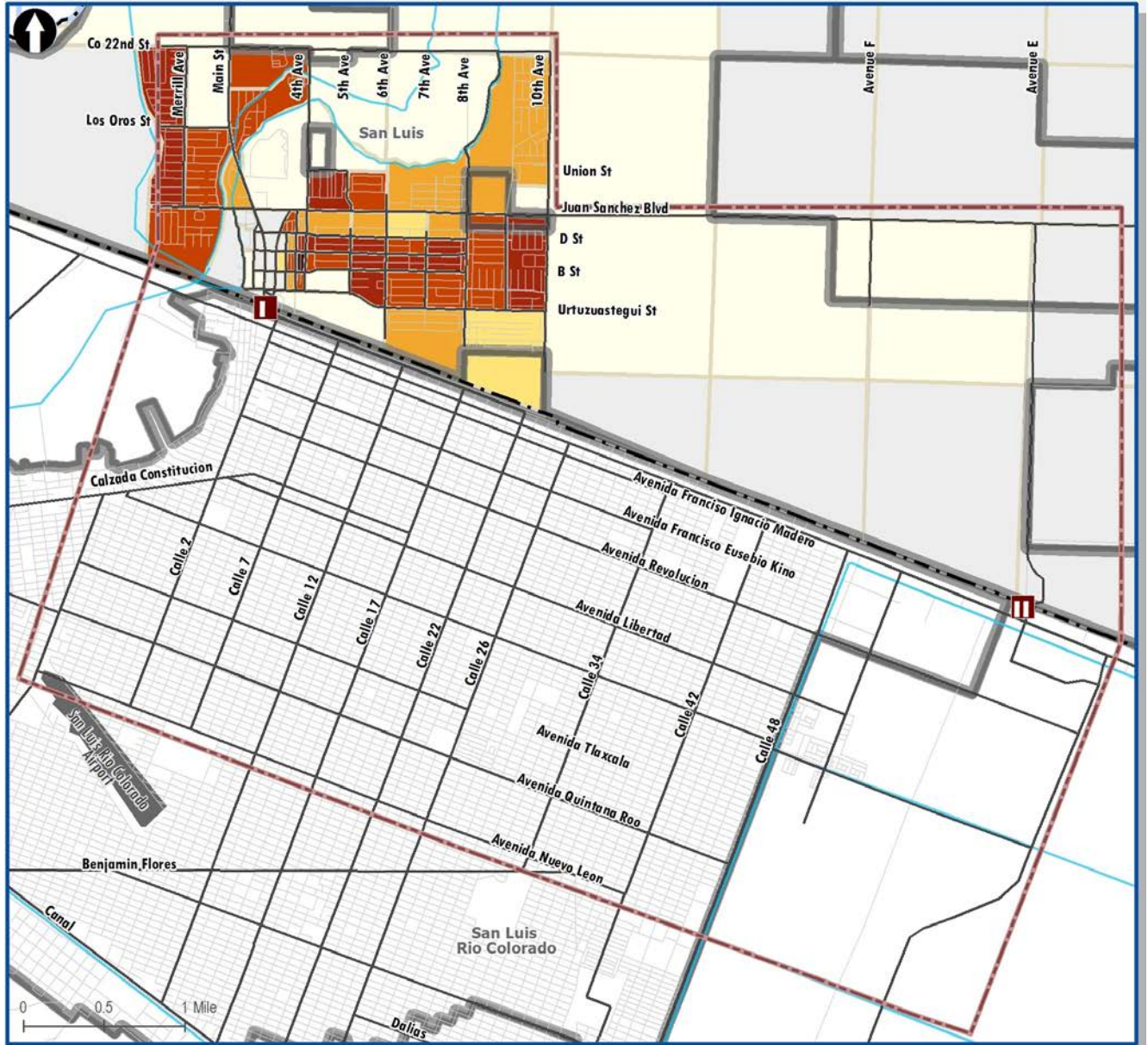
FIGURE 6.2: POPULATION DENSITY 2018

Population per Square Mile
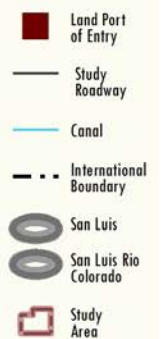
- 0
- 1 - 3,000
- 3,001 - 6,000
- 6,001 - 9,000
- 9,001 - 13,000
- 13,001 - 18,000
- 18,001 and above

- Land Port of Entry
- Study Roadway
- Canal
- International Boundary
- San Luis
- San Luis Rio Colorado
- Study Area

Source: U.S. Census 2010, ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, Arizona Dept. of Administration Office of Employment and Population Statistics
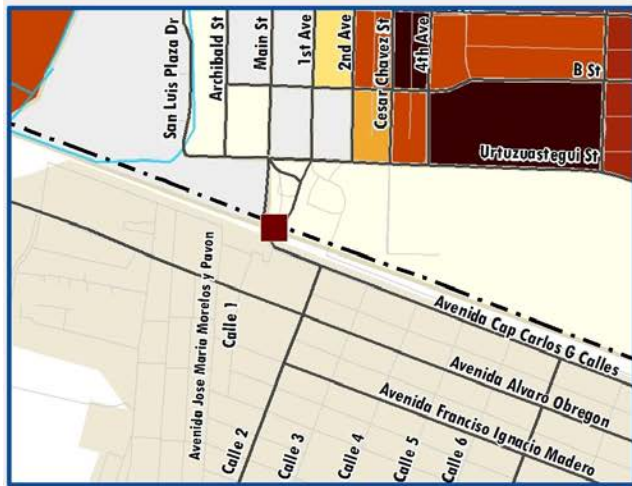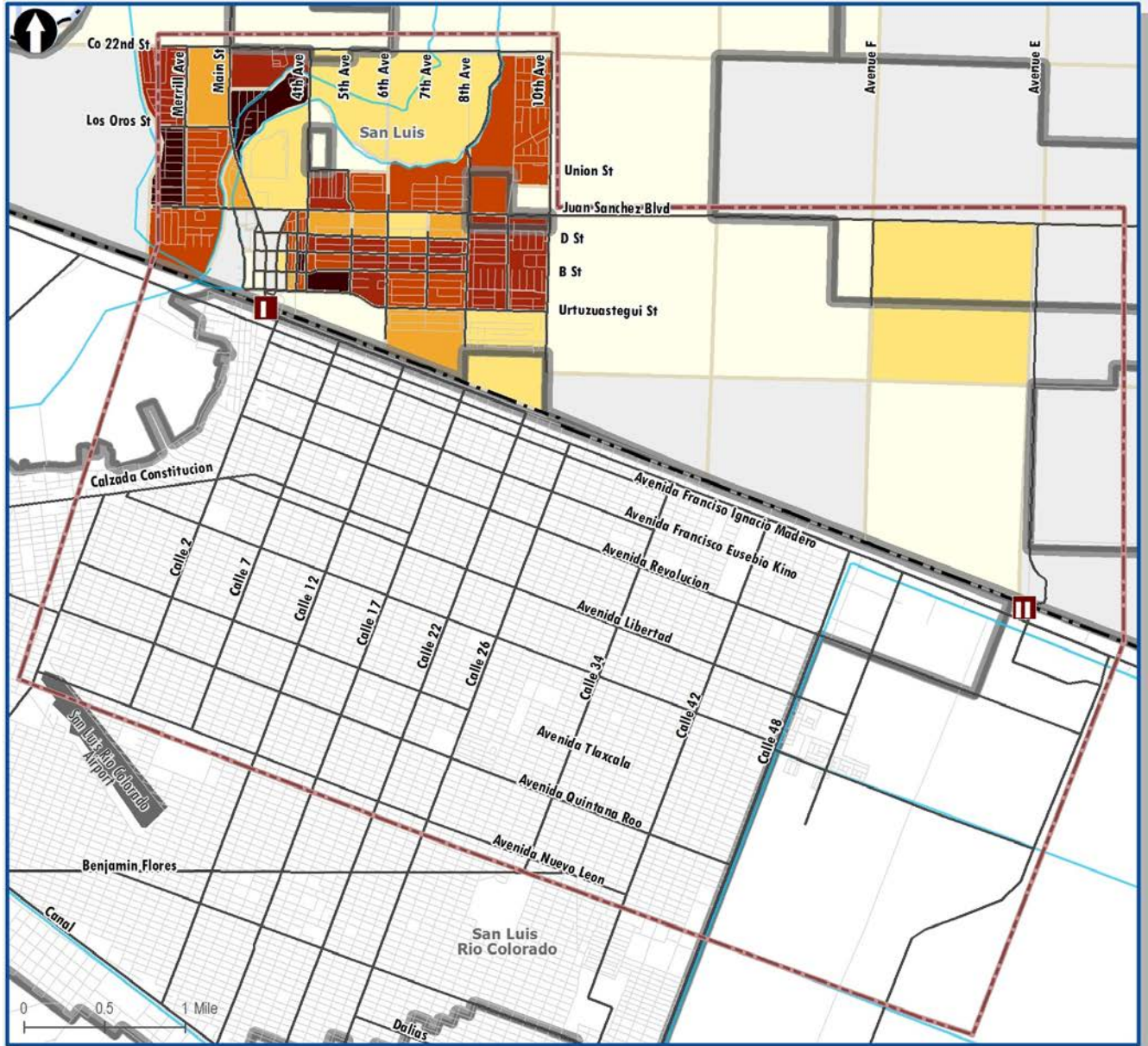
FIGURE 6.3: POPULATION DENSITY 2030

Population per Square Mile

- 0
- 1 - 3,000
- 3,001 - 6,000
- 6,001 - 9,000
- 9,001 - 13,000
- 13,001 - 18,000
- 18,001 and above

- Land Port of Entry
- Study Roadway
- Canal
- International Boundary
- San Luis
- San Luis Rio Colorado
- Study Area

Source: U.S. Census 2010, ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, Arizona Dept. of Administration Office of Employment and Population Statistics
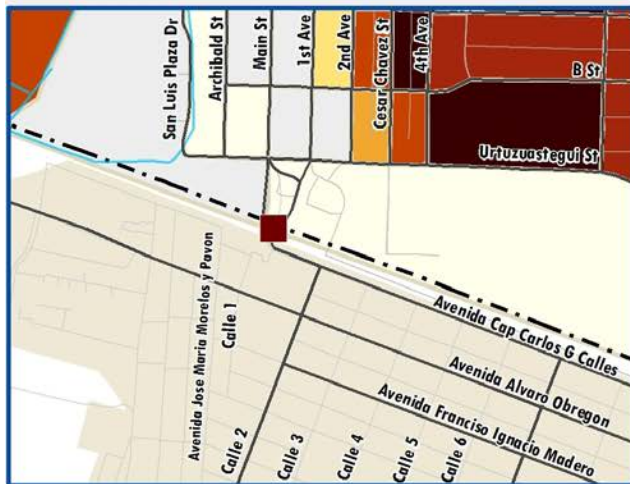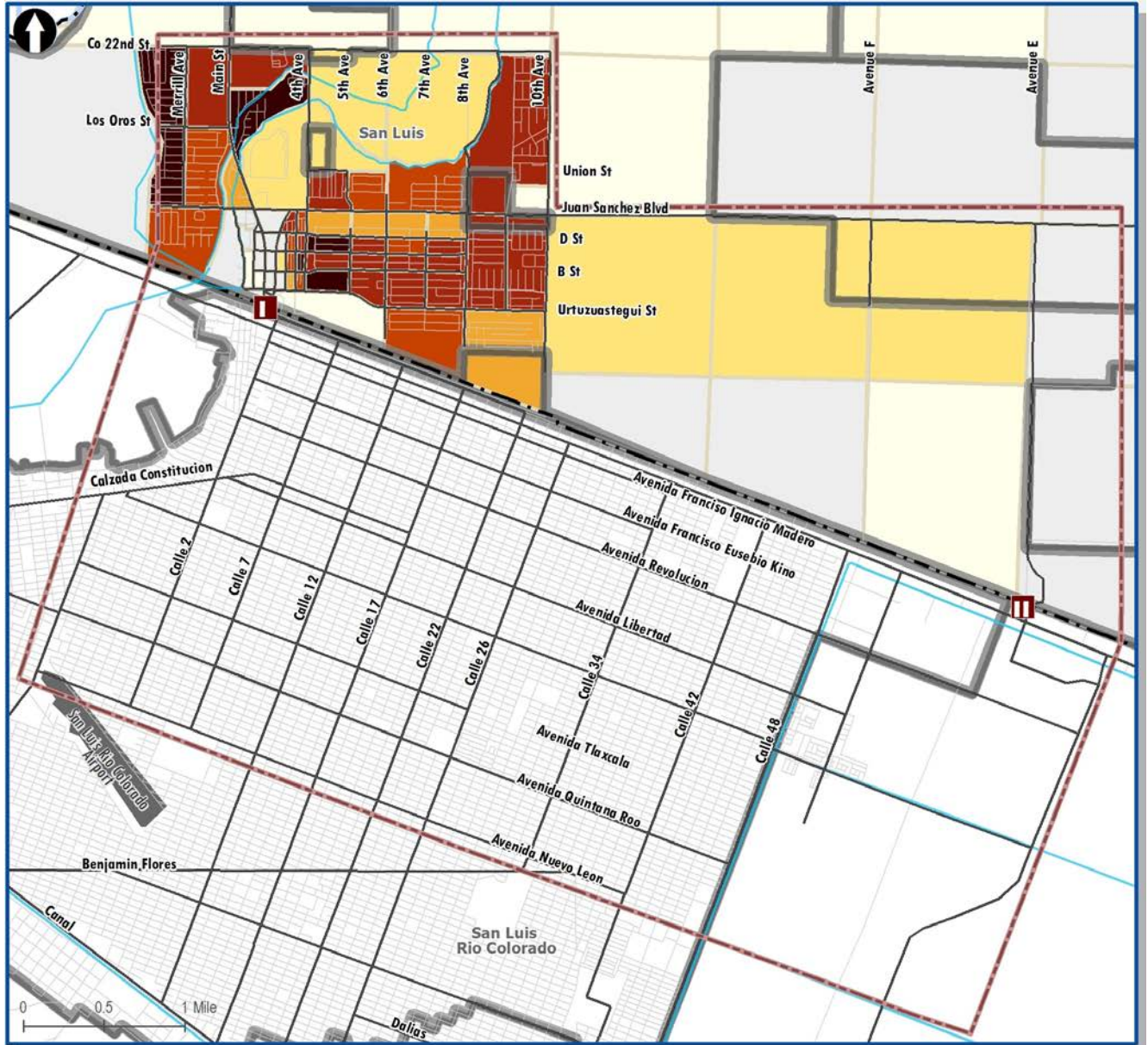
FIGURE 6.4: POPULATION DENSITY 2040

Population per Square Mile

	0
	1 - 3,000
	3,001 - 6,000
	6,001 - 9,000
	9,001 - 13,000
	13,001 - 18,000
	18,000 and above

Land Port of Entry
Study Roadway
Canal
International Boundary
San Luis
San Luis Rio Colorado
Study Area

Source: U.S. Census 2010, ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, Arizona Dept. of Administration Office of Employment and Population Statistics

FIGURE 6.5: PROJECTED POPULATION AND HOUSING UNITS
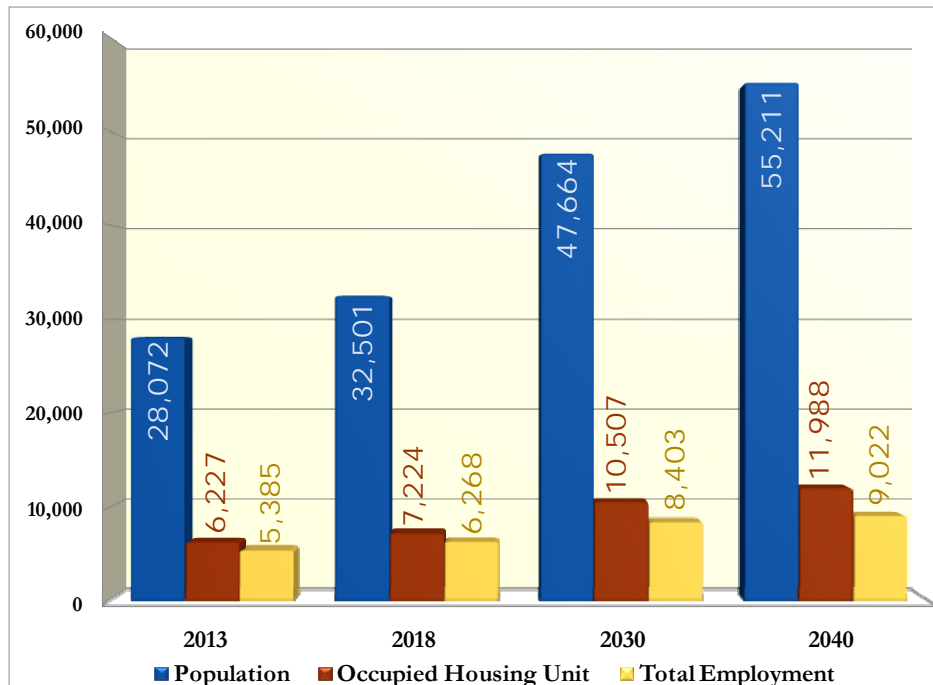
Employment Forecasts

Future employment projections were developed using the *City of San Luis 2020 General Plan* and growth assumption from City staff . The same procedures used to develop the population forecasts, were utilized to develop future employment projections. Table 6.2 summarizes the 2013 and projected employment along with the employment to population ratio in the study area. Based on this assumption, the study area will have approximately 6,268 employees in 2018, 8,403 employees in 2030, and 9,022 employees in 2040. Figure 6.6 and 6.9 are a graphical illustration of the employment density for the 2013, 2018, 2030 and 2040 horizon years respectively.

TABLE 6.2: PROJECTED POPULATION AND EMPLOYMENT

		2013	2018	2030	2040
Study Area	Population	**28,072**	**32,501**	**47,664**	**55,211**
	Total Employment	5,385	6,268	8,403	9,022
	Employment/Population Ratio	*0.19*	*0.19*	*0.18*	*0.16*
City of San Luis	Population	28,413	33,355	55,651	64,728
	Total Employment	**6,141**	**7,142**	**10,038**	**12,574**
	Employment/Population Ratio	0.22	0.21	0.18	0.19
YMPO Region	Population	195,683	222,455	295,892	330,161
	Total Employment	**71,208**	**86,739**	**111,353**	**124,271**
	Employment/Population Ratio	0.36	0.39	0.38	0.38
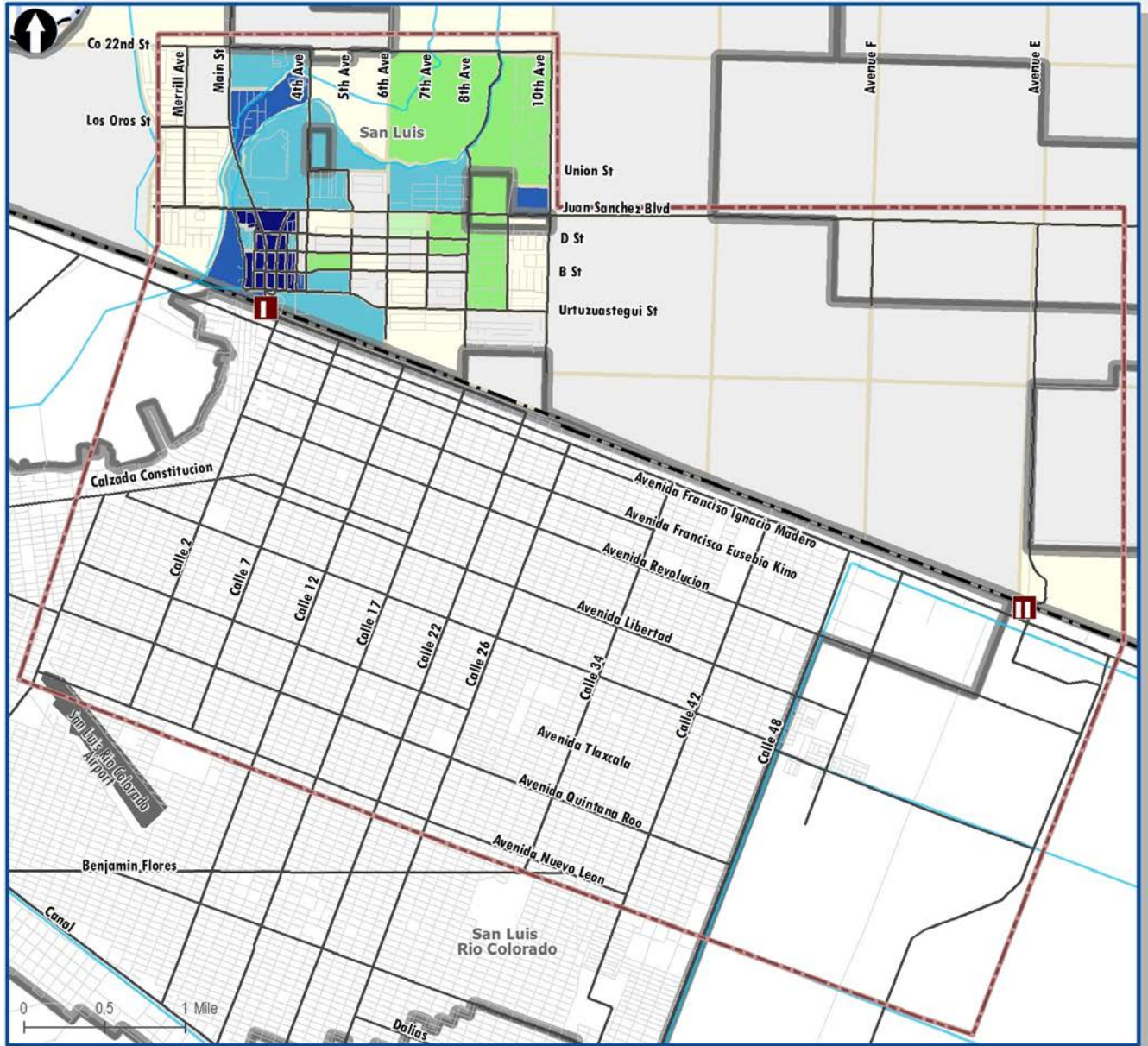
FIGURE 6.6: EMPLOYMENT DENSITY 2013
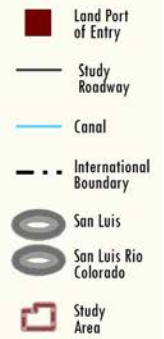
Employees per Square Mile

- 0
- 0 - 250
- 251 - 500
- 501 - 1,000
- 1,001 - 2,000
- 2,001 - 5,000
- 5,001 and above

- Land Port of Entry
- Study Roadway
- Canal
- International Boundary
- San Luis
- San Luis Rio Colorado
- Study Area

Source: U.S. Census 2010, ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, Arizona Dept. of Administration Office of Employment and Population Statistics
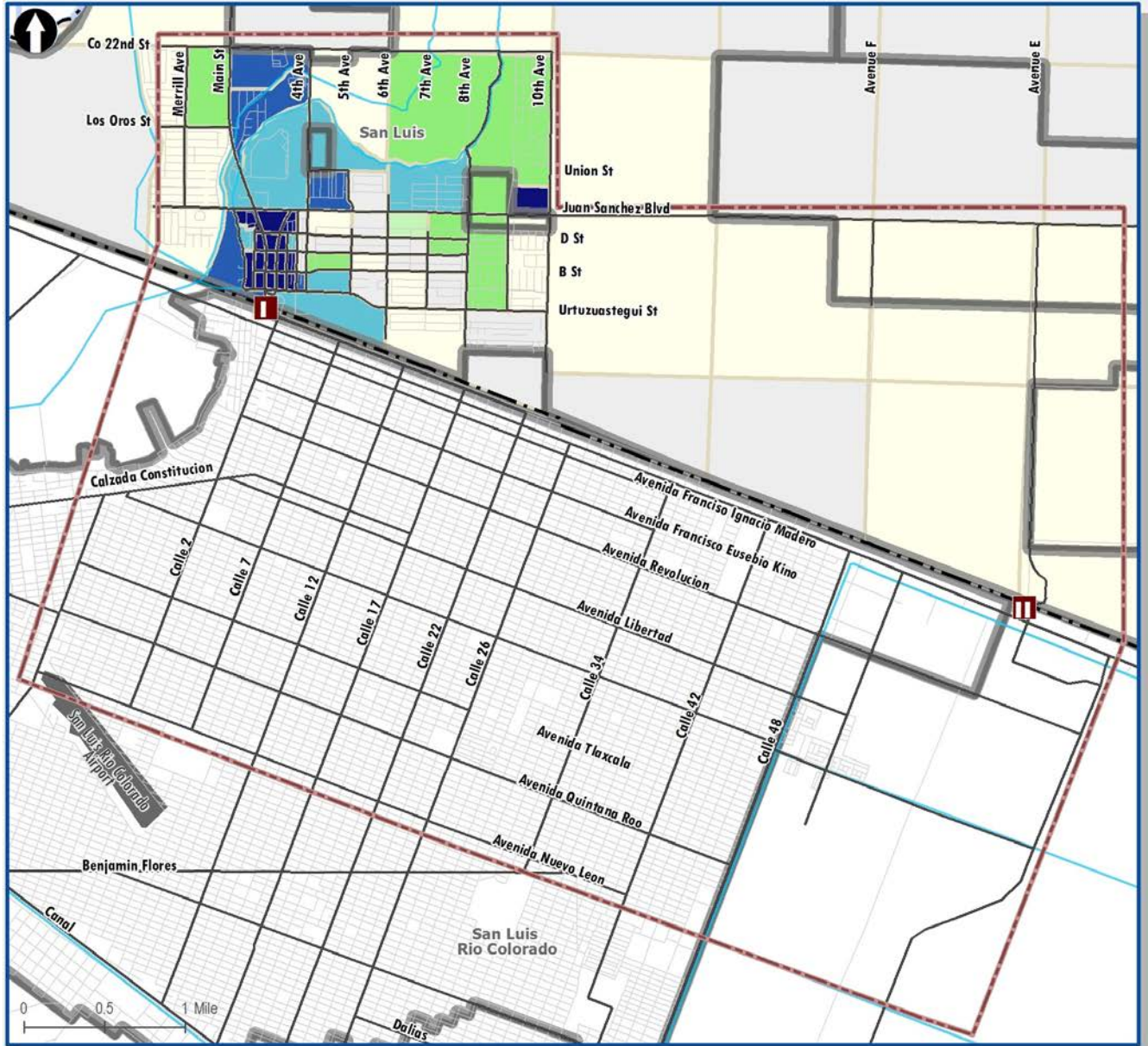
FIGURE 6.7: EMPLOYMENT DENSITY 2018

Employees per Square Mile

- 0
- 1 - 250
- 251 - 500
- 501 - 1,000
- 1,001 - 2,000
- 2,001 - 5,000
- 5,001 and above

Land Port of Entry

Study Roadway

Canal

International Boundary

San Luis

San Luis Rio Colorado

Study Area

Source: U.S. Census 2010, ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, Arizona Dept. of Administration Office of Employment and Population Statistics
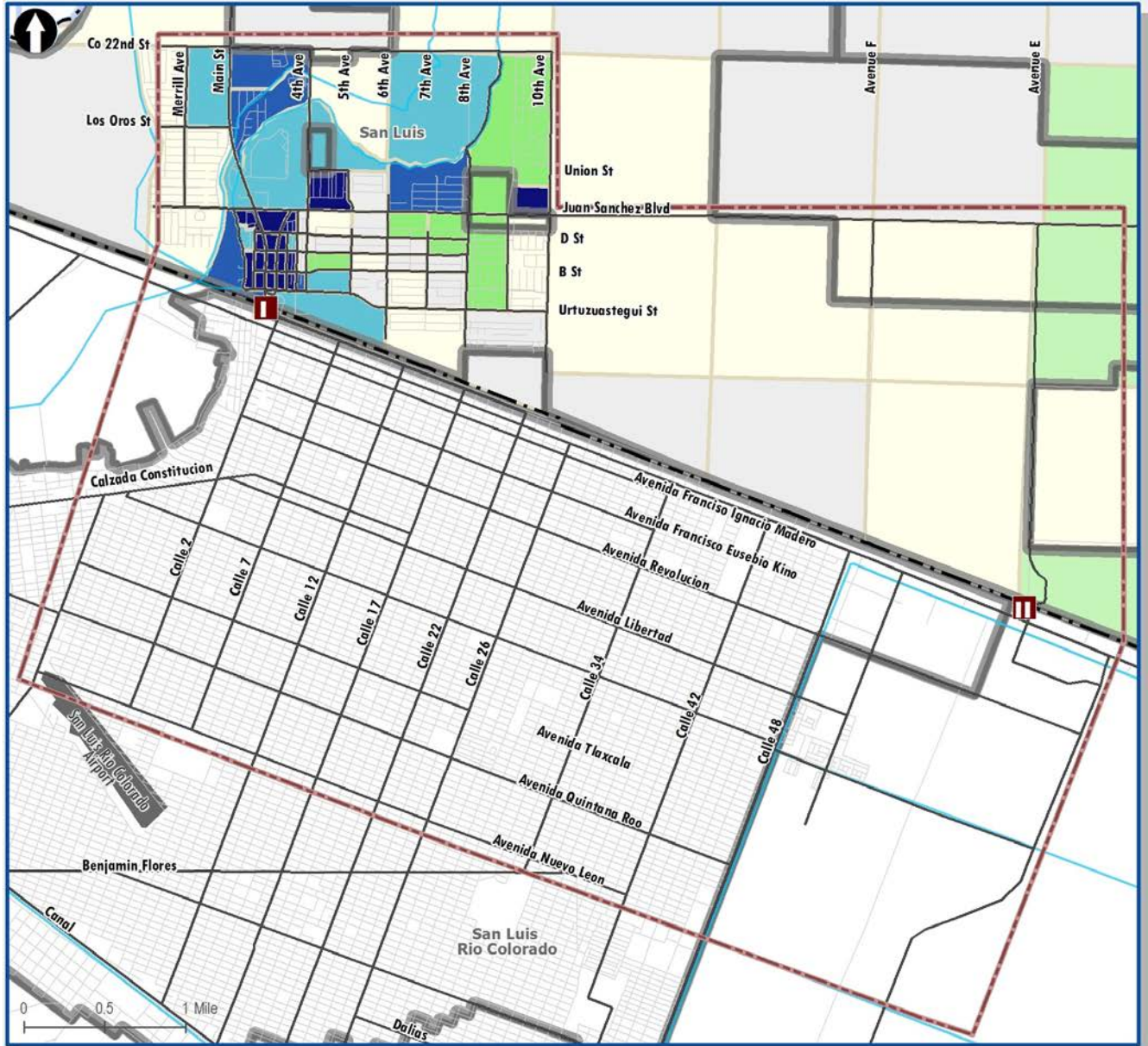
FIGURE 6.7: EMPLOYMENT DENSITY 2030

Employees per Square Mile

	0
	1 - 250
	251 - 500
	501 - 1,000
	1,001 - 2,000
	2,001 - 5,000
	5,001 and above

Land Port of Entry

Study Roadway

Canal

International Boundary

San Luis

San Luis Rio Colorado

Study Area

Source: U.S. Census 2010, ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, Arizona Dept. of Administration Office of Employment and Population Statistics
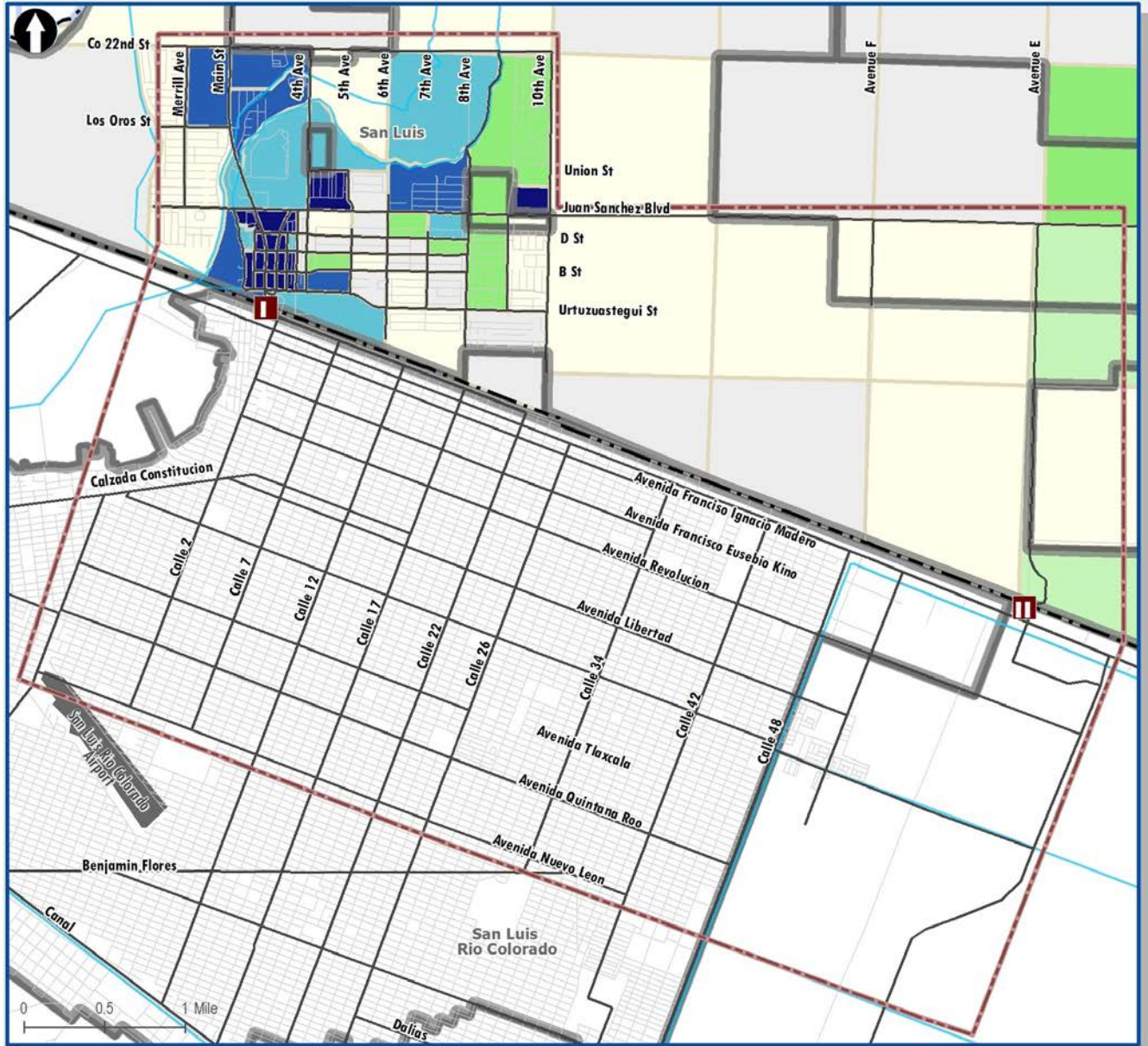
FIGURE 6.9: EMPLOYMENT DENSITY 2040

Employees per Square Mile
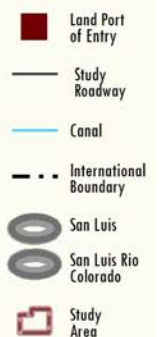
- 0
- 0 - 250
- 251 - 500
- 501 - 1,000
- 1,001 -2,000
- 2,001 - 5,000
- 5,000 and above

Land Port of Entry

Study Roadway

Canal

International Boundary

San Luis

San Luis Rio Colorado

Study Area

Source: U.S. Census 2010, ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, Arizona Dept. of Administration Office of Employment and Population Statistics

Socioeconomic Data for Travel Demand Model

The YMPO travel demand model was used to estimate the 2013 traffic volumes and to forecast future traffic volumes for horizon years 2018, 2030, and 2040. Future socioeconomic data (population, housing units, and employment), as previously discussed, was disaggregated into the travel model's TAZs. Housing units and employment data were allocated to the TAZs using the *City of San Luis 2020 General Plan*'s Land Use Plan and identified growth areas as a guide. Furthermore, City staff identified several locations within the study area that may be potential employment and/or residential growth areas. Growth areas, as shown in Figure 6.10, identified in the General Plan include:

- Juan Sanchez Boulevard from US 95/Main Street to 10th Avenue
- Avenue E from SR 195 to U.S.-Mexico Border
- Area east of 10th Avenue between County 22nd Street and County 24th Street.
- US95/Main Street from County 22nd Street to south of County 19th Street

FIGURE 6.10: GROWTH AREAS
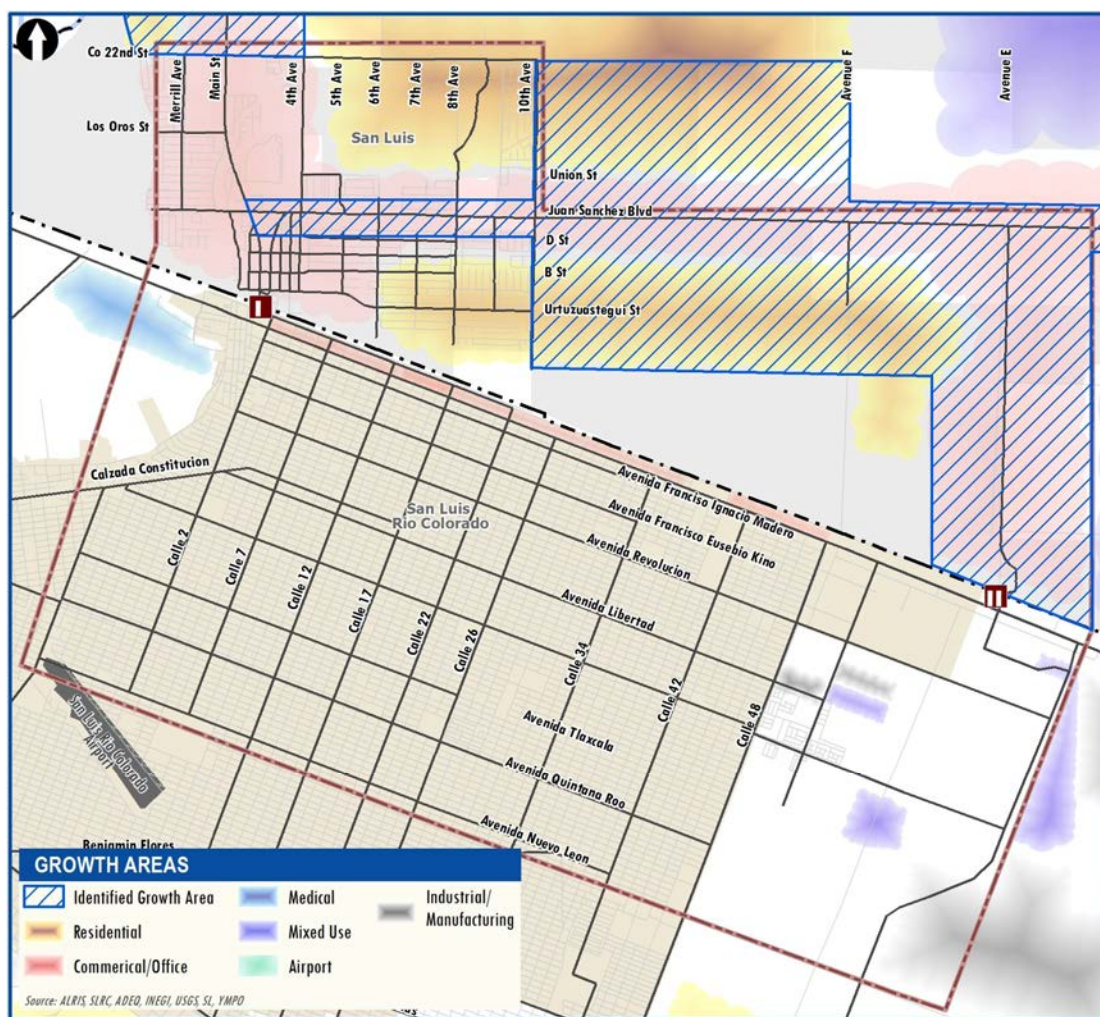
7.0 FUTURE TRAFFIC CONDITIONS

The primary purpose of forecasting future traffic volumes is to estimate the additional travel demand added to existing roadways and to forecast congestion levels due to projected population and employment growth. In addition, this analysis provides valuable insight into potential transportation solutions. As previously discussed, the YMPO Regional Travel Demand Model was used to forecast traffic volumes for 2018, 2030, and 2040, using the socioeconomic data developed in the preceding sections. Similar to the 2013 traffic analysis, the degree of traffic congestion is expressed in terms of LOS.

Projected 2018 No-Build Traffic Conditions

Figure 7.1 displays the projected 2018 traffic volumes and Figure 7.2 illustrates the LOS for the current roadway network with projected 2018 socioeconomic conditions *if no roadway improvements are made (No-Build)*. Traffic volumes and LOS results in this section represent average annual daily traffic conditions. All roads located within the study area operate at a LOS A and B, except for the following:

LOS E
- Juan Sanchez Boulevard Mesa Street to US 95/Main Street

LOS D
- Juan Sanchez Boulevard from US 95/Main Street to 4th Avenue
- Juan Sanchez Boulevard from 5th Avenue to 6th Avenue
- Juan Sanchez Boulevard from 7th Avenue to 8th Avenue
- Juan Sanchez Boulevard from 0.9 mile east of 10th Avenue to Avenue F

LOS C
- County 22nd Street from Main Street to Orgullo del Sol Apartment entrance
- Juan Sanchez Boulevard from Moctezuma Apartment entrance to Mesa Street
- Juan Sanchez Boulevard from 4th Avenue to 5th Avenue
- Juan Sanchez Boulevard from 6th Avenue to 7th Avenue
- Juan Sanchez Boulevard from 10th Avenue to 0.9 mile east of 10th Avenue
- Juan Sanchez Boulevard from Avenue F to SR 195 east of Avenue E
- B Street west of Main Street
- US 95/Main Street from C Street to D Street
- Urtuzuastegui Street from 4th Avenue to 5th Avenue

FIGURE 7.1: TRAFFIC VOLUME 2018 NO BUILD

VOLUME

- 1 - 500
- 501 - 1,500
- 1,501 - 3,500
- 3,501 - 7,000
- 7,001 - 14,000
- 14,001 - 24,000
- 24,001 and above

Land Port of Entry

Study Roadway

Canal

International Boundary

San Luis

San Luis Rio Colorado

Study Area

Source: ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, YMPO

FIGURE 7.2: LEVEL OF SERVICE 2018 NO BUILD

Level of Service
- LOS A
- LOS B
- LOS C
- LOS D
- LOS E
- LOS F

- Land Port of Entry
- Study Roadway
- Canal
- International Boundary
- San Luis
- San Luis Rio Colorado
- Study Area

Source: ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, YMPO

Projected 2030 No-Build Traffic Conditions

Figure 7.3 displays the projected 2030 traffic volumes and Figure 7.4 illustrates the LOS for the current roadway network with projected 2030 socioeconomic conditions *if no roadway improvements are made (No-Build).* Traffic volumes and LOS results in this section represent averageannual daily traffic conditions. All roads located within the study area operate at a LOS A and B, except for the following:

LOS F
- Juan Sanchez Boulevard from US 95/Main Street to Joe Orduno Memorial Park entrance
- Juan Sanchez Boulevard 10th Avenue to SR 195 west of Avenue E
- Avenue F from south of Juan Sanchez Boulevard

LOS E
- County 22nd Street from Orgullo del Sol Apartment entrance to 4th Avenue
- Juan Sanchez Boulevard from Mesa Street to US 95/Main Street
- Juan Sanchez Boulevard from Joe Orduno Memorial Park entrance to Cesar Chavez Street
- Main Street north of County 22nd Street

LOS D
- County 22nd Street from Main Street to Orgullo del Sol Apartment entrance
- County 22nd Street from 4th Avenue to 8th Avenue
- Juan Sanchez Boulevard from Cesar Chavez Street to 4th Avenue
- Juan Sanchez Boulevard from 5th Avenue to 6th Avenue
- Juan Sanchez Boulevard from 7th Avenue to 8th Avenue
- Avenue E from Juan Sanchez Boulevard to 0.48 mile north of County 24th Street

LOS C
- County 22nd Street from 8th Avenue to 10th Avenue
- US 95/Main Street from C Street to D Street
- Juan Sanchez Boulevard from Moctezuma Apartment entrance to Mesa Street
- Juan Sanchez Boulevard from 4th Avenue to 5th Avenue
- Juan Sanchez Boulevard from 6th Avenue to 7th Avenue
- Juan Sanchez Boulevard from 8th Avenue to 10th Avenue
- Juan Sanchez Boulevard from o SR 195 east of Avenue E to study limits
- D Street from Main Street to 1st Avenue
- D Street from Cesar Chavez Street to 5th Avenue
- C Street from Archibald Street to east of 5th Avenue
- B Street from Archibald Street to 4thDrive
- B Street west of 5th Avenue to west of 6th Avenue
- Urtuzuastegui Street from Archibald Street to I LPOE, and again from 1st Avenue to 6th Avenue
- Main Street from Archibald Street to County 22nd Street
- 1st Avenue from Urtuzuastegui Street to B Street, and again from C Street to Juan Sanchez Boulevard
- 4th Avenue from 0.28 mile north of Union Street to Las Brisas Boulevard
- 10th Avenue from Juan Sanchez Boulevard to Black Street, from Krystal Street to County 22nd Street
- Avenue E from 0.48 mile north of County 24th Street to 0.47 mile north of County 25th Street
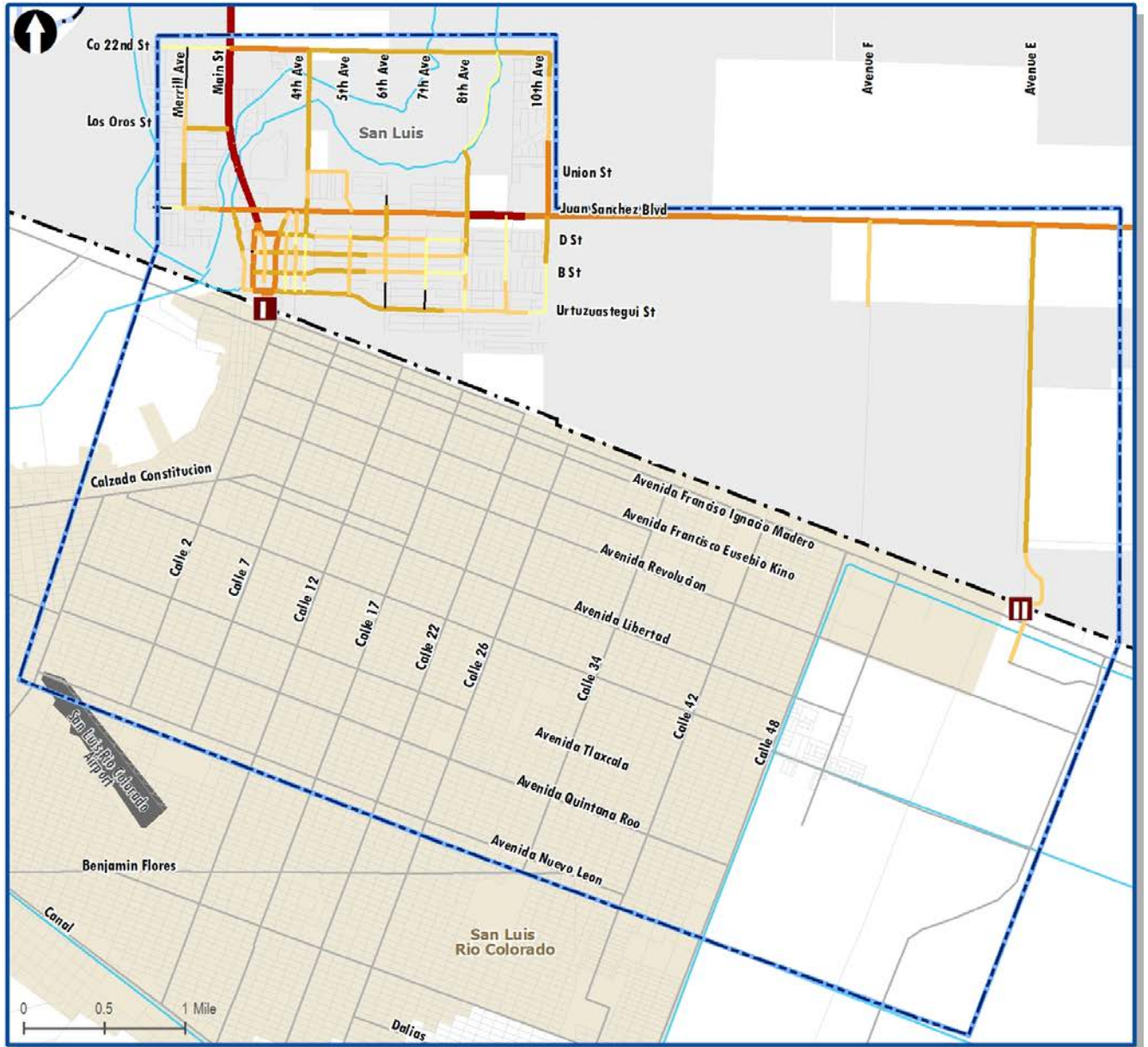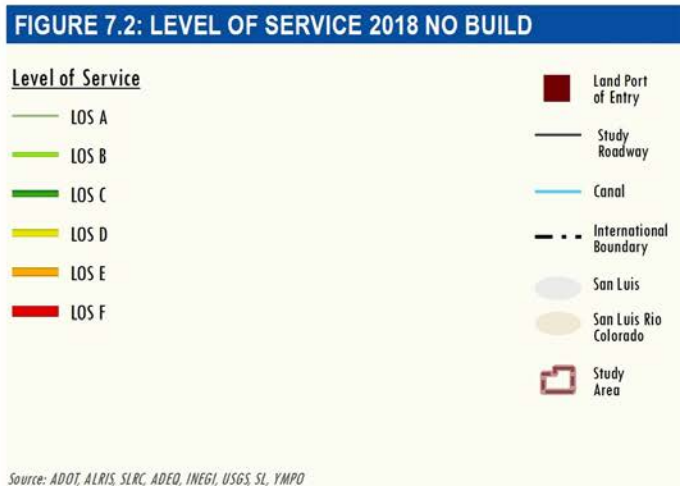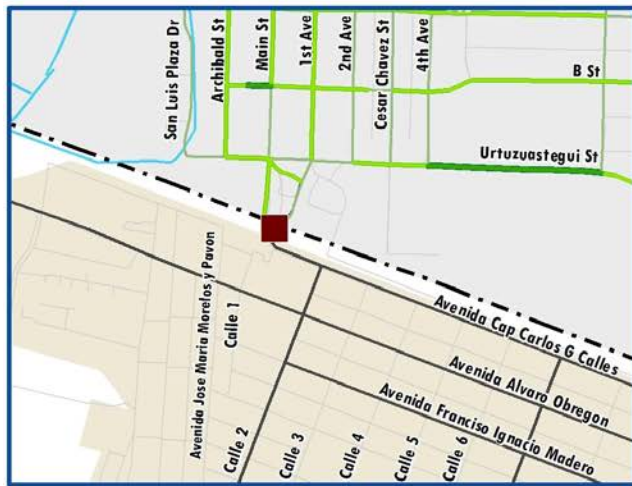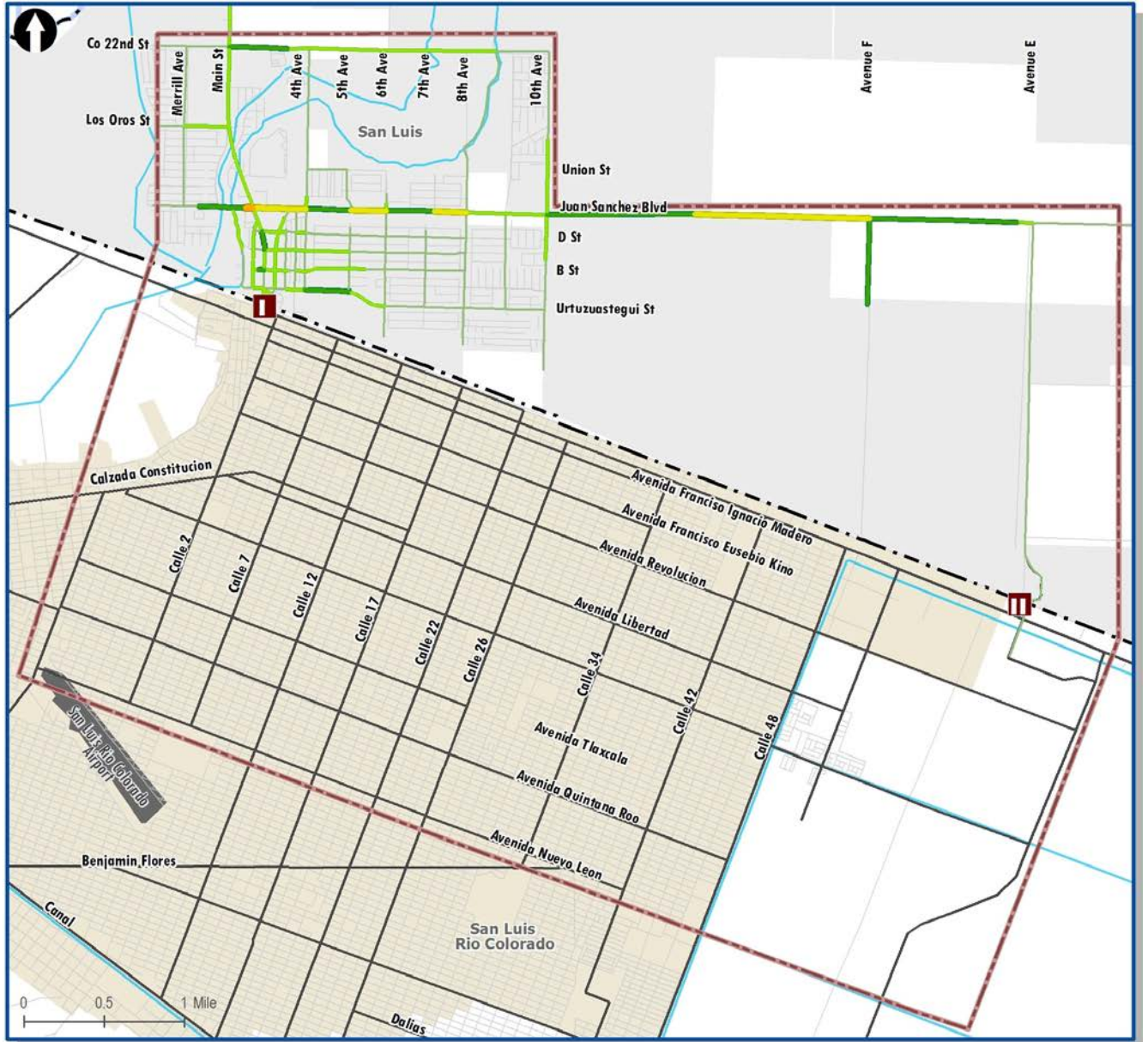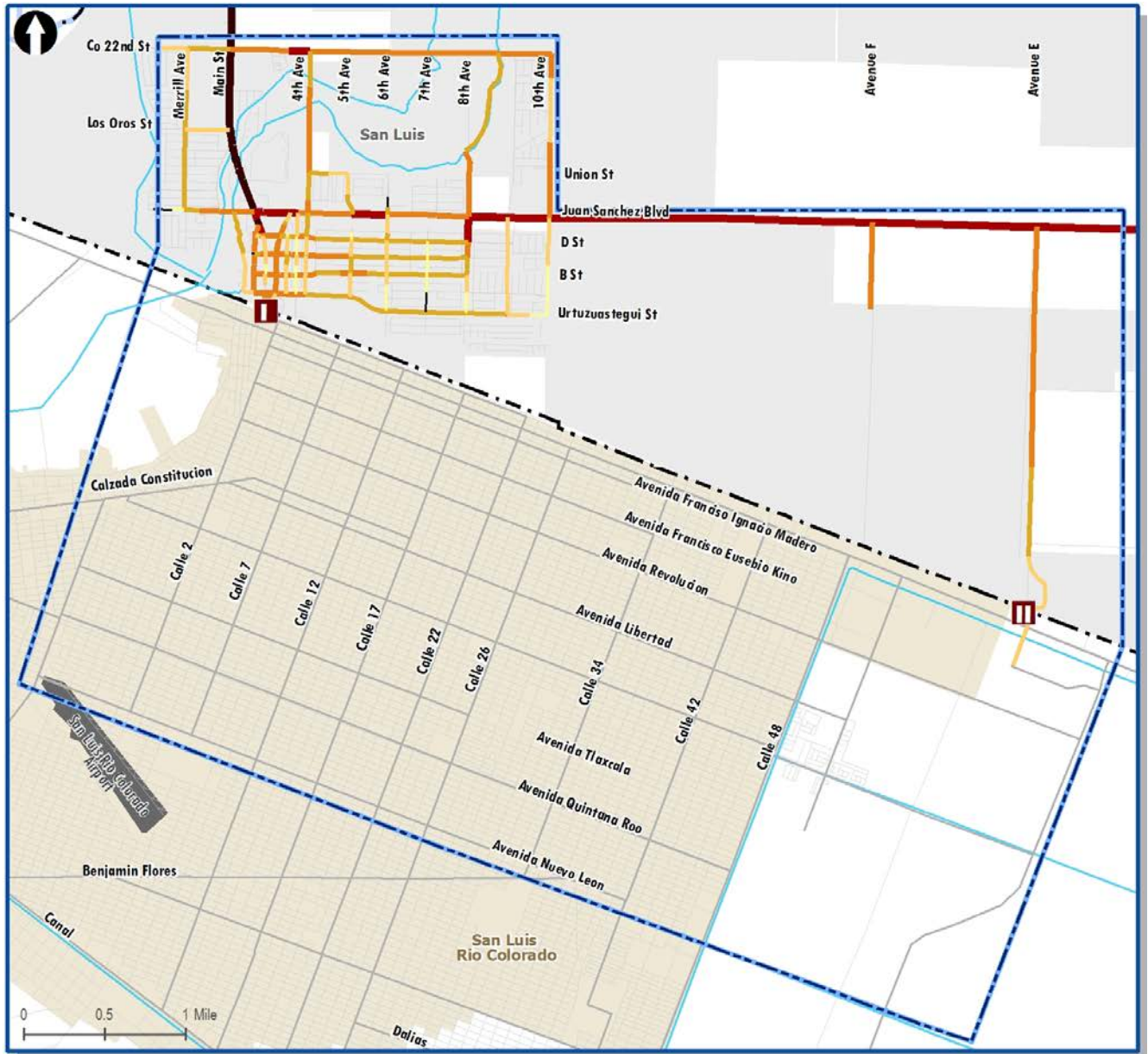
FIGURE 7.3: TRAFFIC VOLUME 2030 NO BUILD

VOLUME

— 1 - 500
— 501 - 1,500
— 1,501 - 3,500
— 3,501 - 7,000
— 7,001 - 14,000
— 14,001 - 24,000
— 24,001 and above

Land Port of Entry
Study Roadway
Canal
International Boundary
San Luis
San Luis Rio Colorado
Study Area

Source: ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, YMPO
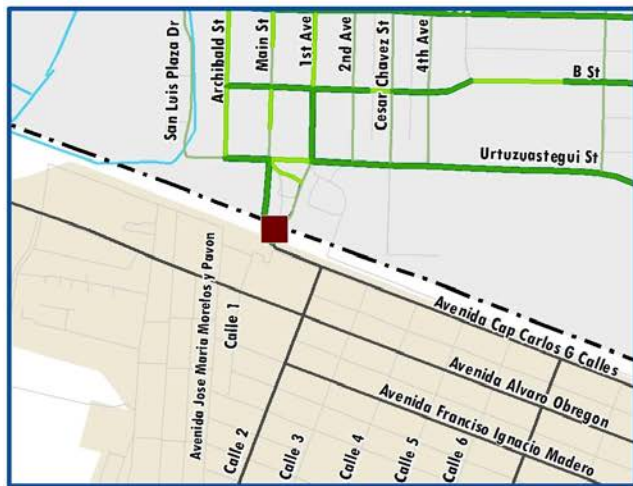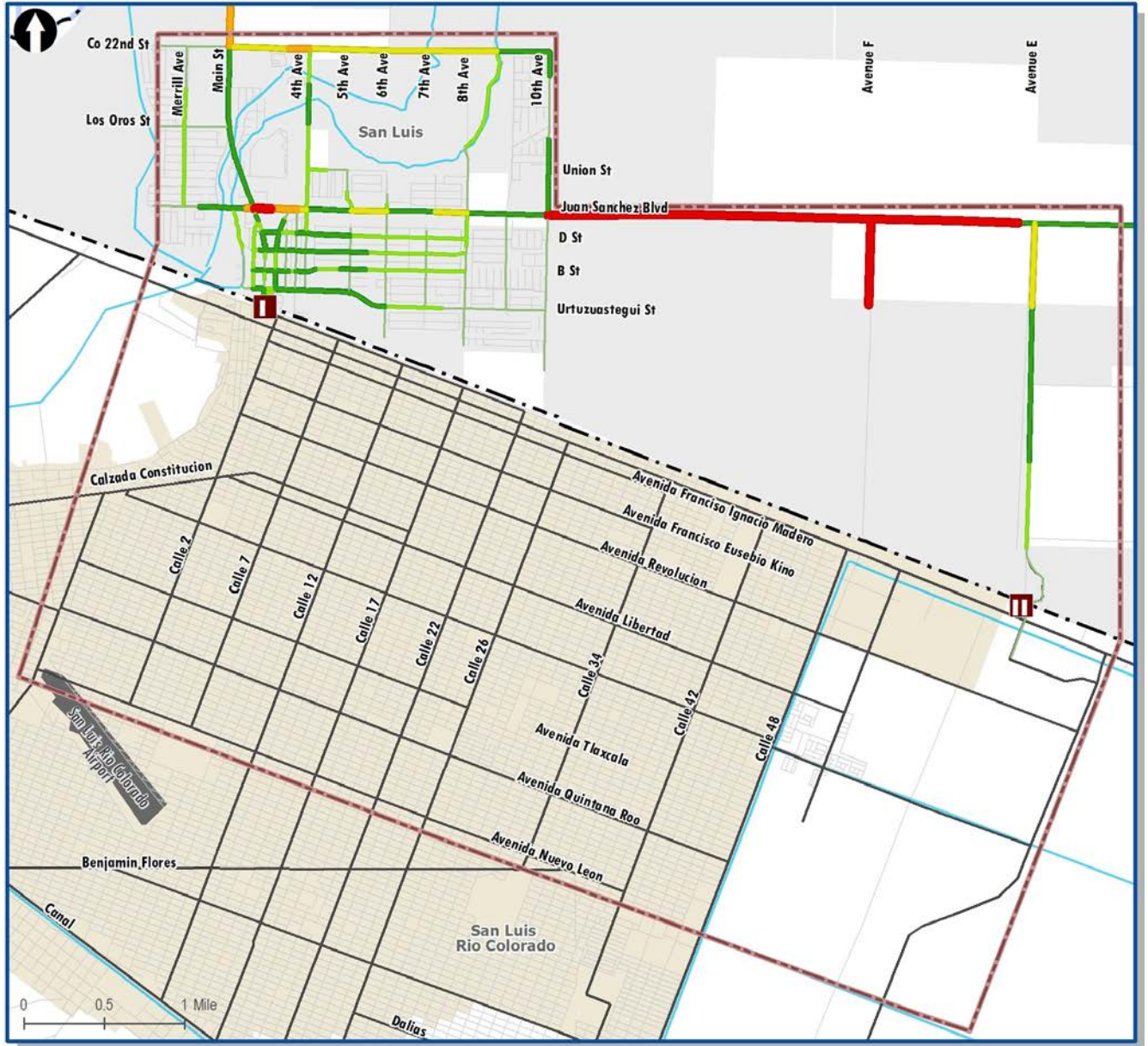
FIGURE 7.4: LEVEL OF SERVICE 2030 NO BUILD

Level of Service

- LOS A
- LOS B
- LOS C
- LOS D
- LOS E
- LOS F

Land Port of Entry

Study Roadway

Canal

International Boundary

San Luis

San Luis Rio Colorado

Study Area
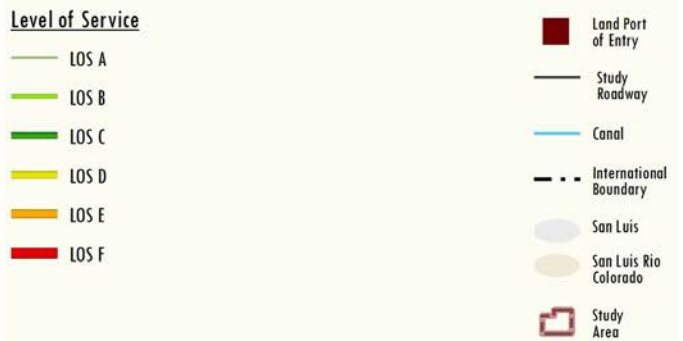
Source: ADOT, ALRIS, SLRC, ADEO, INEGI, USGS, SL, YMPO

Projected 2040 No-Build Traffic Conditions

Figure 7.5 displays the projected 2040 traffic volumes and Figure 7.6 illustrates the LOS for the current roadway network with projected 2040 socioeconomic conditions *if no roadway improvements are made (No-Build)*. Traffic volumes and LOS results in this section represent averageannual daily traffic conditions. All roads located within the study area operate at a LOS A and B, except for the following:

LOS F

- Juan Sanchez Boulevard from US 95/Main Street to Cesar Chavez Street
- Juan Sanchez Boulevard 10th Avenue to SR 195 west of Avenue E
- Avenue F from Juan Sanchez Boulevard to Los Olivos Drive
- Main Street north of County 22nd Street
- County 22nd Street from Orgullo del Sol Apartment entrance to 4th Avenue

LOS E

- County 22nd Street from Main Street to west of 4th Avenue
- Juan Sanchez Boulevard from Avenue J to San Luis Plaza Drive
- Juan Sanchez Boulevard from Mesa Street to US 95/Main Street
- Juan Sanchez Boulevard from 5th Avenue to 6th Avenue
- Juan Sanchez Boulevard from 7th Avenue to 8th Avenue

LOS D

- County 22nd Street from 4th Avenue to 8th Avenue
- Juan Sanchez Boulevard from Moctezuma Apartment entrance to Avenue J
- Juan Sanchez Boulevard from San Luis Plaza Drive to Mesa Street
- Juan Sanchez Boulevard from Cesar Chavez Street to 4th Avenue
- Juan Sanchez Boulevard from 8th Avenue to east of 9th Avenue
- Juan Sanchez Boulevard from o SR 195 east of Avenue E to study limits
- D Street from Main Street to 1st Avenue
- D Street from 4th Avenue to 4th Drive
- C Street from Main Street to 2nd Avenue
- C Street from Cesar Chavez Street to 4th Drive
- B Street from Archibald Street to 2nd Avenue
- B Street from 4th Avenue to 4th Drive
- Avenue E from Juan Sanchez Boulevard to 0.48 mile north of County 24th Street
- Urtuzuastegui Street from Archibald Street to I LPOE
- Urtuzuastegui Street from 4th Avenue to 6th Avenue
- Main Street from Juan Sanchez Boulevard to County 22nd Street

LOS C

- County 22nd Street from 8th Avenue to 10th Avenue
- Juan Sanchez Boulevard from 4th Avenue to 5th Avenue
- Juan Sanchez Boulevard from 6th Avenue to 7th Avenue
- Juan Sanchez Boulevard from 8th Avenue to 10th Avenue

LOS C (continued)

- D Street from 2nd Avenue to Cesar Chavez Street
- D Street from 4th Drive to 6th Avenue
- C Street from Archibald Street to Main Street
- C Street from 2nd Avenue to Cesar Chavez Street
- C Street from 4th Drive to 6th Avenue
- B Street from 2nd Avenue to 4th Avenue
- B Street from 4th Drive to 6th Avenue
- Urtuzuastegui Street from 1st Avenue to 4th Avenue
- Urtuzuastegui Street from 6th Avenue to east of 8th Avenue
- US 95/Main Street from Archibald Street to County 22nd Street
- US 95/Main Street from C Street to D Street
- Merrill Avenue from Los Valles Street to Aquila Street
- San Luis Plaza Drive south of Juan Sanchez Boulevard
- Archibald Street from D Street to Urtuzuastegui Street
- 1st Avenue from Urtuzuastegui Street to south of Juan Sanchez Boulevard
- 4th Avenue from Juan Sanchez Boulevard to Arizona Street
- 4th Avenue from Las Brisas Boulevard to Union Street
- 8th Avenue south of Juan Sanchez Boulevard
- 10th Avenue from Juan Sanchez Boulevard to Black Street
- 10th Avenue from Krystal Street to County 22nd Street
- Avenue E from 0.48 mile north of County 24th Street to 0.47 mile north of County 25th Street
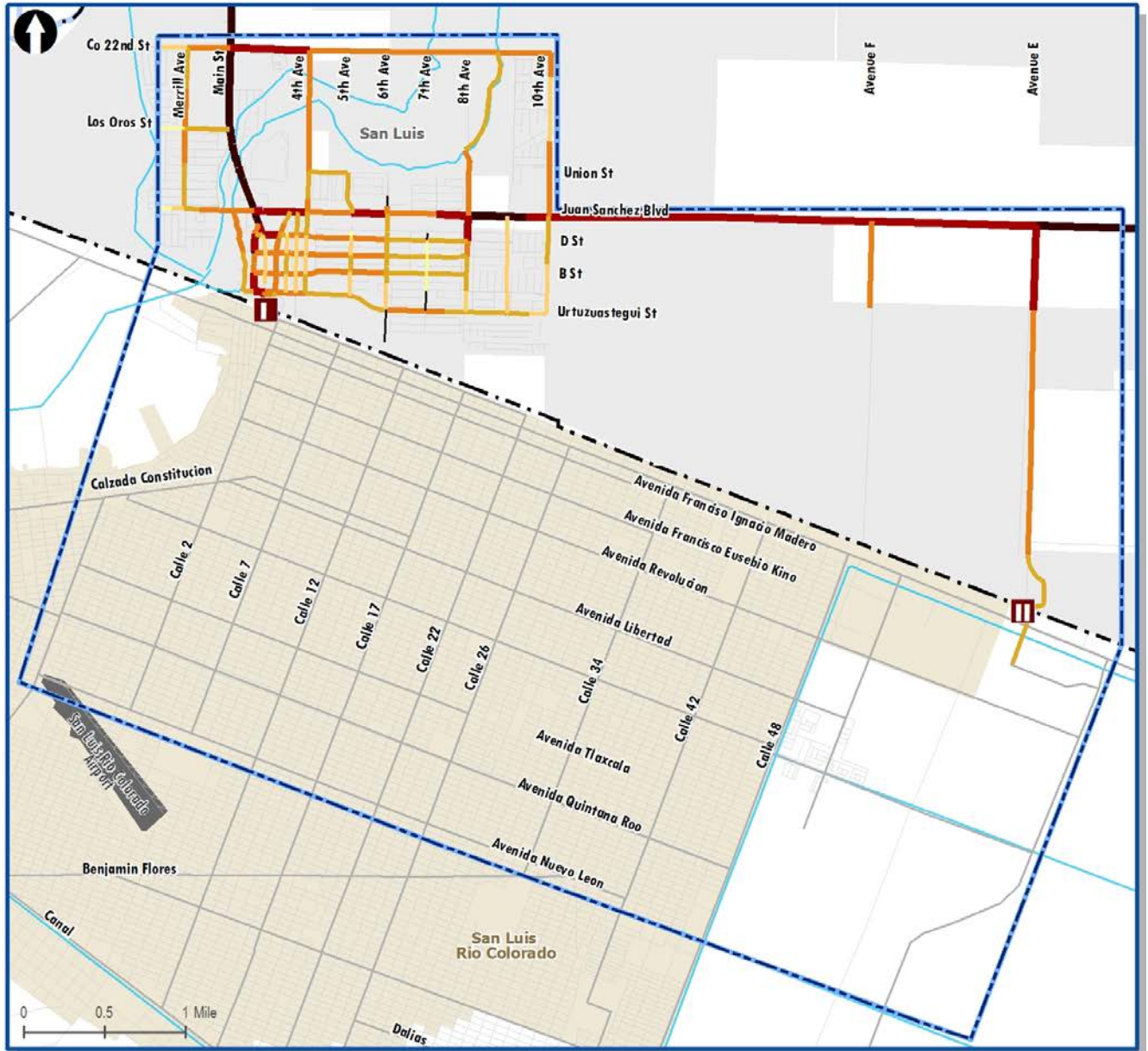
FIGURE 7.5: TRAFFIC VOLUME 2040 NO BUILD

VOLUME

——	1 - 500
——	501 - 1,500
——	1,501 - 3,500
——	3,501 - 7,000
——	7,001 - 14,000
——	14,001 - 24,000
——	24,001 and above

Land Port of Entry
Study Roadway
Canal
International Boundary
San Luis
San Luis Rio Colorado
Study Area

Source: ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, YMPO
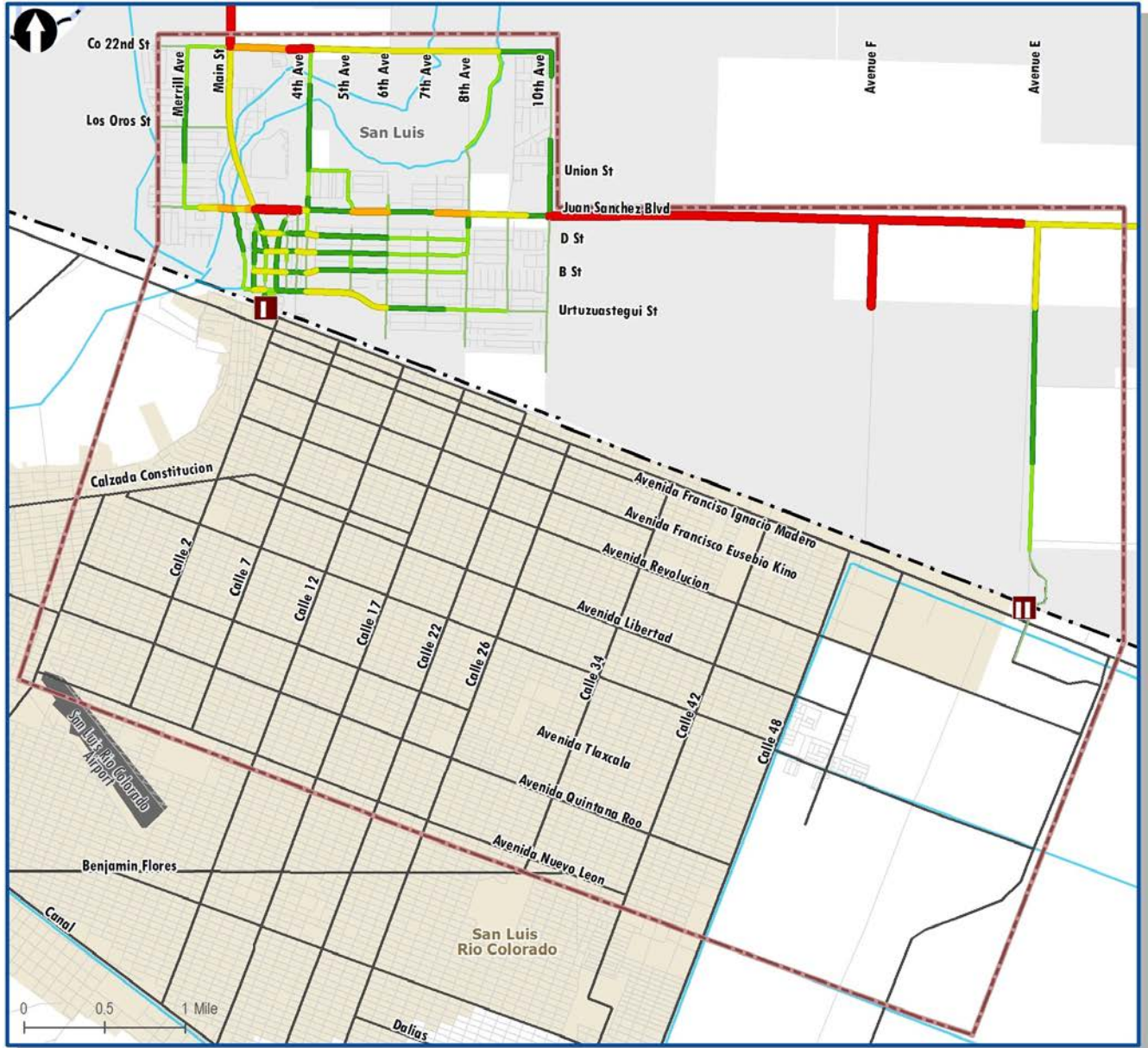
FIGURE 7.6: LEVEL OF SERVICE 2040 NO BUILD

Level of Service

LOS A
LOS B
LOS C
LOS D
LOS E
LOS F

Land Port of Entry
Study Roadway
Canal
International Boundary
San Luis
San Luis Rio Colorado
Study Area

Source: ADOT, ALRIS, SLRC, ADEQ, INEGI, USGS, SL, YMPO

Summary of Future Conditions

The following is a summary of findings from the future conditions analysis.

- Population and employment growth between 2013 to 2018 is relatively small, resulting in little change in traffic volume and trends.

- Juan Sanchez Boulevard by 2030 is highly congested in the vicinity of US 95/Main Street as a result of the people trying to access the U.S. Post Office and again east of the 10th Avenue where future growth is expected to occur.

- County 22nd Street, by 2040, from US95/Main Street to 4th Avenue is congested as it is used as alternative route to the congested Main Street and Juan Sanchez Boulevard.

- In 2040 the east-west streets in the downtown area are moderately congested as they carry traffic between the one-way couplets (Archibald Street and 1st Avenue) and Main Street.

- In addition, the same east-west streets experience moderate congestions as the roads transition from the downtown area to the residential area to the east.

8.0 ORIGIN-DESTINATION SURVEY

An Origin-Destination Survey was conducted to get a better understanding of the daily travel characteristics between the two cities, surrounding communities, region, and daily activities at the San Luis I LPOE. The survey was conducted at the northbound and southbound terminals on the U.S. side of San Luis I LPOE for one day during the week of March 12th. Privately owned vehicles (POV), pedestrians, and bicyclists were surveyed for three periods:

- Morning (6:00 AM - 10:00 AM)
- Mid-day (11:00 AM - 1:00 PM)
- Evening (4:00 PM - 7:00 PM

A total of 1,605 drivers and 448 pedestrians were surveyed. The total number of drivers at the respective terminals were 719 northbound and 886 southbound with a capture rate of 10 to 12 percent of the total southbound traffic in the afternoon. In comparison, the pedestrians surveyed were 249 northbound and 199 southbound with a capture rate of two to three percent of total southbound pedestrians in the afternoon.

Survey Questions

In general, drivers and pedestrians were asked the same questions such as "where are you going", "how long is your trip", "how often do you cross the border", and "what is the purpose of your trip" as shown in Figure 8.1.

Figures 8.2 to 8.8 display survey results for POV, while Figures 8.9-8.16 display survey results for pedestrians. Next to each figure there is a summary of findings for the item displayed. Overall the majority of the travel is contained between San Luis and San Luis Rio Colorado for shopping, visiting family, or personal reasons like doctor's appointment. Farm workers constituted a large portion of the pedestrian traffic at the LPOE

FIGURE 8.1: SAMPLE SURVEY QUESTIONS

Privately Owned Vehicles (POVs) Survey Results

FIGURE 8.2: POV SURVEY RESULTS - TIME OF DAY
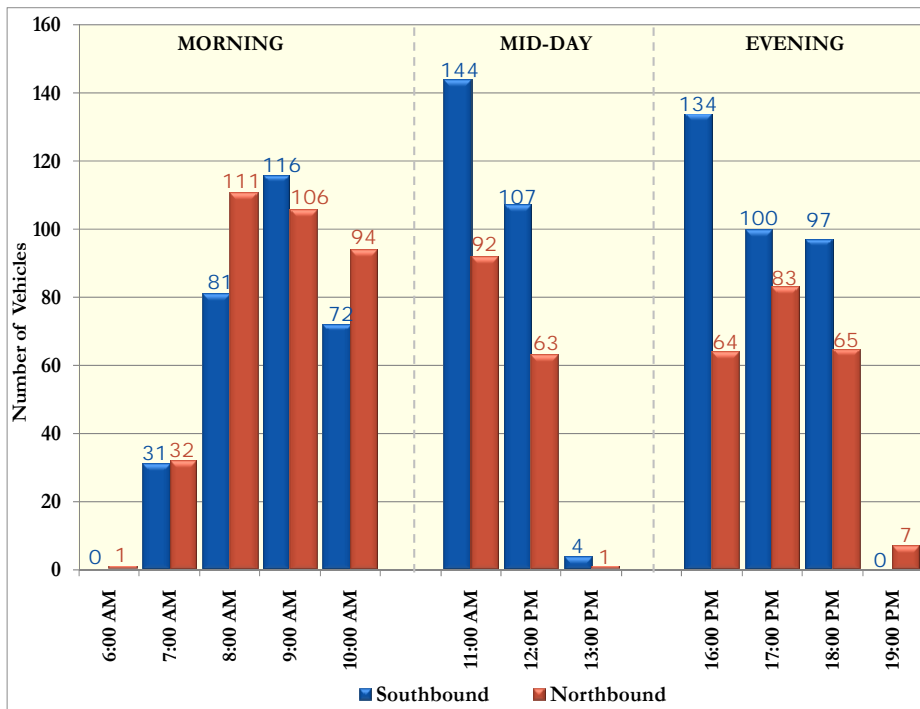
Of the Total Trips

- 40% occurred in the *morning* (6 - 10 AM)
- 34% in the *evening* (4 - 7 PM)
- 26% during *mid-day* (11 AM - 13 PM)
- 11 AM Peak Hour: 236 trip

Northbound Facts

- 48% were morning trips
- 30% were evening trips
- 8 AM Peak Hour: 111 trips

Southbound Facts

- 37% were evening trips
- 34% were morning trips
- 11 AM Peak Hour: 144 trips

FIGURE 8.3: POV SURVEY RESULTS - NUMBER OF PASSENGERS
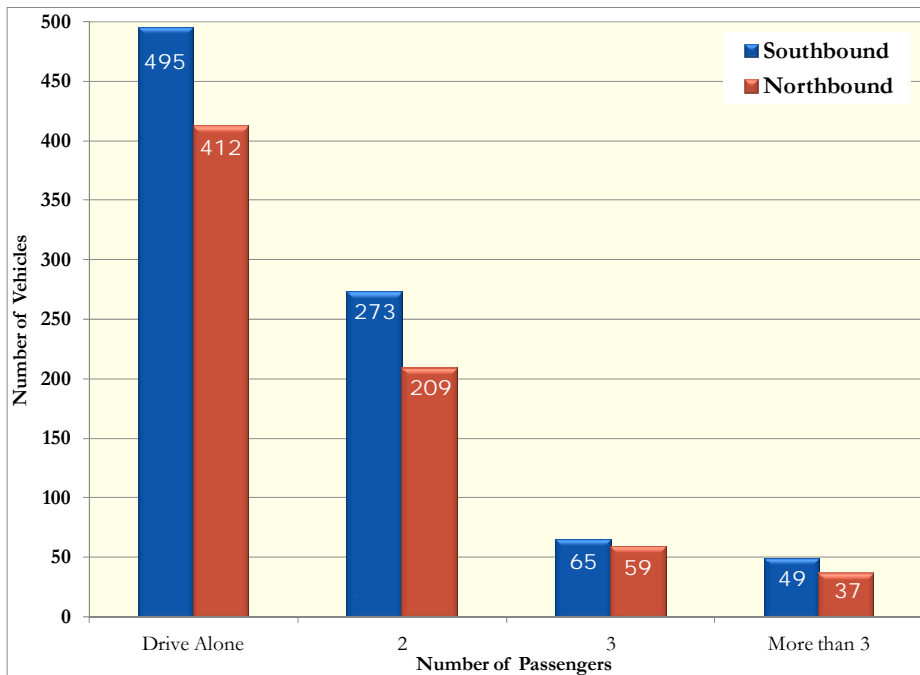
Of the Total Drivers

- 57% *drove alone*
- 43% carpooled
- Average Occupancy: 1.48

Northbound Facts

- 57% *drove alone*
- 43% carpooled

Southbound Facts

- 56% *drove alone*
- 44% carpooled

FIGURE 8.4: POV SURVEY RESULTS - VEHICLE TYPE
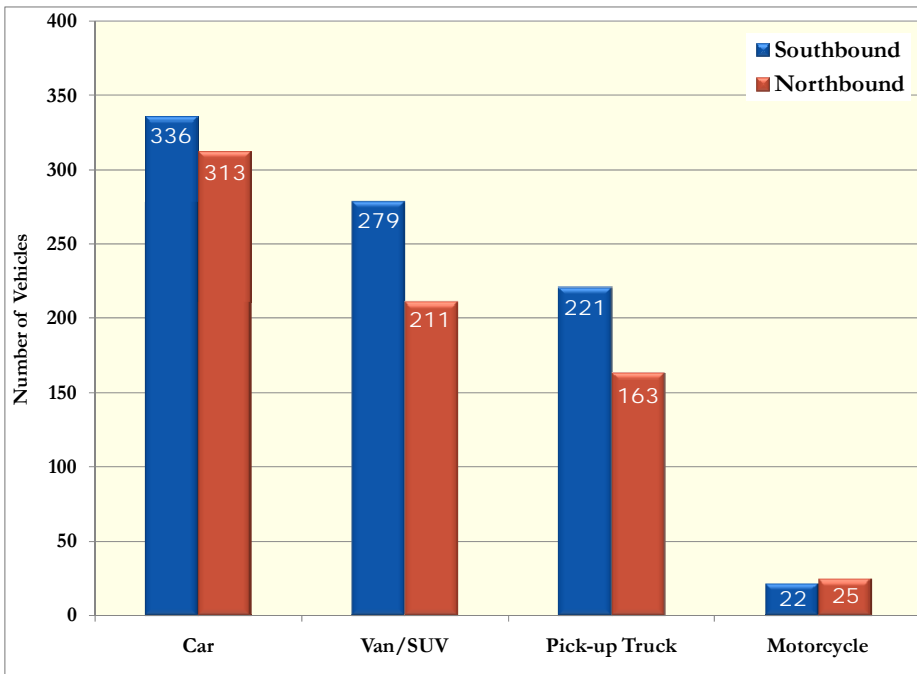
Of the total Vehicles
- 41% were *Cars*
- 31% were *Van/SUV*
- 24% *were Pick-up Trucks*

Northbound Facts
- 44% *Cars*
- 30% *Van/SUV*
- 23% *Pick-up Trucks*

Southbound Facts
- 39% *Cars*
- 33% *Van/SUV*
- 26% *Pick-up Trucks*

FIGURE 8.5: POV SURVEY RESULTS - TRIP PURPOSE
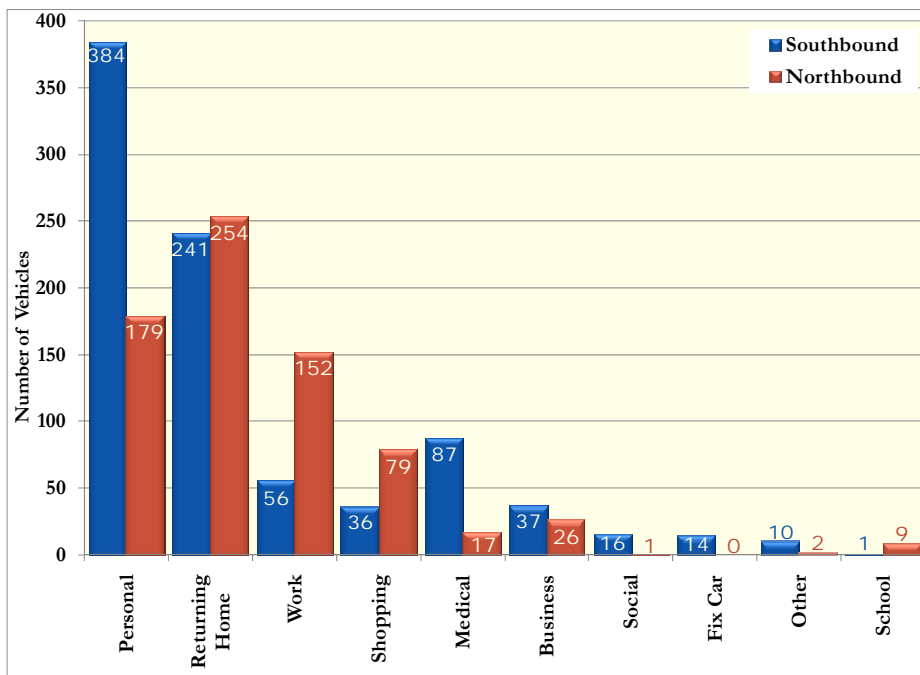
Of the Total Trips
- It seems that there is a trip exchange between the two directions; the highest purpose southbound is Personal while the northbound is Home Trips.

Northbound Facts
- 35% *Home(returning home)* trips
- 25% *Personal* trips
- 21% *Work* trips

Southbound Facts
- 44% *Personal* trips
- 27% *Home* trips
- 10% *Medical* trips

Personal includes Family, Pick up Children, and Personal. Other includes Baseball, Fishing, and Vacation

FIGURE 8.6: POV SURVEY RESULTS - TRIP ORIGIN AND DESTINATION

Southbound

MEXICO
To
San Luis Rio Colorado

From
San Luis: 477
Yuma Area: 259
Somerton: 75

Other Origins - Other Destination: 71

Southbound Facts

- Majority of trips *end* in San Luis Rio Colorado:
- 54% from San Luis,
  - 216 *Personal* trips
  - 118 *Home* trips
- 29% from Yuma Area,
  - 100 *Personal* trips
  - 71 *Home* trips
- 9% from Somerton,
  - 21 *Personal* trips

Northbound

USA
To
San Luis: 384
Yuma Area: 234
Somerton: 40

From
San Luis Rio Colorado

Other Origins - Other Destination: 61

Northbound Facts

- Majority of trips *originate* in San Luis Rio Colorado:
- 53% to San Luis,
  - 147 *Home* trips
  - 96 *Personal* trips
- 33% to the Yuma Area,
  - 76 *Work* trips
  - 62 *Personal* trips
- 6% to Somerton,
  - 23 *Home* trips

FIGURE 8.7: POV SURVEY RESULTS - EXPECTED TRIP LENGTH

Of the Total Trips

- More than half (83%) were day trips (*less than a day*)
- 10% were to last *more than a month*

Northbound Facts

- 64% *day* trips
- 43% of trips were to last *more than a month*

Southbound Facts

- 97% *day* trips
- 2% of trips were for *1 - 3 days*
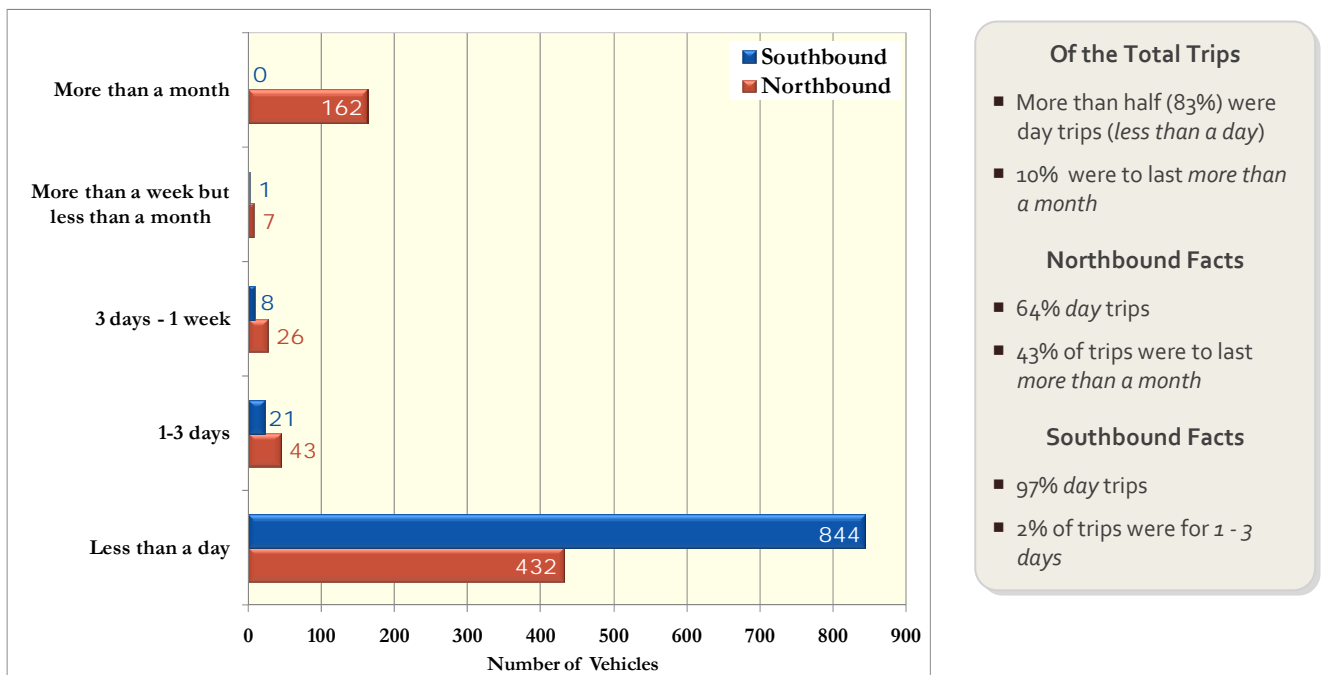
FIGURE 8.8: POV SURVEY RESULTS - BORDER CROSSING
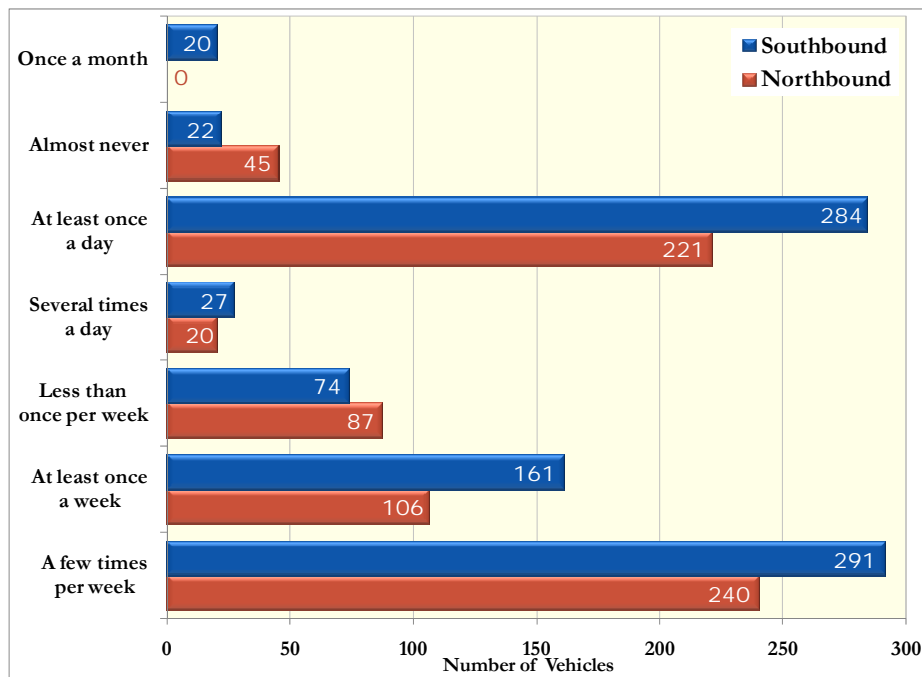
Of the Total Drivers

- 33% cross the border *a few times per week*
- 29% *at least once a day*

Northbound Facts

- 33% *a few times per week*
- 27% *at least once a day*

Southbound Facts

- 33% *a few times per week*
- 31% *at least once a day*

Pedestrian and Bicyclists Surveyed

FIGURE 8.9: PEDESTRIAN SURVEY RESULTS - SOUTHBOUND PEDESTRIANS
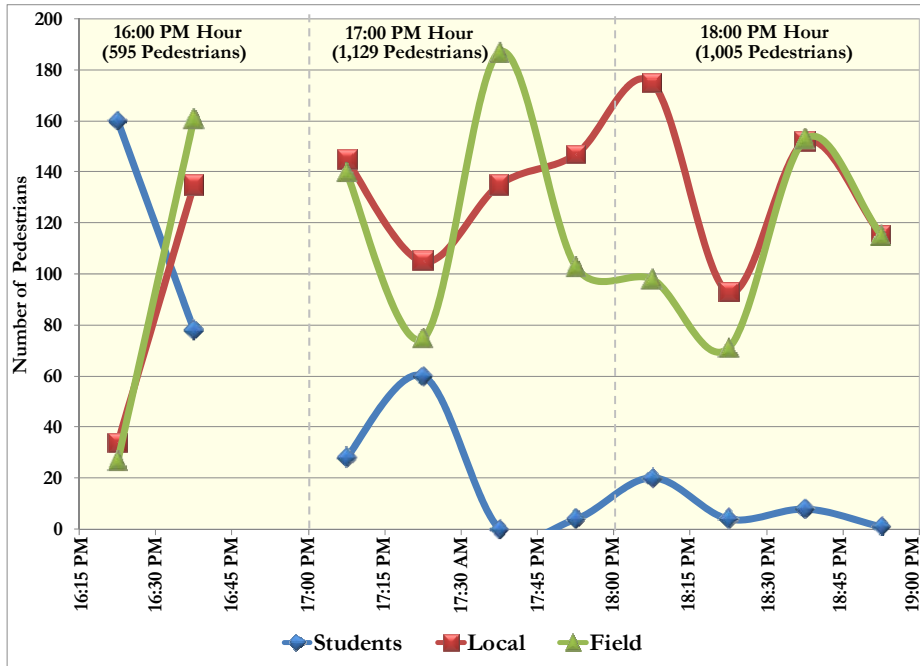
Counted Pedestrians

- 2,729 southbound pedestrians were counted from 16:15 PM to 19:00 PM
- 363 Students
- 1,236 Local
- 1,130 Field

Survey Pedestrians

- 448 total pedestrians were surveyed
- Northbound: 249
- Southbound: 199

Capture Rate

- 2 -3% of total pedestrians in the afternoon.

Students: Children and/or teenager with school uniform and/or backpack; Local: People carrying groceries and/or adults/young adults with work purposes (other than field); Field: People coming from either local or region field work.

FIGURE 8.10: PEDESTRIAN SURVEY RESULTS - TIME OF DAY
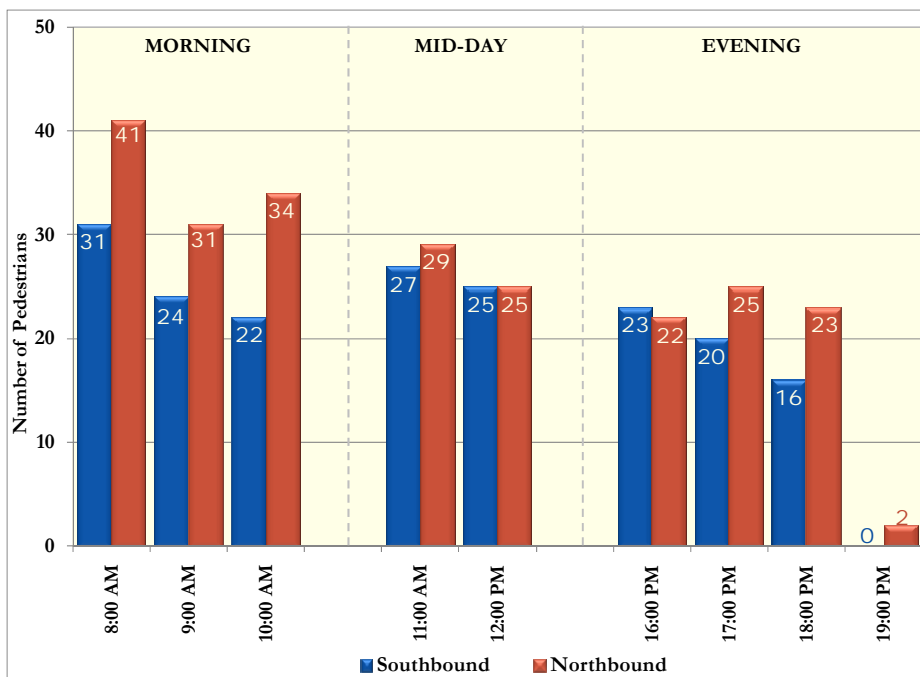
Of the Total Trips

- 47% occurred in the *morning* (6 - 10 AM)
- 29% in the *evening* (4 - 7 PM)
- 24% during the *mid-day* (11 AM - 13 PM)
- 8 AM Peak Hour: 72 Pedestrians

Northbound Facts

- 49% were *morning* trips
- 29% were *evening* trips
- 8 AM Peak Hour: 41 Pedestrians

Southbound Facts

- 44% were *evening* trips
- 30% were *morning* trips
- 8 AM Peak Hour: 31 Pedestrians

FIGURE 8.11: PEDESTRIAN SURVEY RESULTS - NUMBER OF PEDESTRIANS
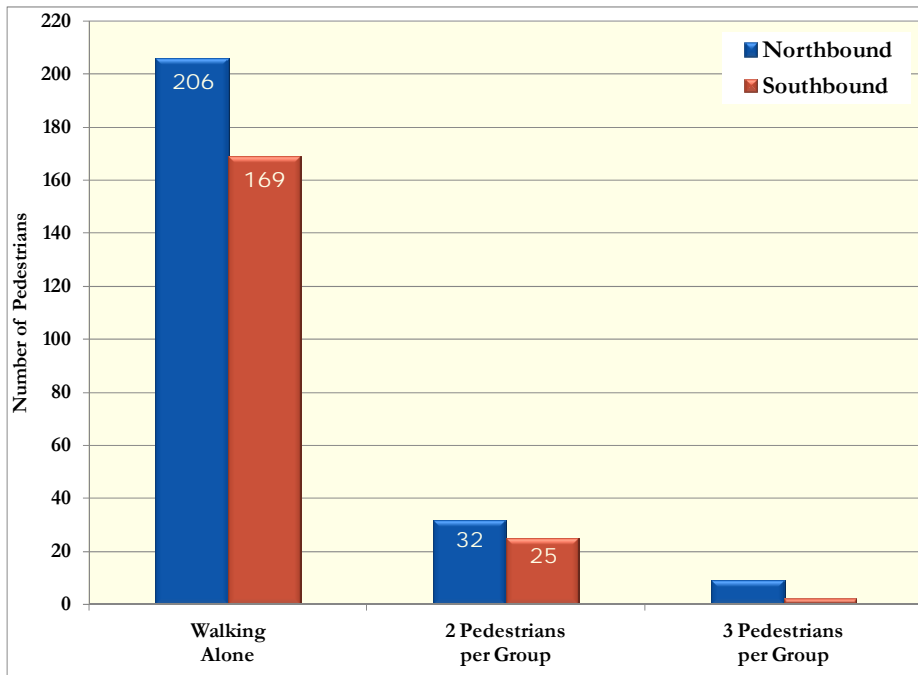
Of the Total Pedestrians

- 85% walked alone
- 15% walked with a group

Northbound Facts

- 83% walked alone
- 17% walked in a group

Southbound Facts

- 86% walked alone
- 14% walked in a group

FIGURE 8.12: PEDESTRIAN SURVEY RESULTS - GENDER
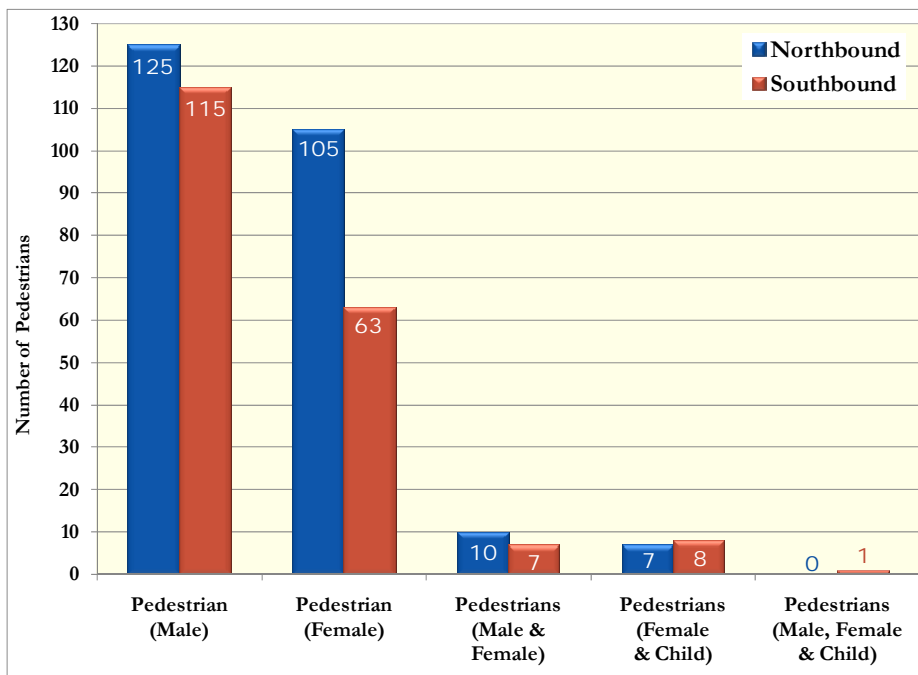
Of the Total Pedestrians

- 55% of were male
- 37% were female

Northbound Facts

- 50% male
- 42% female
- 3% traveled with a child

Southbound Facts

- 59% male
- 32% female
- 4% traveled with a child

FIGURE 8.13: PEDESTRIAN SURVEY RESULTS - TRIP PURPOSE
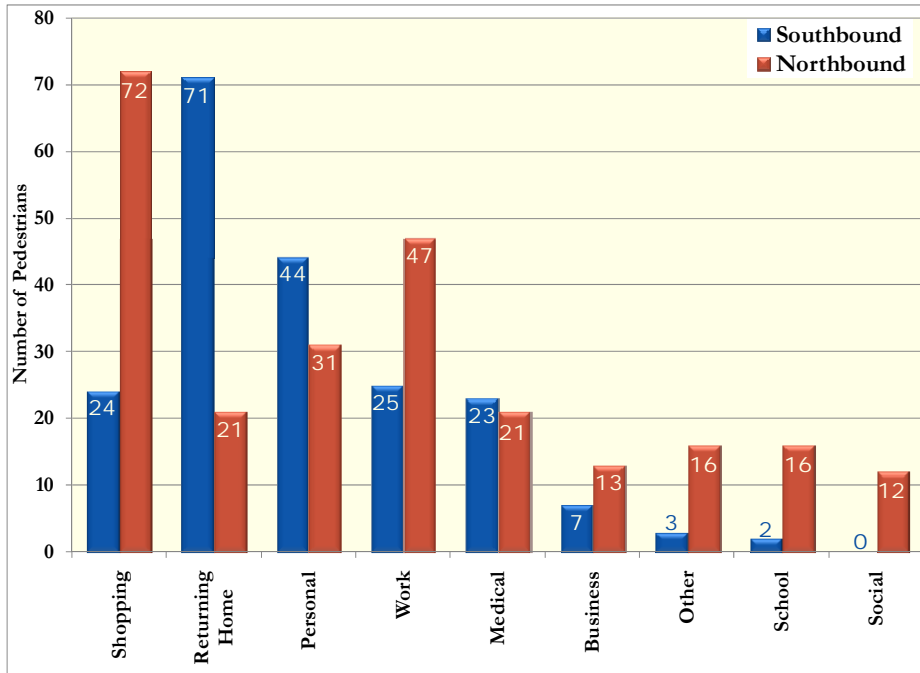
Of the Total Trips

- It seems that there is a trip exchange between the two directions; the highest purpose southbound is *Home* trips while the northbound is *Shopping* trips

Northbound Facts

- 29% *Shopping* trips
- 19% *Work* trips
- 12% *Personal* trips

Southbound Facts

- 36% *Home* trips
- 22% *Personal* trips
- 13% *Work* trips

*Personal includes Family, Pick up Children, and Personal.

FIGURE 8.14: PEDESTRIAN SURVEY RESULTS - TRIP ORIGIN AND DESTINATION

Southbound

MEXICO
To
San Luis Rio Colorado

From
San Luis: 116
Yuma Area: 41
Somerton: 19

Other Origins – Other Destination: 23

Southbound Facts

- Majority of trips **end** in San Luis Rio Colorado:
- 58% from San Luis,
  - 32 *Personal* trips
  - 33 *Home* trips
  - 22 *Shopping* trips
- 21% from Yuma Area,
  - 17 *Home* trips
- 10% from Somerton,
  - 9 *Home* trips

Northbound

USA
To
San Luis: 187
Yuma Area: 38
Somerton: 15

From
San Luis Rio Colorado

Other Origins - Other Destination: 9

Northbound Facts

- Majority of trips **originate** in San Luis Rio Colorado:
- 75% from San Luis,
  - 64 *Shopping* trips
  - 33 *Work* trips
- 15% to Yuma Area,
  - 10 Work trips
  - 7 Shopping trips
- 6% to Somerton,
  - 5 Personal trips

FIGURE 8.15: PEDESTRIAN SURVEY RESULTS - EXPECTED TRIP LENGTH
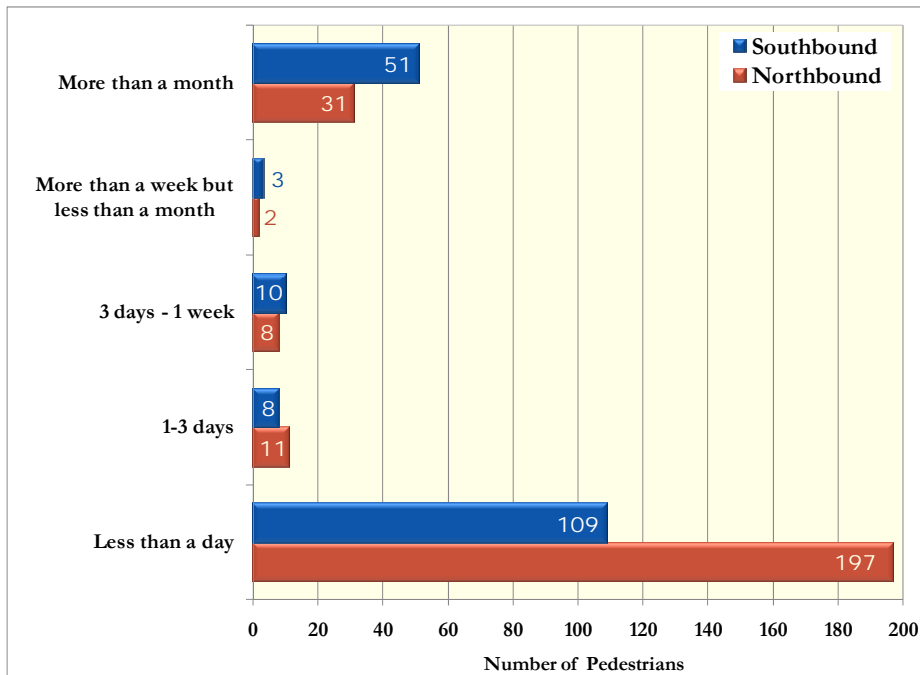
Of the Total Trips

- 70% of total trips were day trips *(less than a day)*
- 20% of total trips were to last *more than a month*

Northbound Facts

- 79% day trips
- 12% of trips were to last *more than a month*

Southbound Facts

- 60% day trips
- 28% of trips were to last *more than a month*

FIGURE 8.16: PEDESTRIAN SURVEY RESULTS - BORDER CROSSING
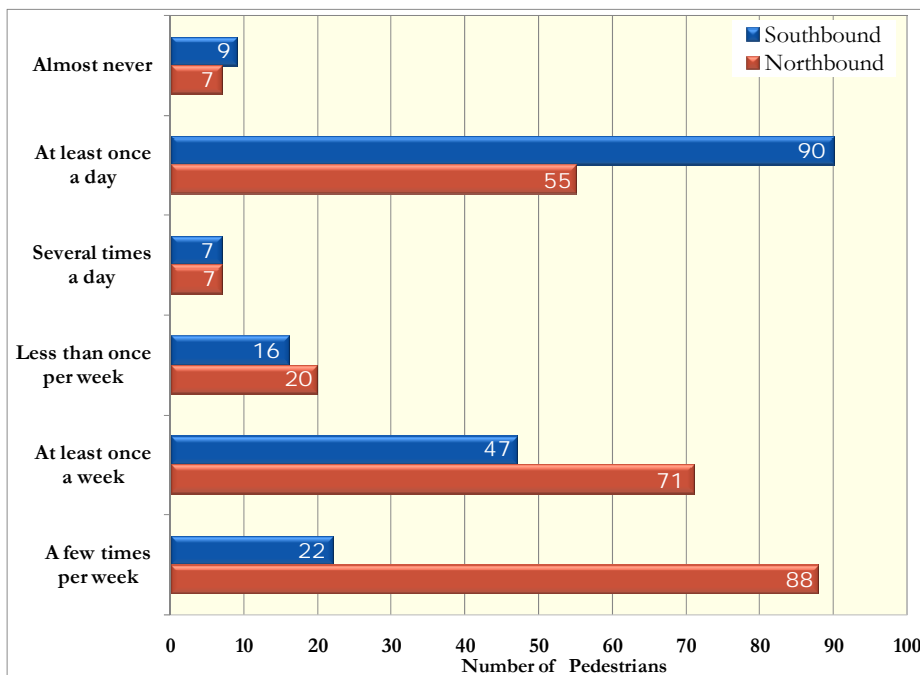
Of the Total Pedestrians

- 33% cross the border *at least once a day*
- 27% *a few times per week*

Northbound Facts

- 35% *a few times per week*
- 29% *at least once a week*

Southbound Facts

- 47% *at least once a day*
- 25% *at least once a week*

9.0   SAN LUIS LAND PORT OF ENTRY I OPERATIONAL ANALYSIS

To develop an effective long range transportation plan for the Binational area, the daily activities at San Luis I LPOE were assessed. Operational activities at the port strongly impacts the surrounding transportation facilities in San Luis and San Luis Rio Colorado as it is the only processing location for non-commercial vehicles, pedestrians, and bicyclist. Below is a summary of the findings; a more detailed report of the operational condition of San Luis I LPOE is located in Appendix A.

Figure 9.1 displays the traffic volume by the different modes at San Luis I LPOE over a 16 year period. Commercial trucks prior to the opening of San Luis II LPOE in November 2010 were processed at San Luis I LPOE. As illustrated in the figure, commercial truck and pedestrian activity are influenced by the season; higher in the winter months during the harvesting and lower in the summer months. Major events in history impact LPOE activity as well, as denoted by the dash red line which first represents the effects of 9/11 events while the latter represents the economic recession of 2008. The commercial and pedestrian activity have remained relatively steady over the last 16 years, however POV activity is still declining from its peak in January 2005.

FIGURE 9.1: TRAFFIC VOLUME AT SAN LUIS I LPOE FROM JANUARY 1995 TO JANUARY 2011
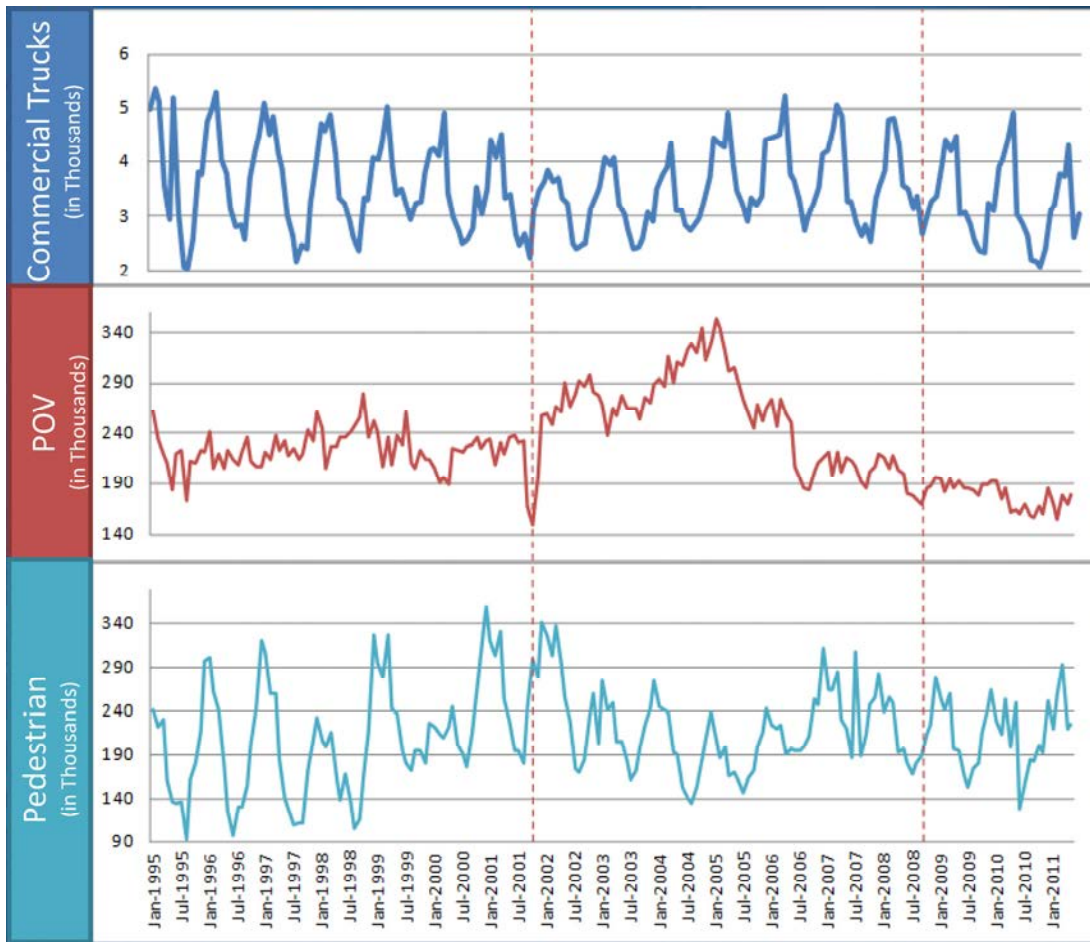
As shown in Figure 9.2 - 9.3. traffic volume for both POVs and pedestrians is distributed evenly throughout out the week, indicting the San Luis I LPOE is used on a daily basis by the local population.

FIGURE 9.2: POV TRAFFIC VOLUME DISTRIBUTION BY DAY OF THE WEEK
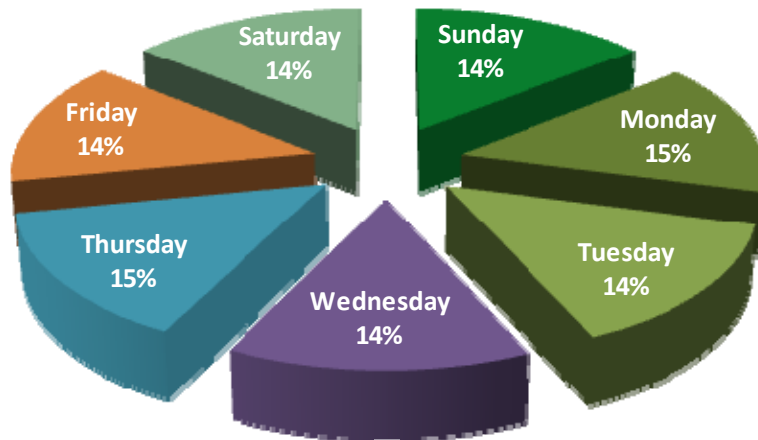
FIGURE 9.3: PEDSTRIAN TRAFFIC VOLUME DISTRIBUTION BY DAY OF THE WEEK
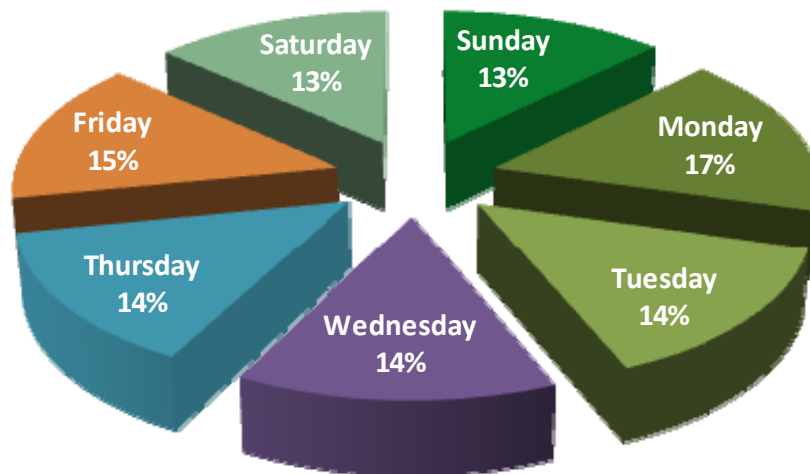
Figure 9.4 illustrates the POV volumes by the hour of the day, while Figure 9.5 illustrates the POV wait times by hour of the day. POV congestion at the northbound lanes of San Luis I LPOE is relatively constant throughout an average day, with the exception of the period between 2 AM and 4 AM, where there is a significant drop in vehicular. Wait time characteristics also follows the same daily distribution pattern as the traffic volume with the longest wait time occurring between 12 PM to 5 PM. Pedestrians are also crossing in an even flow throughout the day with the exception of the early hours of the day from 3 AM to 6 AM when farm workers arrive at the port causing congestion that translates in longer wait time. Figures 9.6 and 9.7 display the pedestrian volume by hour and POV wait time by hour respectively.

FIGURE 9.4: POV VOLUME BY DAY HOUR
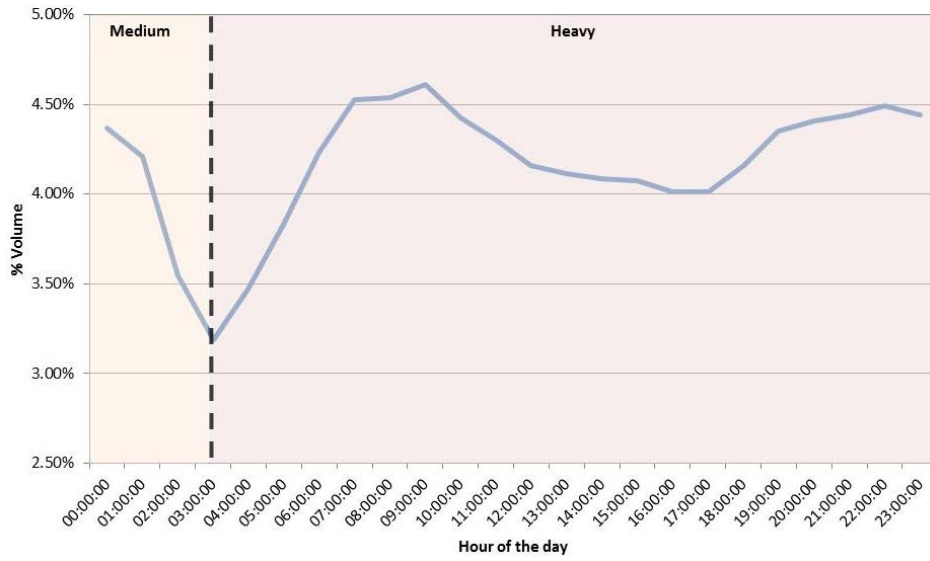
FIGURE 9.5: POV WAITING TIME BY DAY HOUR
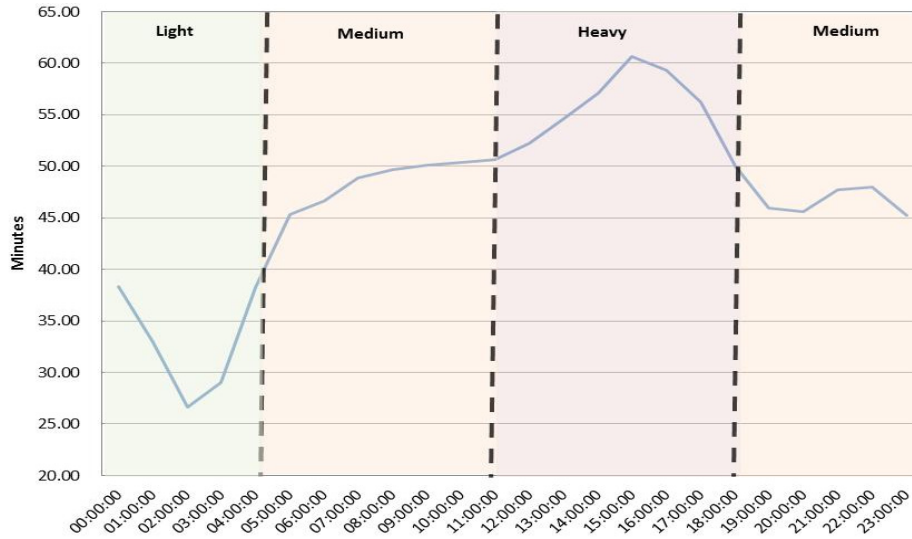
FIGURE 9.6: PEDSTRIAN VOLUME BY DAY HOUR
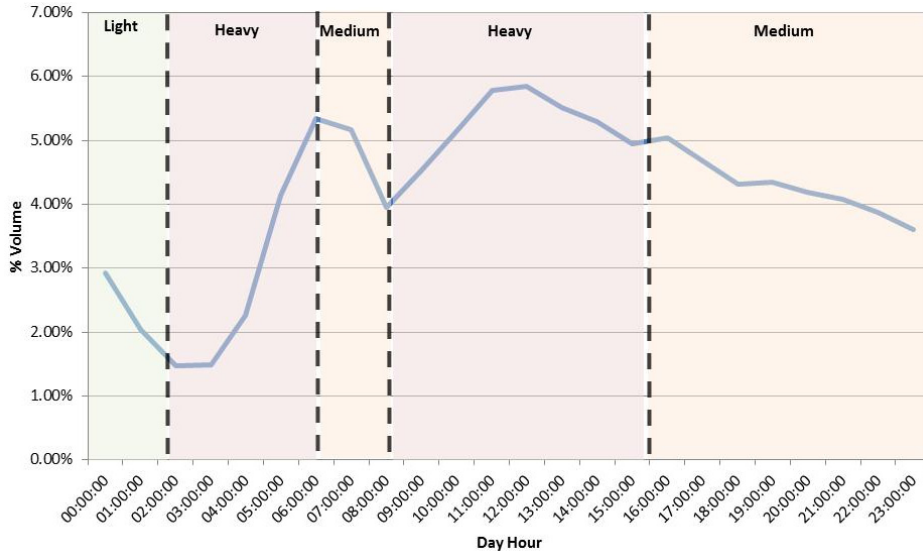
FIGURE 9.7: PEDESTRIAN WAITING TIME BY DAY HOUR
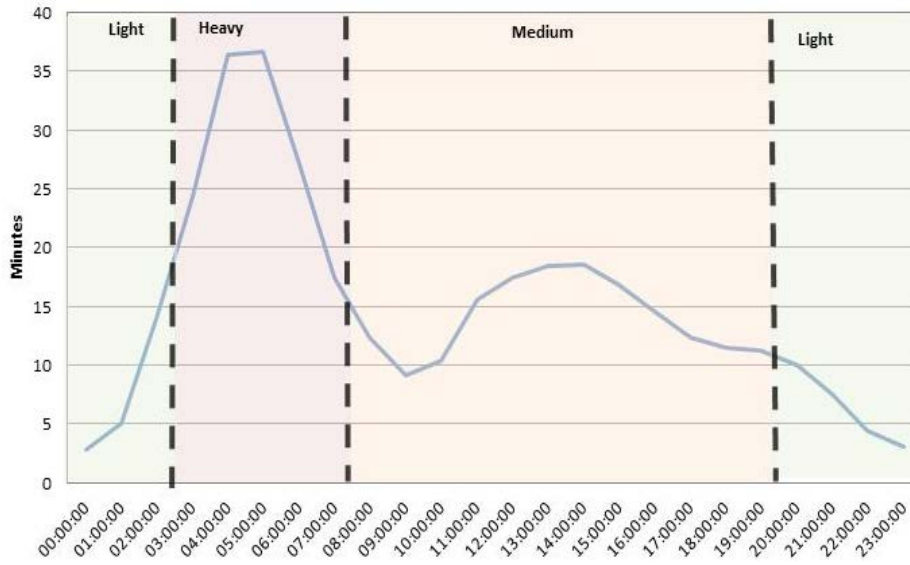
APPENDIX A: SAN LUIS I LPOE OPERATIONAL ANALYSIS

BINATIONAL SAN LUIS

TRANSPORTATION STUDY

Working Paper No. 1

Existing and Future Conditions: San Luis I LPOE Operational Analysis

July 2012

Prepared For:

ADOT

Prepared By:

TIS Consulting Group

and

JACOBS

TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF FIGURES

1.0   INTRODUCTION

This report documents the activities and findings resulting from the analysis of the current conditions at the San Luis Land I Port of Entry (LPOE) , as part of Arizona Department of Transportation's (ADOT) *Binational San Luis Transportation Plan* study. The main objective of the study is to create a transportation plan for the San Luis, Arizona and San Luis Rio Colorado, Mexico region that considers the needs of both cities especially in the vicinity of the LPOE. The LPOE is the key interaction point for the region's travel and an analysis of the port as a transit flow system was part of the project's activities. The analysis will be conducted for the current system conditions as well as for the future conditions. This will be achieved using several methods such as traffic behavior analysis, forecasting tools, and system simulation models.

At present, the study focuses on determining the current conditions of the traffic flow at the San Luis I LPOE. The first activity conducted was to identify, classify, and summarize previous studies findings regarding the border conditions, forecasts, plans and recommendations for the region. In addition, several studies were identified containing information related to the border and the cities of San Luis and San Luis Río Colorado, as well as the states of Arizona and Sonora. This review was also used to identify any information regarding border conditions, forecasts, infrastructure plans and recommendations for the region.

Next step activities included gathering historical data of potential external factors that could have an impact on the volume of border crossings at the LPOEs for three modes of crossing the border: trucks, privately owned vehicles (POV), and pedestrians/bicyclists. Trucks will utilize San Luis II LPOE, while the other modes will use San Luis I LPOE. Publicly available information was collected, while other information had to be requested from government institutions –such as the Federal Institution of Information Access and Data Protection (IFAI). The data collected was related to macroeconomic, social and demographic indicators of the two regions under the scope of the study:

For the third step, the information was analyzed and compared to the port's crossing volumes to determine if any of the economic or demographic factors are somewhat related to the crossing travel behavior. A pre-analysis was performed, which consisted of identifying any trends presented in the information, as well as any seasonality or correlation that could aid in identifying the effects (if any) these variables have on the border crossings. The analysis presented in this paper is the groundwork that is necessary to develop the forecast models later in the study.

The waiting times data provided by U.S. Customs and Border Protection (CBP) was analyzed in order to determine the longest waiting times throughout the day and the impact that the queues may have in the surrounding areas of the port. The report is organized in two main parts, consisting of a matrix of the previous studies and the pre-analysis of the current conditions.

2.0   DOCUMENTATION OF PREVIOUS STUDIES

Previous studies related to the San Luis – San Luis Río Colorado border, were reviewed in order to prevent work duplication and to gather as much information as possible. Several studies and projects were reviewed, most of them about Yuma County and the City of San Luis, but also about Arizona's borders and the trade with Mexico. There are many studies that analyze the road conditions and traffic of the studied areas, as well as the demographic and economic conditions.

This review seeks to find possible connections between demographic and economic information and the passengers and commercial crossing at the San Luis LPOEs. Specifically, attempting to understand how demographic and economic factors could explain the trade in this area. A matrix was created to summarize the reviewed literature and the relevant information related to the current study.

The list of the most relevant studies reviewed follows:

1. San Luis II L POE
2. 2010 - 2033 YMPO Regional Transportation Plan
3. City of San Luis, General Plan 2020
4. City of San Luis, Traffic Circulation Study
5. City of San Luis Small Area Transportation Study
6. Yuma Regional Transit Study
7. Statewide Transportation Planning Framework, Western Arizona Regional Framework Study
8. Programa de Desarrollo Urbano del Centro Población, San Luis Río Colorado,Sonora
9. Proyecto de Desarrollo de San Luis Río Colorado
10. Plan de Modernización de Aduanas
11. El Paso Simulation Report
12. Nogales Mariposa POE Forecasting
13. Logistics Capacity Study of the Guaymas-Tucson Corridor
14. I-10 National Freight Corridor Study
15. Arizona's Global Gateway: Addressing the Priorities of Our Border Communities
16. Arizona Trade Corridor Study
17. Public-Private Partnerships Potential for Arizona-Mexico Border Infrastructure Projects
18. Arizona Multimodal Freight Analysis Study
19. Arizona Rural Transit Needs Study
20. Statewide Bicycle Safety Plan
21. Nogales Cyber Port Project
22. I-10 Phoenix Tucson Bypass Study
23. Mariposa Port of Entry Bottleneck Study

During the review it was found that roadways, leading to the LPOE and in San Luis, were analyzed for current and future condition with corresponding levels of service. Socio-demographic and economic data were also well analyzed in almost all the studies reviewed for mid- to long-term projections for the region.

For the San Luis I LPOE, previous studies contains information about border crossing and the recommendation to move the commercial traffic to a different LPOE due to the resulting queuing and danger caused by trucks driving across downtown San Luis. Some studies discuss the economic advantages of having the San Luis II LPOE ; a new port of entry to service only the commercial traffic crossing of the area, by providing long term growth to the surrounding industrial zone that will flourish because of the facility. However, there is no information of what the current impact of the San Luis II POE has been now that it is operating; furthermore, no study has analyzed whether it is working properly, if it has met expectations, if it was well planned to suit the commercial traffic or if it is over/under capacity.

With respect to Arizona's borders, there are some analysis related to the imports and exports between Sonora and Arizona, as well as the destination and origin of different products. It was found that almost 88 percent of the products cross through the Nogales LPOE and come from the state of Sonora, while other products come from Sinaloa and Jalisco.

FIGURE 2.1: LITERATURE MATRIX

Title	San Luis II Land POE	2010 - 2033 YMPO Regional Transportation Plan	City of San Luis, General Plan 2020	City of San Luis, Traffic Circulation Study	City of San Luis Small Area Transportation Study	Yuma regional transit study	Statewide Transportation Planning Framework, Western Arizona Regional Framework	Programa de Desarrollo Urbano del Centro Población, San Luis Río Colorado,Sonora	Proyecto de Desarrollo de San Luis Río Colorado	Plan de modernización de aduanas	El Paso Simulation Report	Nogales Mariposa POE	Logistics capacity study of the Guaymas-Tucson Corridor	I-10 National Freight Corridor Study	Arizona's Global Gateway: Addressing the Priorities of Our Border Communities	Arizona trade corridor study	Public?Private Partnerships Potential for Arizona?Mexico Border Infrastructure Projects	Arizona multimodal freight analysis study	Arizona Rural Transit Needs Study	Statewide Bicycle Safety Plan	Nogales CyberPort Project	I-10 Phoenix Tucson Bypass Study	Mariposa Port of Entry Bottleneck Study
Year	2011	2010	2011	2011	2009		2008		2010	2007	1998				2003	1993	2009	2007*	2008	2003	2003	2008	2008
Environmental Review	x	x	x		x	x	x	x	x														
Demographic characteristics		x	x	x	x	x			x	x							x						
Economy study		x	x		x			x	x	x							x	x					
Future socioeconomic characteristics		x	x	x	x	x			x	x							x						
Land use		x	x		x	x	x		x	x							x						
Future travel demand		x			x	x	x																
Truck routes / freight		x							x					x					x				x
Road conditions		x	x	x	x			x	x	x				x	x		x		x				x
Level of Service		x	x	x	x									x									
Traffic volumes, patterns, trends		x	x	x	x				x								x		x			x	x
Public transportation		x				x	x	x	x														
Road improvements plans/recommendations		x	x		x	x			x							x	x				x		
Mariposa POE												x	x		x		x				x		x
Utilities		x	x					x	x														
Housing conditions		x	x					x	x														
Border crossing						x						x	x	x			x						x
Bicycle/pedestrians facilities		x	x		x	x	x	x	x											x	x		
San Luis POE expansion			x	x	x												x		x				
Port facilities															x			x	x				
Rail		x				x			x					x				x					
Crash data		x	x		x																		
Imports/exports Sonora-Arizona										x							x						
Rural public transportation						x													x				

3.0   SAN LUIS LPOE BASELINE ANALYSIS OF CURRENT CONDITIONS

The objective of this section is to perform an analysis of the current conditions of San Luis LPOEs, taking into consideration historical crossing volumes and waiting times, in order to define how the LPOE impacts the surrounding areas. The activities performed in this section are:

- **Traffic volume analysis**. Analysis of historical crossing volumes for different modes of transportation (commercial, POV, and pedestrian) to identify factors that could affect its behavior.

- **Analysis of external variables.** Analysis of macroeconomic, social and demographic variables, such as gross domestic product, personal income, crime index, etc., that could have an effect on international crossing volumes. The analysis attempts to identify any general trends, seasonality or shifts that could affect crossing volumes.

- **Correlation of crossing volumes and external factors**. Analysis of the statistical relationship between the number of border crossings for each mode of transportation and external factors. This relationship helps identify which factors correlate positively or negatively to border crossings.

- **Analysis of waiting times.** Analysis of waiting times at different periods of the day at the LPOE. The goal is to identify the period with the longest waiting time and its effect on the rest of the LPOE's operations.

Study Area

There are two LPOEs connecting the City of San Luis, Arizona with San Luis Río Colorado, Mexico; these allow the trade between the two cities and have become vital for the economy of the entire region. San Luis I LPOE is utilized by POVs and pedestrian traffic, and San Luis II LPOE is currently used for commercial trucks only. The main economic activities in the region are farming, manufacturing industry and maquiladoras.

Due to farming operations in Arizona, a considerable amount of people cross the border every day, making San Luis I LPOE a congested port for both pedestrians and POVs and make this LPOE the main concern of our analysis. The primary focus of this study are the facilities within the San Luis I LPOE. Figure 3.1 shows the current infrastructure conditions of San Luis I and San Luis II and its influence zone, which could directly affect its operations.

Error! Reference source not found.1 includes a list of known issues affecting the LPOEs current operations based on prior interviews with local users and LPOE operators. As mentioned before, POV and pedestrians are the two modes that have made San Luis I LPOE a congested area.
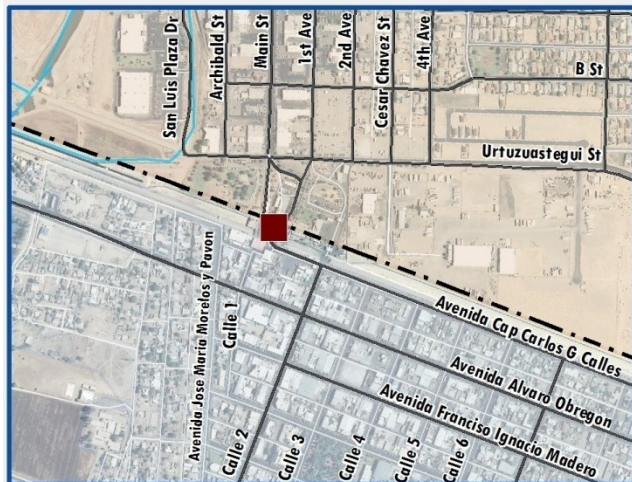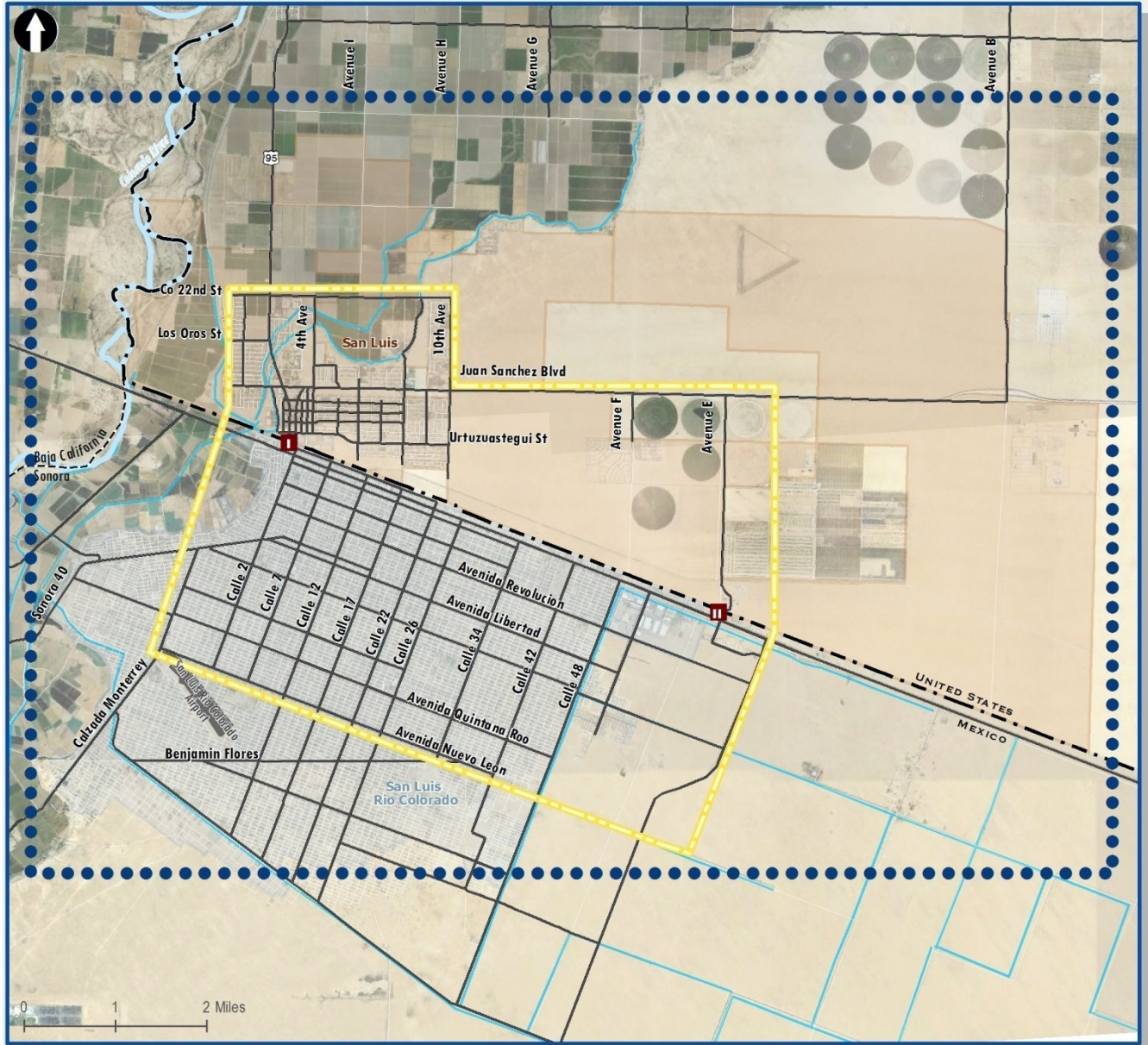
FIGURE 3.1: SAN LUIS LPOE I AND II

Study Area
Influence Area
Study Roadway
Land Port of Entry
Canal
International Boundary
San Luis
San Luis Rio Colorado

Source: ALRIS, SLRC, ADEQ, INEGI, USGS, Google

TABLE 3.1: CURRENT USAGE CHARACTERISTICS OF SAN LUIS POE I

	POV	Pedestrians
POE Area	≈11 acres	
POE northbound capacity	- 6 lanes - 1 SENTRI Lane	- 6 workstations - 1 bicycle lane
Usage	- 24/7 - 6 AM – 10 PM	- 3 open booths (24/7) - 24/7
Street queue northbound	Cap. Carlos G. Calles (International Avenue)	N/A
POE southbound capacity	2 lanes (24/7)	1 lane
Distance from POE to reduced queue northbound	168 ft	N/A
Street queue southbound	Main St. 95	N/A
Known issues	- Long queues in northbound traffic.	-Current infrastructure is insufficient. -Fights between pedestrians. Seasonality: -Long queues during winter (farm)

During the 2010 fiscal year, POV crossings reached two million, making this mode of traffic the most saturated. Table 3.2 below indicates the northbound monthly traffic volumes for the 2010 fiscal year. The comparison of the northbound and the southbound crossings is presented in Figure 3.2.

TABLE 3.2: POV NORTHBOUND AND SOUTHBOUND VOLUMES FOR FY 2010

Month	Northbound (CBP)	Southbound (SAT)	% Difference
Oct-09	189,138	183,607	-3.01%
Nov-09	189,463	185,650	-2.05%
Dec-09	193,350	204,884	5.63%
Jan-10	191,630	197,713	3.08%
Feb-10	175,024	185,523	5.66%
Mar-10	184,732	131,922	-40.03%
Abr-10	162,192	157,855	-2.75%
May-10	164,350	156,787	-4.82%
Jun-10	159,201	144,088	-10.49%
Jul-10	168,565	150,846	-11.75%
Ago-10	157,655	137,719	-14.48%
Sep-10	156,608	144,268	-8.55%
TOTAL	**1,980,862**	**2,091,908**	**-6.96%**

FIGURE 3.2: POV NORTHBOUND AND SOUTHBOUND TRAFFIC VOLUMES FOR FY 2010
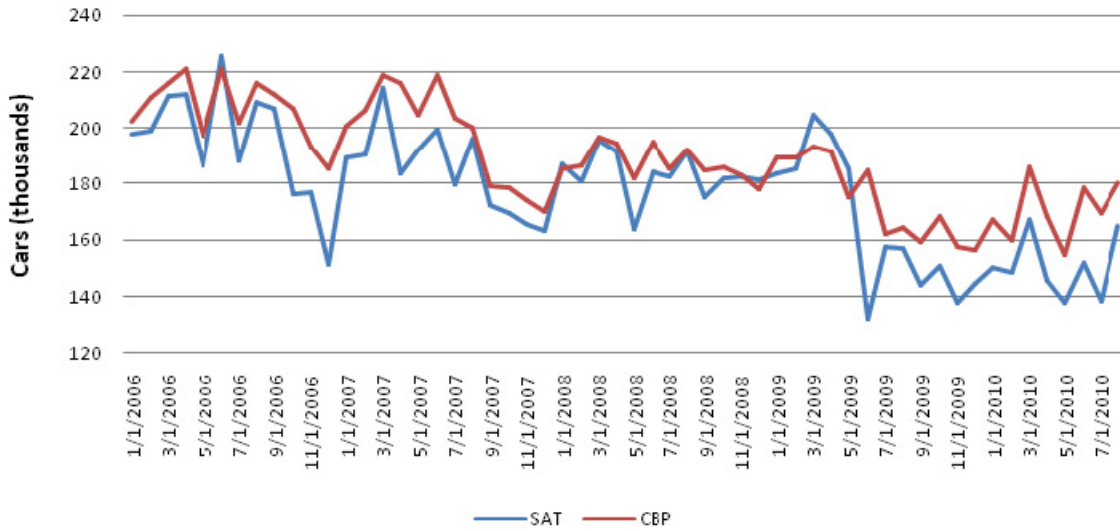
The following sections focus on performing more detailed analyses of the LPOE's traffic volumes. This analysis seeks to determine the relationships that exist between relevant economic, demographic and commercial indicators and historic traffic volumes crossing the LPOE.

Traffic Volumes Analysis

The objective of the traffic volume analysis is to identify underlying factors that may have an effect on the LPOE border crossings, such as unforeseen events, seasonality and trends. Unforeseen events may be in the form of extraordinary circumstances such as the 9/11 events, while seasonality may be due to short cyclical reasons such as agricultural production. Lastly, trends can be associated to long-term phenomena such as simple economic inflation. The analysis begins with a comparison between the three main modes of transportation (Commercial, POV and Pedestrian).

Figure 3.3 shows a linear chart that represents monthly crossing volumes for the period of January 1995 to May 2011 for the three transportation modes considered. From this figure, one can identify that the most significant shift in behavior occurs during September 2001. The 2001 shift is significant for POV, where the crossing volumes dropped from approximately 240,000 units in August to 140,000 in October. Pedestrian and commercial crossings did not show the same behavior.

Commercial trucks and pedestrian crossings present an evident seasonality; both show the highest peak during the winter (January, February or March), and the lowest dip during the summer, (June, July and August).

FIGURE 3.3: CROSSING VOLUMES (THOUSANDS) IN SAN LUIS POE (1995- 2011)
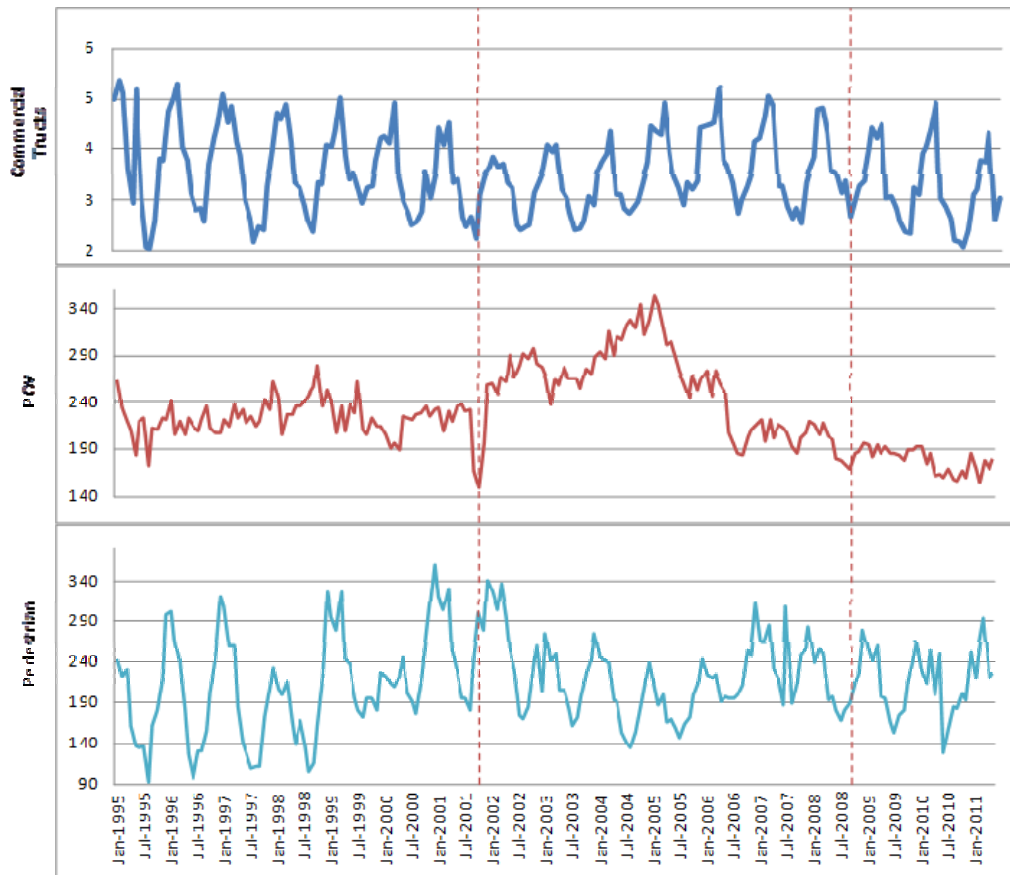
Table 3.3 presents the yearly crossing volumes by type of mode and the volume percentage change from year-to-year. Data shows that POV volumes have been decreasing since 2004, as well as pedestrian volumes in particular over the last 3 years from 2007 to 2009.

TABLE 3.3: YEARLY CROSSING VOLUMES BY MODE

Year	POV		Pedestrian		Buses	
	Volume	% Change	Volume	% Change	Volume	% Change
2002	3,306,378		2,968,278		102	
2003	3,189,867	-3.52%	2,625,907	-11.53%	38	-62.75%
2004	3,755,829	17.74%	2,316,812	-11.77%	74	94.74%
2005	3,472,277	-7.55%	2,227,807	-3.84%	83	12.16%
2006	2,703,263	-22.15%	2,669,311	19.82%	96	15.66%
2007	2,481,013	-8.22%	2,939,684	10.13%	53	-44.79%
2008	2,313,661	-6.75%	2,564,499	-12.76%	64	20.75%
2009	2,253,331	-2.61%	2,537,177	-1.07%	59	-7.81%

Analysis of External Factors (Potential Drivers)

After the preliminary analyses of the traffic volumes, the next step is to perform a similar analysis on the historical behavior of what is called *"external factors"*. These factors refer to all those economic and demographic factors that are neither strictly nor directly related to the border crossing volumes, but may be significant drivers of its behavior. In the same fashion, this analysis attempts to identify any specific trait (peaks, falls, trends, seasonality, etc.) within these factors' historical data. In this section, a time series analysis is presented for each of these potential drivers.

Employment Levels in San Luis Río Colorado (SLRC)

San Luis Río Colorado's economy is based on: 1) farming activity, including agriculture and cattle, 2) services, and 3) manufacturing, driving the trade between Mexico and the United States. A good employment level indicator for these activities is the amount of Beneficiaries of the Mexican Social Security Institute (IMSS - Instituto Mexicano del Seguro Social) in SLRC. These are categorized into these different economic activities; it would be analyzed how the number of employees registered in the Institution fluctuated trough time.

Figure 3.4 illustrates the number of employees registered with the IMMS in San Luis Rio Colorado. For beneficiaries in general, there is no visible tendency; at first sight, almost every December, the number of beneficiaries decreases. Figure 3.4 also illustrates that there is also not much seasonality, this variable is correlated to the manufacturing sector.

FIGURE 3.4: EMPLOYEES REGISTERED ON IMSS IN SLRC

Beneficiaries IMSS SLRC Manufacturing

Since 1997 the number of beneficiaries has been slightly decreasing as depicted in Figure 3.5. Throughout the year, the employees registered do not present many changes; it just decreases over the last 2 months of every year. There are important changes on the last months of 2000 and the first months of 2001; also in 2005, the registered employees decreases; and finally, during the 2008-2009 crisis. There is no seasonality present in this data.

The Geography and Statistics National Institute (INEGI) generates two surveys which analyze maquiladoras and export industry, which are strongly correlated to manufacturing:

- EMIME: This survey is just from 1996 to 2006 and refers to the exports of the maquiladora industry; it is really different every year and every month. There was a decrease of activities in the years 2001 and 2005

- IMMEX: Information is available from the second half of 2007 to 2011. There is a decrease in 2008 and 2009. There is no visible seasonality in this data.

FIGURE 3.5: MANUFACTURE BENEFICIARIES REGISTERED TO IMSS IN SLRC
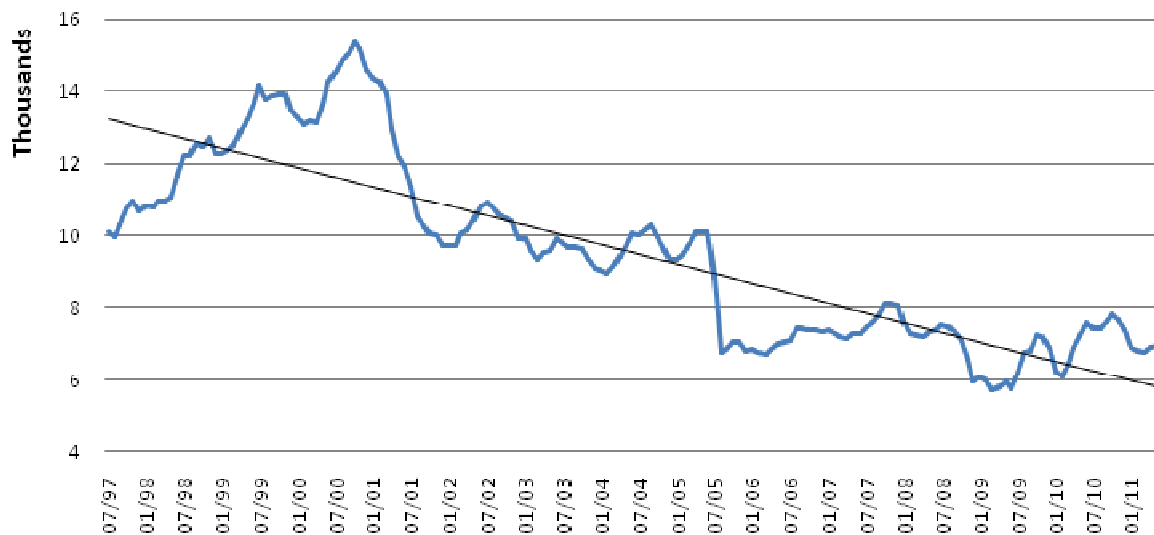
Beneficiaries IMSS SLRC Services

Figure 3.6 illustrates the number of service employees registered with the IMMS in San Luis Rio Colorado. The services sector presents an upward tendency, even during the 2008-2009 economic crisis. Figure 3.6 also illustrates, there is no seasonality and every month looks the same. This variable was considered because the services area has one of the highest quantities of beneficiaries.

FIGURE 3.6: SERVICES BENEFICIARIES REGISTERED TO IMSS IN SLRC
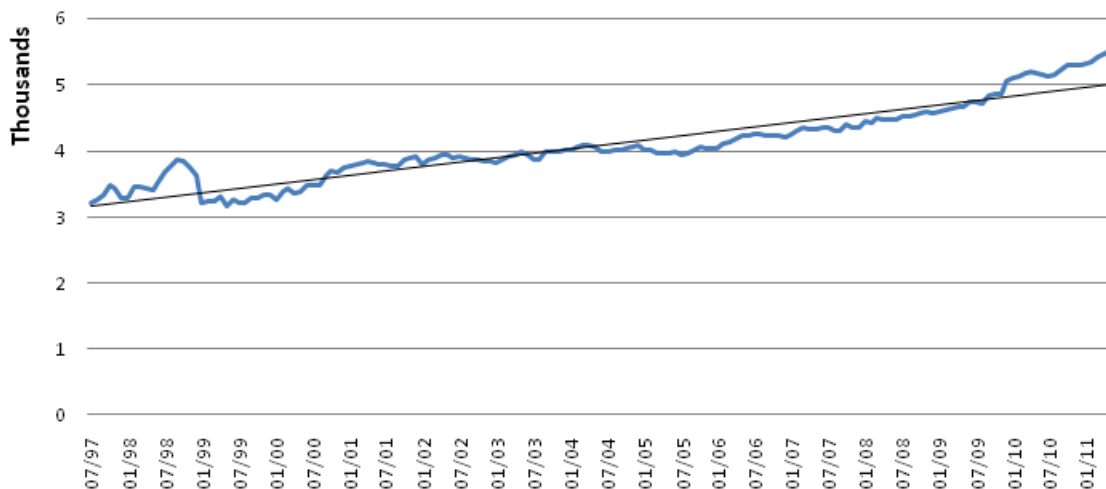
Beneficiaries IMSS SLRC Farm

Figure 3.7 illustrates the number of farm workers registered with the IMMS in San Luis Rio Colorado. This data has no specific trend; the beneficiaries of IMSS decrease almost every December, except for the last 2 years. The number of beneficiaries that work at farms started increasing in 2009, and has a major peak on January2010; this shows a lot of variability due to the increment of the beneficiaries in the last 2 years.

FIGURE 3.7: FARM WORKERS REGISTERED TO IMSS IN SLRC BOX PLOT
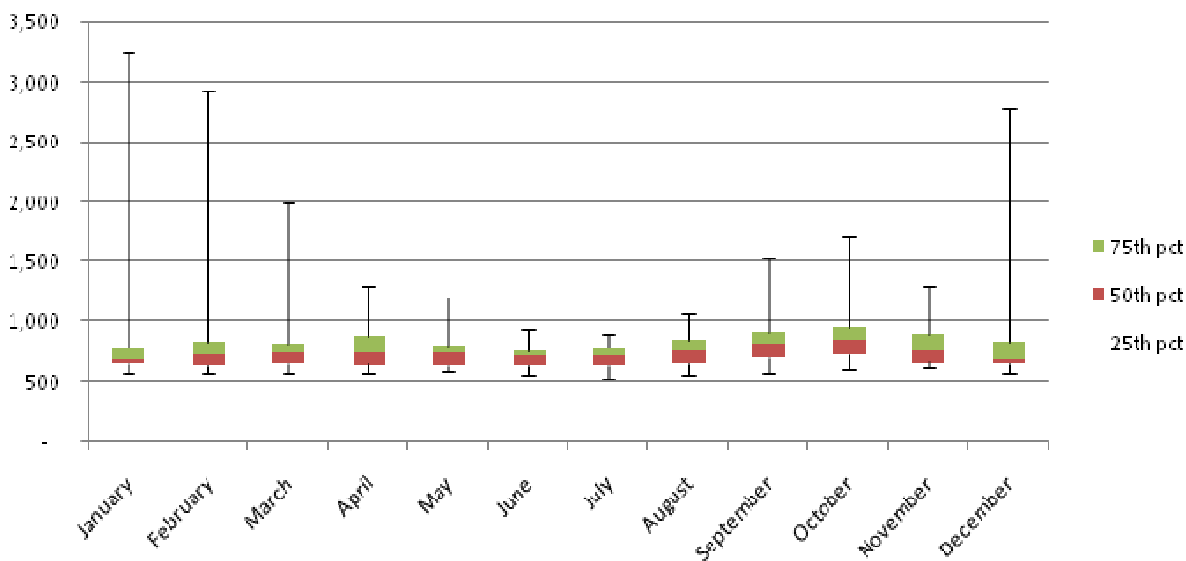
Beneficiaries IMSS SLRC Trade ....

Figure 3.8 illustrates the number of trade industry employees registered with the IMMS in San Luis Rio Colorado. As illustrated in the figure, this data shows an upward tendency. The same behavior is shown almost every year, except for the last part of 2008 and the beginnings of 2009; it decreases a little, but then increases again. About seasonality, apparently it does not present any. This variable, and manufacturing beneficiaries, are correlated to Mexico and USA's indicators such as GDP, IPP and CPI.

FIGURE 3.8: TRADE INDUSTRY BENEFICIARIES REGISTERED TO IMSS IN SLRC
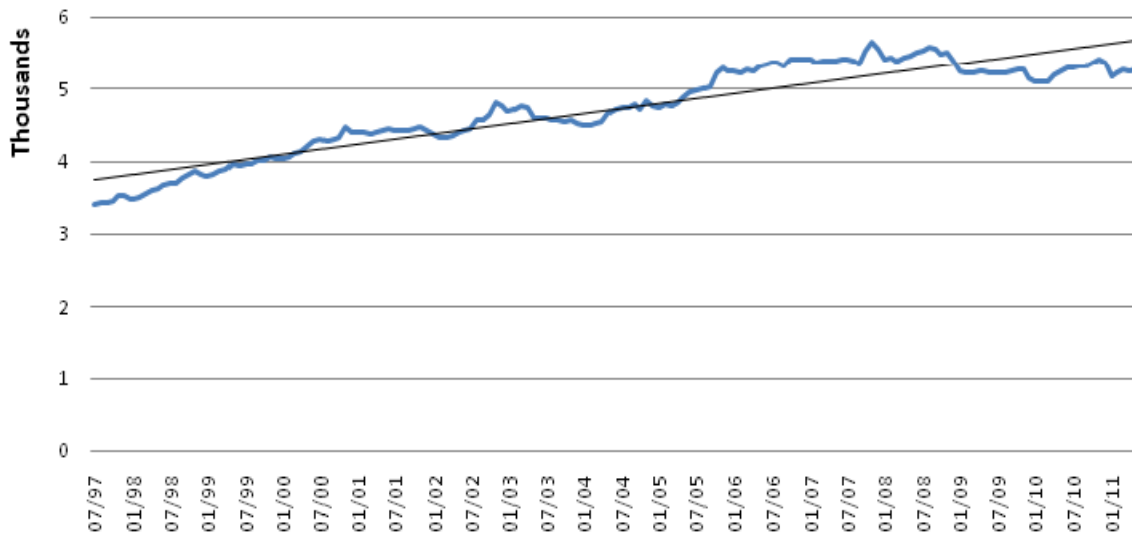
Mining in San Luis Río Colorado

Figure 3.9 illustrates total mining activity in San Luis Rio Colorado, Mexico. Mining in SLRC, or nearby areas was also analyzed, but just a few people work in this sector and production is not very consistent; therefore mining in other sections was analyzed:

- Mining in Mexicali. There are a lot of irregularities and inconsistencies on the information of gold production: one month, the production is 154 kilos, but the next month is just 2 kilos or no production at all (or there is a lack of information). The production stopped in 2001 and started again in 2010. The entire mining industry shows these irregularities. The same happened to silver mining.

- Mining in Plutarco Elías Calles (PEC). There are many data irregularities and inconsistencies regarding the information obtained for the gold mining activities in Plutarco Elías Calles. The production stopped in 2002.

FIGURE 3.9: MINING IN AREAS NEARBY SLRC, KILOGRAMS

Gold, Plutarco E. Calles

Gold, Mexicali

Silver, Mexicali
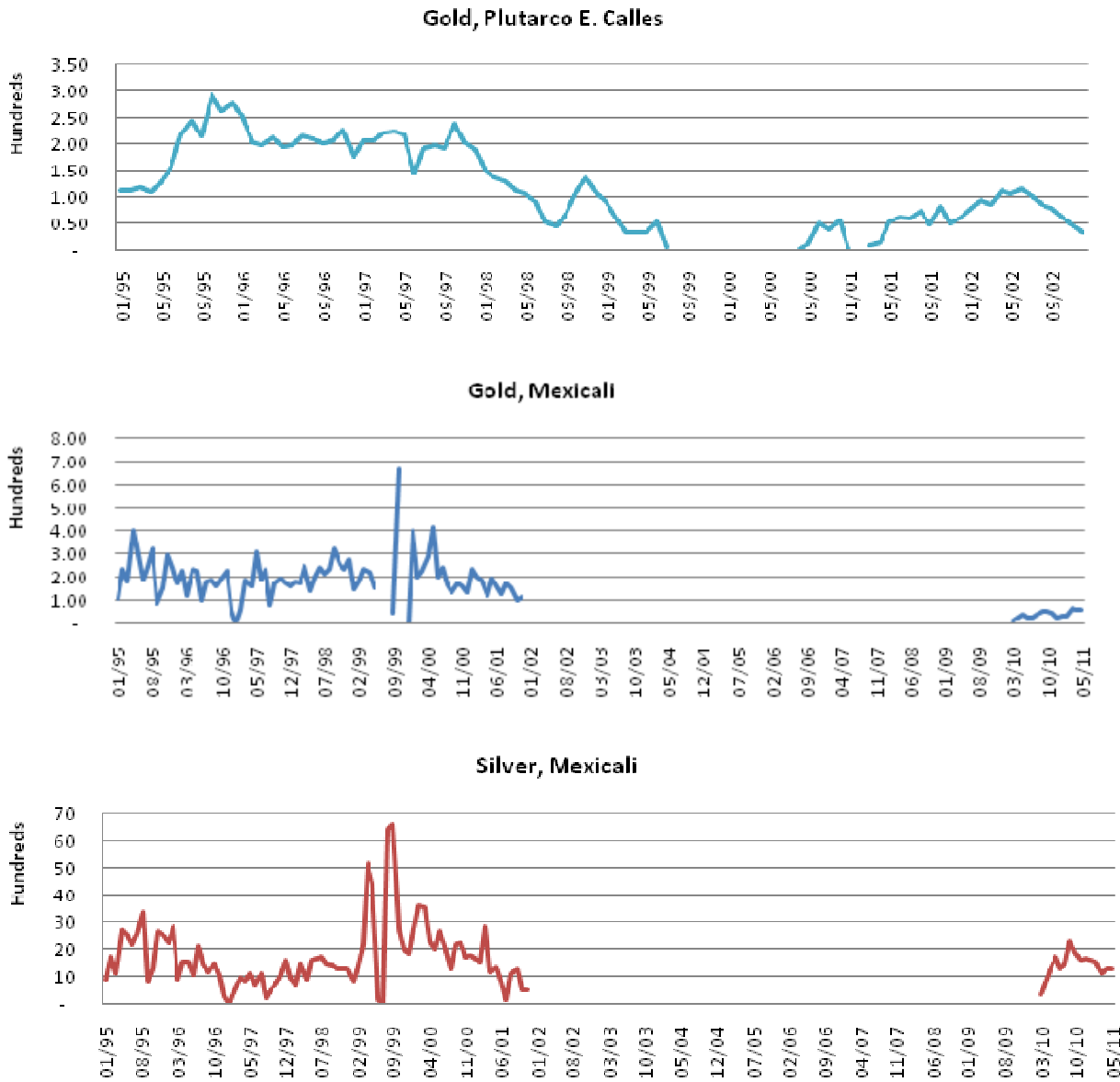
Crime in Sonora

Figure 3.1outlines the number of felonies in Sonora from 1995 to 2009. It was decided to analyze how crime could affect the southbound border crossings, based on the number of felonies, homicides and drug crimes committed in Sonora. Drug crime offenses include everything that has to do with production, distribution, consumption, transportation or selling of drugs. It is expected that these variables behave opposite to the number of crossings.

FIGURE 3.10: CRIME IN SONORA (NUMBER OF FELONIES)
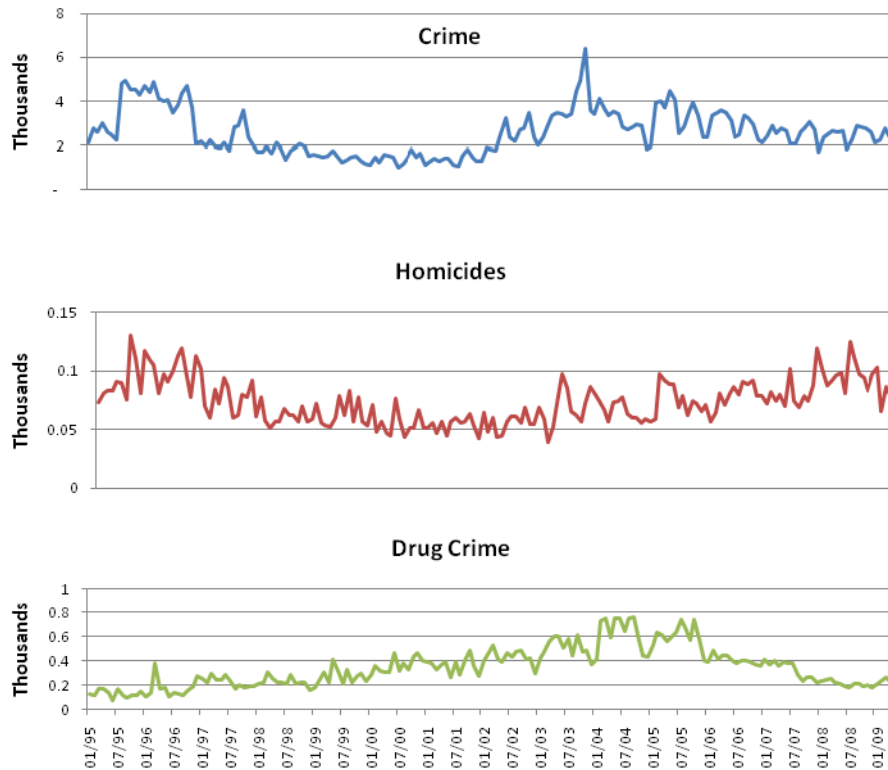
Economic Indicators in Arizona

Economic indicators are analyzed to determine if they have an opposite effect on the number of crossings at the LPOE. Personal income, compensation and wage in Arizona are strongly correlated, and they also have a strong relationship with personal income in the United States as shown in Figure 3.11. There is a visible upward tendency through all the series, except for the period 2008-2009, during the economic crisis. The data shows no visible seasonality.

FIGURE 3.11: ECONOMIC INDICATORS U.S.
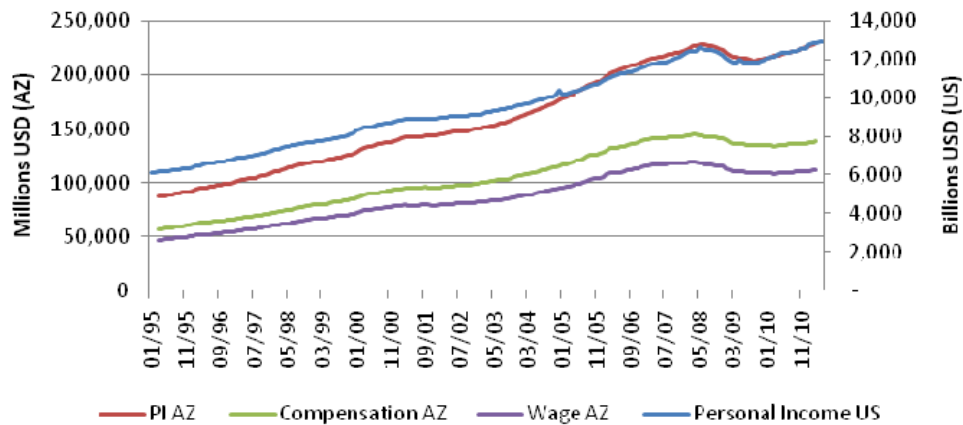
Industrial Production and Consumer Price Index in Mexico

The Industrial Price Index has a variation with a small growth tendency through time, but there is a visible decrease from May 2008 to January 2009, as shown in Figure 3.12. There is no visible seasonality during this period of time. Note that even though for the Consumer Price Index there is a clearly upward tendency, even during the crisis, it does not present seasonality either as per Figure 3.13.

FIGURE 3.12: INDEX OF INDUSTRIAL PRICE IN MEXICO
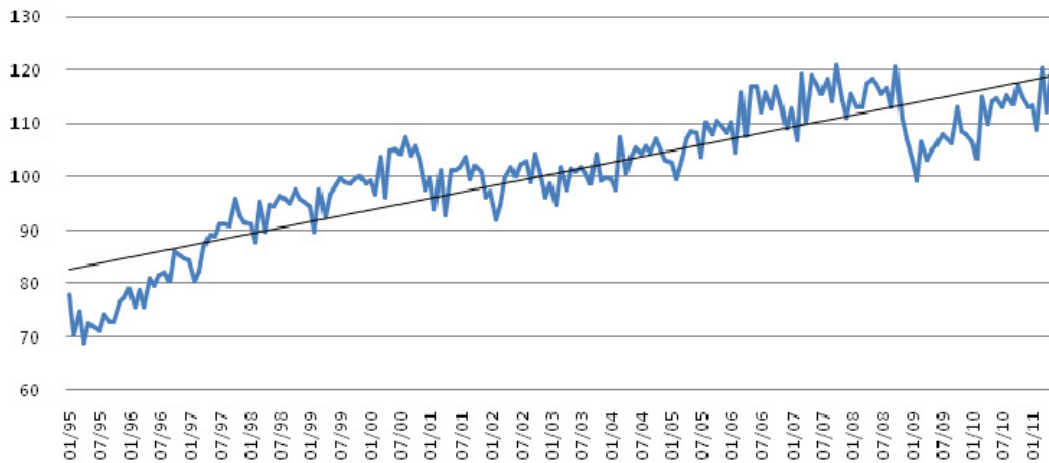
FIGURE 3.13: CONSUMER PRICE INDEX IN MEXICO
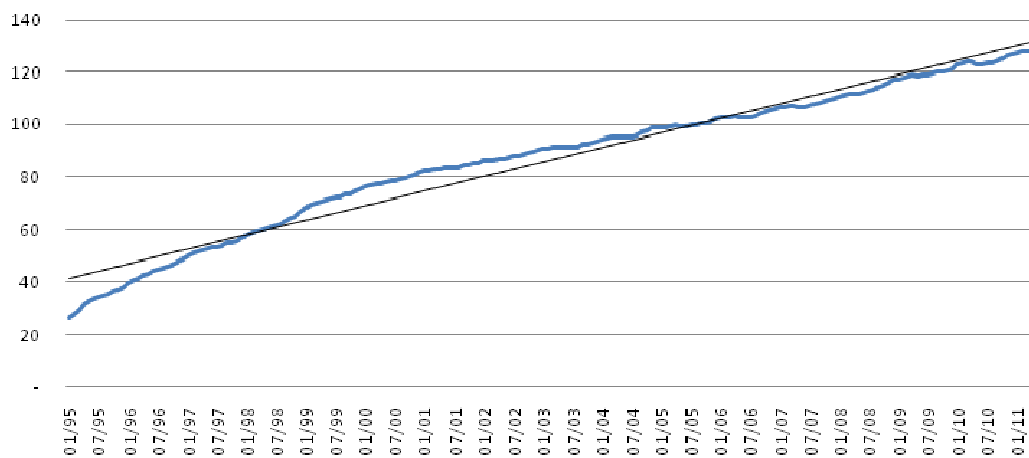
Gross Domestic Product (GDP) - Mexico

The GDP information is only available in a quarterly basis. For the purpose of this study, the different data were lineally adjusted to a monthly basis for a better analysis and comparison to other variables. There is a clearly upward trend; but almost every year looks exactly the same, with the

exception of a small decrease during the last months of 2008 and the first months of 2009, shown in Figure 3.14. The Mexican GDP does not present any seasonality.

FIGURE 3.14: GROSS DOMESTIC PRODUCT IN MEXICO (BILLIONS OF PESOS)
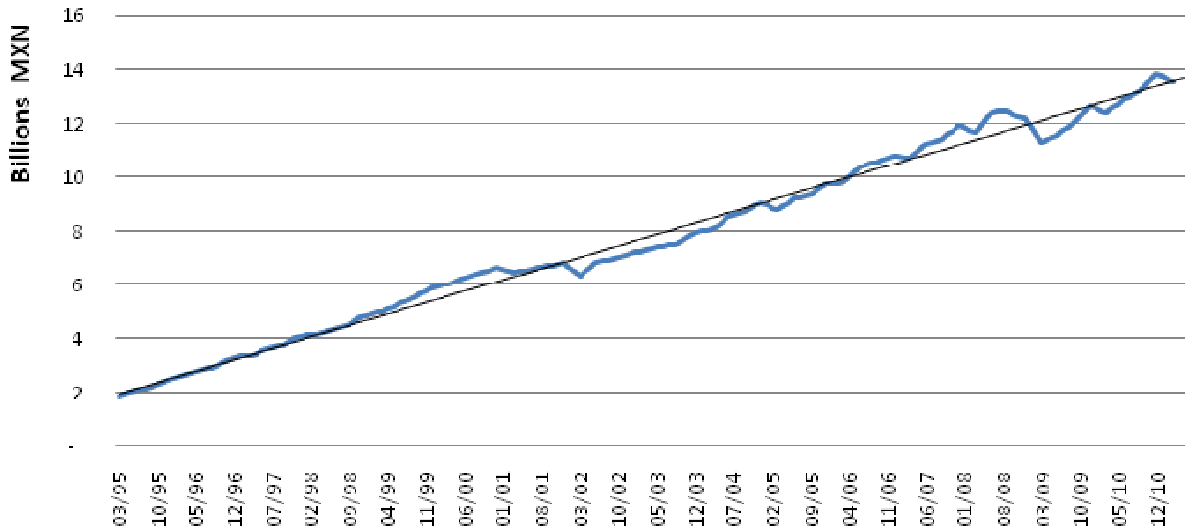
Index of Industrial Production in the United States

The Index of Industrial Production, displayed in Figure 3.15, has no particular trend; there is a lot of variability throughout the years and a visible decrease during the crisis of 2008-2009. There is no seasonality. This index is not correlated to any variable.

FIGURE 3.15: INDEX OF INDUSTRIAL PRICE IN THE US
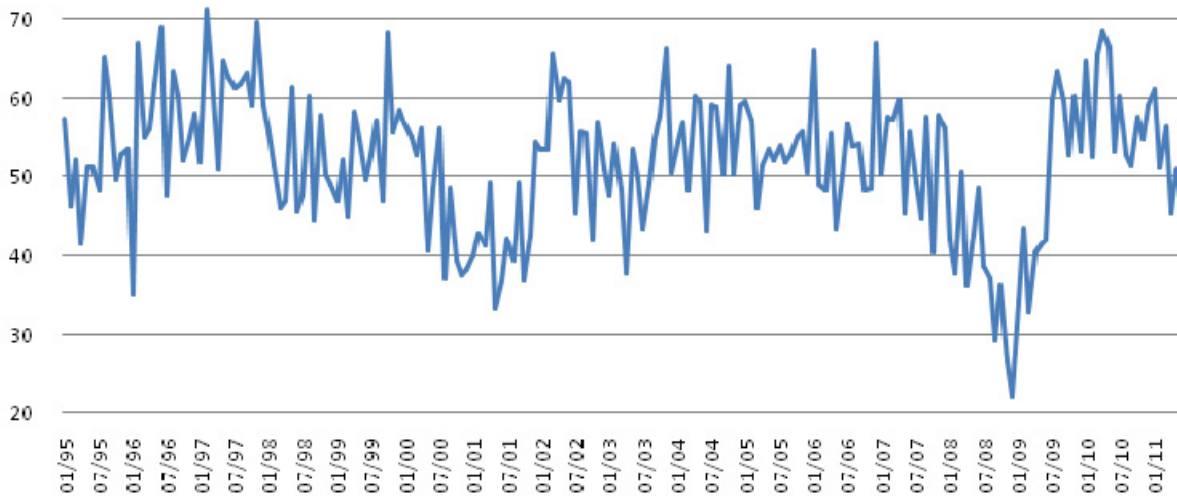
Consumer Price Index (CPI) and GrossDomestic Product (GDP) - US

There is a clearly upward tendency; shown in Figure 3.16, but almost every year looks exactly the same with just a minimum decrease during the last months of 2008 and the first months of 2009. It does not present seasonality and it is the same case for the GDP of the U.S.

FIGURE 3.16: MACROECONOMIC INDICATORS (GDP AND CPI IN THE US)
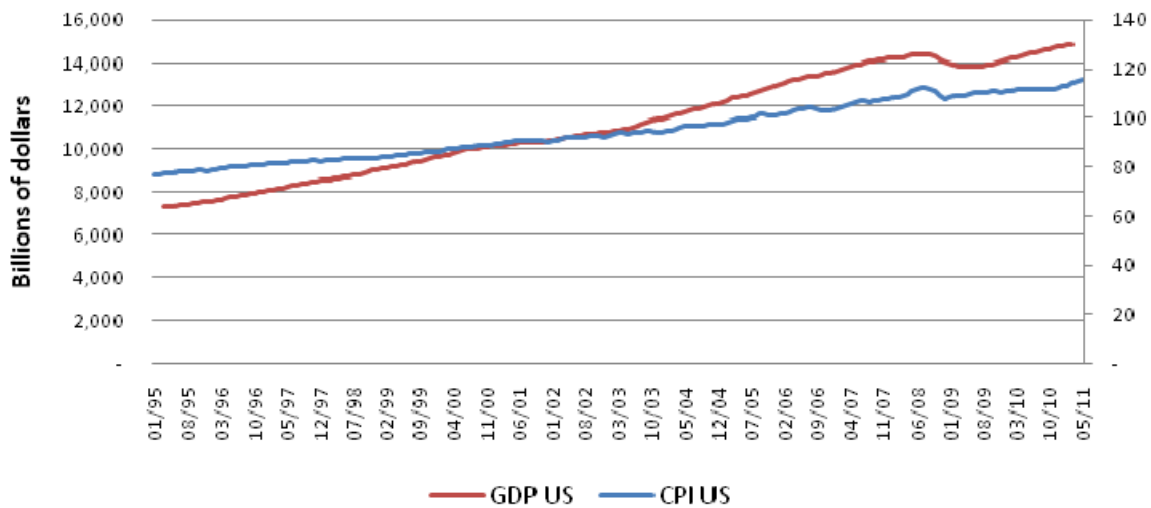
Diesel and Gasoline Price

Diesel and gasoline behave almost the same and have a really strong correlation. The price had a great growth in June 2008 and a significant fall in January 2009 as per Figure 3.17.

FIGURE 3.17: DIESEL AND GASOLINE PRICE (DOLLORS PER GALLON)
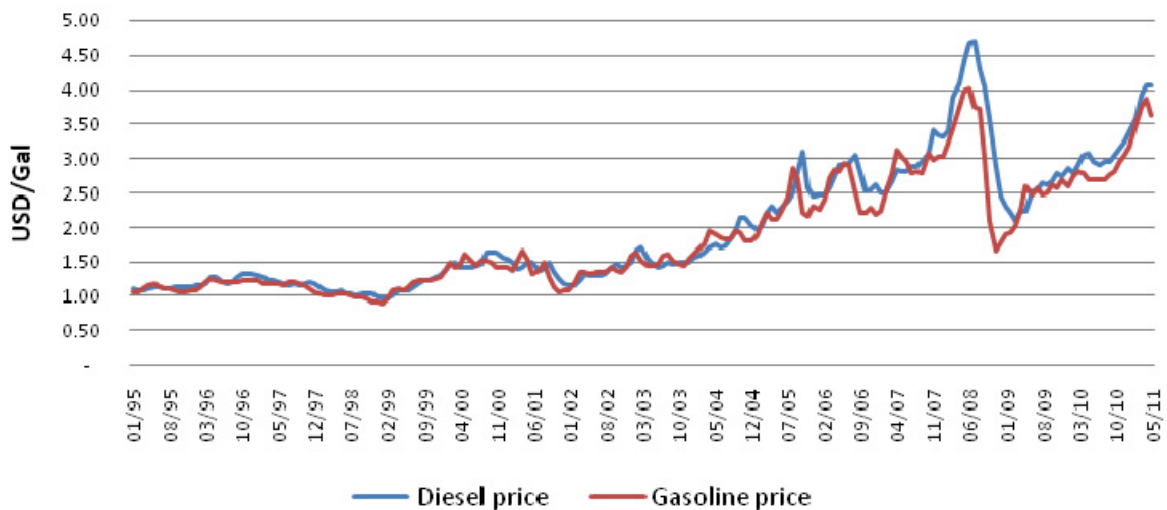
Note that for the prices of gasoline and diesel, the highest of both appears during the summer; nonetheless, there is no strong sign of seasonality as Figure 3.18 shows.

FIGURE 3.18: DIESEL AND GASOLINE PRICE (SEASONALITY)
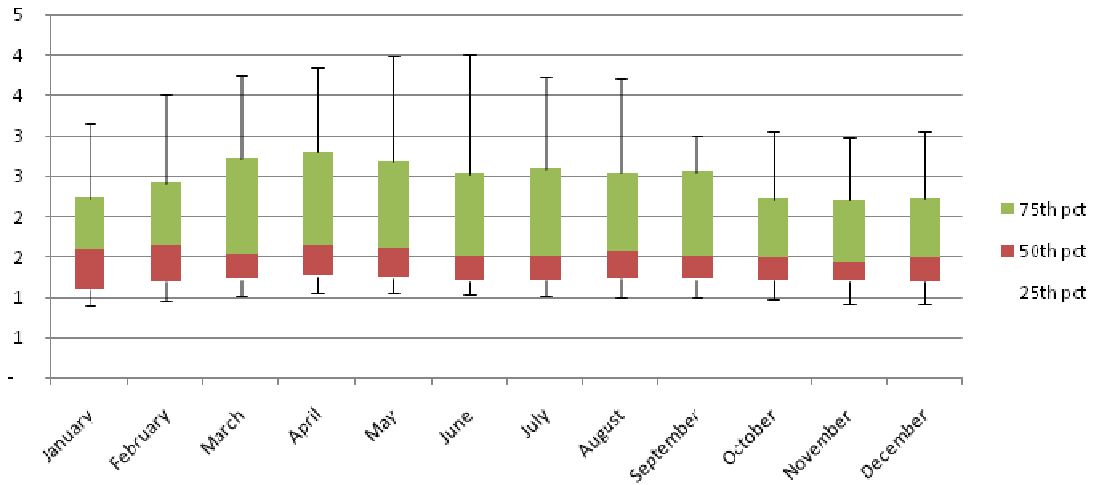
Exchange Rate

There is a clearly upward trend; as display in Figure 3.19, but almost every year looks exactly the same with just a minimum decrease during the last months of 2008 and the first months of 2009. The data does not present seasonality.

FIGURE 3.19: EXCHANGE RATE (MXN/USD)

Agriculture Production (Yuma)

Based on the literature reviewed, agriculture in the Yuma County is an important variable to consider, because labor is provided by the Mexican people crossing every day to work at the farms. During 2010, the major agricultural products in the Yuma County were: broccoli, cauliflower, iceberg lettuce and romaine lettuce; lettuce accounts for most of the total acreage and pounds harvested. Table 3.4 present a summary of amount of products harvested in pounds.

TABLE 3.4: 2010 MAIN PRODUCTS GROWN IN SAN LUIS, ARIZONA (POUND)

Month	Broccoli	Cauliflower	Iceberg lettuce	Romaine lettuce
November	231,152	111,699	8,383,503	953,588
December	1,062,604	799,757	18,266,588	2,778,742
January	1,484,182	1,199,289	18,315,529	3,149,091
February	1,417,706	827,428	13,096,777	2,145,232
March	845,518	659,438	14,758,718	2,415,360
April	241,325	114,474	4,091,102	593,447

Figure 3.20 presents the iceberg lettuce production; all products have almost the same behavior and the same seasonality, starting in November, having a major peak in January and ending in April.

FIGURE 3.20: ICEBURG LETTUCE 2010 PRODUCTION IN SAN LUIS, ARIZONA
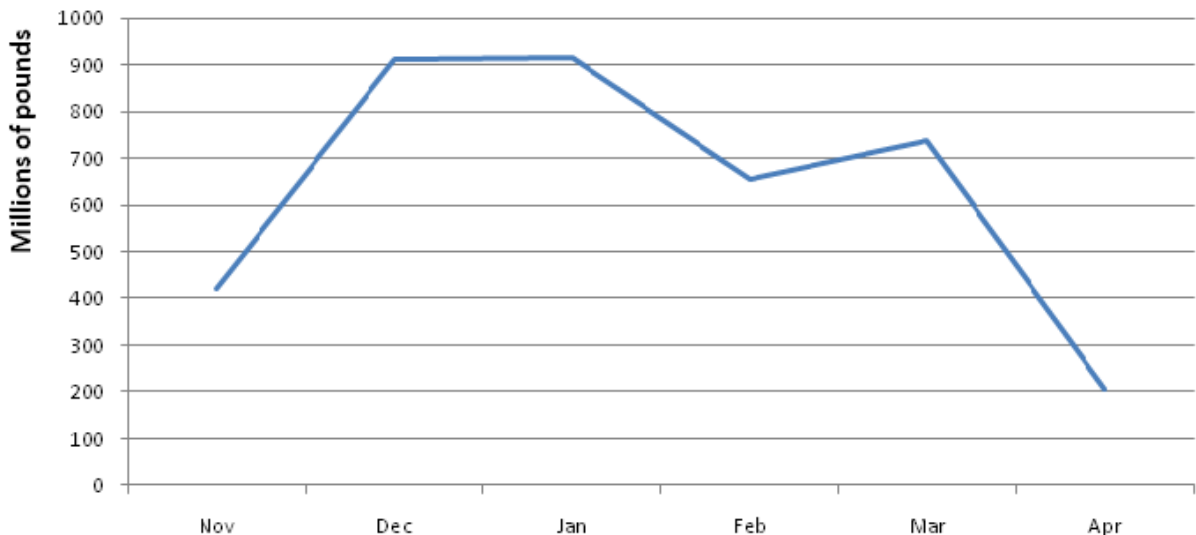
Agriculture Production (Mexico)

Agriculture on the Rural Development District of Mexicali and San Luis Rio Colorado is mostly used to supply the Yuma demand, as described in the *Fruits and Vegetables Producers Regional Union*. There are 4 main products, as Table 3.5 shows, based on the value of the production, and the quantity: green alfalfa, which is produced almost every month, forage sorghum, tomato, and wheat. The largest production takes place during the summer and fall seasons.

TABLE 3.5: 2010 MAIN PRODUCTS GROWN IN BAJA CALIFORNIA (TONS)

Month	Tomato	Wheat	Green alfalfa	Forage sorghum
January				
February			0.5	
March			0	
April			3.22	
May		39.92	8.47	
June	1.64	55.99	17.78	
July	28.25	4.09	5.13	
August	24.12		15.78	22.46
September	45.99		13.47	24.97
October			14.88	16.44
November			7.1	32.76
December			13.62	3.37

Furthermore, Baja California Sur's production was analyzed, since it might cross through San Luis LPOE. There are several products in this area, but the most important are green alfalfa, potato, onion, tomato, Anaheim pepper, wheat and asparagus shown in Table 3.6.

TABLE 3.6 – MAIN PRODUCTS GROWN IN BAJA CALIFORNIA SUR, 2010 (TONS)

Month	Potato	Onion	Tomato	Anaheim pepper	Wheat	Asparagus	Green alfalfa
January	42.54		3.47	10.85		59.77	6.35
February	33.39		28.43	14.17		11.74	5.74
March	6	16	14	5		18	3
April	1.67	48.49	9.72	10		5.62	18.59
May	9.88	2.76	6.72	3.9	39.92		11.01
June	6.91	2.15	17.74	23.29	55.99		4.32
July		4.89	6.41	22.96	4.09		5.51
August		19.7	12.57	10.05			8.57
September		6.26	0.98			4.53	7.91
October							13.7
November							6.04
December							9.65

Correlation between external variables

A correlation analysis was performed between external variables, and the resulting matrix is shown in Figure 3.21. If the coefficient of correlation is nearest to 1 or -1, it can be said that those variables are correlated; the darkest colors (green or red) represent a stronger correlation.

- Macro-economic variables are strongly correlated to each other, such as Arizona's personal income, compensation, wage; Mexico's IPP, CPI and GDP; and moreover, these variables are correlated to trade industry beneficiaries.

- The IPP in the US is not correlated to any variable.

- Crime and homicides are not strongly correlated either; but a negative correlation between drug crimes and some variables was found as expected.

FIGURE 3.21: MATRIX OF CORRELATION BETWEEN EXTERNAL VARIABLES

	Ben-SL	Ben-PP	Ben-PEX	Ben-F	Ben-T	Ben-M	Ben-S	Ben-O	EMIME	Au-Mxc	Au-PEC	Ag-Mxc	IMMEX	Crime	Homicides	Drugs	PI-Az	Co-Az	W-Az	IPP-Mx	CPI-Mx	GDP-Mx	IPP-US	CPI-US	Diesel	Gas	PI-US	GDP-US	ER
Ben-SL	1.00																												
Ben-PP	-0.50	1.00																											
Ben-PEX	-0.62	0.52	1.00																										
Ben-F	-0.08	-0.15	0.15	1.00																									
Ben-T	-0.51	0.80	0.49	0.15	1.00																								
Ben-M	0.91	-0.65	-0.69	-0.24	-0.80	1.00																							
Ben-S	-0.50	0.39	0.53	0.47	0.79	-0.76	1.00																						
Ben-O	-0.65	0.64	0.69	0.36	0.87	-0.88	0.91	1.00																					
EMIME	0.91	-0.71	-0.48	0.20	-0.61	0.96	-0.63	-0.76	1.00																				
Au-Mxc	0.56	-0.56	-0.36	0.08	-0.65	0.65	-0.50	-0.60	0.46	1.00																			
Au-PEC	0.10	-0.56	-0.11	0.07	-0.71	0.36	-0.49	-0.55	-0.13	0.51	1.00																		
Ag-Mxc	0.60	-0.49	-0.46	0.19	-0.46	0.59	-0.32	-0.42	0.55	0.64	0.27	1.00																	
IMMEX	0.84	0.46	0.20	0.13	0.51	0.79	-0.06	0.22	N/A	0.30	N/A	0.28	1.00																
Crime	-0.31	0.31	0.57	0.13	0.04	-0.25	0.03	0.21	-0.26	0.08	0.17	-0.06	0.38	1.00															
Homicides	-0.18	-0.13	0.41	0.37	-0.03	-0.19	0.24	0.21	0.08	0.22	0.27	0.19	-0.12	0.54	1.00														
Drugs	-0.41	0.85	0.31	-0.33	0.54	-0.43	0.08	0.32	-0.58	-0.53	-0.49	-0.50	0.31	0.15	-0.35	1.00													
PI-Az	-0.58	0.75	0.60	0.21	0.97	-0.85	0.89	0.95	-0.40	-0.68	-0.77	-0.49	0.61	0.13	0.06	0.55	1.00												
Co-Az	-0.57	0.81	0.59	0.15	0.98	-0.84	0.85	0.93	-0.38	-0.69	-0.79	-0.51	0.62	0.12	0.00	0.61	1.00	1.00											
W-Az	-0.56	0.82	0.58	0.14	0.98	-0.83	0.83	0.92	-0.36	-0.69	-0.80	-0.51	0.62	0.13	-0.01	0.63	0.99	1.00	1.00										
IPP-Mx	-0.32	0.73	0.46	0.17	0.87	-0.64	0.72	0.79	-0.09	-0.58	-0.81	-0.39	0.75	0.17	0.02	0.57	0.89	0.90	0.91	1.00									
CPI-Mx	-0.51	0.59	0.46	0.25	0.94	-0.80	0.93	0.92	-0.20	-0.67	-0.83	-0.45	-0.28	-0.05	-0.01	0.44	0.96	0.96	0.96	0.91	1.00								
GDP-Mx	-0.53	0.66	0.56	0.28	0.94	-0.82	0.93	0.95	-0.30	-0.66	-0.78	-0.44	0.21	0.07	0.08	0.46	0.99	0.98	0.98	0.89	0.98	1.00							
IPP-US	-0.12	-0.06	0.09	0.07	-0.16	-0.03	-0.01	0.03	-0.33	0.04	0.23	0.05	0.05	0.10	0.17	-0.17	-0.18	-0.19	-0.19	-0.20	-0.16	-0.18	1.00						
CPI-US	-0.57	0.64	0.57	0.27	0.94	-0.85	0.93	0.95	-0.41	-0.67	-0.74	-0.46	-0.02	0.09	0.10	0.45	0.99	0.98	0.97	0.87	0.97	0.99	-0.16	1.00					
Diesel	-0.45	0.66	0.55	0.29	0.87	-0.74	0.80	0.87	-0.53	-0.53	-0.57	-0.36	0.61	0.24	0.17	0.42	0.90	0.89	0.88	0.78	0.80	0.88	-0.16	0.90	1.00				
Gas	-0.46	0.67	0.54	0.28	0.86	-0.74	0.79	0.86	-0.49	-0.54	-0.60	-0.37	0.59	0.23	0.14	0.46	0.90	0.89	0.88	0.78	0.81	0.89	-0.10	0.90	0.97	1.00			
PI-US	-0.54	0.69	0.56	0.26	0.96	-0.84	0.91	0.95	-0.34	-0.66	-0.78	-0.46	0.55	0.09	0.06	0.49	1.00	0.99	0.99	0.90	0.97	1.00	-0.18	0.99	0.90	0.90	1.00		
GDP-US	-0.57	0.73	0.59	0.22	0.97	-0.85	0.90	0.95	-0.37	-0.69	-0.78	-0.49	0.59	0.10	0.05	0.54	1.00	0.99	0.99	0.90	0.97	0.99	-0.16	0.99	0.89	0.89	1.00	1.00	
ER	-0.51	0.43	0.48	0.19	0.75	-0.71	0.82	0.82	-0.13	-0.61	-0.78	-0.41	-0.77	-0.04	0.04	0.33	0.87	0.86	0.85	0.80	0.93	0.89	-0.15	0.88	0.64	0.64	0.88	0.88	1.00

Correlation (Crossing Mode vs. Potential Drivers)

Three main modes of travel through the LPOE were analyzed: POVs, pedestrians, and commercial traffic. In this section, a correlation analysis was performed between the external variables previously analyzed and the three different modes of travel. This was done on a monthly basis and with an outlook from one to six months to notice if any variables showed significance when accounting for an effect delay.

Appendix AA shows the correlation between several variables and the modes of transportation, accounting for up to six months of lead for each variable. Those marked with red are the only ones that were somehow correlated; through this analysis we find that the POV mode of entry was correlated to homicides, and farm and services beneficiaries.

Waiting time analysis at the San Luis I POE

The purpose of this section is to analyze historical traffic volumes data of the different modes, so that current conditions could be established. Monthly volumes of southbound crossings and waiting times were obtained from CBP and are displayed in Figure 3.21.

Privately Owned Vehicles (POV)

In order to determine the current performance of the San Luis I LPOE, waiting times for the POVs were analyzed, taking the 2010 fiscal year as the basis. CPB provided detailed hourly information by day and month which was analyzed . It was determined that the longest waiting times occur from 1 PM to 5 PM, and the shortest wait times occurs in the early morning hours.

FIGURE 3.21: AVERAGE BORDER CROSSING WAITING TIME, HOURLY
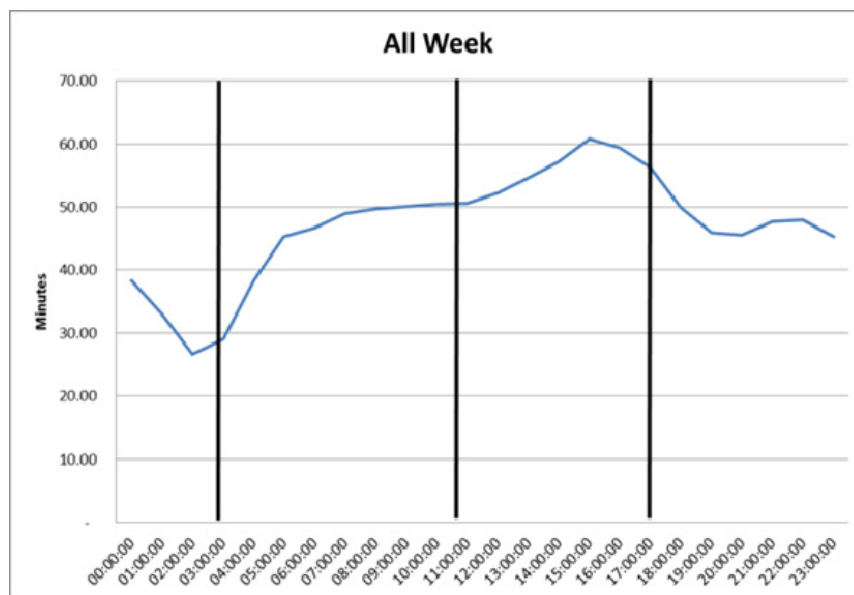
An analysis of the hourly waiting times was conducted for every day of the week, and the average of the time period studied determined that three different behaviors exist during the week as Figure 3.22 shows. It was decided to analyze them separately.

FIGURE 3.22: DIFFERENT BEHAVIORS OF THE BORDER CROSSING HOURLY WAITING TIMES
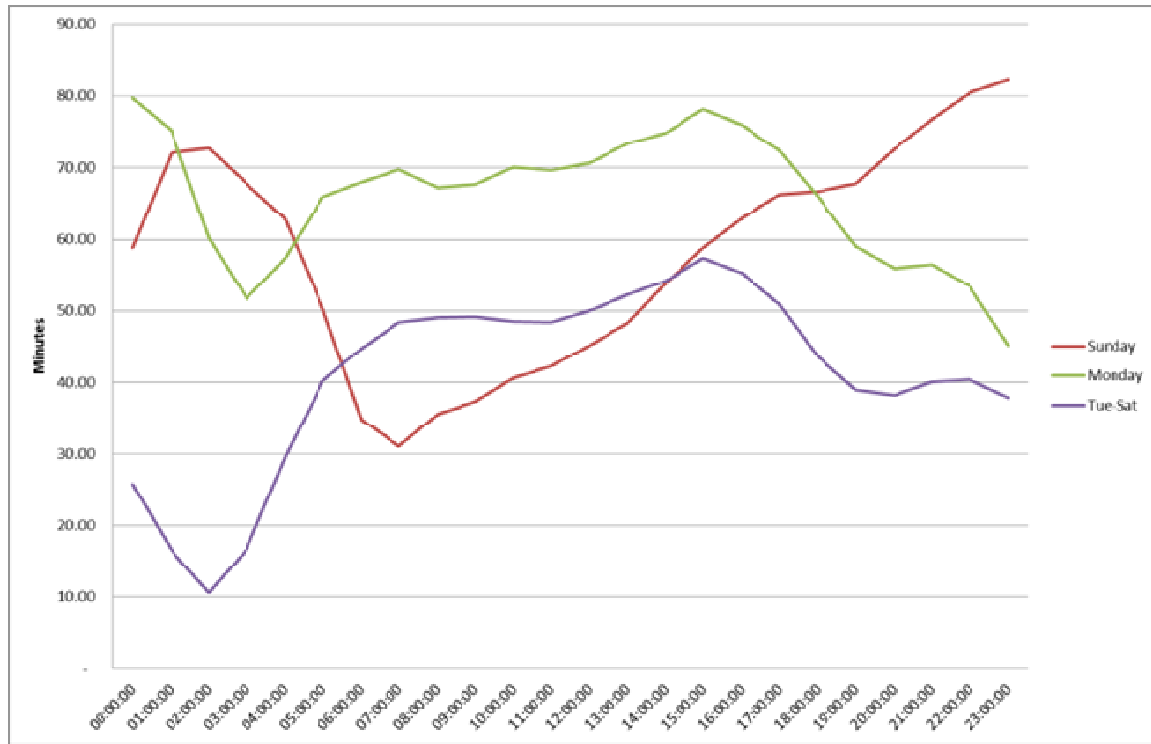
One of the objectives of analyzing this information is to know how many cars there would be in the queue and how long processing would take at any given hour of the day. To accomplish this, Little's Law was followed, which implies the average arrival rate of the POVs and the average time that the inspection of a unit takes. The following table shows some assumptions made, like the average size of a standard car and the average time within arrivals.

Time within arrivals	3.28	Cars/min
Standard car size	5	M
Standard car size	0.005	km

The number of opened booths at a given time of the day was also considered. At San Luis I LPOE, there are 6 available booths opened 24/7, but there are only 2 lanes to get to the border gate, so this number was considered instead to analyze the length and the number of cars at the queue.

Table 3.7 presents a comparison between the different behaviors during the day and how the waiting times affect the length of the queue.

TABLE 3.7: WAIT TIME AND QUEUE LENGHT (KM) BY DAY OF THE WEEK

Hour	Sunday	Length	Monday	Length	Tue-Sat	Length
0:00:00	58.83	0.49	79.71	0.66	25.85	0.22
1:00:00	72.10	0.60	75.27	0.62	16.65	0.14
2:00:00	72.67	0.60	60.23	0.50	10.60	0.09
3:00:00	67.81	0.56	51.63	0.43	16.77	0.14
4:00:00	62.83	0.52	57.42	0.48	29.50	0.25
5:00:00	50.33	0.42	65.90	0.55	40.19	0.33
6:00:00	34.85	0.29	68.04	0.56	44.79	0.37
7:00:00	31.10	0.26	69.76	0.58	48.38	0.40
8:00:00	35.62	0.30	67.27	0.56	49.03	0.41
9:00:00	37.35	0.31	67.69	0.56	49.12	0.41
10:00:00	40.60	0.34	70.04	0.58	48.47	0.40
11:00:00	42.29	0.35	69.65	0.58	48.43	0.40
12:00:00	45.19	0.38	70.60	0.58	49.99	0.41
13:00:00	48.31	0.40	73.37	0.61	52.23	0.43
14:00:00	53.88	0.45	74.86	0.62	54.24	0.45
15:00:00	58.74	0.49	78.23	0.65	57.42	0.48
16:00:00	62.94	0.52	75.96	0.63	55.27	0.46
17:00:00	66.29	0.55	72.40	0.60	50.95	0.42
18:00:00	66.69	0.55	65.90	0.55	43.55	0.36
19:00:00	67.73	0.56	59.00	0.49	38.99	0.32
20:00:00	72.63	0.60	55.90	0.46	38.17	0.32
21:00:00	76.71	0.63	56.44	0.47	40.02	0.33
22:00:00	80.51	0.67	53.47	0.44	40.38	0.34
23:00:00	82.22	0.68	45.22	0.38	37.92	0.32

As outlined in Table 3.7, Sundays show a distinct different behavior which is almost the opposite to what is happens during the rest of the week. The highest peak on Sundays occurs between 8 P.M. and 11 P.M, and the queue length is 0.68 kilometers, which translates into 135 standard cars per booth; the lightest hours take place in the morning. From Tuesday to Saturday the behavior is almost the same as the average of the entire week; Monday's behavior is more similar to the rest of the week, the same peak hours, but with longer waiting times, length of the queue, and the amount of cars in the queue.

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4.0 CONCLUSION

From the analysis performed, it is concluded that although there have been several studies on traffic, social and demographic conditions and various forecasts on these border areas, there are no studies analyzing the actual port operational activities of San Luis I LPOE nor the factors that influence the border crossings. In addition, existing studies mentioned the recent opening the San Luis II LPOE commercial port; however, the results of the operation of this port have yet to be studied.

After analyzing various factors that could affect the border crossings, a strong relationship between macroeconomic factors was observed, both in Mexico and the United States. For other variables, however, no apparent relationships were observed, such as the case of the Industrial Production Index in the United States. Moreover, through analyzing time series, no seasonality was found in most variables, with the clear exception of agriculture in San Luis, which shows a clear seasonality.

While exploring the existence of correlation between the various factors and the waiting times of different modes of traffic, it was observed that there is no strong correlation with most of the variables. Furthermore, as expected after analyzing the volumes of the crossings, a strong relationship between agriculture in San Luis against pedestrian and POVs crossing is shown. This, as noted in the literature review, is due to Mexican workers crossing every day to work at the farms.

Daily and hourly waiting times for POVs were also analyzed. From this it was concluded that there are three different behaviors during the week: Tuesdays to Saturdays, where rush hour is from 3 PM to5 PM. Mondays behave similarly to the rest of the week but waiting times have higher ranges. Finally, Sundays are different from the rest of the week, having almost an opposite behavior.

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APPENDIX AA

TABLE AA.1: INDEX OF ABBREVATIONS

Variable	Abbreviation
Beneficiaries IMSS (SLRC)	Ben-SL
Beneficiaries IMSS (PP)	Ben-PP
Beneficiaries IMSS (PEC)	Ben-PEX
Beneficiaries IMSS SLRC Farm	Ben-F
Beneficiaries IMSS SLRC Trade	Ben-T
Beneficiaries IMSS SLRC Manufacture	Ben-M
Beneficiaries IMSS SLRC Services	Ben-S
Beneficiaries IMSS SLRC Others	Ben-O
EMIME SLRC	EMIME
Gold Mxc	Au-Mxc
Gold PEC	Au-PEC
SilverMxc	Ag-Mxc
IMMEX Son	IMMEX
Crime Sonora	Crime
Homicides	Homicides
Drugcrimes	Drugs
PI AZ 2	PI-Az
Compensation AZ	Co-Az
Wage AZ	W-Az
IPP MX	IPP-Mx
CPI MX	CPI-Mx
GDP MX	GDP-Mx
IPP US	IPP-US
CPI US	CPI-US
Diesel price	Diesel
Gasolineprice	Gas
Personal Income US	PI-US
GDP US	GDP-US
Exchange Rate	ER

FIGURE AA.1: MONTHLY BORDER CROSSING CORRELATIONS

	POV	POV+1	POV+2	POV+3	POV+4	POV+5	POV+6	Ped	Ped+1	Ped+2	Ped+3	Ped+4	Ped+5	Ped+6	Bus	Bus+1	Bus+2	Bus+3	Bus+4	Bus+5	Bus+6	Truck	Truck+1	Truck+2	Truck+3	Truck+4	Truck+5	Truck+6
Ben-SL	0.11	0.09	0.08	0.07	0.05	0.03	0.00	0.12	0.09	0.08	0.09	0.12	0.14	0.15	-0.14	-0.15	-0.14	-0.15	-0.18	-0.20	-0.20	-0.14	-0.15	-0.15	-0.11	-0.06	-0.00	0.04
Ben-PP	-0.03	0.01	0.03	0.07	0.10	0.13	0.16	0.04	0.03	0.02	0.02	0.02	0.01	0.00	0.25	0.24	0.26	0.25	0.22	0.23	0.24	0.21	0.20	0.18	0.18	0.17	0.17	0.17
Ben-PEX	-0.11	-0.11	-0.11	-0.10	-0.09	-0.07	-0.06	-0.34	-0.36	-0.34	-0.31	-0.23	-0.18	-0.12	0.01	0.05	0.08	0.11	0.13	0.12	0.08	-0.08	-0.08	-0.07	-0.01	0.06	0.15	0.19
Ben-F	-0.43	-0.44	-0.45	-0.47	-0.49	-0.50	-0.50	0.00	-0.08	-0.12	-0.16	-0.16	-0.15	-0.14	-0.23	-0.23	-0.21	-0.18	-0.14	-0.13	-0.12	-0.04	-0.11	-0.16	-0.21	-0.21	-0.18	-0.13
Ben-T	-0.31	-0.29	-0.28	-0.26	-0.25	-0.22	-0.21	0.11	0.11	0.11	0.12	0.11	0.11	0.10	0.15	0.13	0.13	0.11	0.09	0.09	0.09	0.06	0.07	0.06	0.05	0.05	0.05	0.03
Ben-M	0.28	0.27	0.26	0.25	0.24	0.22	0.20	0.04	0.03	0.02	0.03	0.04	0.06	0.06	-0.11	-0.10	-0.10	-0.10	-0.11	-0.13	-0.13	-0.09	-0.09	-0.08	-0.05	-0.03	0.00	0.02
Ben-S	-0.46	-0.46	-0.47	-0.48	-0.48	-0.49	-0.50	0.04	0.04	0.05	0.06	0.05	0.04	0.03	-0.04	-0.06	-0.06	-0.07	-0.10	-0.10	-0.10	-0.06	-0.07	-0.07	-0.08	-0.09	-0.09	-0.08
Ben-O	-0.36	-0.35	-0.35	-0.33	-0.33	-0.32	-0.32	-0.03	-0.04	-0.04	-0.05	-0.07	-0.07	-0.07	0.04	0.01	0.01	0.00	-0.01	0.01	0.03	0.05	0.02	-0.01	-0.03	-0.05	-0.04	-0.03
EMIME	-0.08	-0.09	-0.11	-0.14	-0.18	-0.23	-0.27	0.05	0.06	0.07	0.11	0.13	0.15	0.16	-0.28	-0.25	-0.25	-0.23	-0.25	-0.25	-0.24	-0.20	-0.20	-0.17	-0.12	-0.07	-0.03	-0.02
Au-Mxc	-0.15	-0.16	-0.14	-0.11	-0.15	-0.15	-0.16	-0.12	-0.12	-0.14	-0.14	-0.13	-0.12	-0.16	-0.23	-0.16	-0.15	-0.15	-0.23	-0.16	-0.20	0.02	0.06	0.08	0.05	0.09	0.09	0.11
Au-PEC	-0.02	-0.04	-0.06	-0.09	-0.11	-0.12	-0.13	-0.14	-0.17	-0.20	-0.20	-0.18	-0.16	-0.12	0.02	0.03	-0.01	-0.01	0.00	-0.01	-0.04	0.06	0.04	0.02	0.02	0.05	0.09	0.13
Ag-Mxc	-0.28	-0.24	-0.22	-0.23	-0.23	-0.22	-0.22	-0.07	-0.06	-0.06	-0.06	-0.03	-0.00	-0.06	-0.25	-0.20	-0.19	-0.15	-0.24	-0.28	-0.19	-0.01	0.03	0.07	0.03	0.04	0.10	0.11
IMMEX	0.10	0.10	0.12	0.14	0.20	0.20	0.21	0.25	0.21	0.18	0.11	0.10	0.12	0.16	-0.25	-0.29	-0.32	-0.30	-0.22	-0.25	-0.27	0.03	-0.04	-0.05	-0.10	-0.08	-0.06	-0.03
Crime	-0.08	-0.05	-0.03	0.02	0.03	0.06	0.03	-0.35	-0.39	-0.39	-0.36	-0.34	-0.29	-0.24	-0.08	-0.09	0.01	0.05	0.04	0.08	0.10	0.10	0.05	0.07	0.12	0.12	0.17	0.20
Homicides	-0.41	-0.40	-0.40	-0.39	-0.37	-0.36	-0.37	-0.27	-0.32	-0.25	-0.25	-0.17	-0.11	-0.15	-0.16	-0.09	-0.07	-0.05	-0.10	-0.07	-0.07	-0.13	-0.07	0.04	0.01	0.13	0.15	0.17
Drugs	0.21	0.24	0.30	0.30	0.35	0.37	0.37	0.05	0.04	0.07	0.12	0.11	0.10	0.08	0.26	0.26	0.23	0.24	0.23	0.20	0.19	0.14	0.14	0.17	0.19	0.18	0.15	0.13
PI-Az	-0.23	-0.22	-0.20	-0.19	-0.18	-0.16	-0.14	0.13	0.12	0.11	0.10	0.10	0.10	0.10	0.06	0.07	0.08	0.09	0.09	0.10	0.11	-0.03	-0.05	-0.06	-0.07	-0.07	-0.06	-0.06
Co-Az	-0.18	-0.17	-0.16	-0.14	-0.13	-0.11	-0.10	0.14	0.13	0.12	0.12	0.11	0.11	0.11	0.07	0.08	0.09	0.10	0.11	0.11	0.12	-0.02	-0.05	-0.06	-0.06	-0.06	-0.06	-0.05
W-Az	-0.17	-0.16	-0.15	-0.13	-0.12	-0.10	-0.09	0.15	0.14	0.13	0.12	0.12	0.12	0.12	0.07	0.08	0.09	0.10	0.11	0.11	0.12	-0.02	-0.04	-0.06	-0.06	-0.06	-0.06	-0.05
IPP-Mx	-0.12	-0.15	-0.11	-0.10	-0.09	-0.05	-0.07	0.12	0.08	0.07	0.12	0.13	0.19	0.20	0.01	0.04	0.05	0.06	0.08	0.05	0.08	-0.16	-0.20	-0.13	-0.10	-0.06	0.00	0.00
CPI-Mx	-0.17	-0.16	-0.15	-0.15	-0.14	-0.13	-0.13	0.16	0.16	0.16	0.15	0.14	0.13	0.12	0.03	0.04	0.05	0.05	0.06	0.06	0.07	-0.12	-0.12	-0.12	-0.13	-0.14	-0.15	-0.15
GDP-Mx	-0.25	-0.24	-0.23	-0.22	-0.21	-0.19	-0.18	0.14	0.11	0.10	0.09	0.08	0.09	0.10	0.03	0.04	0.05	0.05	0.06	0.07	0.09	-0.06	-0.09	-0.11	-0.12	-0.11	-0.10	-0.08
IPP-US	0.12	0.12	0.08	0.08	0.08	0.08	0.04	-0.17	-0.16	-0.09	-0.15	-0.09	-0.04	-0.10	0.01	-0.04	0.08	0.07	0.03	0.13	0.06	-0.03	0.02	0.02	-0.03	0.04	0.01	0.02
CPI-US	-0.28	-0.27	-0.26	-0.24	-0.23	-0.22	-0.21	0.10	0.10	0.11	0.10	0.11	0.11	0.10	0.03	0.04	0.05	0.05	0.06	0.06	0.07	-0.10	-0.09	-0.07	-0.07	-0.07	-0.07	-0.08
Diesel	-0.38	-0.35	-0.32	-0.29	-0.26	-0.24	-0.23	0.03	0.03	0.03	0.03	0.04	0.06	0.05	0.02	0.02	0.02	0.01	0.01	0.02	0.03	-0.04	-0.02	0.01	0.01	0.02	0.02	0.01
Gas	-0.33	-0.30	-0.27	-0.24	-0.22	-0.21	-0.21	0.01	0.04	0.07	0.10	0.11	0.12	0.09	0.01	0.01	-0.00	-0.01	0.01	0.03	0.03	-0.05	0.01	0.06	0.07	0.07	0.04	0.00
PI-US	-0.25	-0.25	-0.23	-0.22	-0.21	-0.20	-0.19	0.13	0.13	0.13	0.12	0.11	0.11	0.10	0.03	0.04	0.04	0.05	0.06	0.06	0.07	-0.09	-0.08	-0.07	-0.08	-0.08	-0.09	-0.09
GDP-US	-0.21	-0.20	-0.18	-0.17	-0.16	-0.14	-0.13	0.13	0.11	0.10	0.10	0.10	0.10	0.10	0.05	0.06	0.07	0.08	0.09	0.10	0.11	-0.04	-0.07	-0.08	-0.08	-0.08	-0.08	-0.07
ER	-0.11	-0.10	-0.09	-0.10	-0.10	-0.09	-0.10	0.12	0.10	0.08	0.05	0.02	0.01	0.00	0.02	0.04	0.06	0.07	0.08	0.09	0.09	-0.11	-0.13	-0.16	-0.18	-0.19	-0.19	-0.18