



**BINATIONAL SAN LUIS
TRANSPORTATION STUDY
SAN LUIS RIO COLORADO**



Working Paper No. 1
Existing and Future Conditions

January 2013

Prepared For:



Prepared By:



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1.0 INTRODUCTION

Purpose of the Study

The Binational San Luis Transportation Study is a joint effort by the City of San Luis, Ciudad de San Luis Rio Colorado and the Arizona Department of Transportation (ADOT). The primary purpose of this study is to prepare a long range multi-modal 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 funded by the Federal Highway Administration’s (FHWA) Coordinate Border Infrastructure (CBI) program and administered through ADOT’s Office of International Affairs. Working Paper 1 consists of two reports, one for each of the two cities. The focus of this report is San Luis Rio Colorado, Sonora.

Study Objectives

The principal focus of this study is to develop a Transportation Plan for the City of San Luis Rio Colorado (S.L.R.C) that would be used in conjunction with the Updated City of San Luis 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:

- 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 Port of Entry (LPOE) I.
- 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
- Municipal de San Luis Rio Colorado
- 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 Desarrollo Urbano (SIDUR)
- Secretaria de Comunicaciones 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

Located in the northwest corner of the state of Sonora, the City of San Luis Rio Colorado borders the state of Baja California in the west and the state of Arizona in the U.S. to the north and east as displayed in Figure 1.1. Awarded city status in the 1958, San Luis Rio Colorado was initially established as an agricultural colony to support the military operations in the area during the early 1900s. It's sister city, San Luis, was established with the opening of U.S. San Luis I LPOE in 1930 and in 1979 was incorporated as a city. A second port of entry, U.S. San Luis II LPOE, was opened in October 2010 and currently services only commercial trucks. According to the last census completed, more than 85 percent of the municipality population of the 178, 380 in 2010 were located in the City of San Luis Rio Colorado.

The City of San Luis Rio Colorado is approximately 42 miles from the City of Mexicali in the neighboring state of Baja California, 126 miles from the City of Sonoyta in the state of Sonoyta, and 71 miles from Golfo de Santa Clara which offers a variety of recreational activities and restaurants along the pristine Sonoran Gold Coast. In addition, it is approximately 26 miles from the City of Yuma in Arizona, where I-8 west connects Arizona to southern California cities such as San Diego.

FIGURE 1.1 REGIONAL LOCATION



FACT SHEET

Location: Approximately 26 miles south of the City of Yuma and 71 miles north of Golfo de Santa Clara, Mexico.

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

San Luis Rio Colorado, Sonora, MEX*: Founded in 1917, Incorporated in 1958
Elevation: 148 feet
2010 Population: 158,089[†]

*San Luis 26 Ayuntamiento
sanluisrc.gob.mx)

[†]2010 INEGI, Census of Population

As part of the Long Range Transportation Plan identified in *City of San Luis Small Area Transportation Study (SATS)*, it was recommend that a Binational Study be conducted to address the future trips exchange between the two cities and the recreational traffic using the San Luis I LPOE to reach the Mexican coastal areas. However, with the ever increasing population and economic interdependency

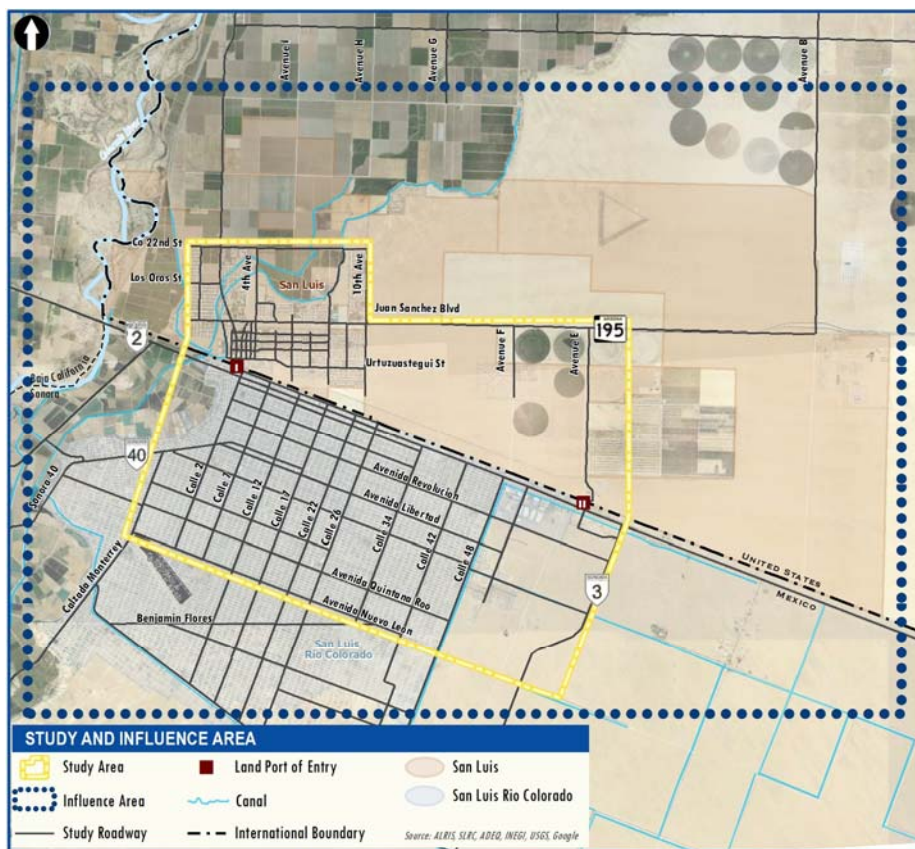


of the two bordering cities, the resurgence of the maquiladora industry, and the opening of the second LPOE which could potential provide new economic opportunities for the area, a regionally integrated and coordinated transportation plan that includes both cities would be most beneficial.

The study area identified is approximately 28.8 square miles that includes portions of the incorporated limits of San Luis and San Luis Rio Colorado, as shown in Figure 1.2. 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 and Nuevo León to the south, Libramiento to the east, and Monterrey to west in San Luis Rio Colorado. Regional access to the portion of the study area located in Mexico is provided by Federal Highway 2, Sonora 40 and Sonora 3. A major east-west artery Federal Highway 2, transverses through the northern city limits, to connect the cities of Mexicali in the west and Sonoyota in the east. Sonora 40, a north-south state highway, connects the U.S. San Luis I LPOE to the communities in the southern portion of the state (Sonora) such as Estacion Coahuila or Rito. Also a state highway, Sonora 3 connects the U.S. San Luis II LPOE to coastal communities in the south such as Golfo de Santa Clara and Puerto Penasco.

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.

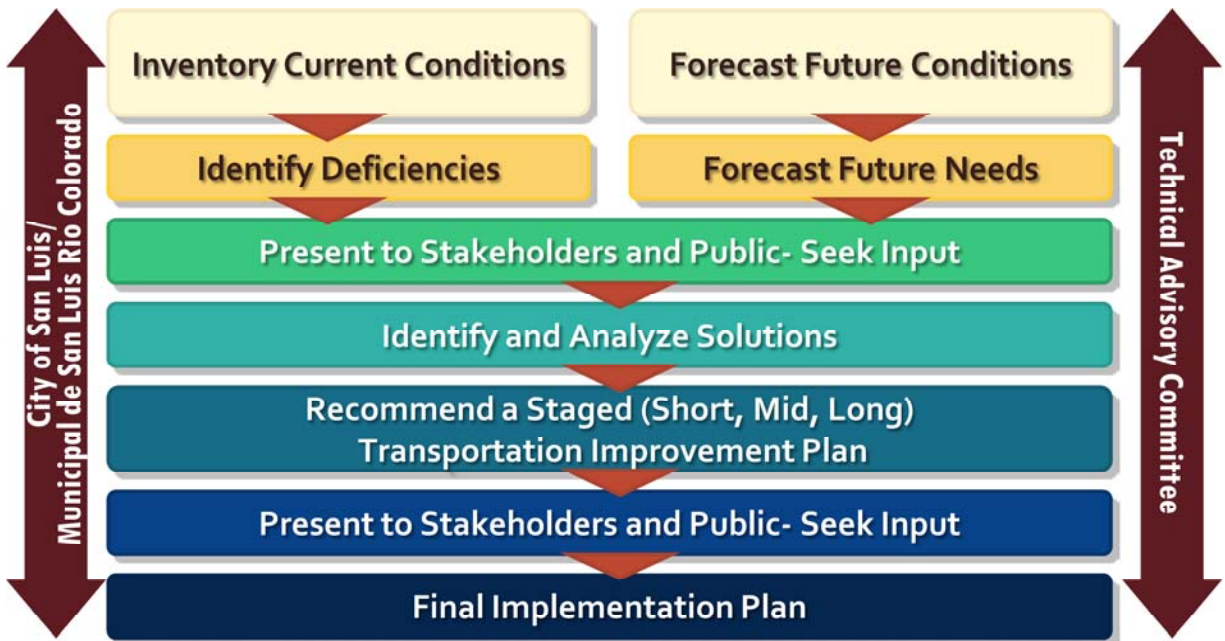
FIGURE 1.2: STUDY AND INFLUENCE AREA



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

Below is brief synopsis of the findings for the recently completed or ongoing transportation related studies in the study area.

San Luis Río Colorado 2040, Programa De Desarrollo Urbano De Centro De Población De La Cuidad De San Luis Río Colordao, Sonora

Completed in December 2010, the Urban Development Program is a comprehensive long-range plan that will serve as a guide in the development of the City of San Luis Rio Colorado over the next 30 years and is an update to the 2006 plan. By 2040, population is projected to be 305, 279 in the City. Growth is focus along the eastern and southern city limits. Recommendations include:

- A series of new roadways are planned for the growth areas; a total of 131.54 miles which consists of 54.00 miles of primary roads, 45.49 miles of collector roads, and 32.5 miles of minor collectors.
- Implement development standards for transportation facilities that includes roadway, parking, pavement preservation, pedestrian and bicycle facility.
- With the uncertainty of the economic markets three different population projections were developed based on current trends as well as the recovery of the U.S. market. The first is reflective of the historical population and market trends in the Mexico and the U.S, while the second included the implementation of several strategic projects and infrastructure, and a gradually increase of the U.S. economic recovery. The third is reflective of the implementation of the several strategic projects, investment of infrastructure, and a strong economic recovery in the U.S.

Programmed and Scoped Projects

Not Available



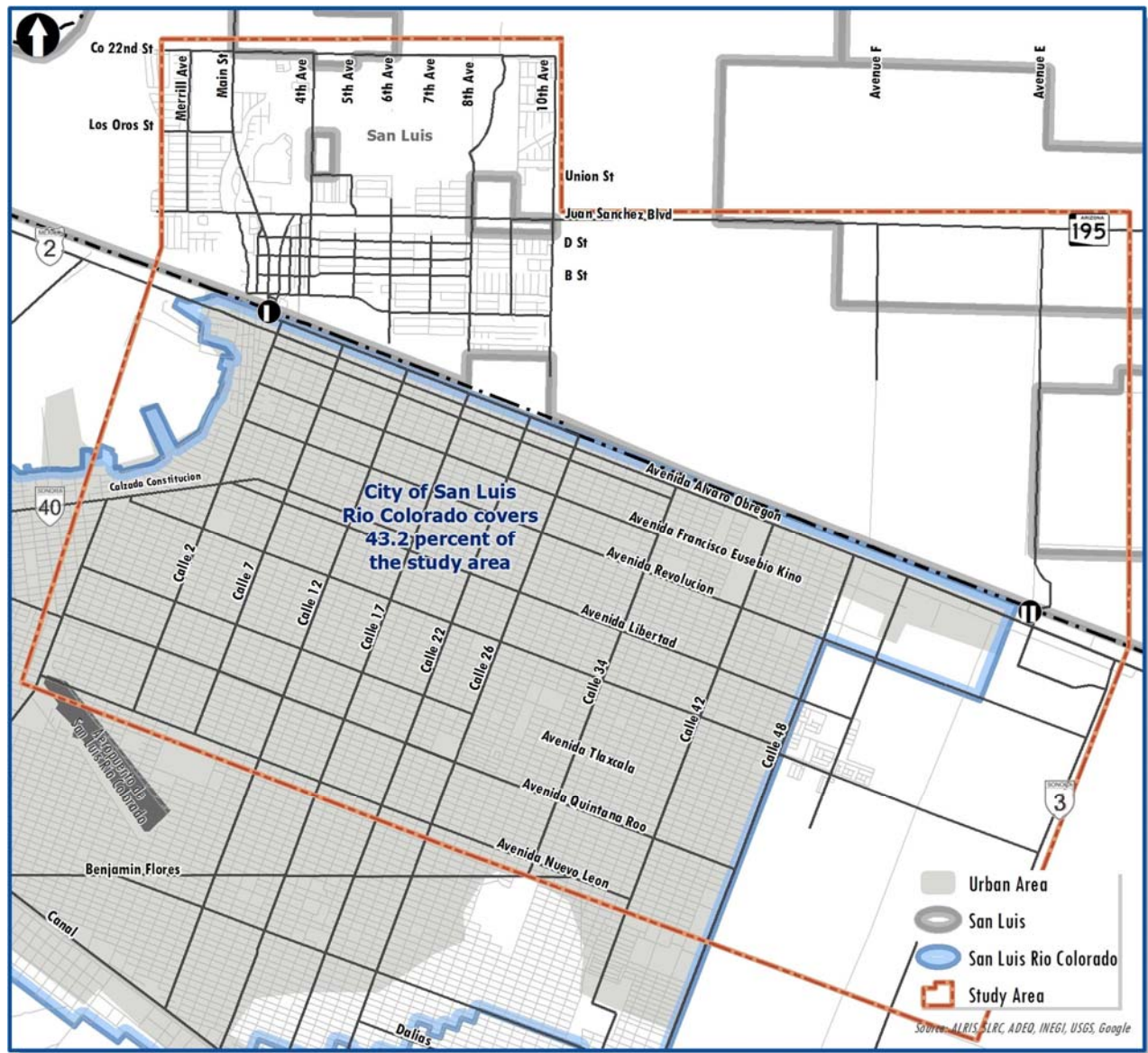
3.0 EXISTING LAND USE AND SOCIOECONOMIC CONDITIONS

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

The study area covers to 28.8 square miles and includes portions of the two border cities, San Luis in the US and San Luis Rio Colorado in Mexico. The portion of the study area located in Mexico accounts for 43.2 percent of the total incorporated boundary of the City of San Luis Rio Colorado, while remaining is located in the unincorporated area of the Municipality of San Luis Rio Colorado.

FIGURE 3.1: LANDOWNERSHIP



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 Consejo Nacional de Población (CONAPO) statistics, in 2010 the City of San Luis Rio Colorado had a population of approximately 158,089 residents with more than half (65%) residing in the study area. Overall, the population in the study area has steadily increase since 2000 although from 2005 to 2010 the population increase at a slightly faster rate (2.78% per year) than the previous five years (1.92% per year). In addition the growth rate observed in the study area from 2005 to 2010 is slightly higher than both the Municipality and State. In 2010, the population in the study area was 102,699, a 14 percent increase from 2005 while the housing units increased 17 percent from 23,448 to 27,549 during the same period. The average household size in 2010 for the study area was 3.73, similar to the Municipality and State estimates. Using the same trend from 2005 to 2010, the population and housing units in the study area are estimated to be 111,264 and 29,846 by 2013. Table 3.1 lists the population and housing growth trends from 2000 to 2013.

SOCIOECONOMIC CONDITIONS

- Land Area: 28.8 square miles
- Population (Year 2013): 111,264
- Occupied Housing Units (Year 2013): 29,846
- Average Household Size: 3.73

Source: INEGI 2010 Census of Population & Housing and 2010 CONAPO

It should be noted that the City of San Luis Rio Colorado is the fourth largest city in the state of Sonora behind Hermosillo, Obregón, and Nogales. With majority (88.6%) of the Municipality population in 2010 located within the city limits, San Luis Rio Colorado is the largest city in the Municipality of San Luis Rio Colorado.

As illustrated in Figure 3.2, the higher population densities occur in the central and eastern portion of the study area for the Mexico section.

TABLE 3.1: POPULATION AND HOUSING UNIT GROWTH TRENDS

	Study Area		Municipality San Luis Rio Colorado		State of Sonora	
	Total Population	Total Private Housing Units Occupied	Total Population	Total Private Housing Units Occupied	Total Population	Total Private Housing Units Occupied
2000	82,272	20,343	145,006	35,315	2,216,969	529,937
2005	90,166	23,448	157,076	40,706	2,394,861	614,595
2010	102,699	27,549	178,380	47,824	2,662,480	712,108
2013	111,264	29,846	192,896	51,716	2,840,995	759,854
Population Growth Rate						
'00 -'05	1.92%	3.05%	1.66%	3.05%	1.60%	3.20%
'05 -'10	2.78%	3.50%	2.71%	3.50%	2.23%	3.17%
'10 -'13	2.78%	2.78%	2.71%	2.71%	2.23%	2.23%

Source: INEGI 2010 Census of Population and Housing, 2010 CONAPO Socio-demographic indicators of the 384 cities



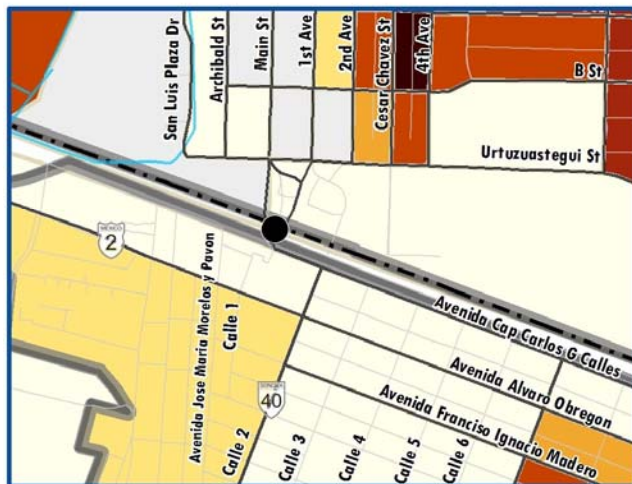
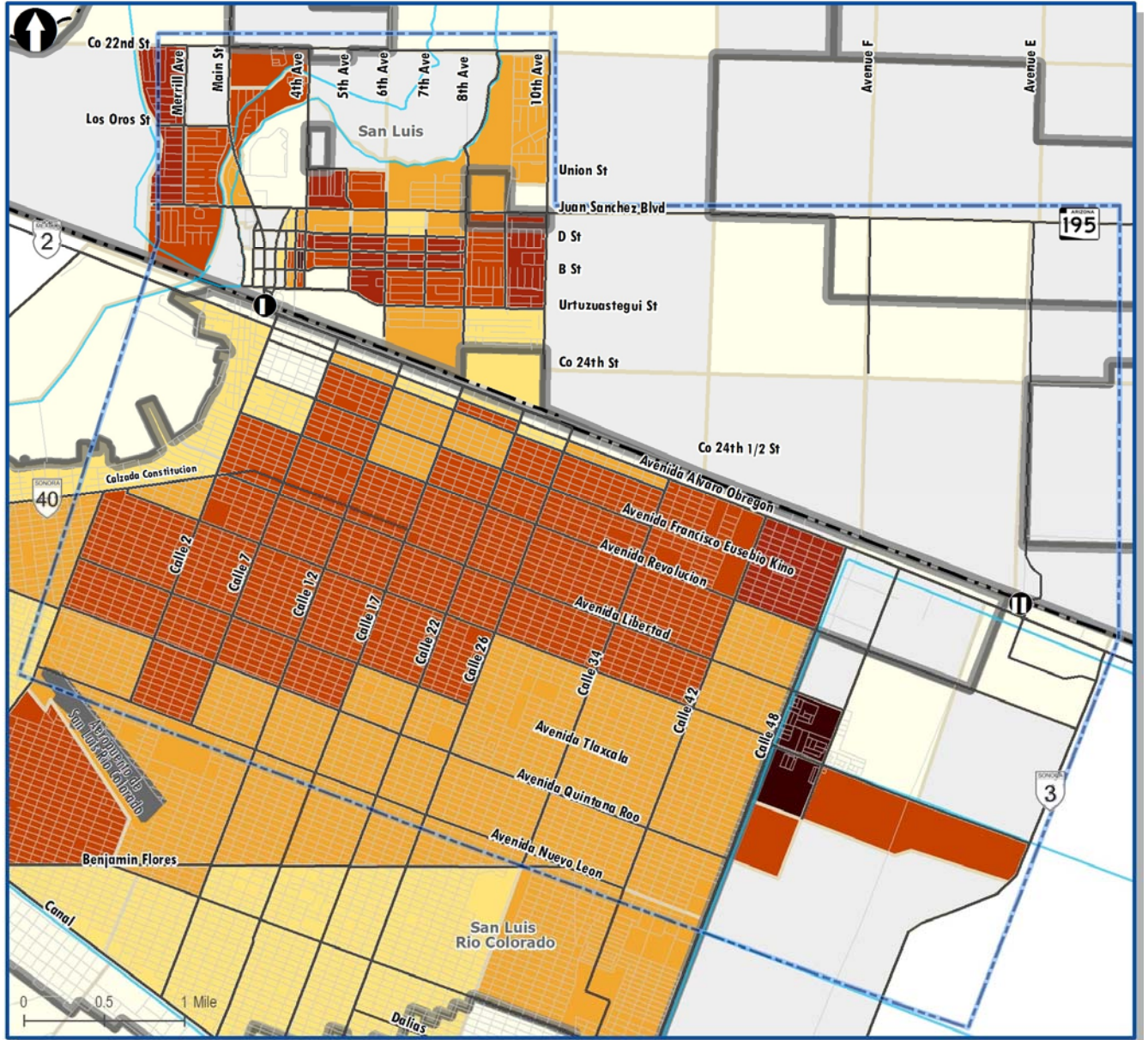


FIGURE 3.2: POPULATION 2013

Population per Square Mile



- 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, SI, Arizona Dept. of Administration Office of Employment and Population Statistics



Employment Overview

Agricultural and manufacturing are the primary drivers of the economy for the study area. However, many of the residents travel to the Yuma or other surrounding communities for employment especially during the winter months which is the peak of harvesting season. Figure 3.3 presents a visual depiction of the location of the major activity centers in the study area. Area of the major attractors totaled 30,636,275 sq. foot or 1.1 sq. miles which accounts for 3.8 percent of the total study area land coverage. Covering the largest square footage, the educational areas included all education levels from preschool to college or technical schools. As illustrated in the figure, educational facilities are located throughout the study area, with the larger facilities located west and east of the city boundaries. Commercial Corridors (mixed commercial and services) are located throughout the study area, mainly along major corridors that include Federal Hwy 2, Sonora 40, Avenida Libertad, and Calle 26.

As Figure 3.3 illustrates there is a higher density of shopping centers, commercial corridors, and health facility in the northwest corner of the city. It was observed that within a one-mile radius of Avenida Alvaro Obregon and Calle 2 intersection, which is just south of the San Luis I LPOE,;

- 62 percent of the total square footage of Health Care Facilities are located in the area.
- 37 percent of the total square footage of Shopping Centers are located in the area.
- 35 percent of the total square footage of Commercial Corridors are located in the area.

Within a two-mile radius:

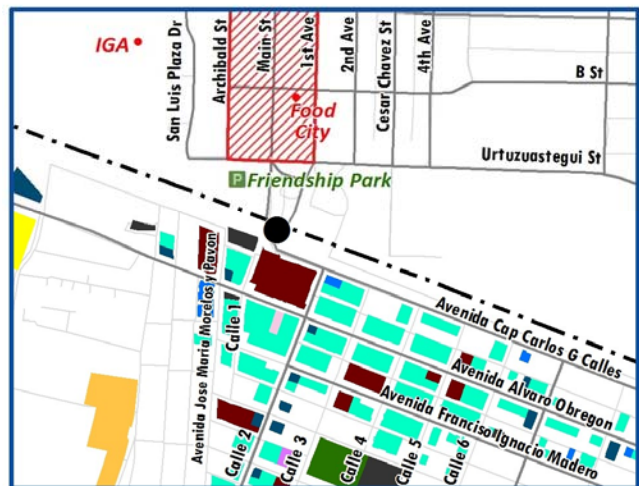
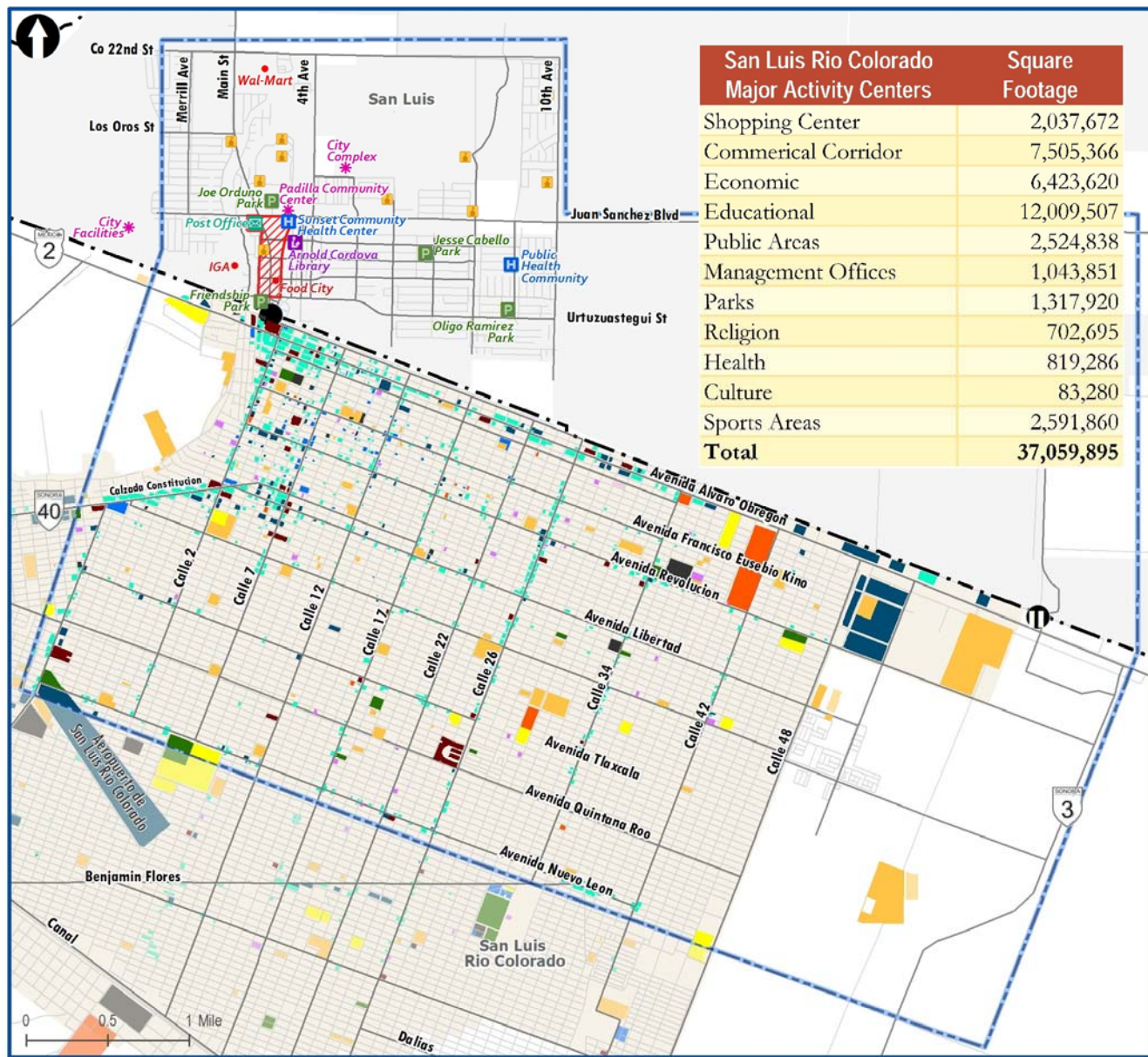
- 98 percent of the total square footage of Health Care Facilities are located in the area.
- 63 percent of the total square footage of Commercial Corridors are located in the area.
- 52 percent of the total square footage of Shopping Centers are located in the area.

Maquiladora Industry in the Study Area

- AceroAmeri-Mex Steel, S.A. de C.V.
- Bose S.A. de C.V.
- Colorado River Maquila, S. de R.L
- Comercializadora R.L. Jones, S. de R.L. de C.V.
- Comercializadora Rio Colorado, S. de RL de CV
- DDCAM Mexico, S.A. de CV
- Empaque Rio Colorado SPR de R.L de C.V.
- Enviroquip S de R.L. de C.V.
- Fox Sports S.A. de C.V.
- GPI Mexicana, S.A. de C.V.
- Kims Packaging de Mexico S. de R.L de C.V.
- Manufacturas Meca, S.A. de C.V.
- Marees Mex, S.A. de C.V.
- Ptmimages Mexico, S. de R.L. de C.V.
- R & J of Sonora, S. de R.L. de C.V.
- S.P.R. de R.L. Bustamante Parra and Associates
- Sana International S. de R.L. de C.V.
- Sonora Pride S.A. de C.V.
- T Mex S. de R.L. de C.V.
- Timpo Sales MX, S. de R.L. de C.V.
- Tse de Mexico, S.A. de C.V.
- Tsunami Produce S.A. de C.V.

Source: InfoMaquila (www.infomaquila.com)





Source: ALRIS, SLRC, ADEQ, INEGI, USGS

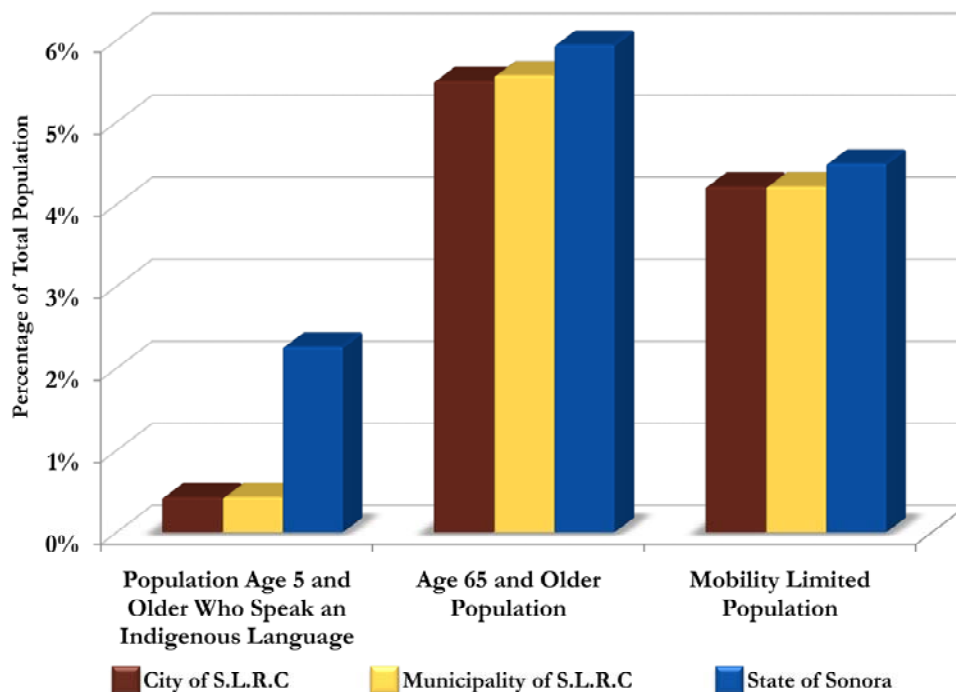


Environmental Justice Review (Title VI)

Although this report of the Binational San Luis Transportation study covers the Mexico portion of the study area, the environmental justice principles and procedures from the previous report 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.

Protected populations considered in this analysis include indigenous, elderly, low-income, and disabled populations. As the locality of these protected populations within the study area are unknown, statistics at the city level will be presented and reviewed. Figure 3.4 shows a graphical comparison of these protected populations while Table 3.2 summarizes the percentage of the protected populations within the City of San Luis Rio Colorado, Municipality of San Luis Rio Colorado, and State of Sonora. Instituto Nacional de Estadística Y Geografía (INEGI) Data Bank was unavailable for selected protected population and local statistics; therefore the Statistical Yearbook of Sonora 2011 data was used to identify the mobility limited and poverty population for the municipality and state. CONAPO city estimates included elderly data for the City of San Luis Rio Colorado; it was observed 87 percent of the municipality's elderly population were located in the City. Since 88.6 percent of the total municipality population reside within the City limits, the same percentage was applied to the mobility limited population and the population that speak an indigenous language for the City of San Luis Rio Colorado.

FIGURE 3.4: TITLE VI POPULATION GROUPS COMPARISON



Source: INEGI Data Bank, 2010 CONAPO Socio-demographic indicators of the 384 cities, Statistical Yearbook of Sonora 2011, and ⁺City of S.L.R.C calculation reflects the 88.6 percent of the Municipality population is located with city limits of San Luis Rio Colorado.



TABLE 3.2: ENVIRONMENTAL POPULATION PERCENTAGES

	City of San Luis Rio Colorado		Municipality of San Luis Rio Colorado		State of Sonora	
	Total Pop	% of Total Population	Total Pop	% of Total Population	Total Pop	% of Total Population
Total Population (Year 2010)	158,089		178,380		2,662,480	
Population, Age 5 and Older, Who Speak an Indigenous Language	681 ⁺	0.4	768	0.4	60,310	2.3
Age 65 and Older Population	8,702	5.5	9,942	5.6	158,431	6.0
Mobility Limited	6,672 ⁺	4.2	7,528	4.2	119,866	4.5
Equity Poverty in 2005		-		41.1		40.4

Source: INEGI Data Bank, 2010 CONAPO Socio-demographic indicators of the 384 cities, Statistical Yearbook of Sonora 2011, and⁺ City of S.L.R.C calculation reflects the 88.6 percent of the Municipality population is located with city limits of San Luis Rio Colorado.

Indigenous Population

The indigenous population consists of individuals, age of 5 and older, who can speak an indigenous language; Mayo or Yaqui mainly in the state of Sonora. It should be noted that this one method of estimating the indigenous population. Similar to the municipality characteristics, less than 1 percent of the total city population spoke an indigenous language in 2010, this is lower than the state's estimate of 2.3 percent.

Population Age 65 and Over

Elderly populations, or persons who are over the age of 65 constitute 5.5 percent of the total city population in 2010, this is relative to the State (6.0%) and Municipality (5.6%) estimates.

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 some form of public transportation. In 2010, the percentage of mobility-limited population in the City was 4.2 percent, which is similar to the Municipality (4.2%) and State (4.5%) estimates.

Poverty Population

Poverty population or Equity poverty, as established by the National Council for Evaluation of Social Development Policy (CONEVAL) refers to individuals who are unable to purchase food and daily expenditures that include clothing, housing, transportation, education, and health even when the total household income is used exclusively for the purchase of these goods. Similar to the state's estimate, 41.1 percent of the municipality population in 2005 were not able to make the necessary expenditures for daily living. Data only available at municipality and state level.



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 3.5 presents the natural environmental overview of the study area.

Vegetation: One vegetation type, microphyll desert scrub, has been identified within the study area.

Water Features: In addition to the canal that is west of the San Luis I LPOE, three canals transverse through the east portion of the study area.

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, currently more than half of the of the study area, from Calle 22 eastward is located in the linkage zone.

Environmental Concerns

Air Quality: Air pollution generated by the production of brick kilns, burning of garbage, and other industrial processes that requires a furnace or oven is of great concern to urban population especially those with asthma and/or lung disease.

Sandstorm: With arid desert like conditions, sandstorms not only impact the air quality but also limit visibility on the roadways posing a hazard to motorists and pedestrians alike. As well as potentially damaging infrastructure such as street lights and sign, and obstructing the roadways with fallen trees.



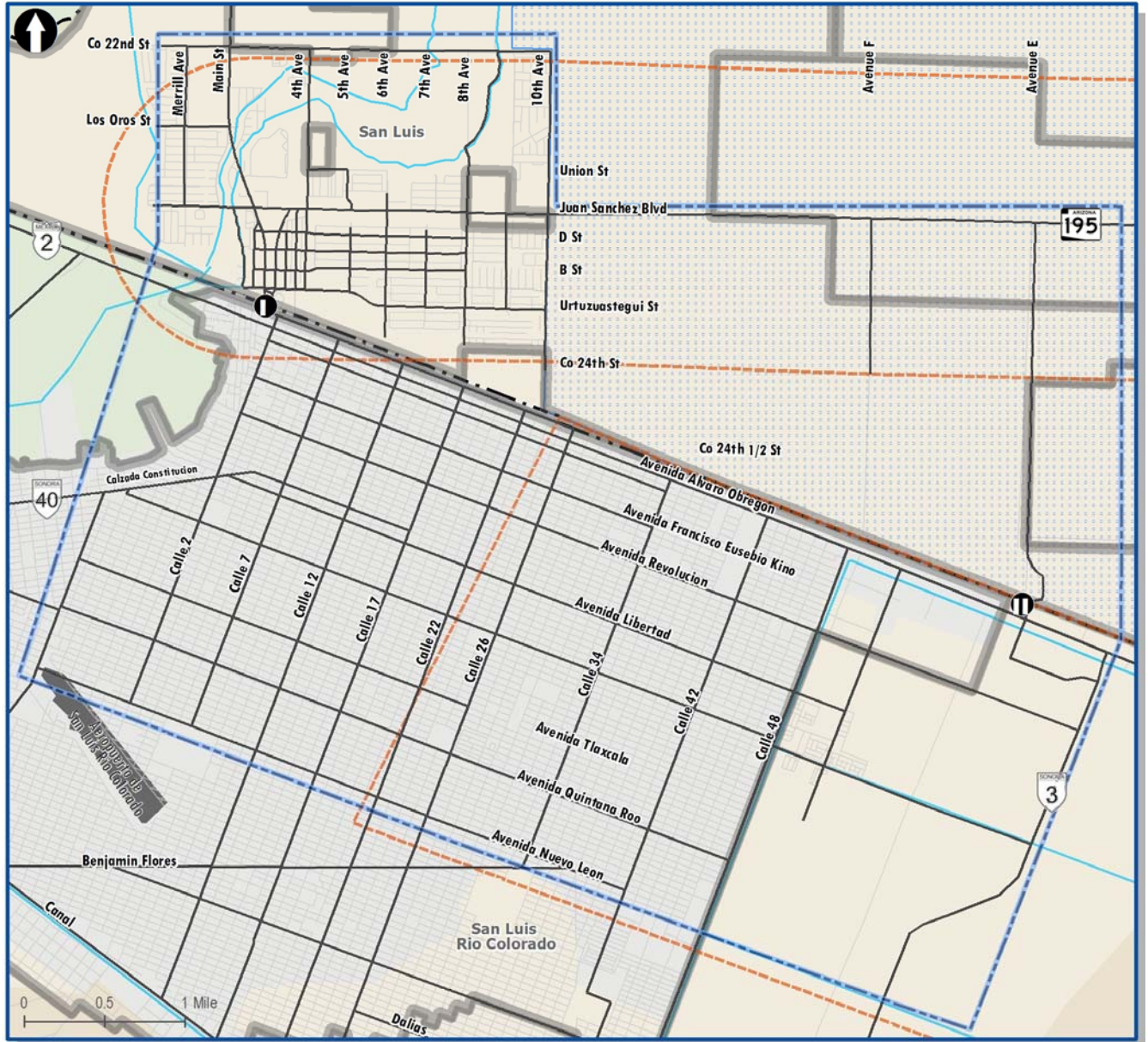


FIGURE 3.5: NATURAL ENVIRONMENT OVERVIEW

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

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



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

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:

- | | | | | | | | | | | | | | |
|---|--|----------------------|-----------|--------------------|------------|----------------------|------------|---------------------------|------------|------------------------|------------|-----------|--|
| <p><i>Mexico 2/
Avenida
Álvaro
Obregón</i></p> | <ul style="list-style-type: none"> ■ Federally owned east-west highway that provides interstate travel across Baja California, Sonora and Chihuahua. It also serves as the regional connection to Mexicali in the west and Sonoyta in the east. ■ Four-lanes (two-lanes each direction) for majority of its length with the exception between Calle 7 and Calle 37 where the road was widened to include a center turn lane. ■ Speeds range from 22 mph (35 kph) to 31 mph (50 kph). ■ With eleven traffic signals, it is the most signalized roadway in the study area. | | | | | | | | | | | | |
| <p><i>Sonora 40/
Calle 2/
Calzada
Constitución:</i></p> | <ul style="list-style-type: none"> ■ North-south principal arterial that provides a regional connection from the U.S./Mexico border at San Luis I LPOE to the southern Sonoran communities. Through the study area, the route follows Calle 2 and Calzada Constitución. ■ Transitions from a two-lane (one-lane each direction) roadway at the border to a four-lane (two lane in each direction) roadway at Avenida Benito Juárez Garica. ■ Speed is 25 mph (35 kph) for entire length in study area. ■ Eight traffic signals located along the route, seven on Calle 2 and one on Calzada Constitución | | | | | | | | | | | | |
| <p><i>Sonora 3/
Libramiento</i></p> | <ul style="list-style-type: none"> ■ North-south principal arterial that provides a regional connection from the U.S./Mexico border at San Luis II LPOE to the southern Sonoran communities. ■ Transitions from a four-lane (two-lane each direction) roadway at Mexico 2/Avenida Álvaro Obregón to a two-lane (two lane in each direction) roadway just south of the commercial vehicle port of entry. ■ Speeds range from 22 mph (35 kph) to 31 mph (50 kph) ■ No signalized traffic control | | | | | | | | | | | | |
| <p><i>Other Major
Roadways:</i></p> | <table border="0"> <tr> <td>■ Avenida Revolución</td> <td>■ Calle 7</td> </tr> <tr> <td>■ Avenida Libertad</td> <td>■ Calle 17</td> </tr> <tr> <td>■ Avenida Nuevo León</td> <td>■ Calle 26</td> </tr> <tr> <td>■ Avenida Benjamín Flores</td> <td>■ Calle 34</td> </tr> <tr> <td>■ Calzada Constitución</td> <td>■ Calle 48</td> </tr> <tr> <td>■ Calle 2</td> <td></td> </tr> </table> | ■ Avenida Revolución | ■ Calle 7 | ■ Avenida Libertad | ■ Calle 17 | ■ Avenida Nuevo León | ■ Calle 26 | ■ Avenida Benjamín Flores | ■ Calle 34 | ■ Calzada Constitución | ■ Calle 48 | ■ Calle 2 | |
| ■ Avenida Revolución | ■ Calle 7 | | | | | | | | | | | | |
| ■ Avenida Libertad | ■ Calle 17 | | | | | | | | | | | | |
| ■ Avenida Nuevo León | ■ Calle 26 | | | | | | | | | | | | |
| ■ Avenida Benjamín Flores | ■ Calle 34 | | | | | | | | | | | | |
| ■ Calzada Constitución | ■ Calle 48 | | | | | | | | | | | | |
| ■ Calle 2 | | | | | | | | | | | | | |



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. Functional classifications for the study area are presented in Figure 4.1.

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:*
- Mexico 2/Avenida Álvaro Obregón: western study limits to Calle 6 (four-lanes)
 - Mexico 2/Avenida Álvaro Obregón: Calle 6 to Calle 37 (four-lanes plus center turn lane)
 - Mexico 2/Avenida Álvaro Obregón: Calle 37 to eastern study limits (four-lanes)
 - Avenida Francisco Eusebio Kino: Calle 2 to Calle 8 (four-lanes)
 - Avenida Francisco Eusebio Kino: Calle 26 to Calle 34 (two-lanes plus center turn lane)
 - Avenida Revolución: Calle 40 to east of Dr. Samuel Ocaña García (four-lanes)
 - Avenida Libertad: Calzada Constitución to Calle 26 (four-lanes)
 - Avenida Tlaxcala: Calle 7 to Calle 17 (two-lanes plus center turn lane)
 - Avenida Nuevo León: Calzada Monterrey to Calle 42 (two-lanes plus center turn lane)
 - Calzada Monterrey: Calzada Constitución to Avenida Nuevo León: (four-lanes)
 - Calle 2: Avenida Benito Juárez García to Avenida Tamaulipas (four-lanes)
 - Calle 2: Avenida Tamaulipas to Avenida Tlaxcala (four-lanes plus center turn lane)
 - Calle 7: Captain Carlos G. Calles y/o Avenida Internacional to Avenida Nuevo León (four-lanes)
 - Calle 12: Captain Carlos G. Calles y/o Avenida Internacional to Avenida Tlaxcala (four-lanes)
 - Calle 17: Captain Carlos G. Calles y/o Avenida Internacional to Avenida Zacatecas (four-lanes)
 - Calle 22: Mexico 2/Avenida Álvaro Obregón to Avenida Tamaulipas (four-lanes plus center turn lane)
 - Calle 22: Avenida Tamaulipas to Avenida Durango (four-lanes)
 - Calle 26: Captain Carlos G. Calles y/o Avenida Internacional to Avenida Francisco Ignacio Madero (four-lanes)
 - Calle 26: Avenida Francisco Ignacio Madero to Avenida Tlaxcala (four-lanes plus center turn lane)
 - Calle 26: Avenida Tlaxcala to southern study limits (four-lanes)
 - Calle 32: Avenida Revolución to Avenida Sinaloa "B" (two-lanes plus center turn lane)
 - Sonora 3/Libramiento: Mexico 2/Avenida Álvaro Obregón to south of commercial port of entry (four-lanes)
 - Calzada Constitución: Avenida Libertad to western study limit (four-lanes)
 - All other study roadway are two-lane (one-lane in each direction) roadway facilities



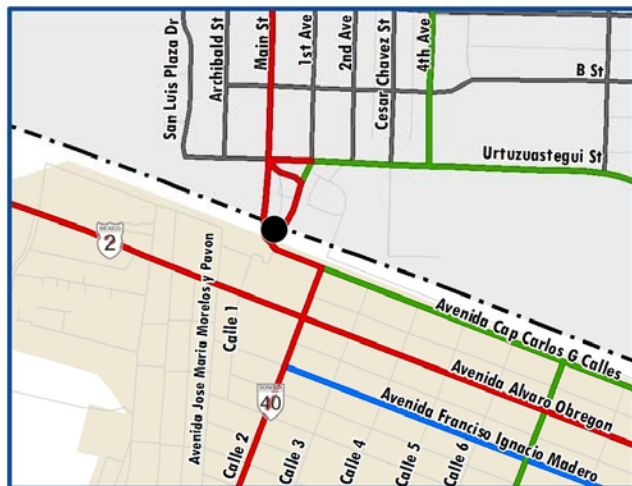
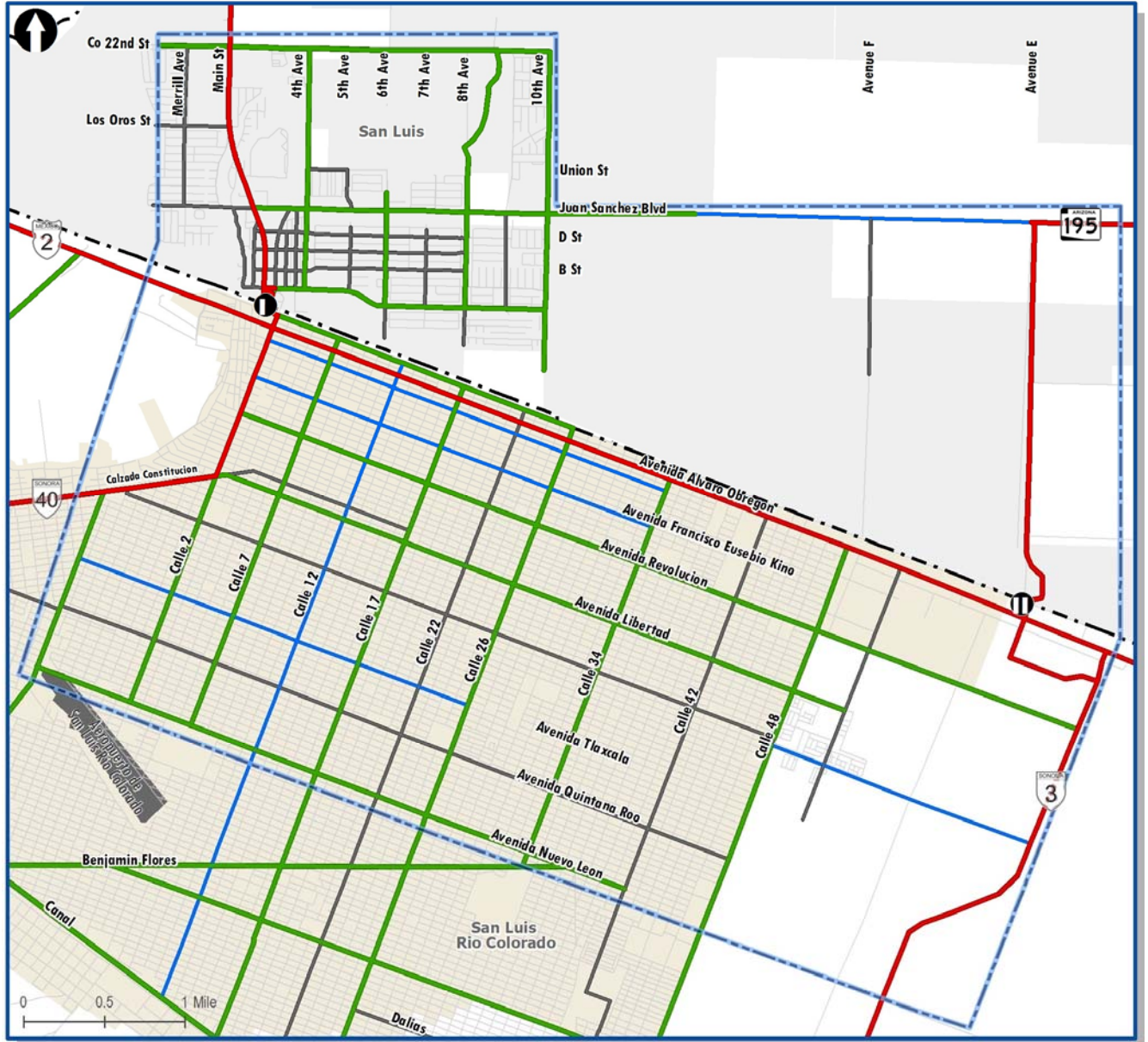


FIGURE 4.1: FUNCTIONAL CLASSIFICATION

- Principal Arterial
- Minor Arterial
- Collector
- Minor Collector
- Land Port of Entry
- - - International Boundary
- San Luis
- San Luis Rio Colorado
- Study Area

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



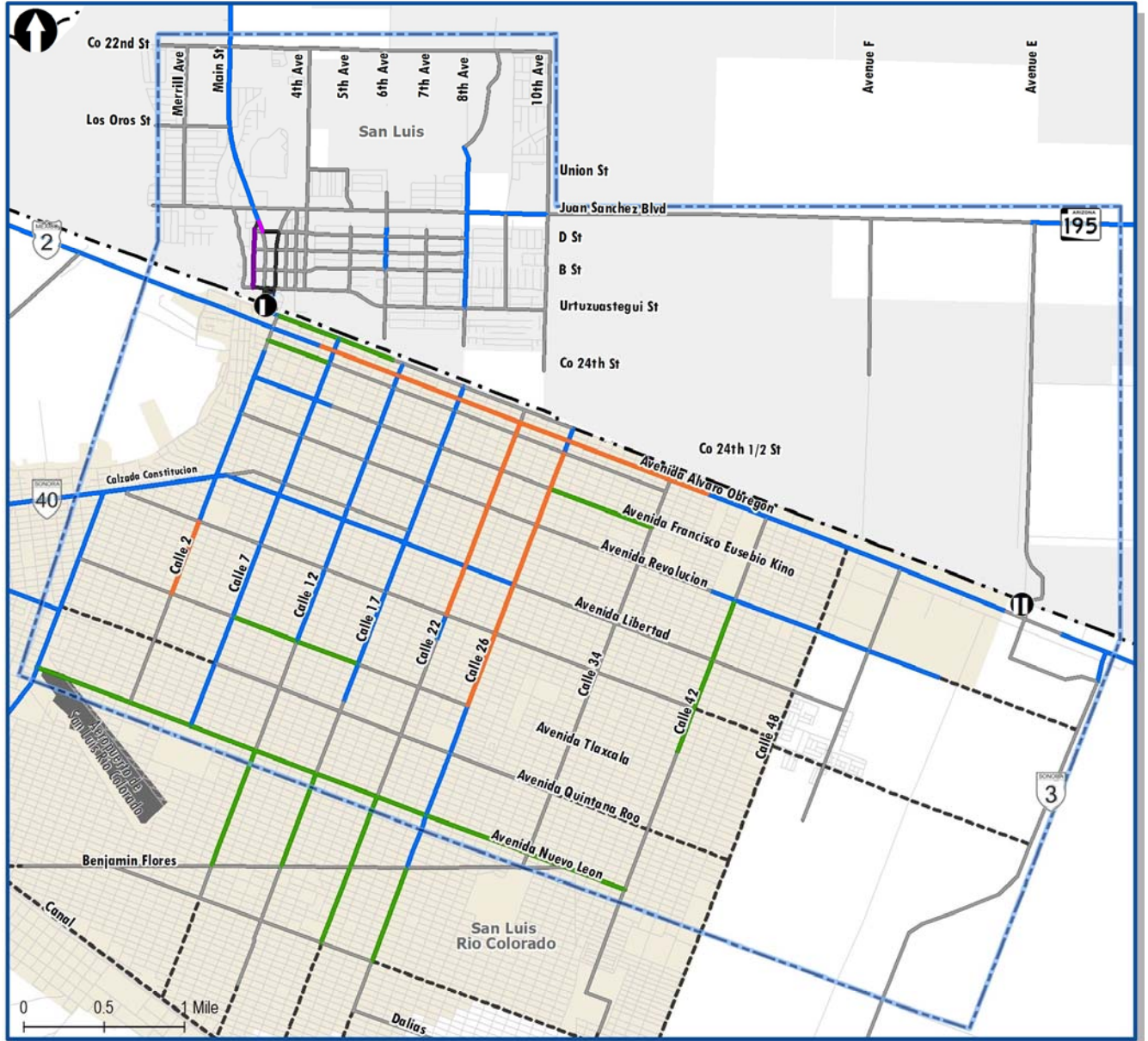


FIGURE 4.2: NUMBER OF LANES

- 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



- Speed Limits:*
- Mexico 2/Avenida Álvaro Obregón ranges from 22 mph (35 kph) to 31 mph (50 kph)
 - Captain Carlos G. Calles y/o Avenida Internacional ranges from 22 mph (35 kph) to 31 mph (50 kph)
 - Majority of streets in the study area are 22 mph (35 kph) or less

- Traffic Signals:*
- | | |
|---|---|
| <ul style="list-style-type: none"> ■ Mexico 2/Avenida Álvaro Obregón and Calle 1 ■ Mexico 2/Avenida Álvaro Obregón and Calle 2 ■ Mexico 2/Avenida Álvaro Obregón and Calle 4 ■ Mexico 2/Avenida Álvaro Obregón and Calle 6 ■ Mexico 2/Avenida Álvaro Obregón and Calle 7 ■ Mexico 2/Avenida Álvaro Obregón and Calle 12 ■ Mexico 2/Avenida Álvaro Obregón and Calle 17 ■ Mexico 2/Avenida Álvaro Obregón and Calle 22 ■ Mexico 2/Avenida Álvaro Obregón and Calle 26 ■ Mexico 2/Avenida Álvaro Obregón and Calle 34 ■ Mexico 2/Avenida Álvaro Obregón and Calle 42 ■ Avenida Franciso Ignacio Madero and Calle 2 ■ Avenida Franciso Ignacio Madero and Calle 3 ■ Avenida Benito Juárez García and Calle 2 ■ Avenida Miguel Hidalgo y Costilla and Calle 2 ■ Avenida Franciso Eusebio Kino and Calle 6 ■ Avenida Franciso Eusebio Kino and Calle 7 ■ Avenida Franciso Eusebio Kino and Calle 12 ■ Avenida Franciso Eusebio Kino and Calle 26 ■ Avenida Revolución and Calle 2 ■ Avenida Revolución and Calle 7 ■ Avenida Revolución and Calle 12 ■ Avenida Revolución and Calle 17 ■ Avenida Revolución and Calle 22 ■ Avenida Revolución and Calle 26 ■ Avenida Revolución and Calle 34 ■ Avenida Libertad and Calle 7 ■ Avenida Libertad and Calle 12 ■ Avenida Libertad and Calle 17 ■ Avenida Libertad and Calle 22 ■ Avenida Libertad and Calle 26 ■ Avenida Libertad and Calle 34 ■ Avenida Tlaxcala and Calzada Monterrey ■ Avenida Tlaxcala and Calle 7 ■ Avenida Tlaxcala and Calle 12 | <ul style="list-style-type: none"> ■ Avenida Tlaxcala and Calle 17 ■ Avenida Tlaxcala and Calle 22 ■ Avenida Tlaxcala and Calle 26 ■ Calzada Aviación and Calzada Monterrey ■ Avenue Nuevo León and Calzada Monterrey ■ Avenue Nuevo León and Calle 9 ■ Avenue Nuevo León and Calle 12 ■ Avenue Nuevo León and Calle 17 ■ Avenue Nuevo León and Calle 22 ■ Avenue Nuevo León and Calle 26 ■ Calzada Constitución and Calle 2 ■ Calzada Constitución and Calzada Monterrey |
|---|---|



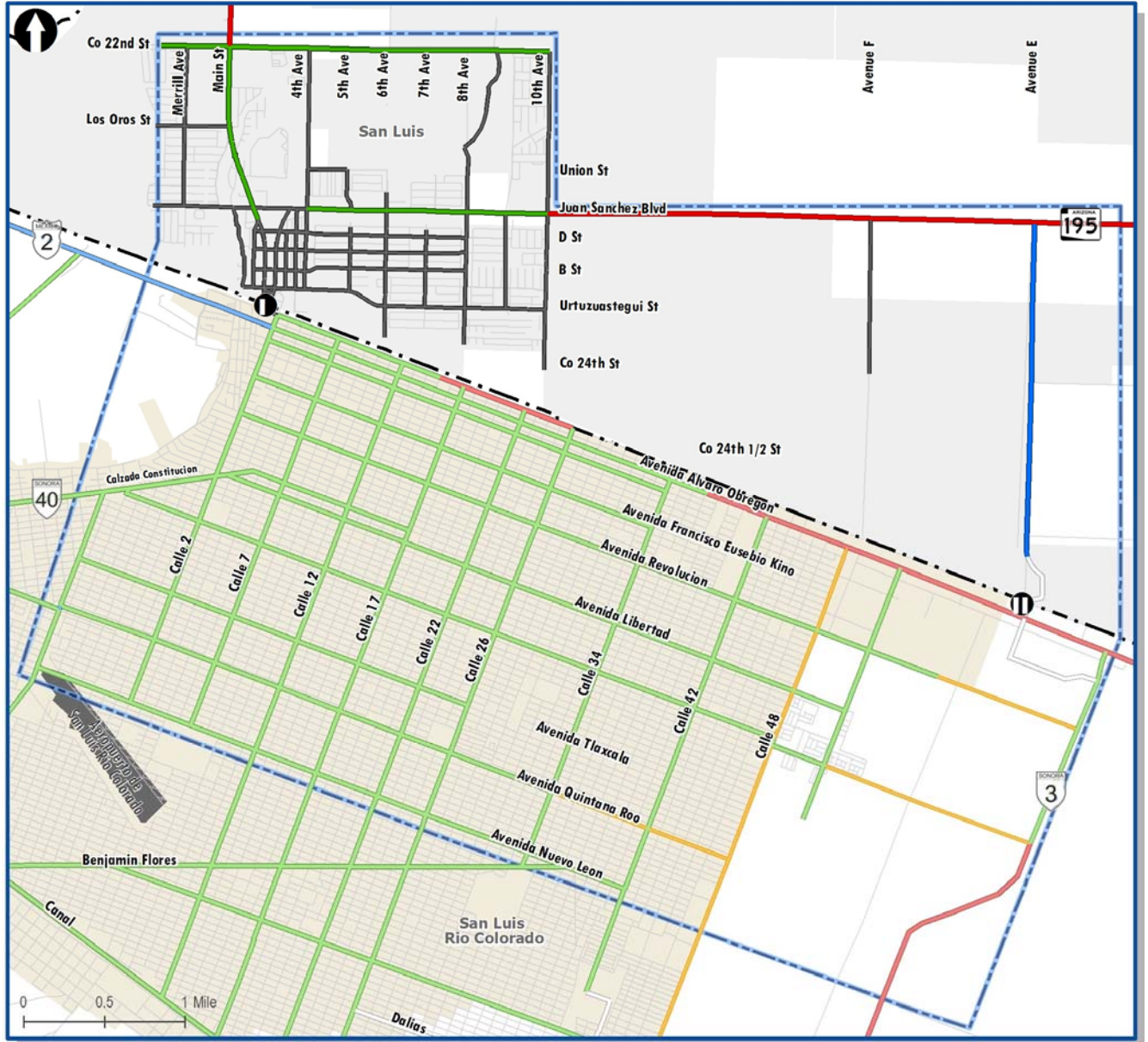


FIGURE 4.3: SPEED LIMITS

San Luis Rio Colorado		San Luis		
50 KPH	40 - 45 KPH	50 - 55 MPH	40 - 45 MPH	● Land Port of Entry
30 - 35 KPH	20 - 25 KPH	30 - 35 MPH	20 - 25 MPH	- - - International Boundary
15 KPH	0 KPH	15 MPH	0 MPH	○ San Luis
				○ San Luis Rio Colorado
				□ Study Area

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



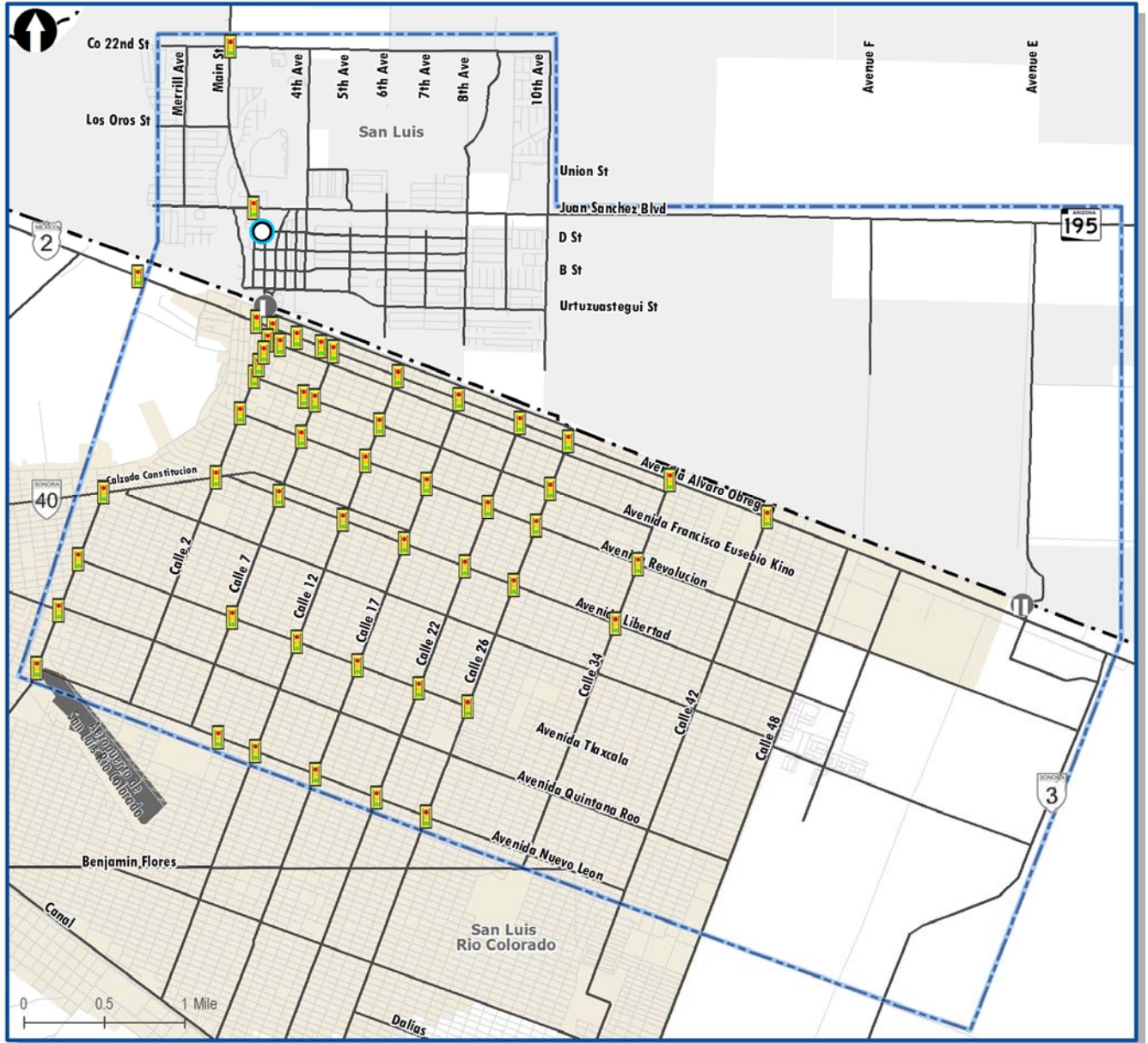


FIGURE 4.4: TRAFFIC CONTROL

-  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

Of the total 77.78 miles of study area roadway, 7.93 miles are unpaved. Majority of the unpaved roads are located in the eastern portion of the study area; Calle 48 which extends from Avenida Álvaro Obregón to the southern study limits is unpaved for its entire length. Status of pavement condition is unavailable.

Bridge Condition

As per the previous study, most of the bridges in the study area are located along Calle 48 canal near the eastern city limits. Major crossings include Avenida Revolución and Avenida Libertad, while minor crossing Avenida Tamaulipas and Nuevo León. Status of bridge condition is unavailable.

Freight

San Luis II LPOE, in the eastern portion of the study area, is a 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. San Luis II LPOE was expected to process an estimated 150 trucks per day when it opened, 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

A crash analysis was conducted 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. Historical crash data from INEGI data bank was available, however the data is for a selected few and only available at a general municipal and state level. Data for crashes occurring between 2004 and 2009 was obtained from INEGI data bank for the Municipality of San Luis Rio Colorado. As majority of the population reside in the City of San Luis Rio Colorado, the trends could be reflective of the traffic conditions in the City. As shown in Figure 4.5, the total number of crashes peaked in 2007, and since has steadily declined. As illustrated in Figure 4.6, a total of 8,631 crashes occurred during the five year time period; collision with another vehicle accounted for 65 percent of the crashes while another 22 percent of the crashes were collisions with a fixed object.

With help from the City staff, high crash and conflict intersections in the study area were identified and are displayed in Figure 4.7. While majority of the intersections in the northern portion of the San Luis Rio Colorado city boundary experience conflict, high crash intersections are located throughout the study area.

FIGURE 4.5: MUNICIPALITY HISTORICAL CRASH TREND

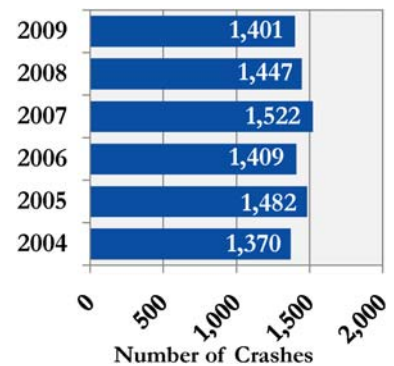
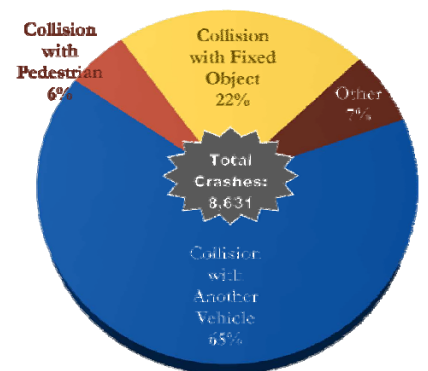


FIGURE 4.6: MUNICIPALITY HISTORICAL COLLISION TYPE



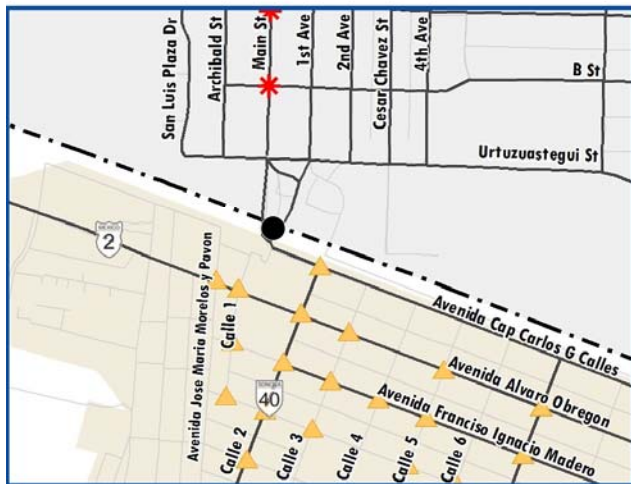
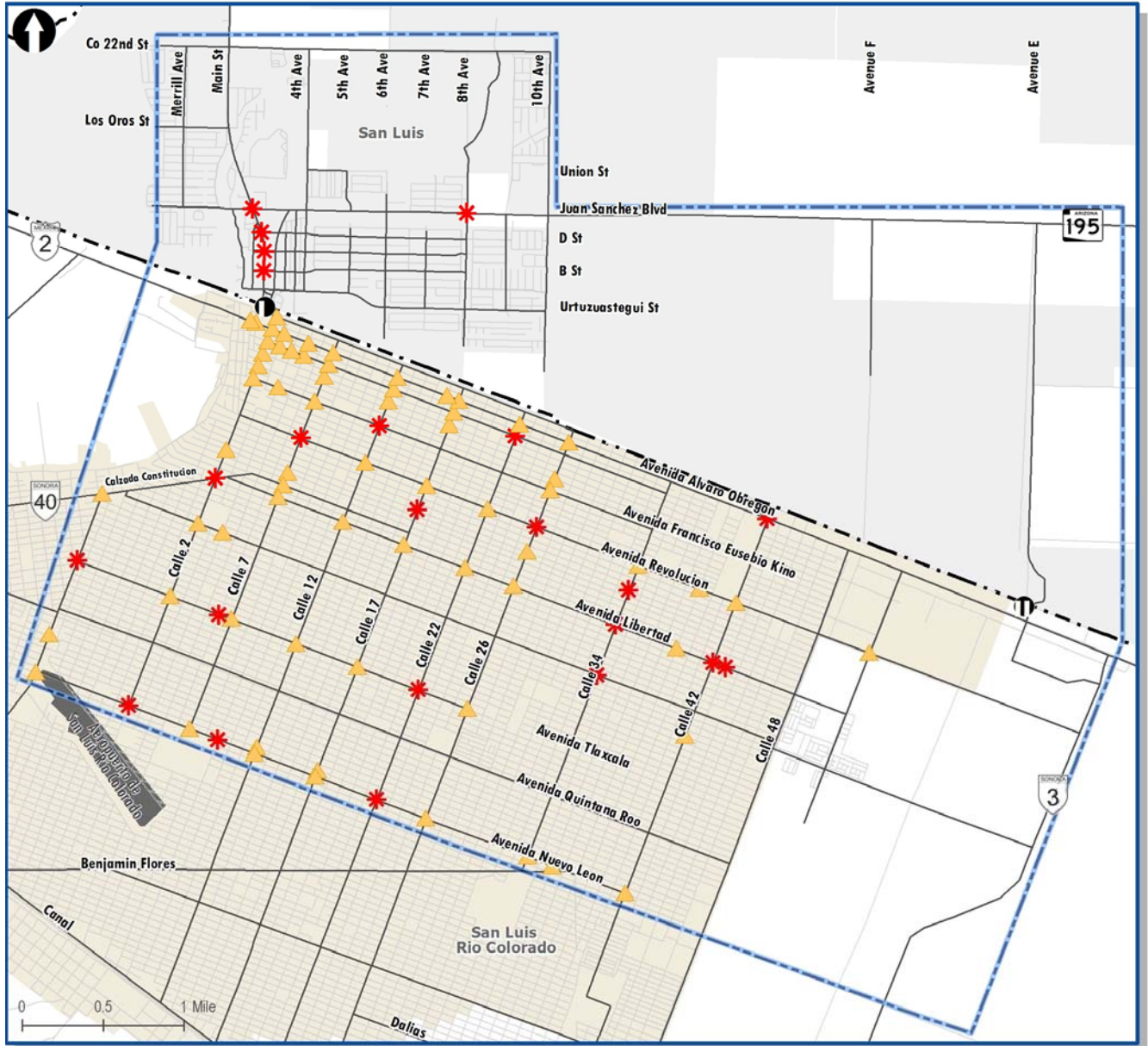


FIGURE 4.7: HIGH CRASH LOCATIONS

- * High Crash Location
- ▲ Conflict Location
- Land Port of Entry
- Study Roadway
- International Boundary
- San Luis
- San Luis Rio Colorado
- Study Area

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



A total of 19 intersections were identified as high crash intersections, 10 were signalized intersection and 9 were unsignalized:

Signalized Intersection

- Avenida Álvaro Obregón and Calle 42
- Avenida Franciso Eusebio Kino and Calle 12
- Avenida Revolución and Calle 7
- Avenida Revolución and Calle 26
- Calzada Constitución and Calle 2
- Avenida Libertad and Calle 34
- Avenida Tlaxcala and Calzada Monterrey
- Avenida Tlaxcala and Calle 22
- Avenida Nuevo León and Calle 9
- Avenida Nuevo León and Calle 22

Predominant violations included lack of caution when driving, failing to yield ROW to left turning vehicle, followed too closely, and running red lights

Unsignalized Intersection

- Avenida Franciso Ignacio Madero and Calle 22
- Avenida 16 de Septiembre and Calle 17
- Avenida 16 de Septiembre and Calle 34
- Avenida Libertad and Calle 42
- Avenida Libertad and Calle 43
- Avenida Tamaulipas and Calle 9
- Avenida Tamaulipas and Calle 34
- Avenida Tlaxcala and Calle 6
- Avenida Nuevo León and Calle 2

Predominant violations included lack of caution when driving, failing to yield ROW, and disregard for stop sign.



Traffic Conditions

Year 2013 Traffic Conditions

Not available

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.

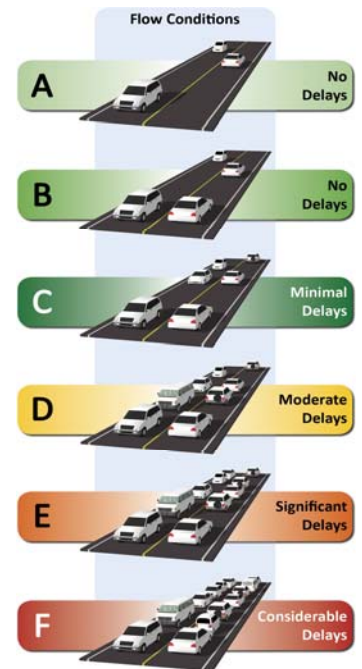
LOS B: Flow is stable, but presence of other users is noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within traffic.

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

Not available



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 4.8 illustrates the pedestrian and bicycle facilities in study area while figure 4.9 displays the different bus routes that transverse through the study area.

Pedestrian and Bicycle Facilities

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

- Sidewalks are located throughout the study area along the study roadways, although as the roadway extend south and eastward away from the core activity area sidewalks lack connectivity.
- Majority of the study area roadways include shared bike lanes that are paved, however Calle 48 and portions of Avenida Tamaulipas and Avenida Quintana Roo have unpaved bike lanes.

Transit Service

Transit services are provided throughout the study area, two bus stops located in the northwest corner of city are the initial starting points for the different routes that provide service to the different parts of the city. The 1st bus stop, near Avenida Francisco Ignacio Madero and Calle 2, services the following routes:

- Cinco de Mayo - Bosque
- Seguro Social
- Hidalgo - Calle 26
- Félix Contreras - Calle 30
- Kino - Tlaxcala
- Madero - Forest

The 2nd bus stop, near Avenida Francisco Ignacio Madero and Calle 3, services the following routes:

- Colima - Tamaulipas
- Tamaulipas - México
- 16 de Septiembre - Zaragoza
- Jalisco - Libertad

In addition, there are three bus carriers that provide international services and all are located in core activity center.

- Terminal Transportes del Pacifico
- Central de Transportes ABC
- Terminal de Transportes Suburbanos

Access Management

The City of San Luis Rio Colorado does not have an access management policy in place.



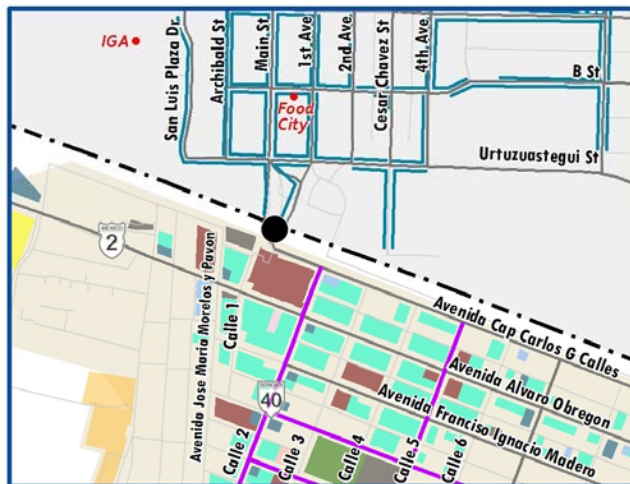
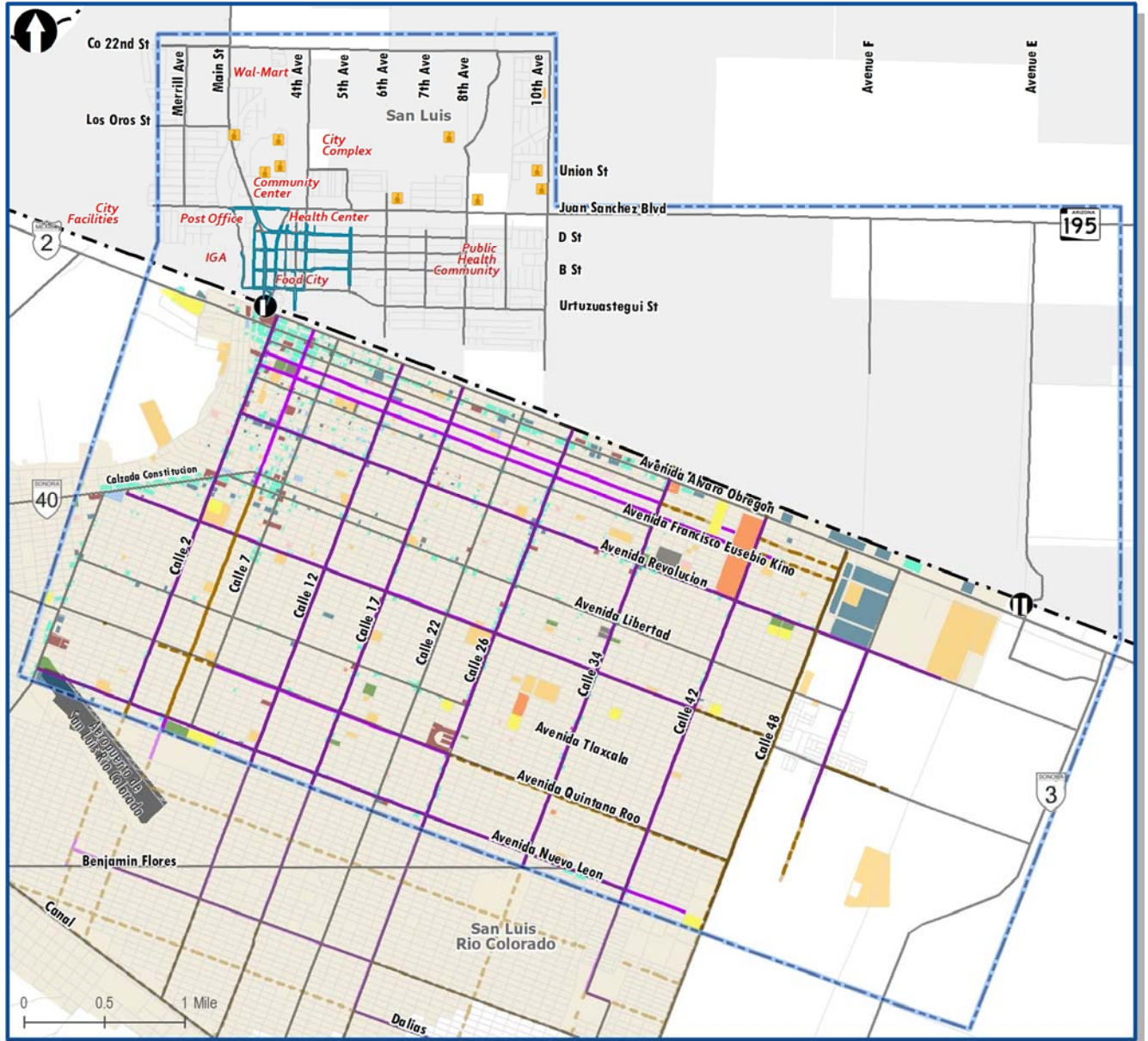


FIGURE 4.8: SIDEWALK AND BICYCLE FACILITIES

- Major Activity Center in San Luis
 - Schools in San Luis
 - Sidewalk
 - Current Bike Lane (Paved)
 - Current Bike Lane (Unpaved)
 - Land Port of Entry
 - Study Roadway
 - - - International Boundary
 - San Luis
 - San Luis Rio Colorado
 - Study Area
- San Luis Rio Colorado Major Activity Centers**
- Shopping Center
 - Commercial Corridor
 - Economics
 - Educational
 - Public Areas
 - Management Offices
 - Parks
 - Religion
 - Health
 - Culture
 - Sports Areas

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



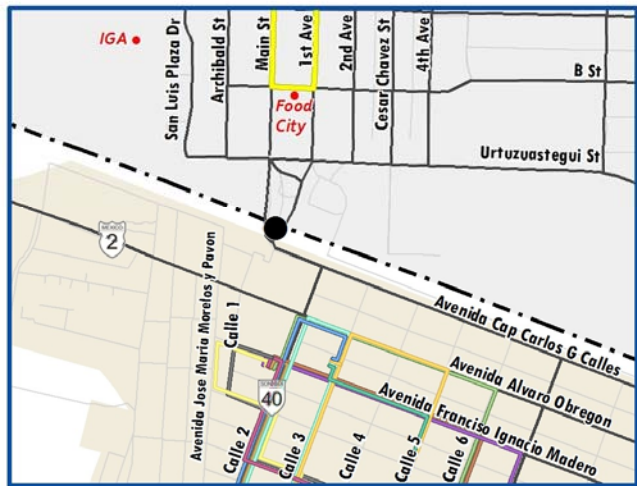
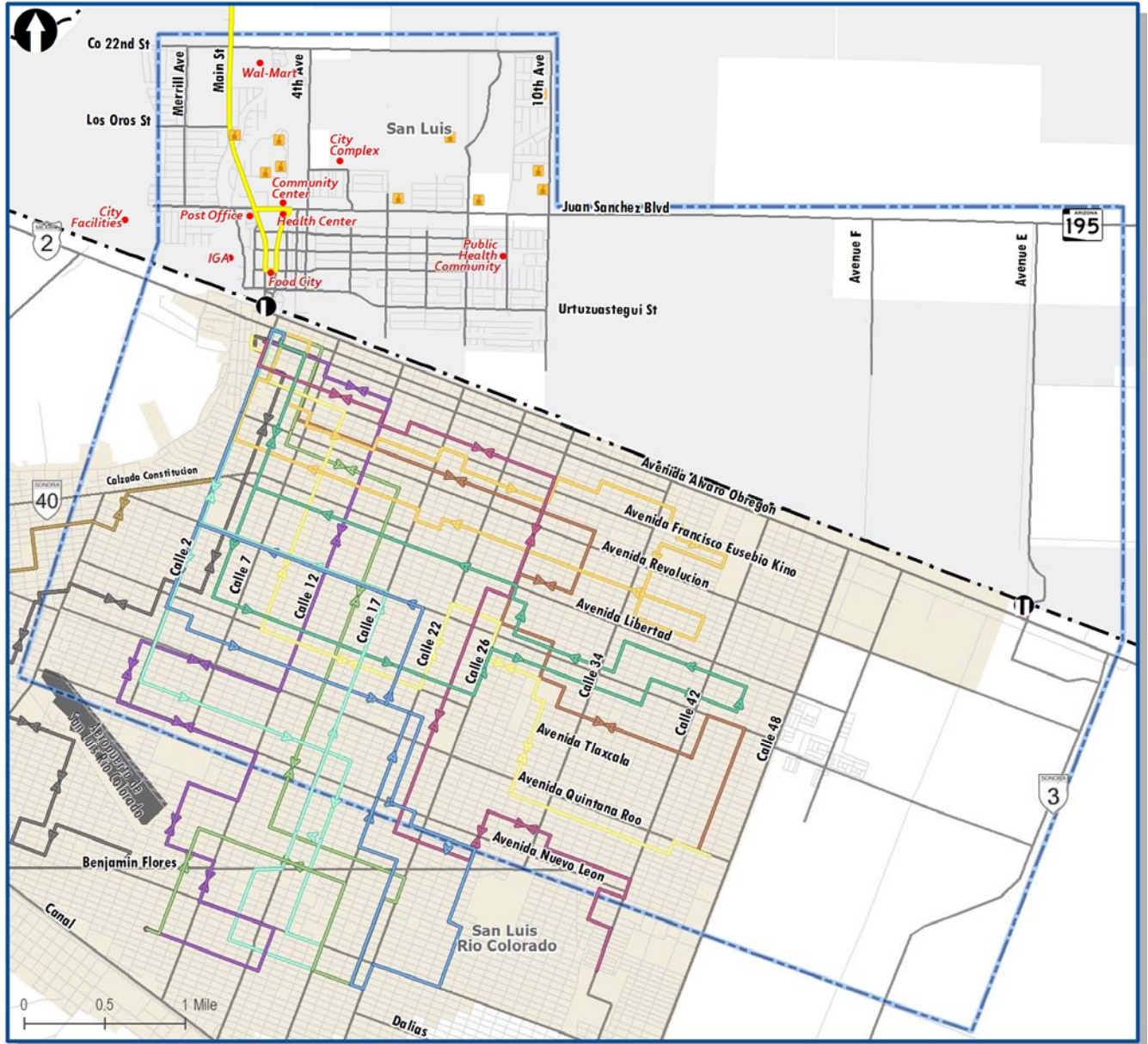


FIGURE 4.9: TRANSIT FACILITIES

- Major Activity Center in San Luis
- Schools in San Luis
- Yuma County Area Transit (YCAT) Route
- San Luis Rio Colorado Transit Routes
- Land Port of Entry
- Study Roadway
- - - International Boundary
- San Luis
- San Luis Rio Colorado
- 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:

- High number of intersection related crashes
- Majority of the intersection conflict occur in the core activity area in the northern portion of the city boundary near the international border
- Signage visibility

Mobility issues:

- Congestion in the core activity area, specifically along Avenida Captain Carlos G. Calles y/o Avenida Internacional during the morning peak periods and Calle 1 during the evening peak periods
- Lack of signal timing and coordination, especially in the core activity area.
- Lack of pavement striping
- Unpaved roads in the eastern portion of the study area
- Access management issues in the core activity area as well as in the remaining portions of the study area

Pedestrian, and bicycle issues:

- Limited of sidewalk connectivity especially outside of the core activity area
- Pedestrian congestion in the core activity area during the morning and evening peak periods
- Unpaved bicycle lanes
- Limited bicycle facilities such bike stations or bike racks

Environmental issue

- More than half of the study area is located in the wildlife habitat block



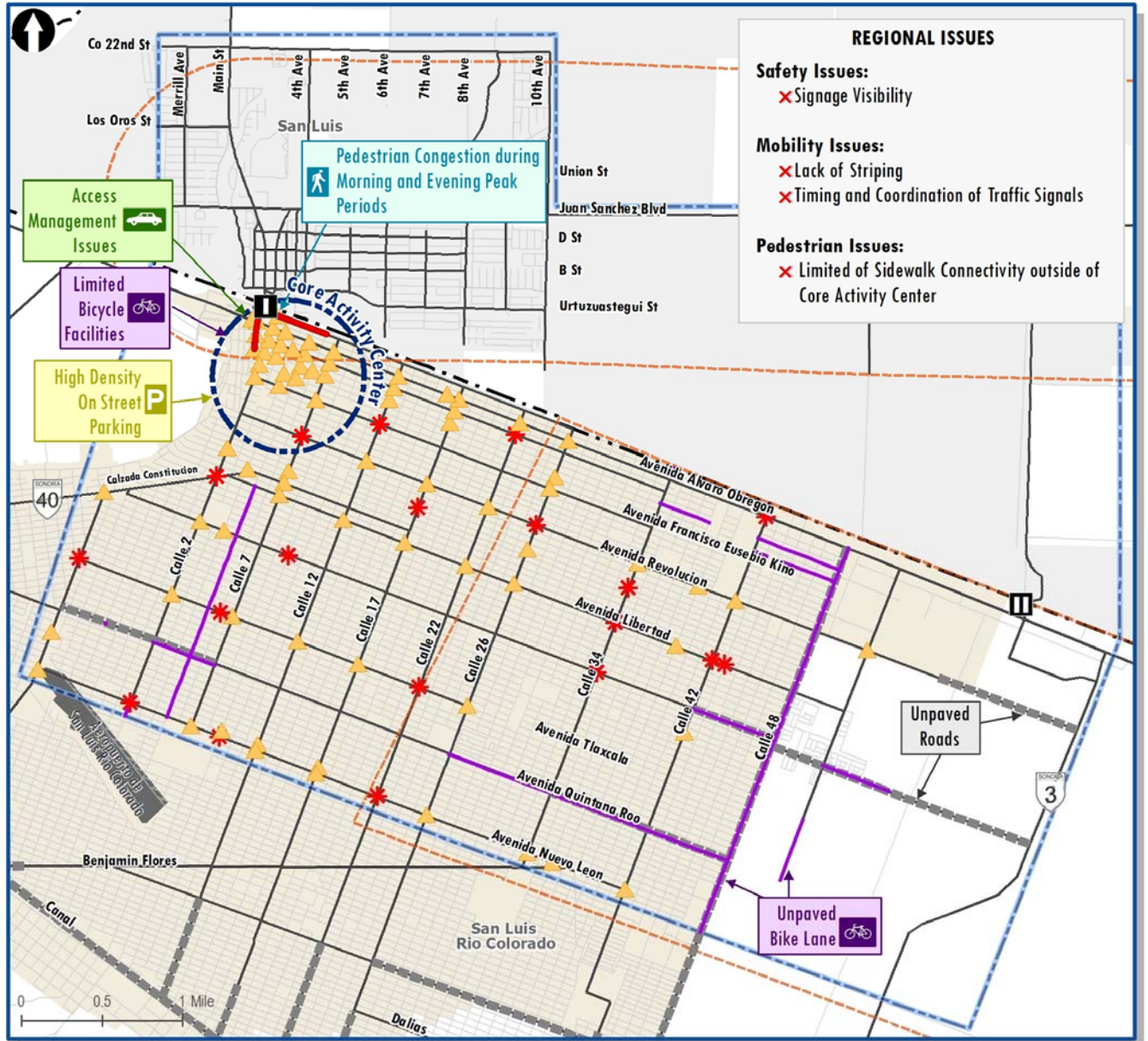


FIGURE 5.1: TRANSPORTATION ISSUES

- * High Crash Location
- High Congestion
- Land Port of Entry
- ▲ Conflict Location
- Unpaved Road
- Study Roadway
- Wildlife Habitat Block
- Unpaved Bike Lane
- International Boundary
- Core Activity Center
- 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 city limits of San Luis Rio Colorado, projections developed for a moderate growth scenario in the Updated Urban Development Program were used for the horizon years 2020, 2030, and 2040. In the base year roughly 64 percent of the city population was located in the study area, using the same trend the study area population is estimated to be 127,093 by 2020, 162,690 by 2030, and 198,318 by 2040.

The forecast for housing units is assumed to retain the base year population to occupied housing unit ratio for future horizon years resulting in an estimated 34,092 units by 2018, 43,641 units by 2030, and 53,198 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.

TABLE 6.1 PROJECTED POPULATION AND HOUSING UNITS

		2013	2020	2030	2040
Study Area	Population	111,264	127,093	162,690	198,318
	Occupied Housing Unit	29,846	34,092	43,641	53,198
	<i>Average Household Size</i>	<i>3.73</i>	<i>3.73</i>	<i>3.73</i>	<i>3.73</i>
City of San Luis Rio Colorado	Population	171,274	195,639	250,435	305,279
	Occupied Housing Unit	45,944	52,480	67,179	81,890
	<i>Average Household Size</i>	<i>3.73</i>	<i>3.73</i>	<i>3.73</i>	<i>3.73</i>
Municipality of San Luis Rio Colorado	Population	192,896	214,138	268,813	327,279
	Occupied Housing Unit	51,716	57,411	72,069	87,852
	<i>Average Household Size</i>	<i>3.73</i>	<i>3.73</i>	<i>3.73</i>	<i>3.73</i>

Employment Forecasts

Not Available



7.0 FUTURE TRAFFIC CONDITIONS

Projected 2018 Traffic Conditions

Not Available

Projected 2030 Traffic Conditions

Not Available

Projected 2040 Traffic Conditions

Not Available

Summary of Future Conditions

Not Available

