

BICYCLE & PEDESTRIAN MASTER PLAN



Acknowledgements



City of Nogales

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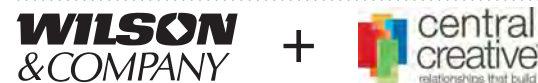
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1.0 | Introduction

The City of Nogales, Arizona strives to be a pedestrian and bicycling friendly community. The *Nogales Bicycle and Pedestrian Master Plan* is a guiding document providing direction on pedestrian and bicycling investments within the City. The ability to bike and walk are important to Nogales's future as they potentially alleviate several challenges such as safety, connectivity, and public health, all while providing a sense of community. By planning a multimodal transportation network, the City can enhance the overall lifestyle and livability of the community.

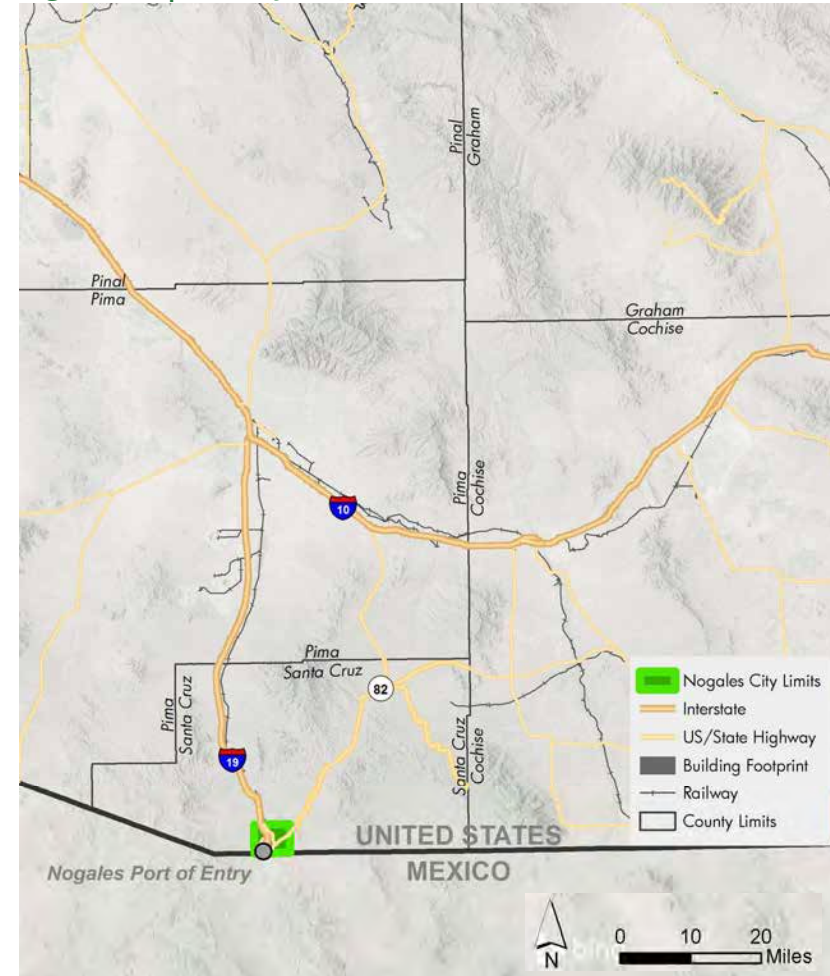
1.1 | Purpose of Study

The purpose of this Plan is to identify safe pedestrian and bicycle connections within the existing transportation system to develop a system of strategic corridors with multimodal accommodations. The needs, issues, and opportunities within the community are documented through working papers and this Final Master Plan. Ultimately, this Plan identifies and prioritizes specific bicycle and pedestrian improvements, and identifies potential funding sources.

1.2 | Study Area

Nogales, Arizona is 20 square miles and located within Santa Cruz County on the border of Arizona and Mexico. The City shares 5 miles of the United States and Mexico border and is a key land port of entry. Figure 1-1 illustrates the location of Nogales within the surrounding region. Figure 1-2 depicts of the City of Nogales, Arizona.

Figure 1-1 | Vicinity Map

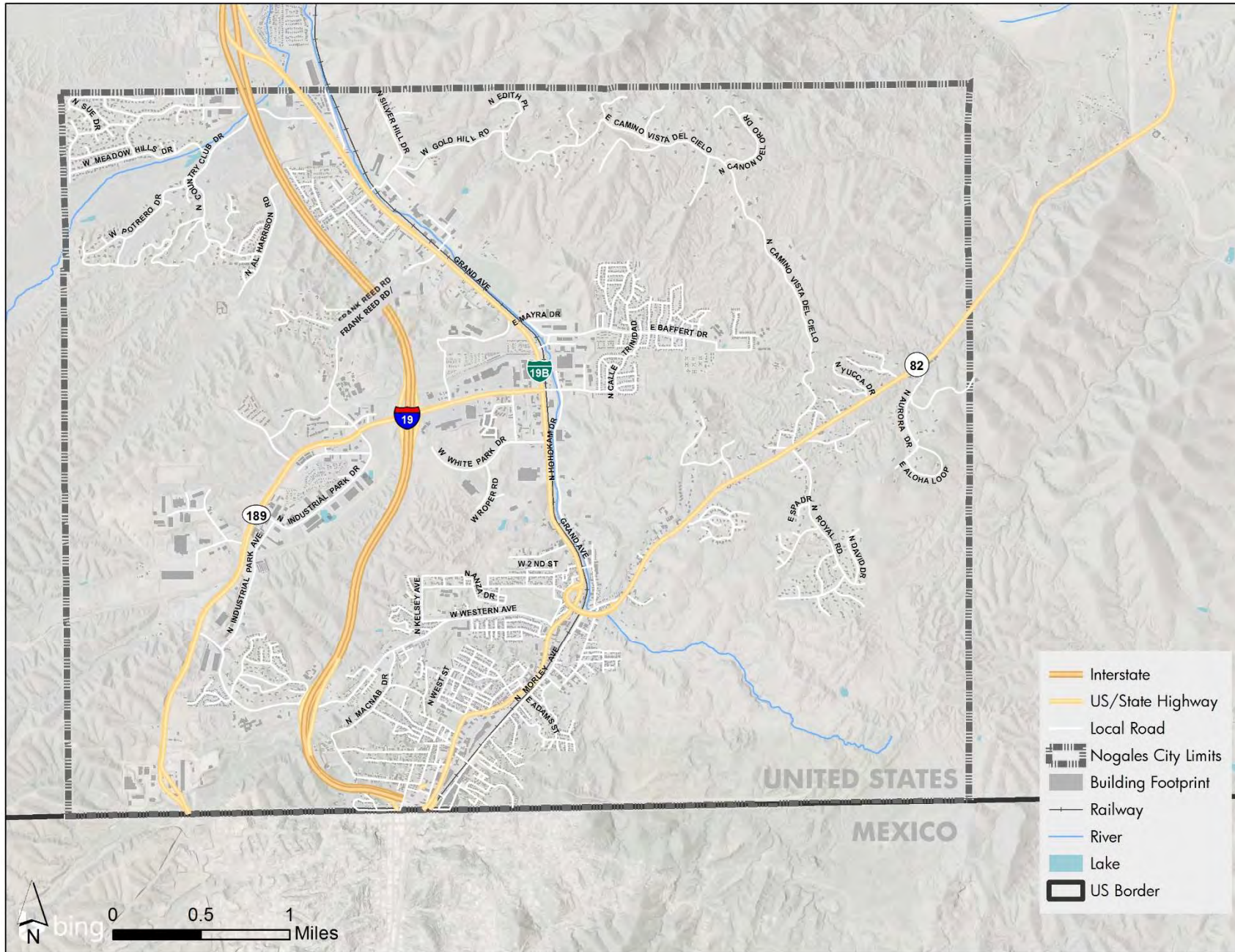


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Introduction



Figure 1-2 | Study Area





1.3 | Critical Mobility Corridors

There are six critical corridors identified by the City of Nogales that do not currently provide for or connect to bicycling or pedestrian facilities. These corridors were evaluated to understand the existing conditions, opportunities and constraints, and identify recommendations for multimodal accommodation. The six corridors are depicted in Figure 1-3 and outlined in Table 1-1.

Table 1-1 | Critical Mobility Corridors

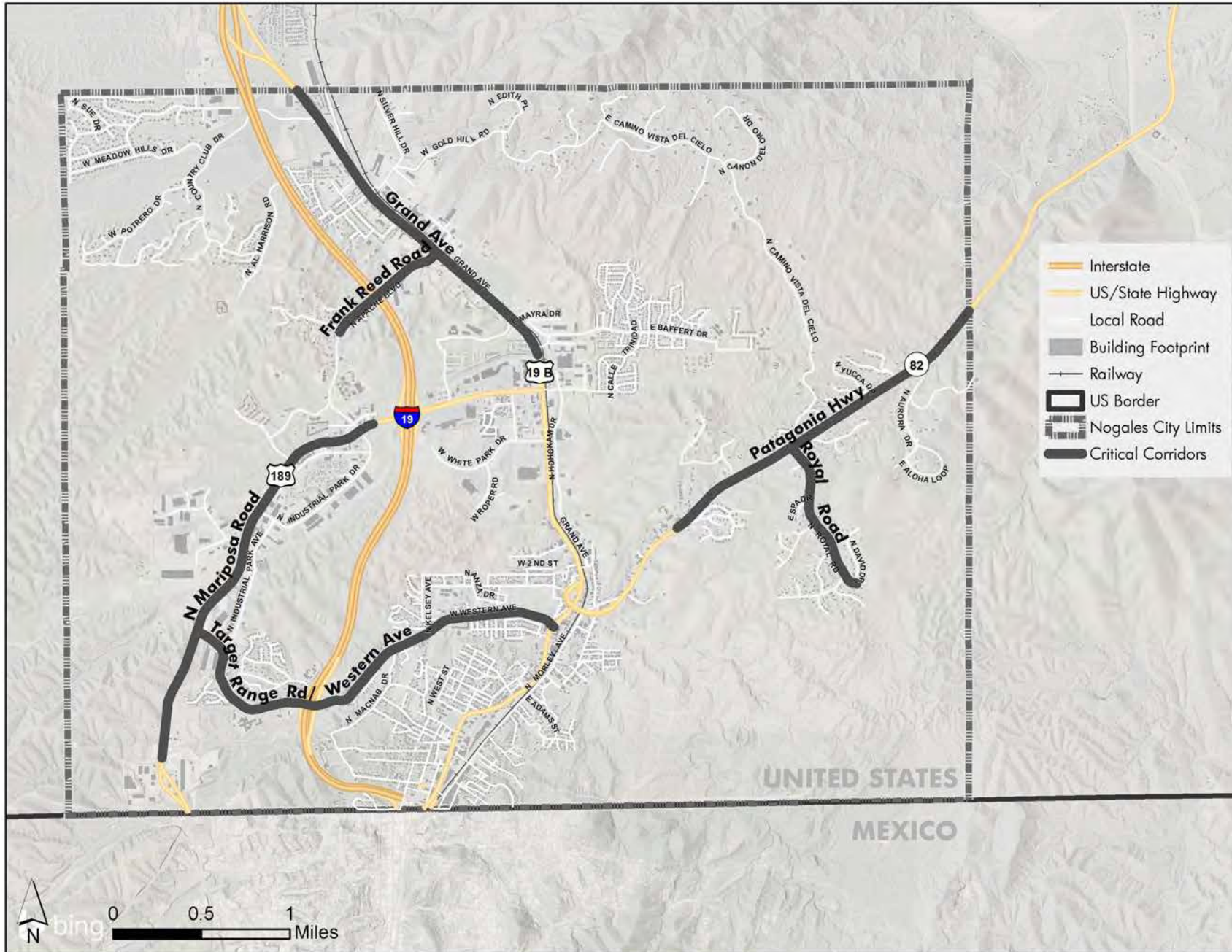
Name	Location	Length (in Miles)
Grand Avenue/ I-19 Business	North of Baffert Drive	2.0
Patagonia Highway (SR-82)	East of existing sidewalks	2.1
Frank Reed Road (Formerly Apache Blvd)	North of Nogales High School	0.7
Mariposa Road	From the existing Land Port of Entry (LPOE), to I-19 and the high school area	2.4
Target Range Road/Western Avenue	East of Mariposa Road to Grand Avenue	2.5
Royal Road	South of Patagonia Highway	0.9

1

Introduction



Figure 1-3 | Critical Mobility Corridors





1.4 | Report Organization

The *Nogales Bicycle and Pedestrian Master Plan* is organized in a way to take the reader through the process of understanding the existing conditions analysis, which lays the groundwork for developing a set of recommendations for the final multimodal transportation network. The existing conditions analysis is a multi-layered method, collecting an inventory of both demographic and physical characteristics to create a prioritization of needed improvements. This includes the integration of applicable elements of previous plans, as well as an analysis of current roadway, bicycle, and pedestrian infrastructure. The network evaluation provides an in-depth listing of the characteristics and geometries of each corridor. Input received from two public meetings are included, which serves as the ground work before final system recommendations.

- Chapter 1 Introduction
- Chapter 2 Previous Plans
- Chapter 3 Community Characteristics
- Chapter 4 Transportation Network
- Chapter 5 Public Input
- Chapter 6 Network Recommendations
- Chapter 7 System Implementation



2.0 | Previous Plans

This section summarizes the previous plans, studies, and reports that influence planning and project activities for the City of Nogales. Prior to this Plan, various studies, plans, and policies have been developed to respond to the community needs. Table 2-1 provides a reference of planning documents which were reviewed in preparation for this planning process.

Table 2-1 | Previous Plan Review

Plan Name	Date	Publishing Agency
Five-Year Strategic Plan FY2018 - FY2022	July 2017	SEAGO
Transportation Coordination Plan Update 2017-2018	December 2016	SEAGO
2016 Title VI Implementation and Public Participation Plan	August 2016	SEAGO
Santa Cruz County Comprehensive Plan	May 2016	Santa Cruz County
Morley-Banker-Hohokam Bike Route Design Concept Report	January 2016	Nogales, AZ
City of Nogales PARA Pedestrian Circulation at Port of Entries	January 2016	Nogales, AZ; ADOT
Rio Rico Walking and Biking Study	July 2013	Santa Cruz County; ADOT
Arizona-Sonora Border Master Plan	February 2013	ADOT; FHWA
City of Nogales General Plan	August 2010	Nogales, AZ
Unified Nogales Santa Cruz County Transportation Plan 2010	April 2010	Unified Nogales Santa Cruz County

These documents identify key improvements to the local and regional transportation network. These recommended improvements seek to improve the safety and mobility of pedestrians, cyclists, and motorists as they traverse the city.

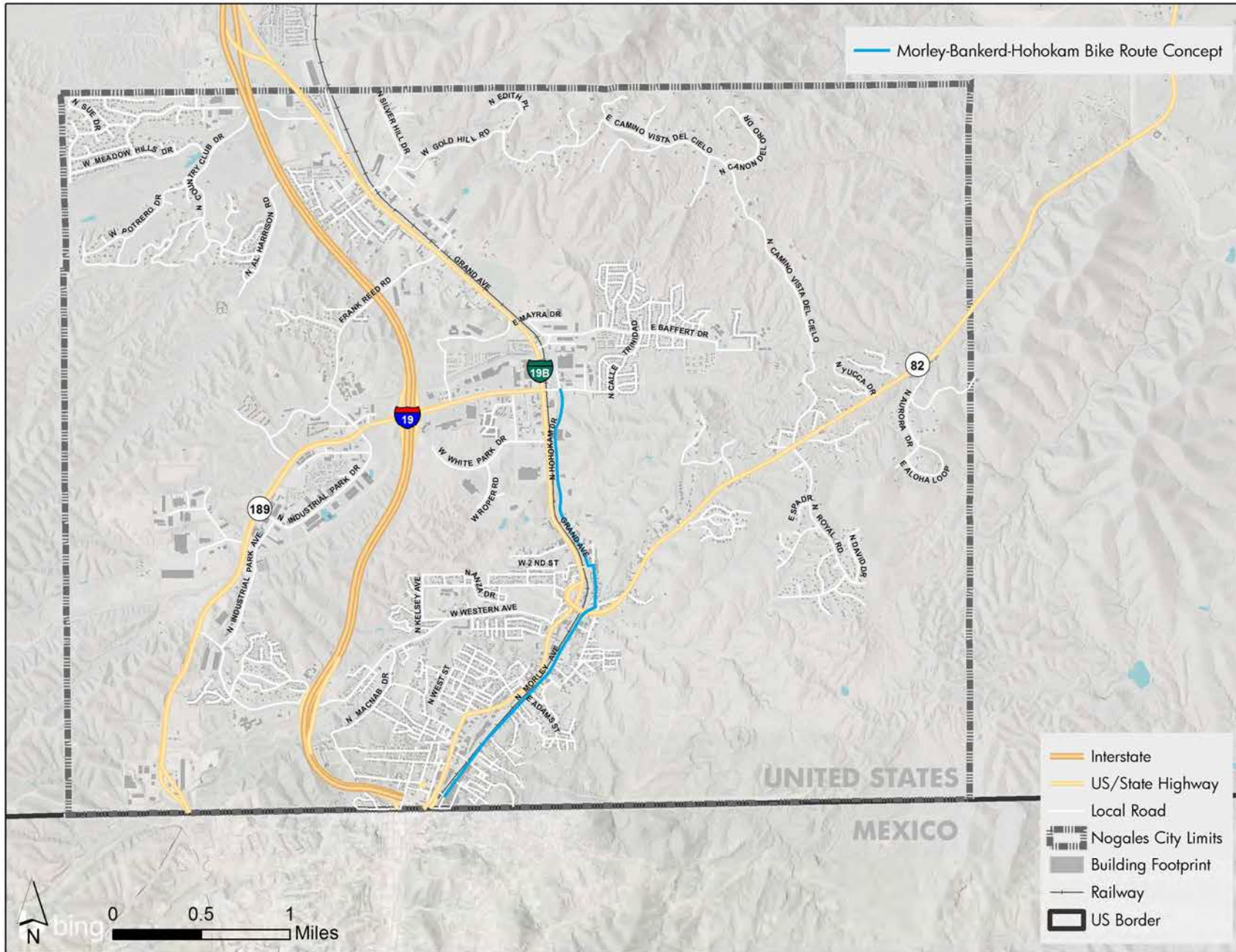
One of the recommended improvements for cyclists is outlined in the *Morley-Banker-Hohokam Bike Route Design Concept Report*. Local biking organization ØS3 petitioned the City to study the corridor in order to increase the safety of riders during their Friday night rides. The route runs north-south along Morley Avenue, Bankerd Avenue, and Hohokam Drive -- just east of the Union Pacific rail and Grand Avenue/I-19 Business corridor (Figure 2-1). The plan suggests a combination of share-the-road lane markings and dedicated bike lanes along the route, and provides multiple options at several key locations. The final alignment can be found in Chapter 6.5.

2

Previous Plans



Figure 2-1 | Proposed Morley-Banker-Hohokam Bike Route





The *Unified Nogales Santa Cruz County Transportation Plan 2010* provides a program of improvements to the transportation system throughout the Nogales and Santa Cruz County area. These improvements are a response to a critical need for safer traffic circulation for drivers, cyclists, and pedestrians traveling throughout the region. The recommendations from the plan were based on previous plans as well as discussions with local stakeholders and public input but are not part of a fiscally constrained improvement program. The Arizona Department of Transportation's (ADOT) Communication and Community Partnerships Division (CCP) assisted in facilitating the public input. Additionally, a Technical Advisory Committee (TAC) comprising of local and state officials -- as well as planning consultants -- were formed to guide the work program.

The recommended improvements within Nogales are shown in Figure 2-2 and Figure 2-3. The majority of roadway improvements for future capacity are planned along the Interstate 19 Business/Grand Avenue corridor. Many of the suggested improvements in this corridor seek to increase connectivity and safety of people traversing the Union Pacific (UP) rail line that runs to the east of Grand Avenue. Currently, out of the 10 rail crossings there is only one grade-separated crossing in Nogales at the intersection of SR-82/ Patagonia Highway. The development of strategic crossings in the corridor would not only increase circulation for travelers but enhance safety as well.

Other key needed improvements include:

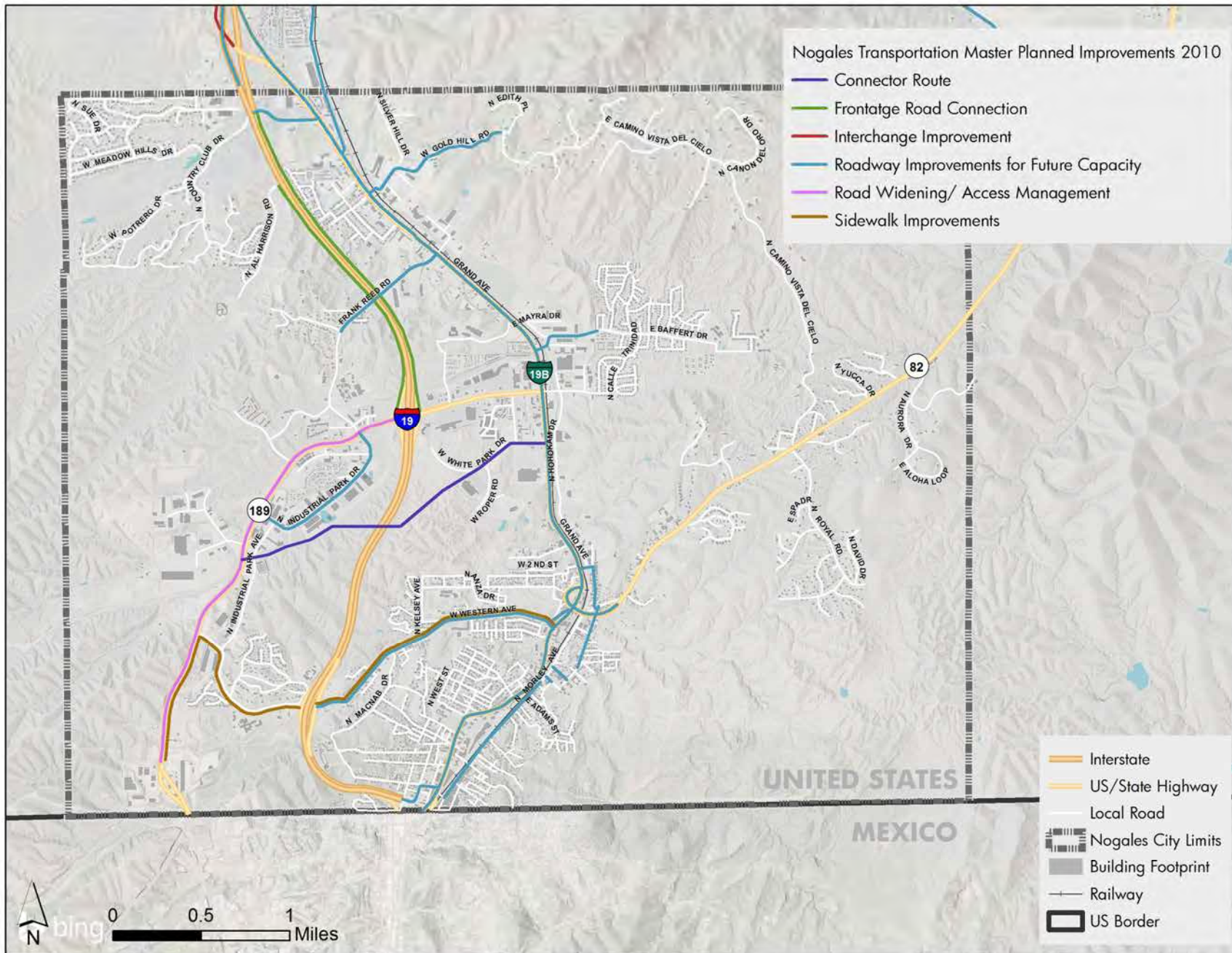
- Roadway widening and access management along SR-189/ Mariposa Road;
- Frontage road connections on Interstate 19 (I-19) between SR-189 and the northern city boundary;
- Interchange improvements at I-19 and I-19 Business;
- Sidewalks along Target Range Road and Western Avenue;
- Improved pedestrian crossings in the central commercial area;
- Gateway signage at high-traffic city boundaries;
- Traffic interchange and intersection improvements; and
- Overpass of rail in high pedestrian volume areas.

2

Previous Plans



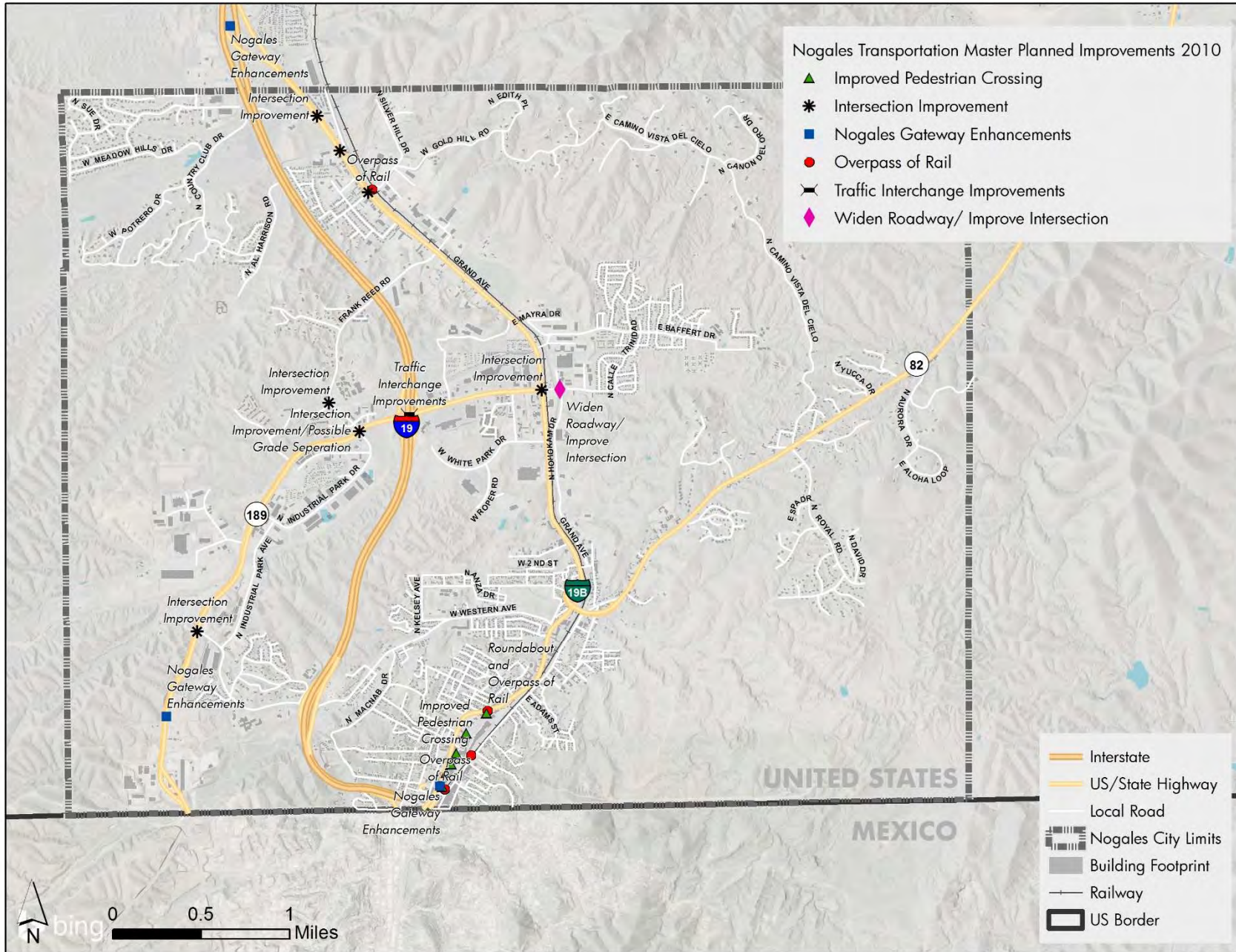
Figure 2-2 | Nogales Identified Transportation Master Plan Linear Improvements 2010



2 Previous Plans



Figure 2-3 | Nogales Identified Transportation Master Plan Point Improvements 2010



2

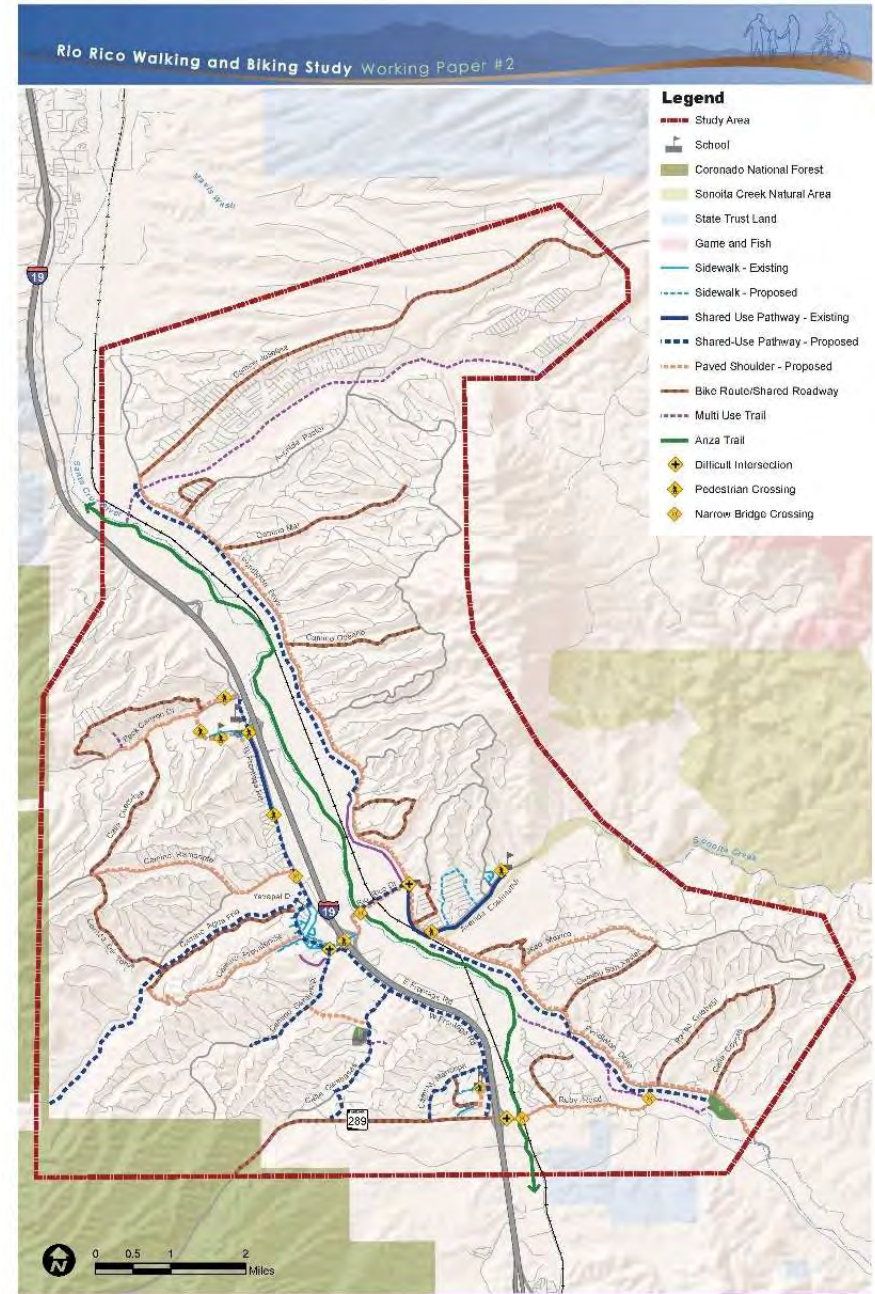
Previous Plans



Figure 2-4 | Rio Rico Walking and Biking Study

In an effort to coordinate future projects with planned land port of entry (LPOE) improvements, the *Arizona-Sonora Border Master Plan* outlined and prioritized various regional multimodal projects. The projects were prioritized and ranked based on the cost effectiveness, project readiness, capacity, and regional benefit of the proposed improvement. Table 2-2 displays the top 13 projects within Nogales based on the prioritization carried out in the 2013 *Arizona-Sonora Border Master Plan*. Most of the proposed improvements in Nogales focus on capacity improvements, with the top-ranked projects focusing on roadway reconstruction, widening, and alignment through the area.

The *Rio Rico Walking and Biking Study* outlines a suite of improvements around the City of Rio Rico, just north of Nogales. Figure 2-4 illustrates the short-term, medium-term, and long-term improvements in the City which seek to improve pedestrian, and cyclist safety and connectivity within and through the area. The planned portion of the Anza Trail through Rio Rico has since been built out and is capable of handling hikers, cyclists, and horse riders; however, there is a 3-mile gap between the built-out section to the south in Nogales and Rio Rico.



2

Previous Plans



Table 2-2 | Multimodal Project Coordination AZ Border Master Plan 2013

Facility	Project Description/Extent	Proposed Improvement	Capacity/Congestion Total Points	Project Cost (in \$1,000s)	Cost of Project vs. Projected Demand	Regional Benefit Total Points	Project Readiness Total Points	LPOE Connectivity Total Points	Weighted Combined Score	Arizona MMI Overall Rank
			12	-	3	8	5	9	100	Out of 108
I-19	At Grand Avenue interchange	Capacity improvements	7	22550	1	4	2	5	50	69
Grand Avenue	Country Club Drive intersection	Capacity improvements	5	1050	2	4	2	5	49	74
SR 82	Grand Avenue to Thelma Street	Capacity improvements	5	12150	1	5	2	6	49	76
E.-W. interconnector	SR 189 to SR 82	Corridor Study, Design and Construct	7	1000	1	3	2	5	48	79
Morely Avenue	Banks Bridge to Park Street, Nogales	Capacity improvements	4	3570	2	4	2	5	46	89
Bankerd Avenue	Doe Street to Morley Avenue	Capacity improvements	5	1800	2	3	2	4	45	92
Doe Street	Grand Avenue to Bankerd Avenue	Capacity improvements	5	1130	1	4	2	5	44	95
Industrial Drive Loop	Nogales	Capacity improvements	5	7000	1	4	2	5	44	96
Old Tucson Road	Grand Avenue to Frontage Road	Design and Reconstruct to 5 Lanes	5	17250	2	3	3	2	43	99
E.-W. Route	SR 189 / Mariposa Road to Grande Avenue (east of I-19 interchange)	New roadway	7	6200	1	2	2	4	43	100
SR 289 Interconnector (Ruby Road)	New N.-S. Interconnector to SR 82	Corridor Study to preserve roadway alignment, Design and Construct	7	56000	1	3	2	2	42	102
Calle Sonora	At N. Hohokam Drive - Nogales	Widen roadway & bridge; improve intersection	4	5300	1	3	2	4	37	107
Pendleton Drive	Rio Rico Drive to Palo Parado Drive	Roadway reconstruction	4	42500	1	4	3	1	36	108



3.0 | Community Characteristics

This chapter documents the community socioeconomic characteristics based on the U.S Bureau of the Census figures from the American Community Survey and 2010/2000 Census. Figure 3-1 displays the block-group geographies which were used to visualize demographic differences. The information on demographic, Limited English Proficiency (LEP), income, journey to work, vehicle availability and disability status are described herein. This chapter also describes the physical characteristics of the community in terms of connectivity, mobility, attractions/destinations and environmental considerations.

3.1 | Population & Age

Nogales has a population of 20,355, according to the 2016 estimate by the US Census Bureau. Table 3-1 shows the change in population since 2000 in Nogales, as well as in Santa Cruz County and Arizona. Population in Nogales has remained basically stagnant since 2000. The county added residents between 2000 and 2010 but has recently experienced a small drop in population. Statewide, there has been robust population growth over the same time period.

As shown in Table 3-1, Nogales has a slightly older population overall than the county or state. A smaller share of residents under 18 years old could account for this.

Table 3-1 | Population & Age

Total Population	Nogales	Santa Cruz County	Arizona
2016 Estimate	20,355	46,547	6,728,577
2010	20,837	47,420	6,392,017
2000	20,878	38,381	5,130,632
Total Population 2016			
Percent of population under 18 years old	17.7%	21.2%	22.7%
Percent of population 65 years old and over	15.9%	15.9%	15.6%
Median age	37.1	36.4	32.7

Source: U.S. Bureau of the Census – Age by Sex: 2012-2016 American Community Survey 5-Year Estimate; Total Population 2010 Census and 2000 Census



There is a significant portion of Nogales households with Limited English Proficiency (LEP). Table 3-2 depicts the proportion and distribution of LEP households. Over 20% of households in Nogales are LEP, or nearly seven times as much when compared with the 3.3% state average. Due to the high number of Spanish-speaking households with limited English, bicycle and pedestrian wayfinding signage as well as educational materials ought to be developed in both English and Spanish.

Table 3-2 | Limited English Proficiency (LEP) Households

	Nogales	% of total	Santa Cruz County	% of total	Arizona	% of total
Total Households	6,368		15,538		2,448,919	
English-Only Households	584	9%	3,992	25.7%	1,780,847	72.7%
Spanish-speaking Households	5,749	90.3%	11,344	73.0%	477,905	19.5%
Limited English (LEP)	1,290	20.3%	2,107	13.6%	81,749	3.3%
Not limited English	4,459	70%	9,237	59.4%	396,156	16.2%
Other language-speaking Households	35	0.5%	202	1.3%	190,167	7.8%
Other language-speaking, Limited English Proficiency	23	0.4%	40	0.3%	28,207	1.2%

Source: U.S. Bureau of the Census – Household Language: 2012-2016 American Community Survey 5-Year Estimate



3.2 | Employment & Income

Among the areas with the greatest concentration of jobs are the shopping center on Mariposa Road, the City and County government complexes, the Nogales School District complex, the downtown Centro Cultural. The largest employers by industry type are retail, wholesale trade, public administration, accommodation and food service, education, and healthcare.

Table 3-3 provides the latest data on median household income of about \$28,000 in the City of Nogales. This is \$10,000 less than the average income for Santa Cruz County and is almost half the median household income for the state of Arizona. Income is classified by its relationship to Area Median Income for a household of four, which is a standard measurement for poverty and is a slightly different measure than simple median household income. In Nogales, this is the AMI for Santa Cruz County, or about \$45,000. Many of Nogales' block groups have median household income below the County AMI and two block groups along the Grand Ave corridor fall into the 30-50% of AMI, or "Very Low Income" category.

Table 3-3 | Median Household Income, 2016 Inflation-Adjusted Dollars

	Nogales	Santa Cruz County	Arizona
Median Household Income	\$27,929	\$38,941	\$51,340

3.3 | Transit Dependent Population

There are common factors that provide a foundation for understanding the level of transit dependency in a community, particularly related to vehicle availability, means of transportation to work and disability status. Tables 3-4 and 3-5 summarize the vehicle availability/means of transportation to work and disabled population groups within Nogales. Fewer residents in Nogales residents take transit or bike to work than the county or state averages; however, a greater proportion of Nogales residents walk to work.

**Table 3-4 | Vehicle Availability and Means of Transportation to Work**

	Nogales	% of total	Santa Cruz County	% of total	Arizona	% of total
Total Workers 16 Years and Over in Households	7,028		17,200		2,822,094	
No Vehicle Available	322	4.6%	381	2.2%	84,217	3.0%
Means of Transportation to Work						
Car	6,436	91.6%	15,619	90.8%	396,156	88.0%
Transit	52	0.7%	56	0.3%	56,190	2.0%
Bike	23	0.4%	40	0.3%	28,207	1.2%
Walk	156	2.4%	268	1.5%	156	0.0%

Source: U.S. Bureau of the Census – Means of Transportation to Work: 2012-2016 American Community Survey 5-Year Estimate

Table 3-5 | Population with Disability

	Nogales	% of total	Santa Cruz County	% of total	Arizona	% of total
Total Population	20,068		46,228		6,620,233	
Total Population with Disability	2,441	12.2%	5,404	11.7%	833,586	12.6%

3.4 | Urban Design

The physical layout of a city generates a perceived environment, which varies from person to person. A perceived environment is made up of paths, edges, districts, nodes, and key destinations or landmarks. These elements play an important role in determining the comfort level of bicyclists and pedestrians utilizing a route. In order to understand the overall layout of Nogales, the perceived environment was analyzed. Figure 3-1 depicts the urban design characteristics of Nogales.

Paths

Paths are the channels of movement within a city and are typically comprised of streets and railroads. Rivers and/or canals are identified as paths if they are used for transportation purposes. Within Nogales, due to the topography of the city, paths consist of I-19, I-19 Business (Grand Avenue), SR-82 (Patagonia Highway), SR-189 (Mariposa Road), and the local roadway network.

Edges

Edges typically consist of physical boundary elements such as rivers, topography changes, and highways. The entirety of Nogales is surrounded by physical boundaries. The United States/Mexico border, which borders Nogales on the south is a physical edge. The topography changes throughout



Nogales create boundaries all over the City, causing development to occur in certain locations throughout Nogales. The railroad and canal, which run parallel to Grand Avenue on the east, provides a boundary. Additionally, I-19 traverses the City creating a linear edge for those on the west side of I-19 and those on the east side of I-19. Due to the physical geography, international border, and arterial roadways, connections across these edges is crucial to the success of a multimodal transportation network.

Districts

Districts are perceived areas with common characteristics such as residential activities, civic activities, industrial activities, and commercial activities. Within Nogales, Grand Avenue primarily facilitates commercial activities. Pockets of industrial and civic activities exist in and around Grand Avenue; however, Mariposa Road serves as the hub for industrial activities. Residential areas are dispersed throughout Nogales in an organic pattern following the geography of the city.

Nodes

Nodes are a concentration of some built characteristic or activity. A few nodes are present throughout Nogales. Two Ports of Entry (POE) act as nodes, which facilitate movement to and from Nogales, AZ and Nogales, Mexico. The downtown cultural center area is a node because of the various activities that exist. Nogales High School is a node of civic activities and the area encompassing Walmart, Home Depot, Safeway, and the strip mall north of Mariposa Road is a node of commercial activities. Additionally, the Nogales City Cemetery is a node due to the unique nature and history of the cemetery.

Key Destinations

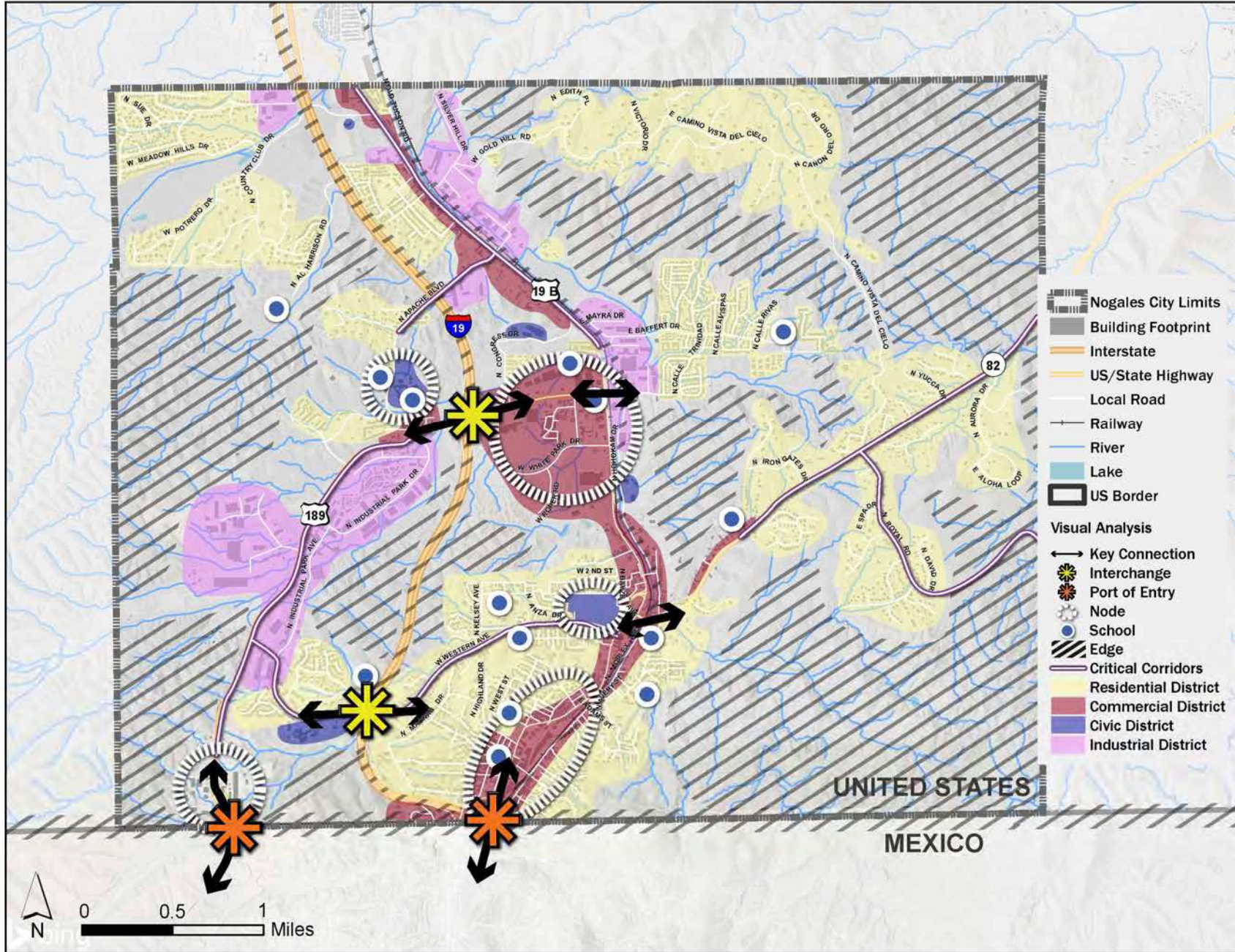
Nodes are made up of key destinations, and Figure 3-2 identifies the key locations or attractors within Nogales. Key destinations or landmarks are used as external reference points as people move throughout a space. Many of the key destinations exist along the Grand Avenue corridor. In addition to key attractors, schools also serve as key destinations throughout a city. Figure 3-14 illustrates the various locations of elementary, middle, and high schools throughout Nogales. A walkshed is used to determine the “comfortable” walking distance for a person walking from a stop to their destination. In this case, a ¼-mile walkshed is displayed around each of the school locations to show areas where sidewalks and crossings are of greater importance to enable a safe route to school.

3

Community Characteristics



Figure 3-1 | Urban Design Characteristics of Nogales

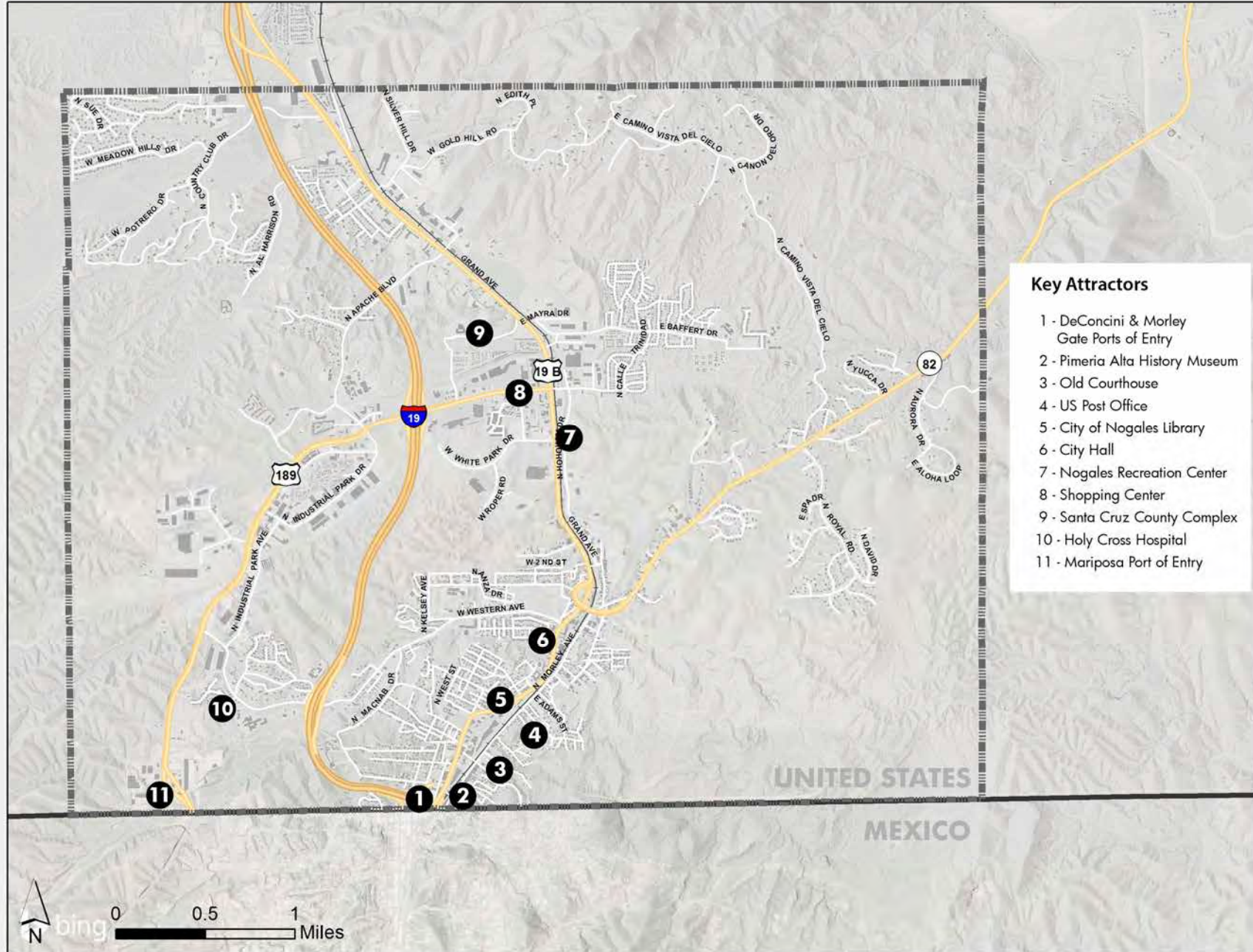


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Community Characteristics



Figure 3-2 | Key Destinations

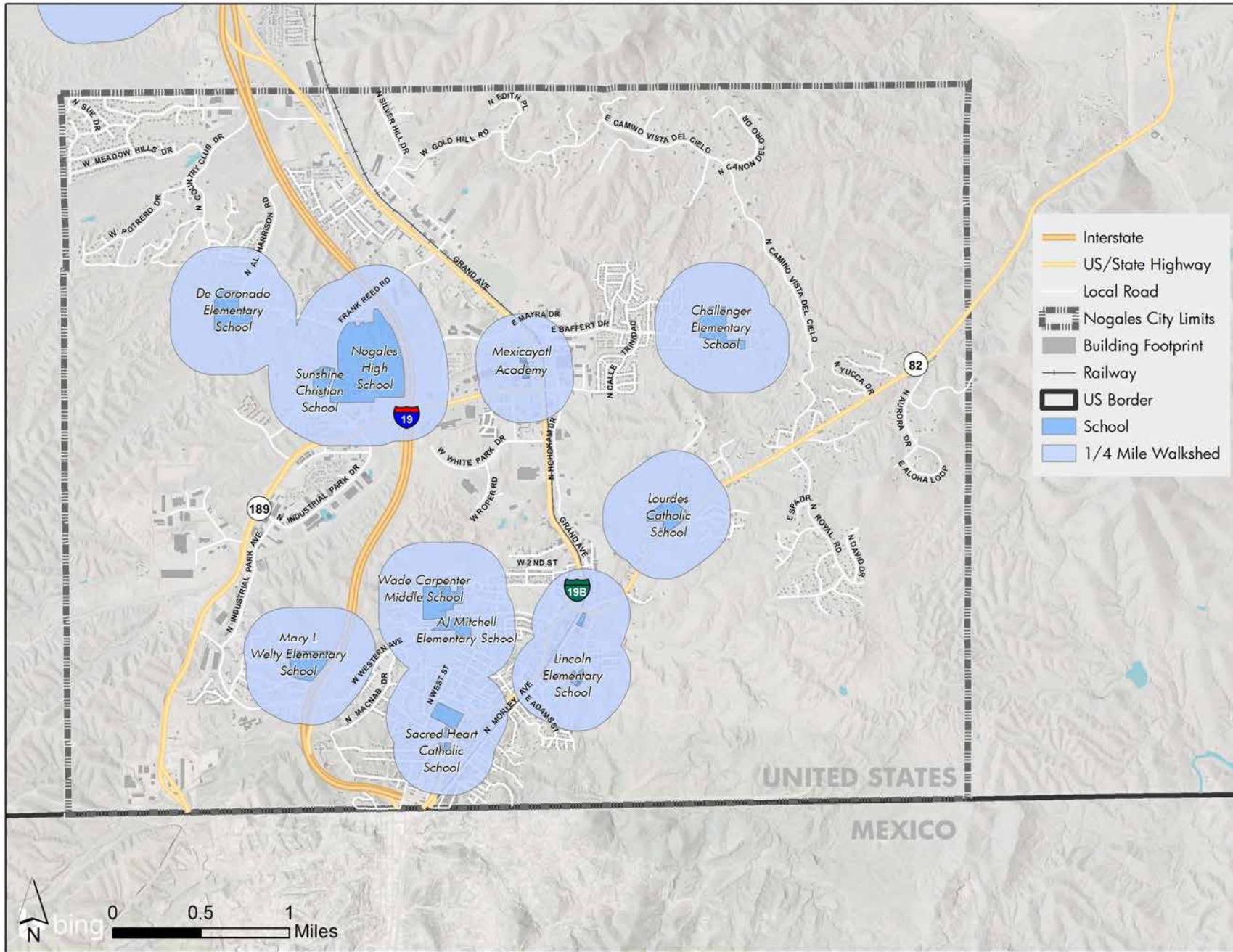


3

Community Characteristics



Figure 3-3 | School Locations





3.5 | Environmental Analysis

An environmental analysis desktop review was conducted to identify potential environmental areas of concern throughout Nogales. The Arizona Department of Environmental Quality (ADEQ) provides spatial information related to air quality, hazardous materials, water quality, and grant projects. Additional resources were used to identify threatened and endangered species as well as 4(f) and 6(f) resources.

Topography

The topography of Nogales, AZ is a significant factor as the city is nestled into the hills. Topography changes throughout Nogales create boundaries, causing development and transportation infrastructure to occur in strategic locations. Additionally, elevation changes cause safety issues along roadways as visibility is limited due to steep slopes (Figure 3-4). Figure 3-5 on the following page illustrates the existing topography throughout Nogales.

Air Quality

The Clean Air Act set a National Ambient Air Quality Standard (NAAQS), which designates areas in the United States as being in “attainment” or “nonattainment” of the standard. According to the ADEQ, Nogales, AZ is currently designated as nonattainment due to present particulate matter (or particle pollution) between 2.5 and 10 ppm.

Bus Idling Policy

ADEQ has worked with school districts to provide a bus idling policy for schools, which includes turning bus engines off when reaching the school, not turning on the engine until ready to depart, providing a bus loading zone at least 100 feet away from the school’s air intake system, and posting signs to limit idling near schools. Currently, the northwest portion of Nogales participates in the Unified Bus Idling Program.

Figure 3-4 | Elevation Changes on SR-82



3

Community Characteristics



Figure 3-5 | Existing Topography





Hazardous Materials

Located within Nogales is Conn-Selmer, Inc. Groundwater Remediation System (GRS), which operates under the hazardous waste Post-Closure Permit. The permit allows Conn-Selmer Inc. to operate until they demonstrate the contamination levels of the groundwater remediation system meet the required standards. According to ADEQ, the concentrations of contaminants at the center of the contamination have been reduced by 97%. By 2008, the concentrations have been reduced to less than 250 parts per billion. The treated water now leaving the GRS contain no volatile organic compounds and was used to irrigate the City of Nogales Palo Duro Creek Golf Course when in operation. Additionally, active and non-active underground storage tank (UST) facilities exist throughout Nogales (Figure 3-7).

Water Quality

The Nogales Wash, which runs parallel to Grande Avenue and Morley Avenue is currently designated a Category 5 impaired stream (Category-1 is least impaired; Category-5 is most impaired). The Nogales Wash is 6.2 miles long and spans from the Mexico border to Potrero Creek. The causes of impairment include ammonia, chlorine, copper, and E. coli.

WQI Grant Projects

The Water Quality Grant (WQI) program allocates funds from the EPA to Arizona projects that mitigate polluted runoff. Four WQI grant projects are located within Nogales and include the following:

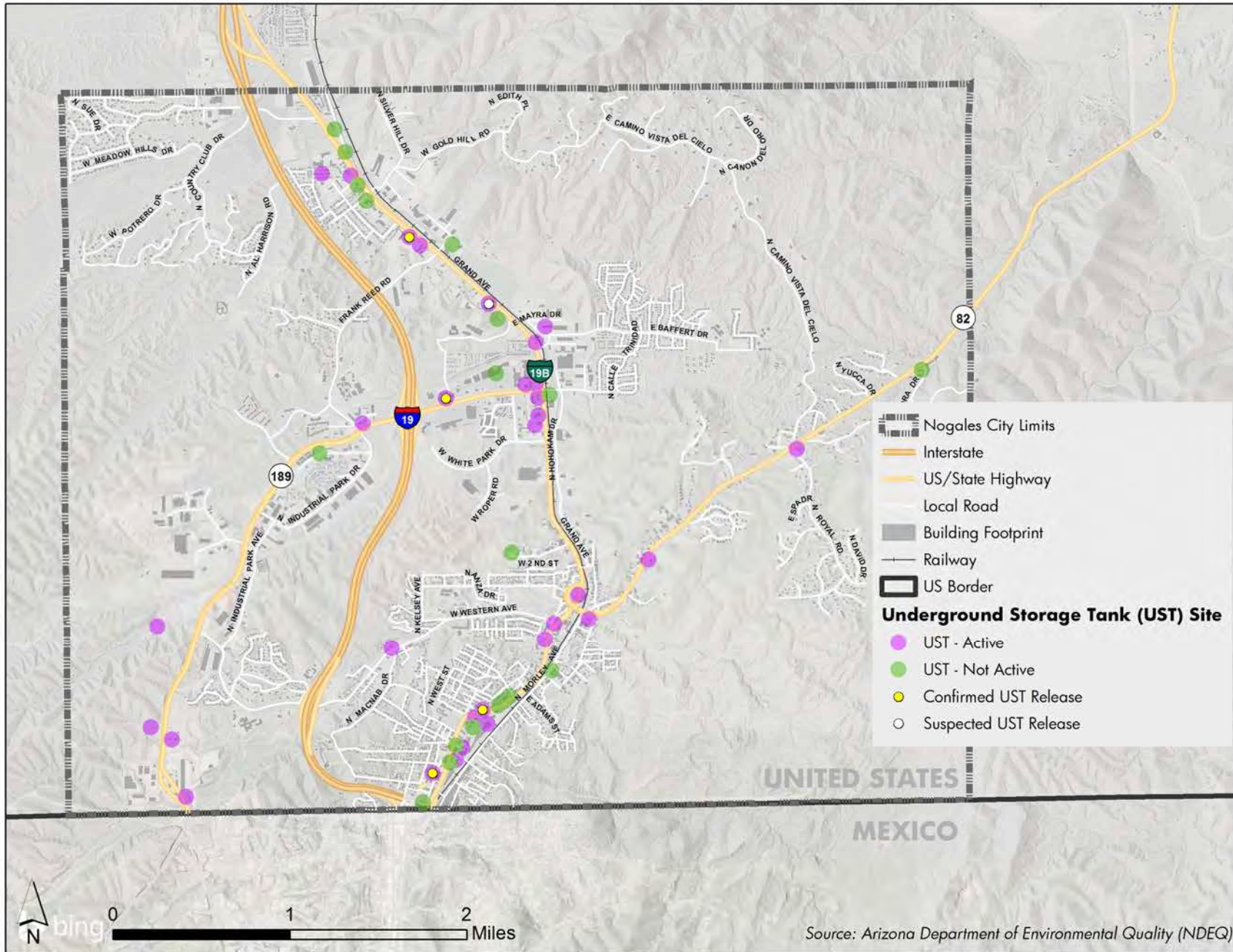
- Youth-led Erosion, E.coli Mitigation in Nogales Wash;
- Santa Cruz River Riparian Revegetation Plan;
- Santa Cruz River Sediment Control; and
- Implementation of BMPs to Control Sediment on the Santa Cruz River.

3

Community Characteristics



Figure 3-6 | Underground Storage Tank Sites in Nogales





Threatened & Endangered Species

According to the U.S. Fish & Wildlife Service, Nogales is not currently listed as a critical habitat for any species; however, it is surrounded by areas that are critical habitats for the following species: Southwester Willow Flycatcher; Yellow Billed Cuckoo; Jaguar; and Mexican Spotted Owl.

100-Year Floodplain

The 100-year floodplain is portrayed in Figure 3-7, following the streams and low areas of the Nogales. The 100-year floodplain means there is a 1% chance of flooding each year. Due to the potential of flash-flooding, it should be noted that there are potential safety risks from locating bicycle facilities in floodplains.

4(f) & 6(f) Historic Resources

According to the National Register of Historic Places (NRHP), several cultural resources exist within the downtown Nogales area (Figure 3-8). Specific buildings and districts have been nominated mostly for architectural significance. The Juan Bautista De Anza National Historic Trail spans from San Francisco, CA along the coast to Los Angeles and heads east through Yuma, AZ along I-8 and diverts south along I-19. Through Nogales, the trail follows Grand Avenue into Mexico to San Miguel de Horcasitas. The Juan Bautista De Anza National Historic Trail route incorporates the Tumacacori National Historical Park, which is just north of Nogales. The Lone Macus Gordon Memorial Park cemetery is located in the heart of Nogales, just west of Grand Avenue. The cemetery is bordered by Western Avenue on the south, Kino Street on the north, Locust Street on the west, and Bejarano Street/Bayze Avenue on the east. Lands within Nogales that were developed and/or acquired with Land and Water Conservation Fund Grants are shown in Table 3-6.

Table 3-6 | Land and Water Conservation Fund Grants in Nogales, AZ

Name	Grant Amount	Year Approved	Year Completed	Type
Nogales Tennis Courts	\$4,225.00	1966	1967	Development
Madison Street Park	\$1,674.55	1968	1969	Development
Anza Drive Development	\$24,820.53	1973	1974	Development
Multi-Use Softball Field	\$18,500.00	1973	1974	Development
Jr. Olympic Swimming Pool	\$62,500.00	1974	1974	Development
Reg. Park and Golf Course	\$175,000.00	1978	1982	Acquisition

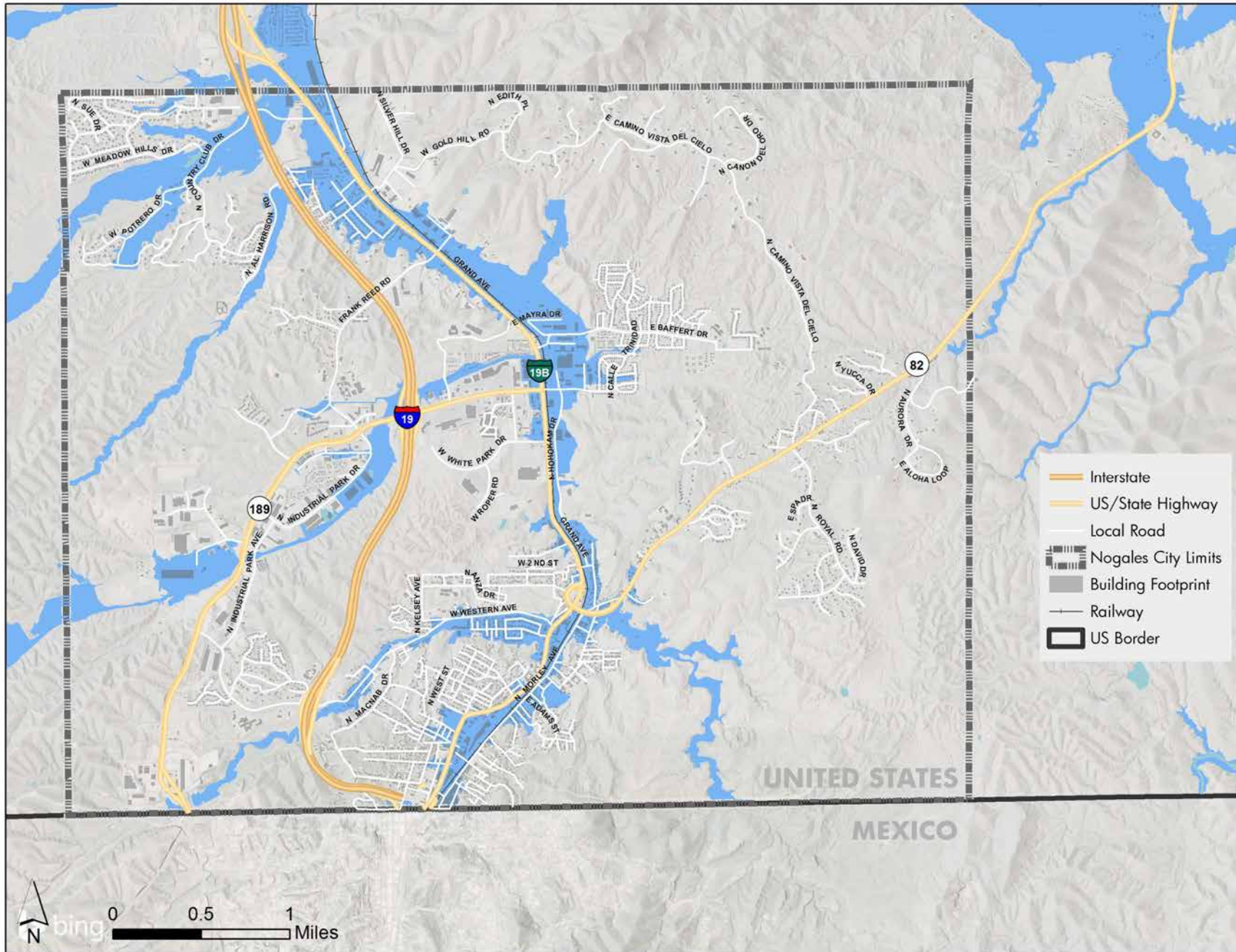
Source: <http://projects.invw.org/data/lwcf/grants-az.html>

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Community Characteristics



Figure 3-7 | 100-Year Floodplain

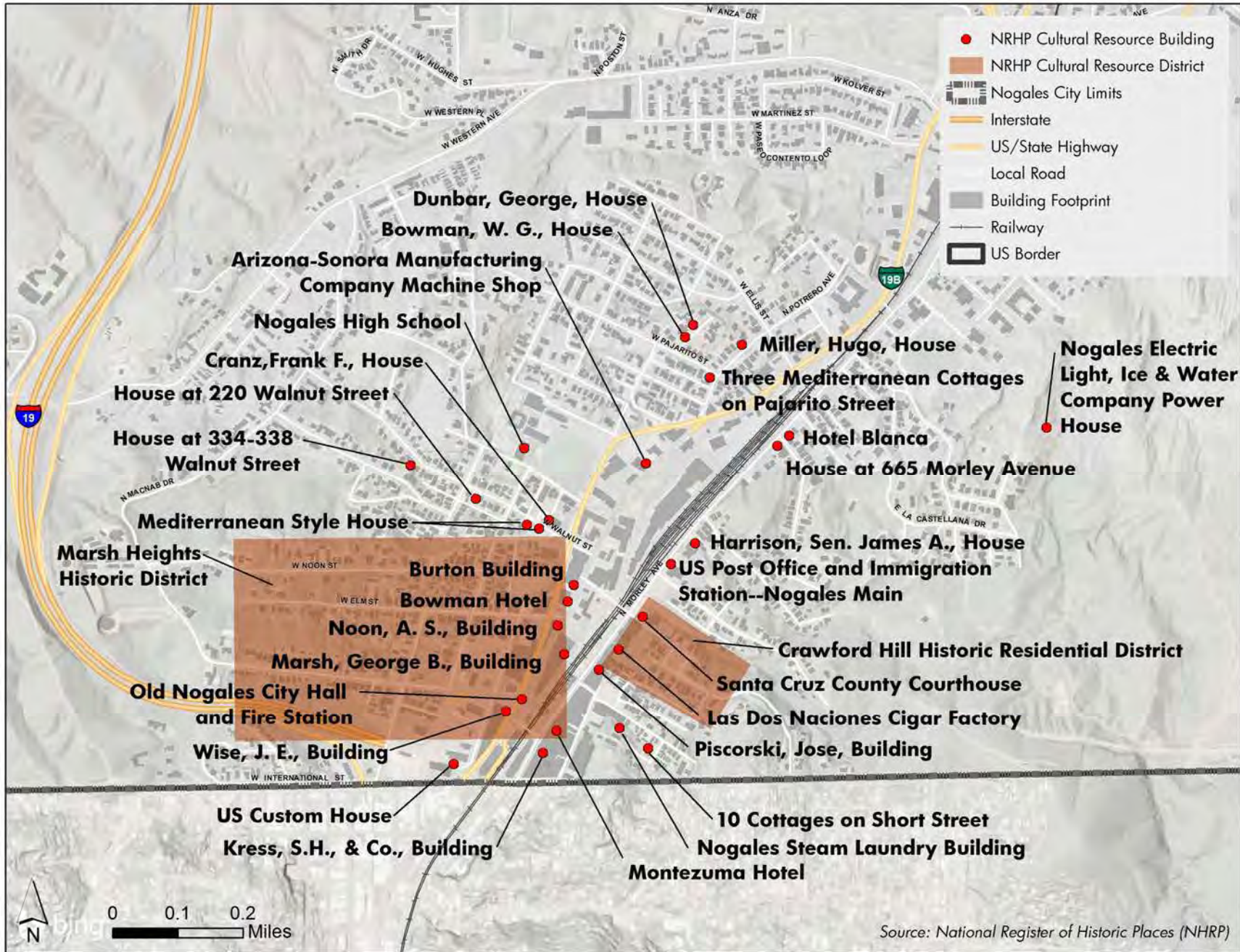


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Community Characteristics



Figure 3-8 | Historic Properties within Nogales



Source: National Register of Historic Places (NHRP)



3.6 | Key Community Characteristic Findings

The review of Nogales existing conditions resulted in several key findings which will help in developing context-specific solutions which increase the safety and mobility of pedestrians and cyclists.

Live and Work Disconnect

With the exception of the central commercial district, residential areas are separated from working areas by edges. There are several edges that act as barriers to mobility in Nogales. The I-19 corridor and I-19B (Grand Avenue/Union Pacific corridor) act as barriers to east-west travels, whereas the hilly-topography limits generally mobility in all directions. This has led to much of the commercial areas being developed in-between these edges along the north-south spine, and much of the residential development in pockets towards the outer extents of the city. This disconnect creates an great need for high volume corridors to facilitate all modes of travel, enabling residents to walk and bike to work.

Schools

Many of the schools in Nogales lack adequate sidewalks connecting to residential areas. A Safe Routes to Schools (SRTS) program would help increase education and attention to students getting to school safely. A part of this process will be evaluating the main routes which students take to arrive to school. Several of the previously identified critical corridors such as Frank Reed Road and Target Range Road/Western Avenue, could be considered due to their proximity to residential and school areas. Often times, SRTS programs lead to built improvements to the physical environment, such as better sidewalks or crosswalks.

Border Crossings

The Mariposa and DeConcini/Morley Gate LPOEs are vital connections for the regional economy and for border residents who travel through the gates daily. Work recently completed on the Mariposa LPOE to the west has increased the capacity of commercial vehicles along Mariposa Road/SR-182. These vehicles utilize the interchange at I-19, creating a great need for safety due to the high amount traffic in this area. The DeConcini/Morley Gate LPOE allow personal automobiles, rail traffic, and pedestrians to cross the border. Understanding the several hundred feet wide entry that is the DeConcini/Morley Gate, is vital to planning pedestrian and cyclists routes that can facilitate daily travels over the border.

ØS3

Efforts by the cyclist advocacy group ØS3 have helped facilitate bike awareness and bike safety in the city. Their efforts help educate cyclists and non-cyclists alike, as well as offer a fun activity to residents. Utilizing their key insights throughout the planning process will be key in creating a functional multi-modal system in Nogales.



4.0 | Existing Transportation Network



Understanding where people walk, drive, bike, or ride transit in and around Nogales is important to identify how the community operates. Furthermore, understanding how goods move throughout a city is important to maintaining a vibrant local economy. The existing transportation network within Nogales consists of highways, local streets, and sidewalks. The primary form of transportation is by automobile; therefore, the roadway network is crucial to the transportation system. Two Land Ports of Entry (LPOE) are located within Nogales, providing an opportunity for pedestrians and vehicles to traverse between the United States and Nogales, Mexico.

This transportation section will provide information on the different roadway facilities, analyze the LPOE's, describe the existing multimodal infrastructure, and evaluate the existing conditions on each of the critical corridors.

4.1 | Roadway Facilities

Data was provided by the City of Nogales, Arizona Department of Transportation and the SouthEastern Arizona Governments Organization (SEAGO) to assist with understanding the physical and operational conditions of the existing roadway circulation network, as described herein.

Roadway Characteristics

According to the U.S. Federal Highway Administration (FHWA), road functional classification is the method of how streets and highways are grouped together into classes or systems, according to their character of traffic service that they are intended to provide. At the federal and state level, streets and highways are grouped into one of three classifications, as described in Table 4-1. Figure 4-1 illustrates the existing roadway functional classification within Nogales. Four out of the six critical mobility corridors previously identified are arterial roads, and the remaining two are collectors.

**Table 4-1 | Functional Classification**

Functional Classification	Service Provided
Arterial	Provides the highest level of service at the greatest speed for the longest uninterrupted distance, with some degree of access control.
Collector	Provides a less highly developed level of service at a lower speed for shorter distances by collecting traffic from local roads and connecting them with arterials.
Local	Consists of all roads not defined as arterials or collectors; primarily provides access to land with little or no through movement.

Source: Federal Highway Administration

Traffic Volume

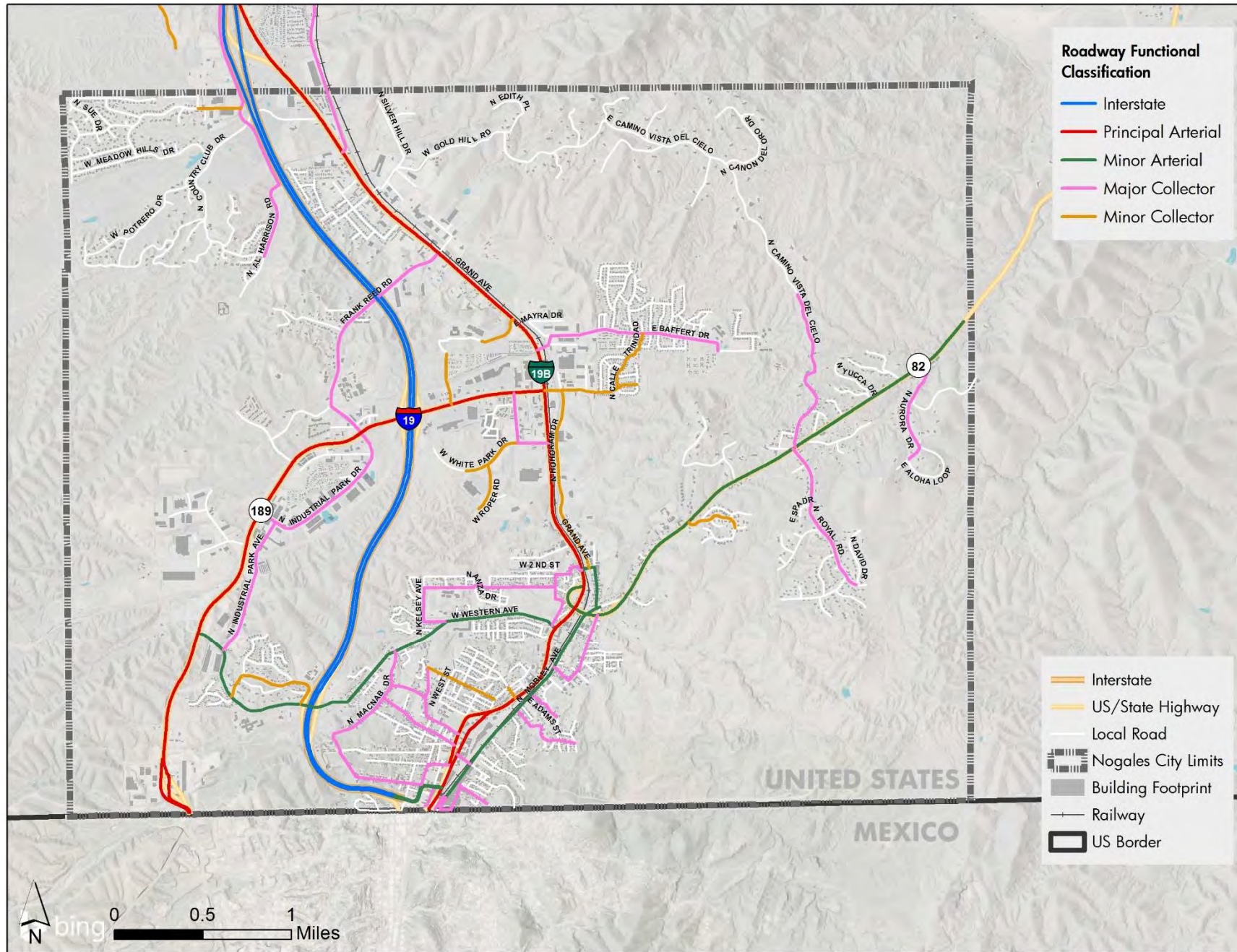
Understanding traffic volumes within Nogales is important for determining the level of traffic stress (LTS) for bicyclists. LTS is a rating given to a roadway to indicate the traffic stress imposed on bicyclists. Figure 4-2 illustrates the existing traffic volumes at specific locations throughout Nogales. The latest traffic counts were taken as recent as 2018 and as far back as 2016. Other than I-19, Grand Avenue carries the highest amount of daily traffic volumes within Nogales ranging from 12,000 to 23,000 vehicles. Traffic volumes indicate vehicles primarily use I-19 and the interchange at Mariposa Road or Grand Avenue to access areas throughout the city. Mariposa Road also carries a significant amount of daily traffic.

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Transportation Network



Figure 4-1 | Existing Functional Classification

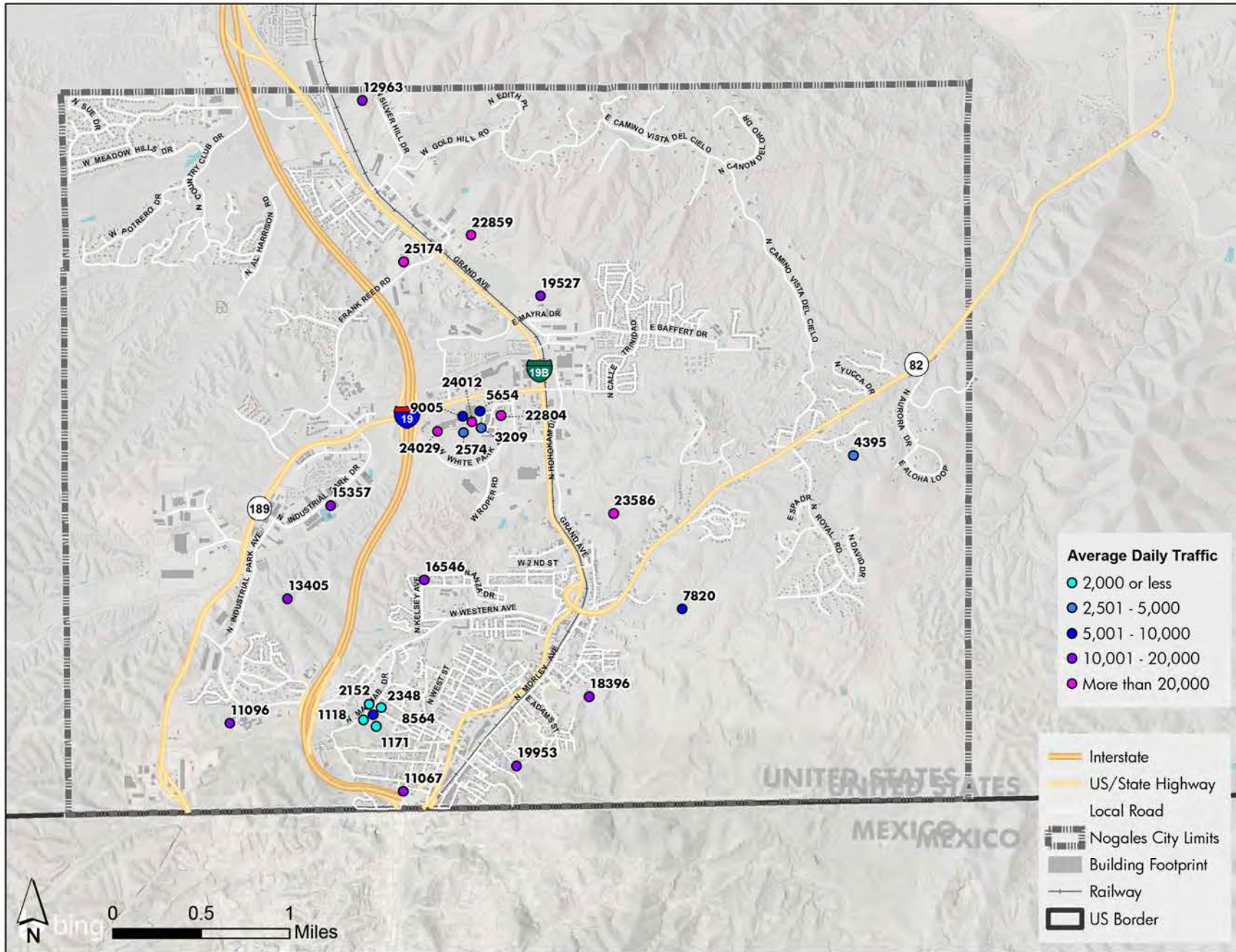


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Transportation Network



Figure 4-2 | Existing Traffic Volume





Level of Service

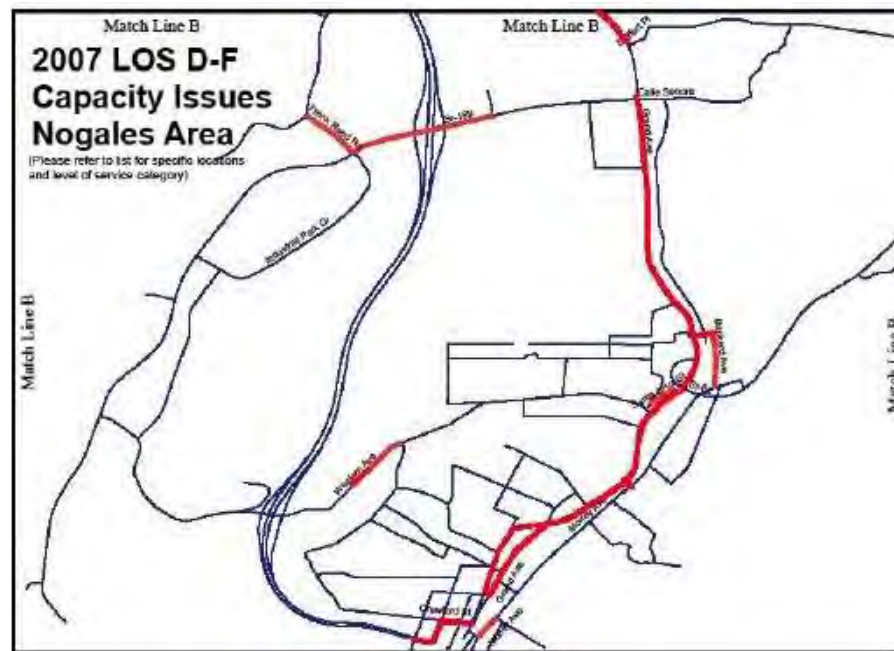
The performance of a roadway network is often defined in terms of Level of Service (LOS). LOS is determined by the delay a driver may experience through a comparison of the volume of traffic on a given roadway to the available capacity of that roadway. The capacity of a roadway to accommodate vehicles is dependent on many factors, including the number of travel lanes, speed limits, traffic control, and access management. Travel demand on a roadway is driven by a number of factors, including the type and size of development accessing the roadway, as well as the role the roadway plays in providing connectivity through a community and adjacent communities.

LOS for roadways is defined by six distinct levels of traffic operations measured by a letter grade of A through F. LOS A represents the best operating condition and LOS F represents the worst operating conditions. Roadway segments are classified into each LOS level based on the ratio of the volume to capacity. LOS A-D are generally regarded as acceptable, while LOS E and F are considered unacceptable. Figure 4-3 identifies the 2007 LOS from the *Unified Nogales Santa Cruz County Transportation Plan 2010*.

Roadway Safety

Various factors determine the level of safety of a roadway and transportation network. These factors include: speed, traffic control, topography (blind spots), amount of traffic, and lighting. Figure 4-4 identifies the existing speed limits throughout Nogales as well as the locations of existing traffic signals.

Figure 4-3 | Level of Service



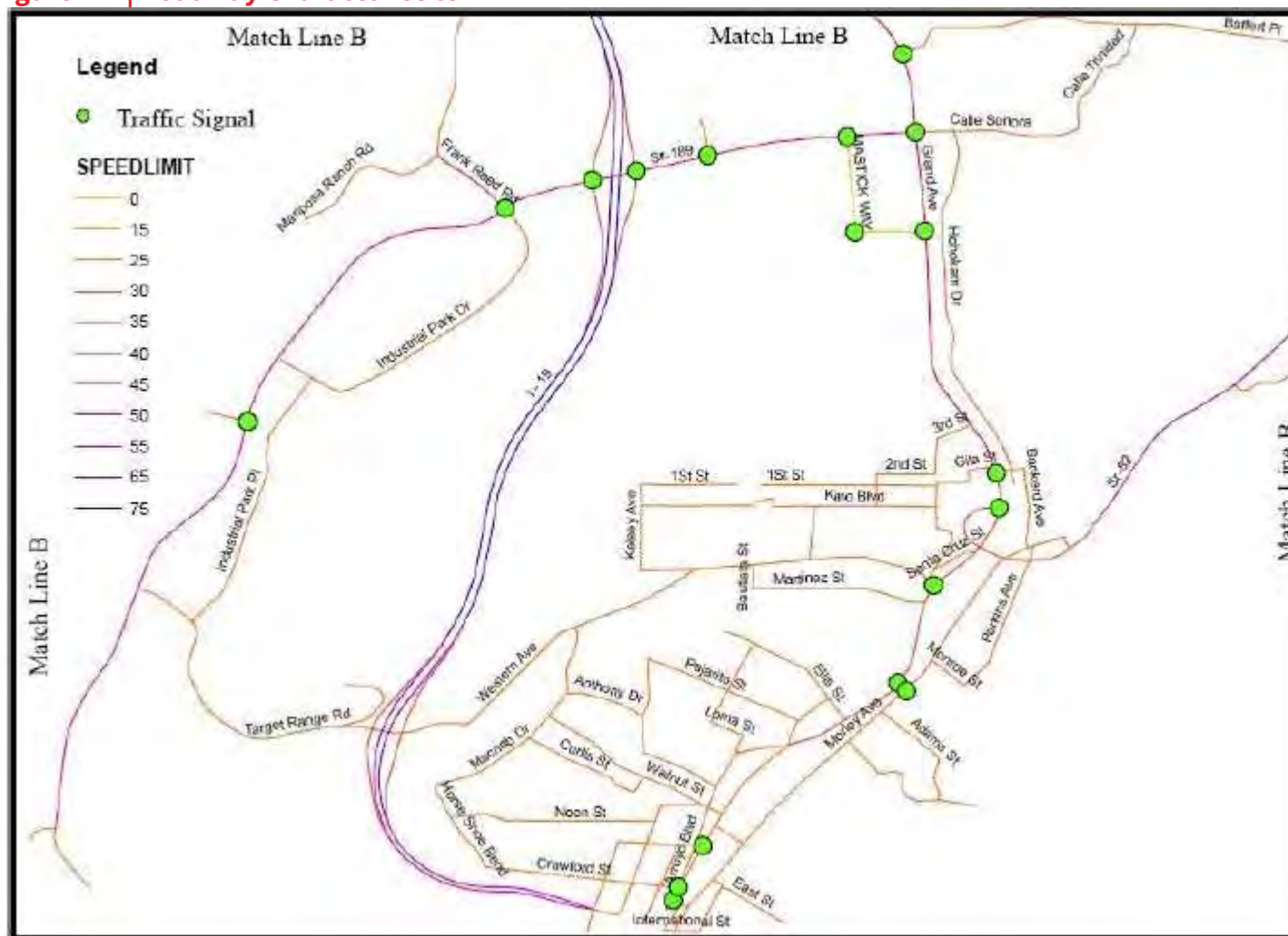
Source: *Unified Nogales Santa Cruz County Transportation Plan 2010*

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Transportation Network



Figure 4-4 | Roadway Characteristics



Source: Unified Nogales Santa Cruz County Transportation Plan 2010

Interchange

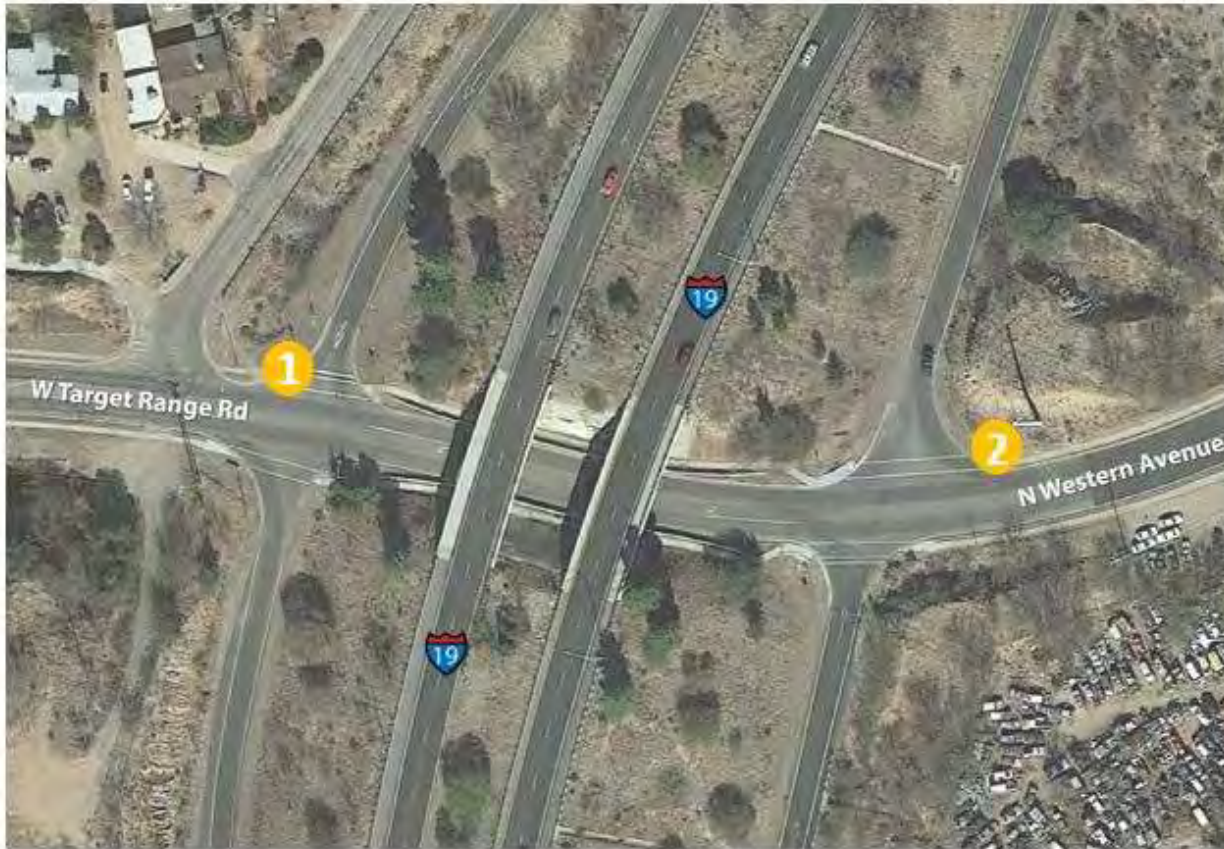
While highways allow for great vehicular mobility, they also act as physical barriers to pedestrians and cyclists who need to traverse across them. Interchanges often times are the only opportunity for traffic to pass under or over a highway, and it is important for all modes of traffic to do so safely. This means having ample traffic lane and sidewalk space. The two interstate interchanges along I-19 are shown in Figure 4-5 and Figure 4-6.

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Figure 4-5 | Interchange at I-19 and W. Target Range Road

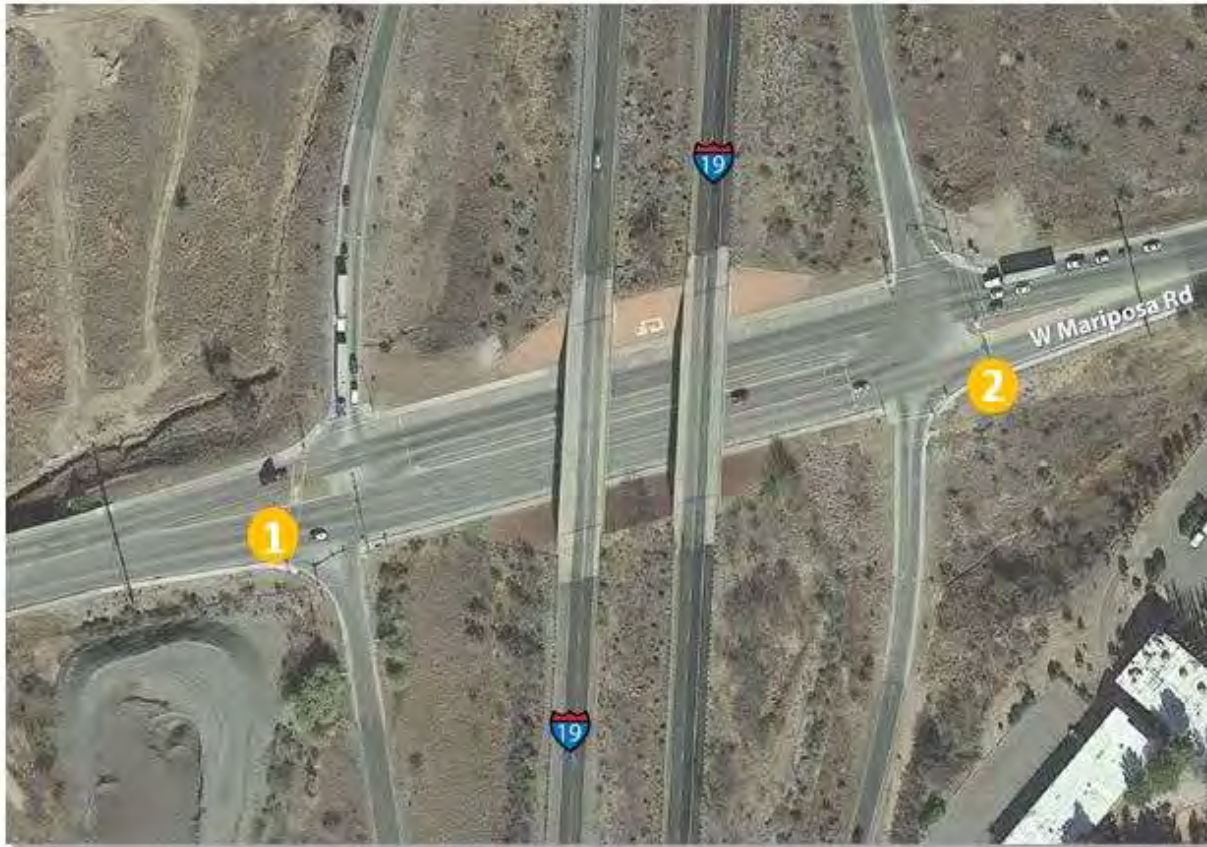


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Transportation Network



Figure 4-6 | Interchange at I-19 and W. Mariposa Road



4.2 | Land Port of Entry

Two Land Ports of Entry (LPOE's) are located within Nogales. The LPOE located along Mariposa Road primarily facilitates vehicular and truck crossings. The dual-gate De Concini/Morley Gate LPOE located across Grand Avenue to Morley Avenue facilitates personal automobile, pedestrian, and train crossings. The Morley gate allows pedestrians to enter the City at Morley Avenue, just to the east of the UP railway. Table 4-3 provides the border crossing data from the U.S Department of Transportation Bureau of Transportation Statistics. In 2017, the Nogales POE received the highest amount of pedestrian and personal vehicular passenger crossings compared to the other POE's within Arizona¹.

¹ USDOT, Bureau of Transportation Statistics 2017

**Table 4-2 | Nogales, AZ Border Crossing Data 2017**

Type	2017
Bus Passengers	191,750
Buses	12,891
Pedestrians	3,349,123
Personal Vehicle Passengers	7,630,386
Personal Vehicles	3,806,449
Train Passengers	2,600
Trains	649
Trucks	333,941

Source: USDOT, Bureau of Transportation Statistics

4.3 | Multimodal Infrastructure

The available non-motorized infrastructure in the area is limited and non-contiguous. This section describes the available infrastructure and understood bicycle and pedestrian activity in the area.

Bicycle and Pedestrian

Sidewalks are present throughout parts Nogales and consist of both attached and detached sidewalks. Detached sidewalks are sidewalks which incorporate a buffer between the traffic lane and the pedestrian zone. Within Nogales, these buffers consist of a landscaped area. Attached sidewalks are not separated or protected from the curb. These type of sidewalks are common in older historic areas with larger concentrations of commercial uses or in residential areas with reduced right-of-way. Sidewalk widths vary throughout Nogales and tend to be wider downtown.

At the onset of this study, there were no dedicated bicycle facilities in Nogales. During the development of this plan, the City installed bike lanes along Congress Road as a pilot program. Without a bike lane, bicyclists must ride in traffic or on the existing sidewalks causing issues for vehicles, pedestrians, and bicyclists. Figure 4-7 depicts the existing sidewalks within the City. While much of the historic areas in the central commercial district have ample sidewalks, there are gaps throughout the system. Specifically, along Western Avenue, routes to Walmart, and the residential areas in northwest Nogales.

Strava Data Trends

With new technologies, there is a growing amount of information that can be crowd-sourced. The GPS and fitness tracking company Strava collects route data on millions of users' recreational movements. Figure 4-8 and Figure 4-10 depict the level of walking and running activity throughout Nogales as compared to the Functional Classification and Sidewalks. Many of the residential and school areas have a high level of running activity. Several of these high-activity running routes do not have sidewalks, forcing users to run in the road. Figure 4-9 and Figure 4-11 depict the biking trips that Strava users took. The majority of these bike rides tend to occur along Grand Avenue and Patagonia Highway. Additionally, these routes correlate



to routes which the OS3 bicycle advocacy group take on their weekend rides. This crowd-sourced information helps to validate critical corridors established from local stakeholders and government officials.

Anza Trail

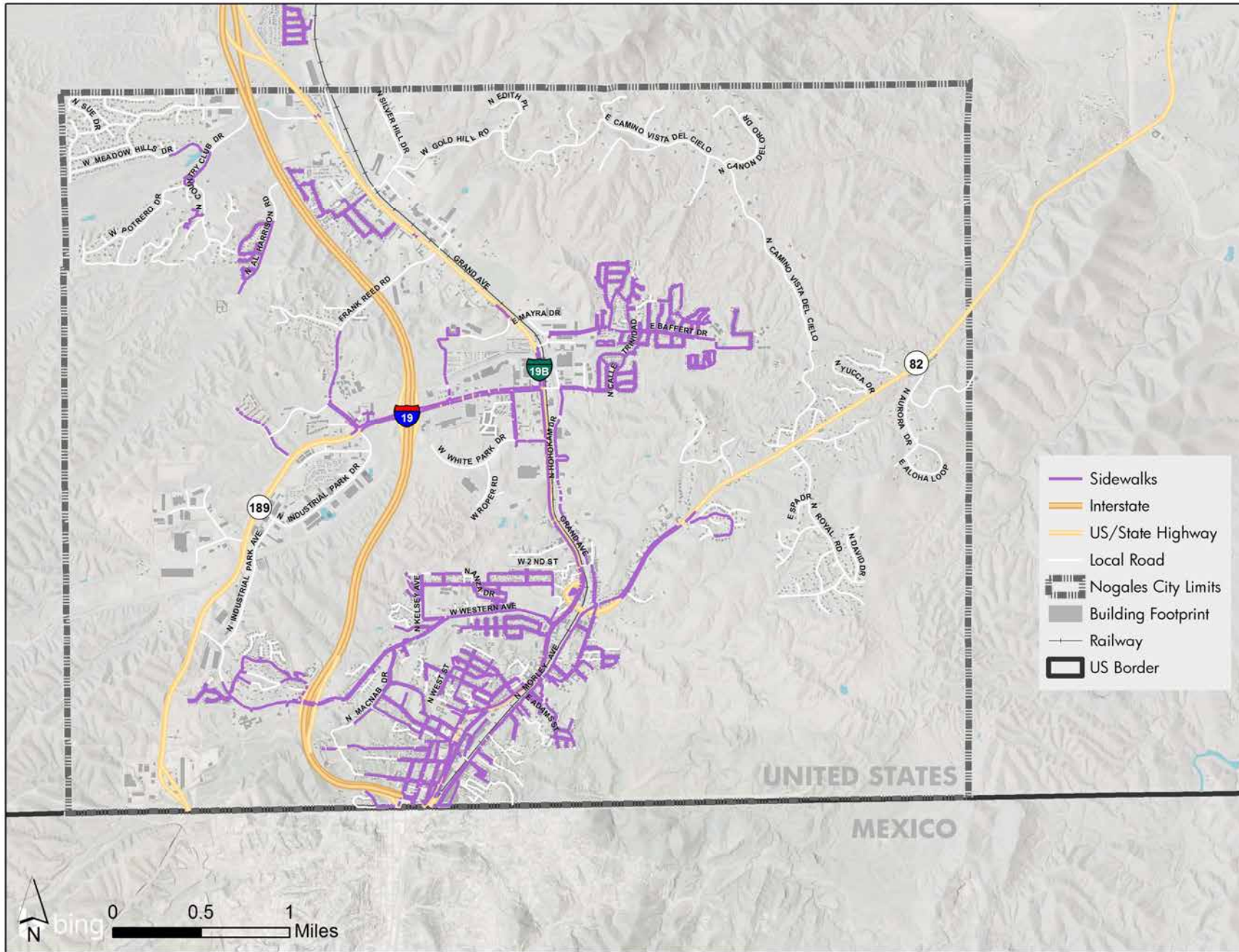
The Anza Trail is a National Historic Trail which runs through the heart of Nogales along the Grand Avenue corridor. It follows the path of Juan Bautista de Anza and his journey to establish a settlement at San Francisco Bay. The portion through Nogales is shown in Figure 4-12. The route through Nogales contains signage, yet the path is limited by its width and is aligned to the existing sidewalk. Other portions of the trail in Santa Cruz County allow for equestrian and cyclist activity. The trail continues north in Rio Rico, however there is currently no recognized connection which bridges this gap. If enhanced, this trail could aid in increasing safety along the Grand Avenue corridor. The trail could also follow the previously studied *Morley-Hohokam-Bankered Bike Route* alignment. Moving pedestrian and bike traffic off of Grand Avenue and towards the east would reduce the amount of potential traffic conflicts and increase safety for pedestrians and cyclists alike.

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Transportation Network



Figure 4-7 | Existing Sidewalks

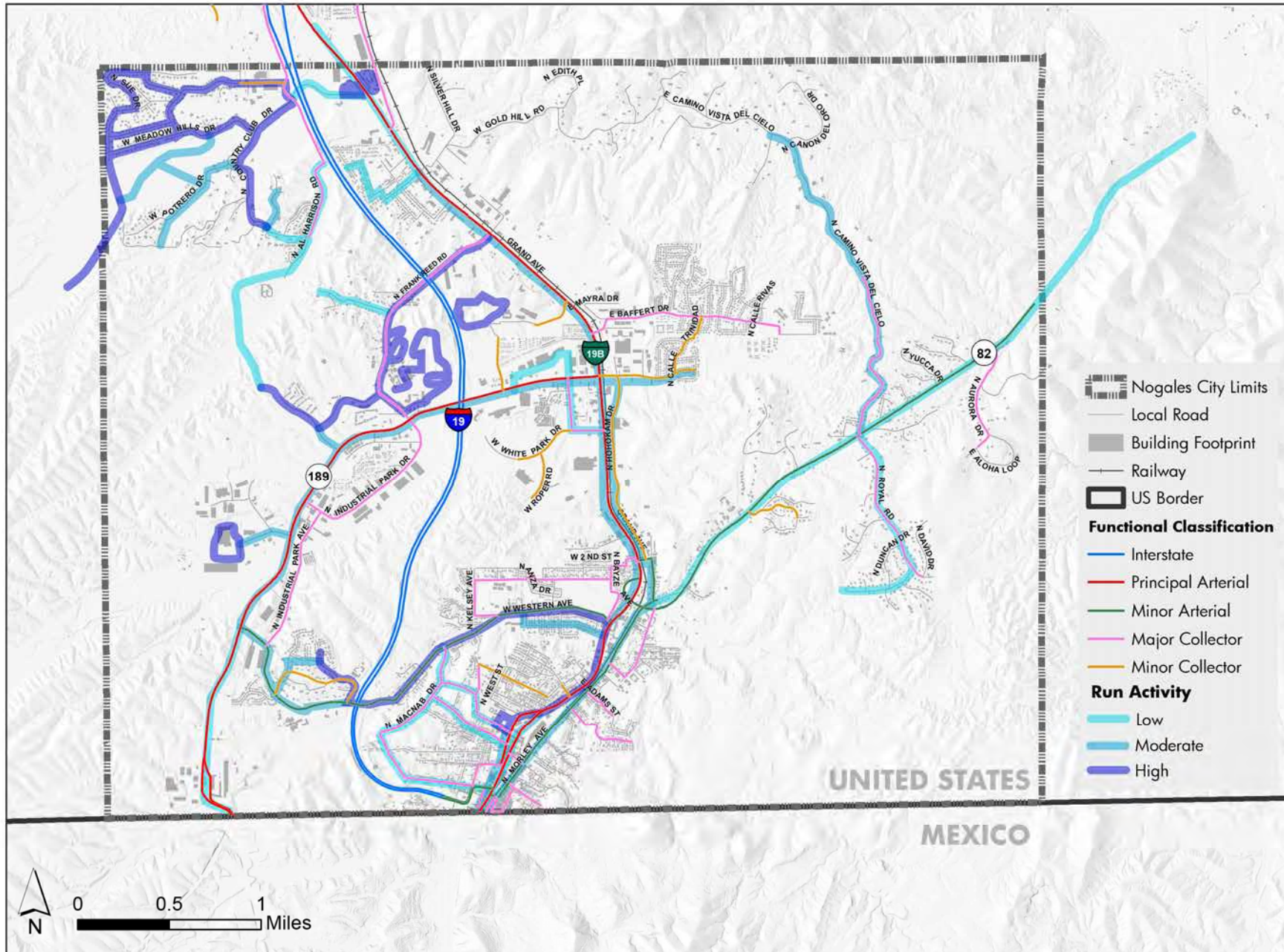


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Transportation Network



Figure 4-8 | Strava Run Activity with Roadway Functional Classification



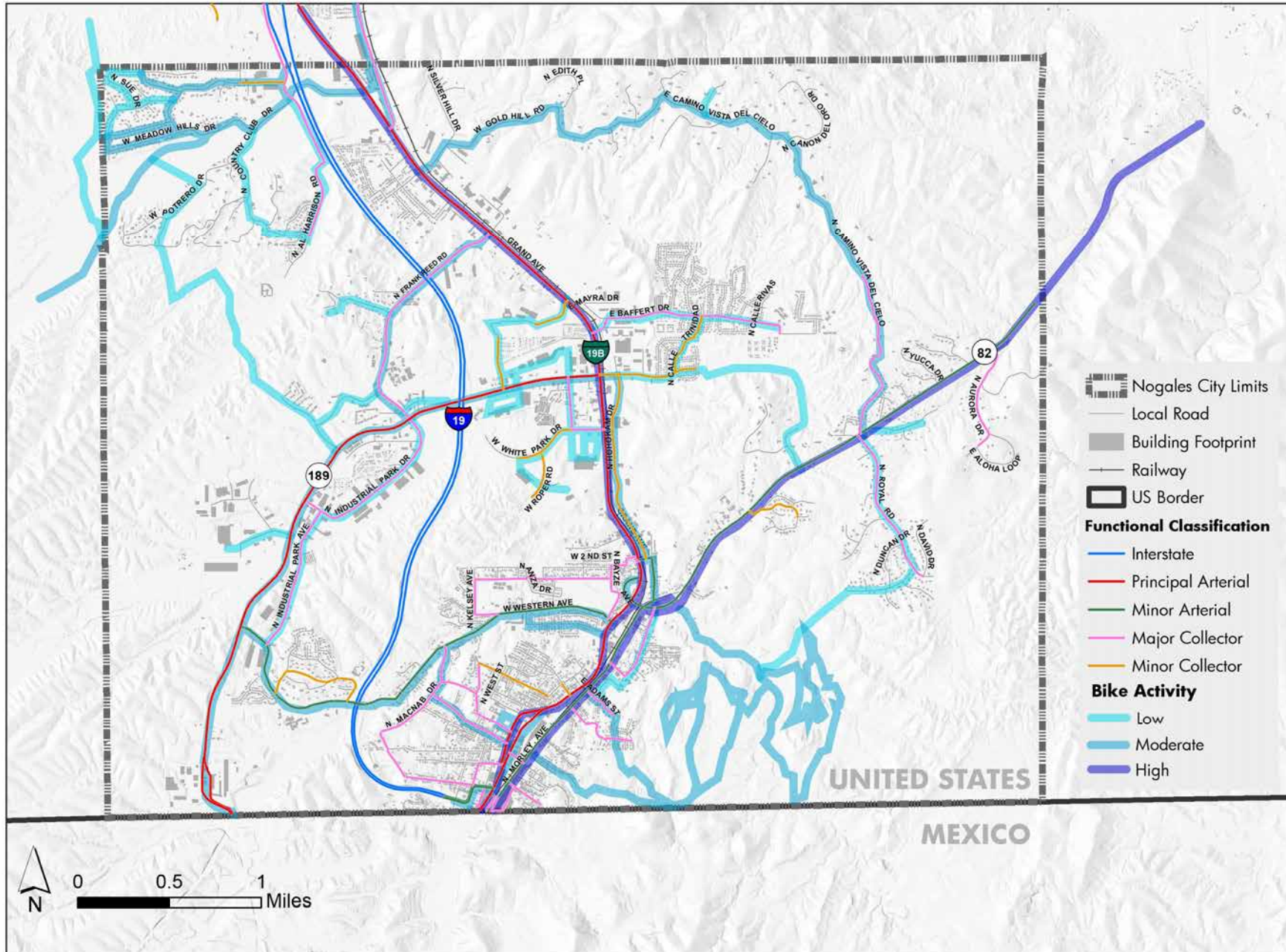
Source: <http://www.strava.com/heatmap>

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Transportation Network



Figure 4-9 | Strava Bike Activity and Roadway Functional Classification



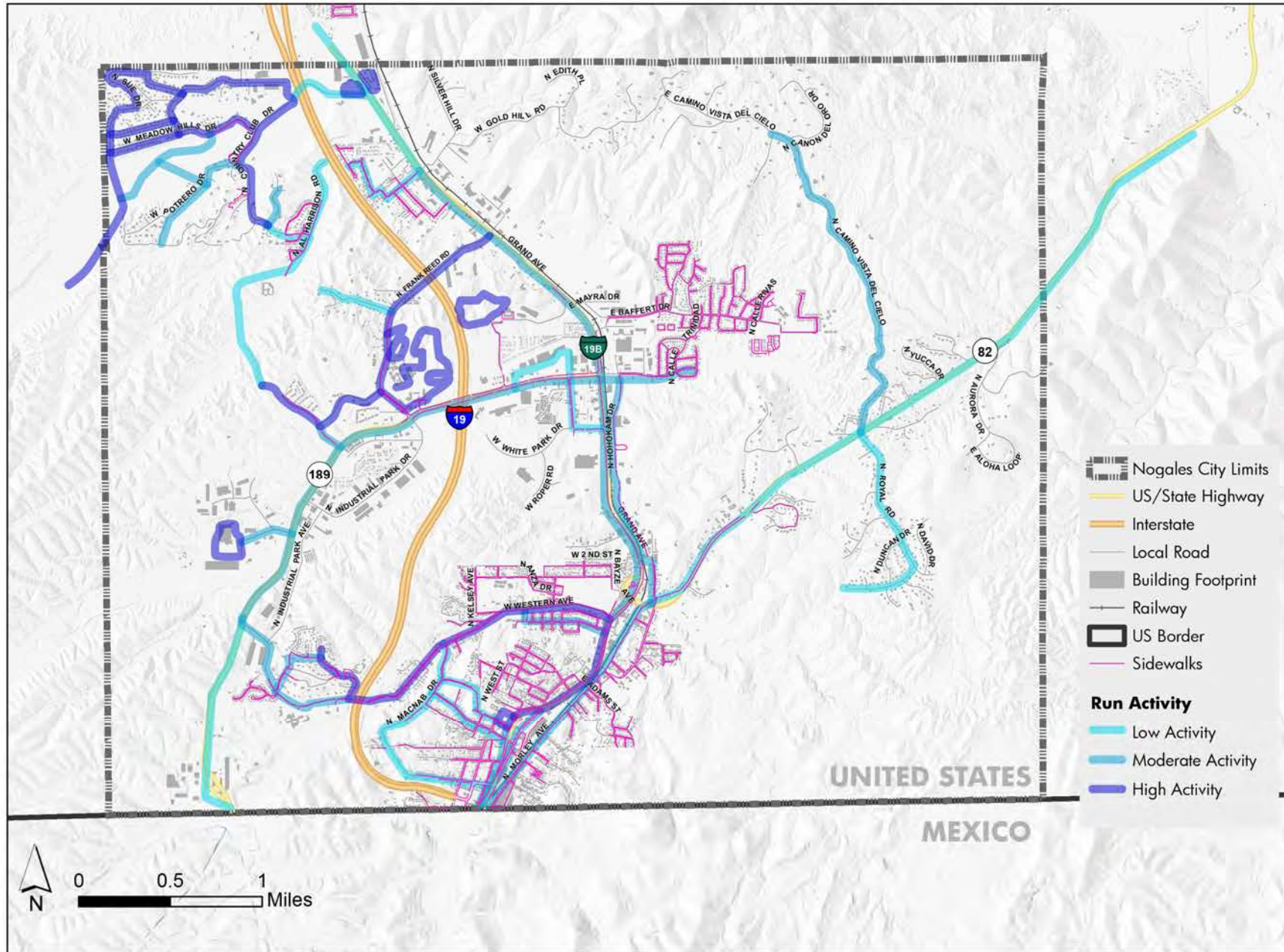
Source: <http://www.strava.com/heatmap>

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Figure 4-10 | Strava Run Activity with Sidewalks



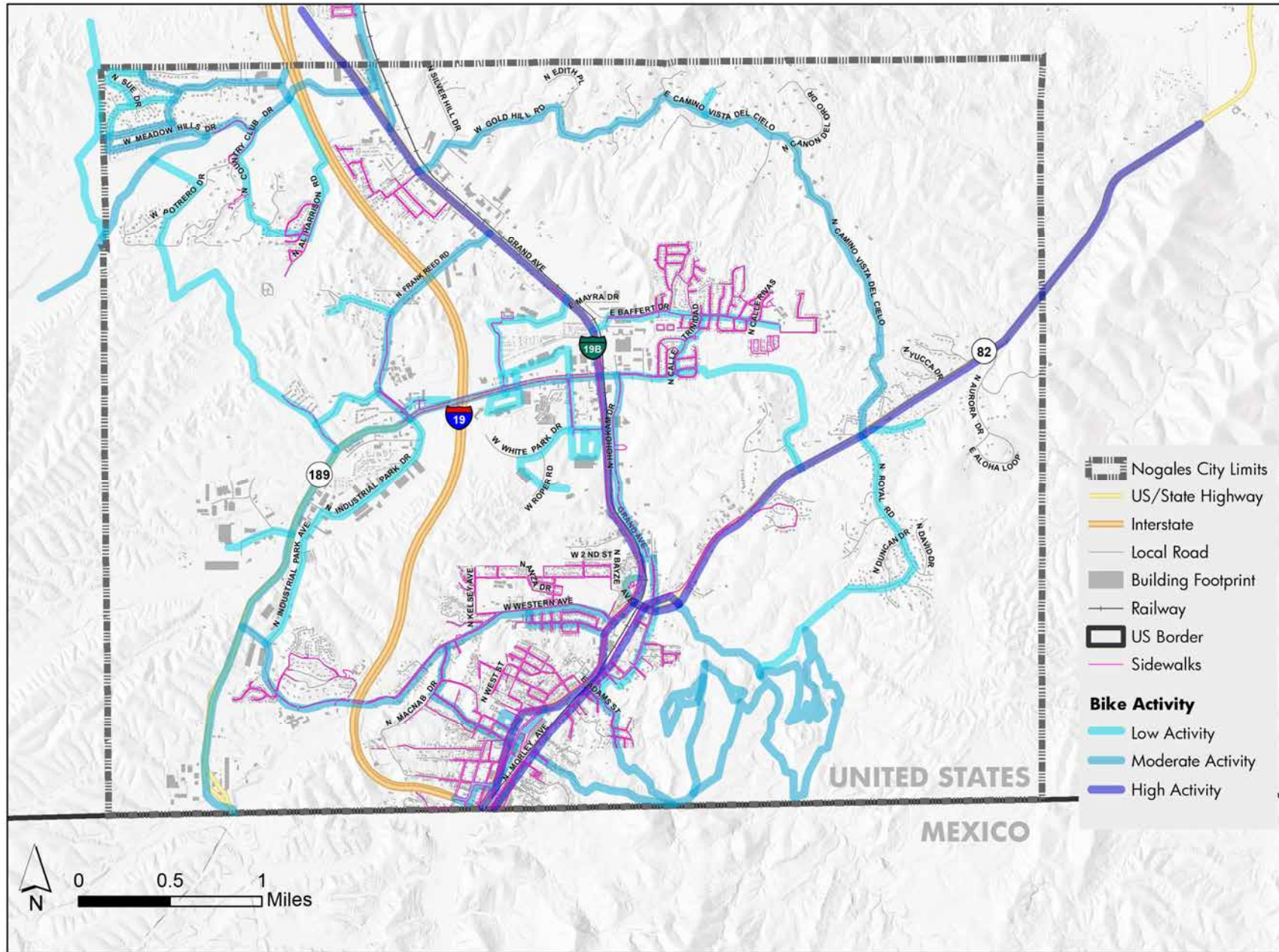
Source: <http://www.strava.com/heatmap>

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Figure 4-11 | Strava Bike Activity with Sidewalks



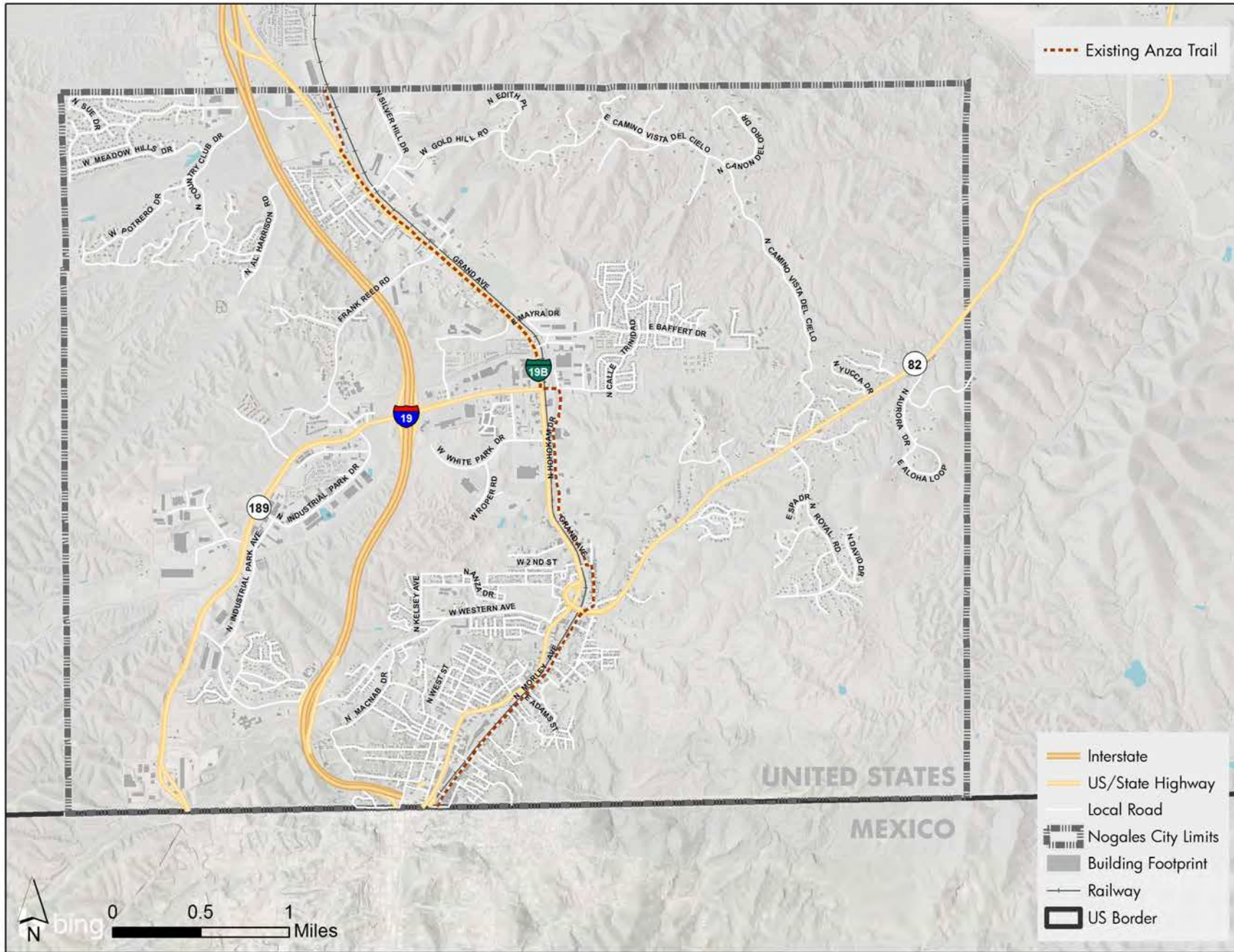
Source: <http://www.strava.com/heatmap>

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Figure 4-12 | Anza Trail through Nogales, AZ



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Transportation Network



Transit

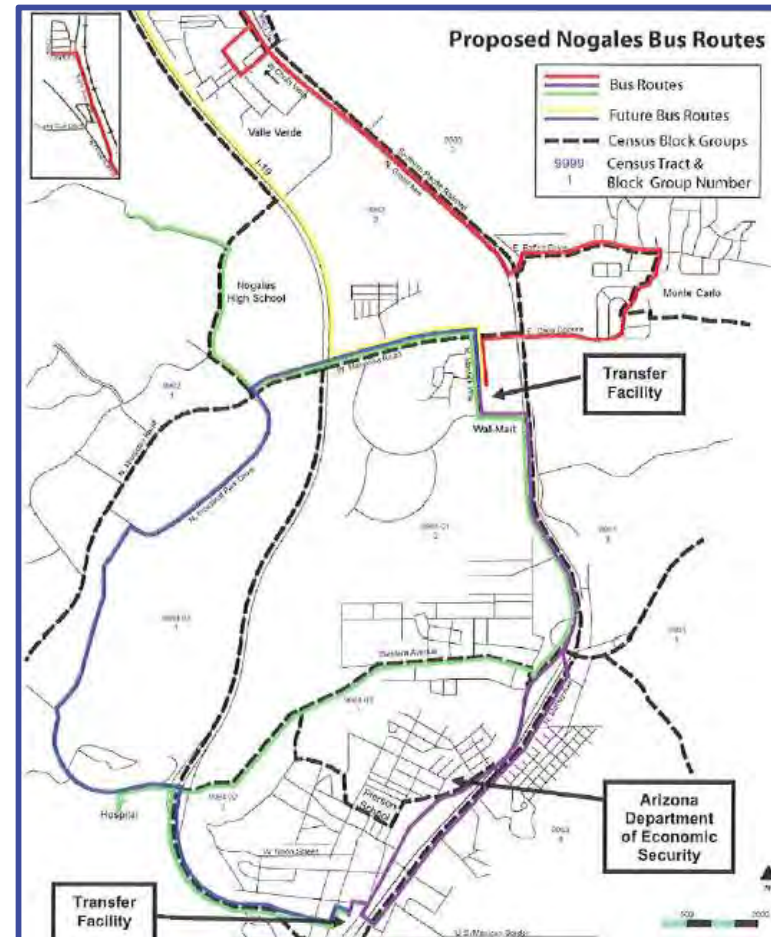
Currently within Nogales, AZ, there is no municipal fixed-route public transit service; however, there are local publicly funded transportation options within Santa Cruz County that include demand-responsive services for the elderly, disabled, and those with special needs through the following organizations:

- Easter Seals Blake Foundation
- Horizon Health and Wellness
- Nogales Infantil
- Pinal Hispanic Council
- Santa Cruz Council on Aging
- Santa Cruz Training Programs, Inc.
- Senior Citizens of Patagonia

Independent bus operators provide service between the US/Mexico border; yet the services are inconsistent and have varying fares. The Sahuaro Roadrunner Shuttle provides connections between Nogales (Arizona and Mexico), Tucson, and Phoenix. The Sahuaro Shuttle provides service every 30 minutes during peak hours. Furthermore, the Greyhound and Tufeso have stations in Nogales. The Greyhound provides service only within the U.S., while Tufeso provides service all the way to Guadalajara, Mexico. Table 4-3 provides the existing bus service locations in Nogales.

In previous plans, a commuter-oriented transit bus service from Rio Rico to Nogales was encouraged along with a passenger rail service to assist in the tourist activities in Santa Cruz County. A transit feasibility plan was conducted in 2006 to determine the viability of fixed-route service within Nogales. The recommendations included five total routes (Figure 4-13).

Figure 4-13 | Previously Proposed Transit Routes



Source: Nogales Transit Feasibility Review and Implementation Plan (Draft-October 2006)

Table 4-3 | Existing Bus Service Locations

Bus Stop/Station	Location
Greyhound	82 North Terrace Avenue
Tufesa	181 North Arroyo
Sahuaro Roadrunner Shuttle	43 North Terrace Avenue



4.4 | Safe Routes to Schools

Schools are a particular area of concern for addressing pedestrian and bicycle safety. Safe Routes to School (SRTS) is a type of program developed between schools, municipalities, and other stakeholders to improve students' ability to walk or bicycle school. The program – developed in line with national best practices – focuses on infrastructure, education and policy changes that make active transportation to school safe, comfortable, and enjoyable for students.

Often times, SRTS programs lead to improvements to the physical environment, such as better sidewalks or crosswalks which end up serving the community as a whole. Appendix A includes a mapped inventory of existing pedestrian infrastructure (sidewalks and marked crosswalks) around each school in Nogales. These maps will form the basis for Safe Routes to School infrastructure recommendations around Nogales schools as part of this plan.

Programming and policy changes are another focus of Safe Routes to School initiatives. Many schools or districts will organize “walk to school” or “bike to school” days to encourage active transportation among students. These are usually developed in coordination with local governments. Local government may collaborate on a case-by-case basis, but some governments have dedicated staff or programs to provide ongoing support to SRTS efforts. The City of Tucson has a permanent Safe Routes to School program operated through its transportation department and in partnership with a local active transportation advocacy organization. The program provides planning support and programming for several initial target schools and assists in organizing SRTS events at schools and districts throughout the city.”

4.5 | Critical Mobility Corridors

There are six identified corridors from the scope of work within Nogales that do not currently provide or connect to ample bicycling or pedestrian facilities. These corridors and cross sections are shown in Figures 4-14 through Figure 4-19. The cross sections provide the existing lane width, number of lanes, curb-to-curb roadway width (when present), shoulders (when present), medians (when present), and sidewalks (when present).

The six corridors are not consistent throughout and typically change dimension. Figures 4-14 through Figure 4-19 illustrate the existing conditions along each of these corridors in order to identify the amount of space currently being used and for what purpose. Primarily, the roadways only serve vehicles with a few locations of sidewalks at Mariposa Road, Patagonia Highway, and Western Avenue. For the most part, the existing lane widths provide more than enough space for vehicular travel.



Identified Needs

The study Advisory Committee provided input related to where bike and pedestrian improvements are needed. Figure 4-20 portrays the locations where bike improvements are needed according to the community. The corridors with more callouts are noted as such. Figure 4-21 illustrates the locations where pedestrian improvements are needed. Areas with more callouts are identified accordingly.

According to the community, areas with the most bike needs include:

- Grand Avenue
- Patagonia Highway
- Waverly Avenue

According to the community, areas with the most pedestrian needs include:

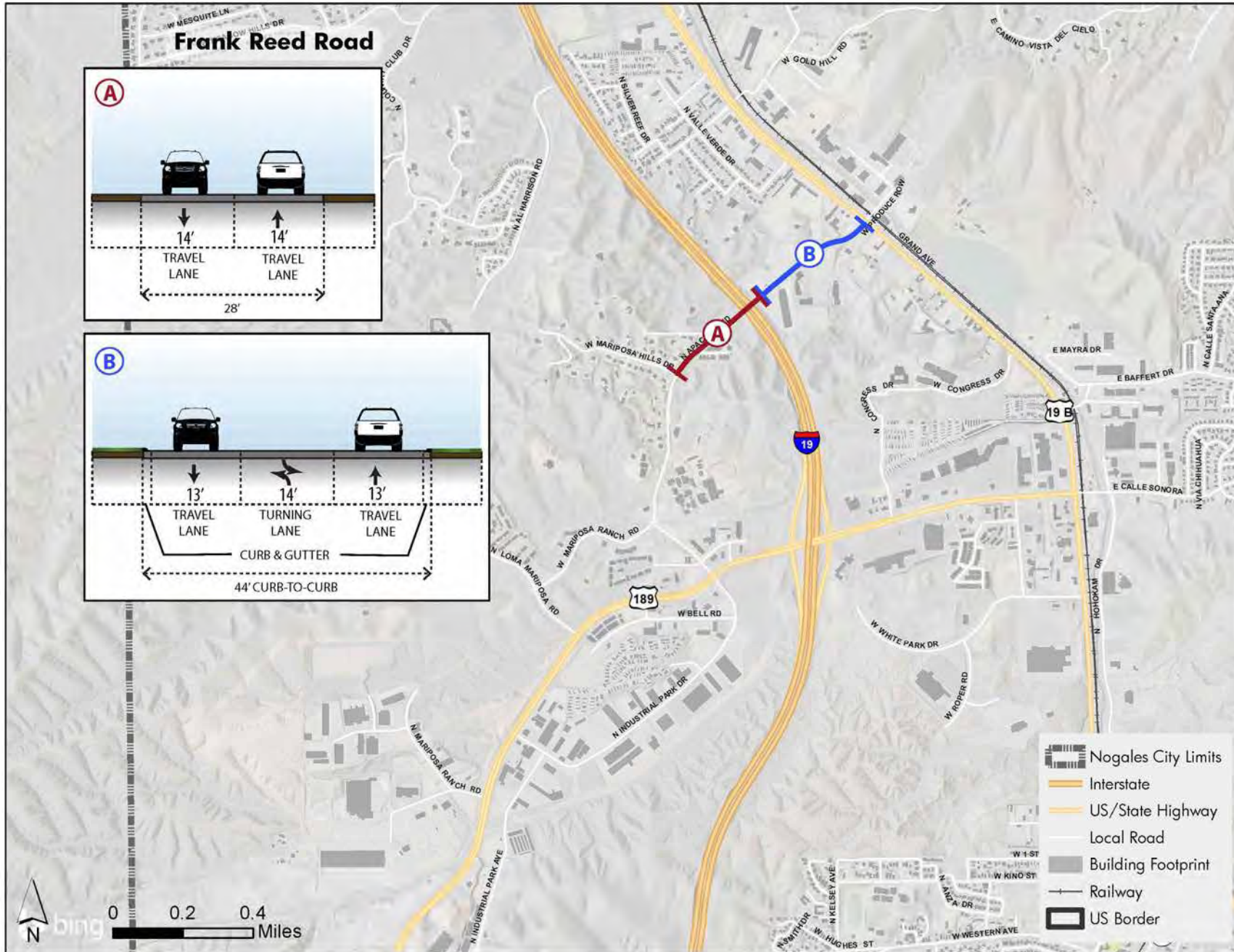
- Grand Avenue
- Patagonia Highway

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Figure 4-14 | Critical Corridor - Frank Reed Road

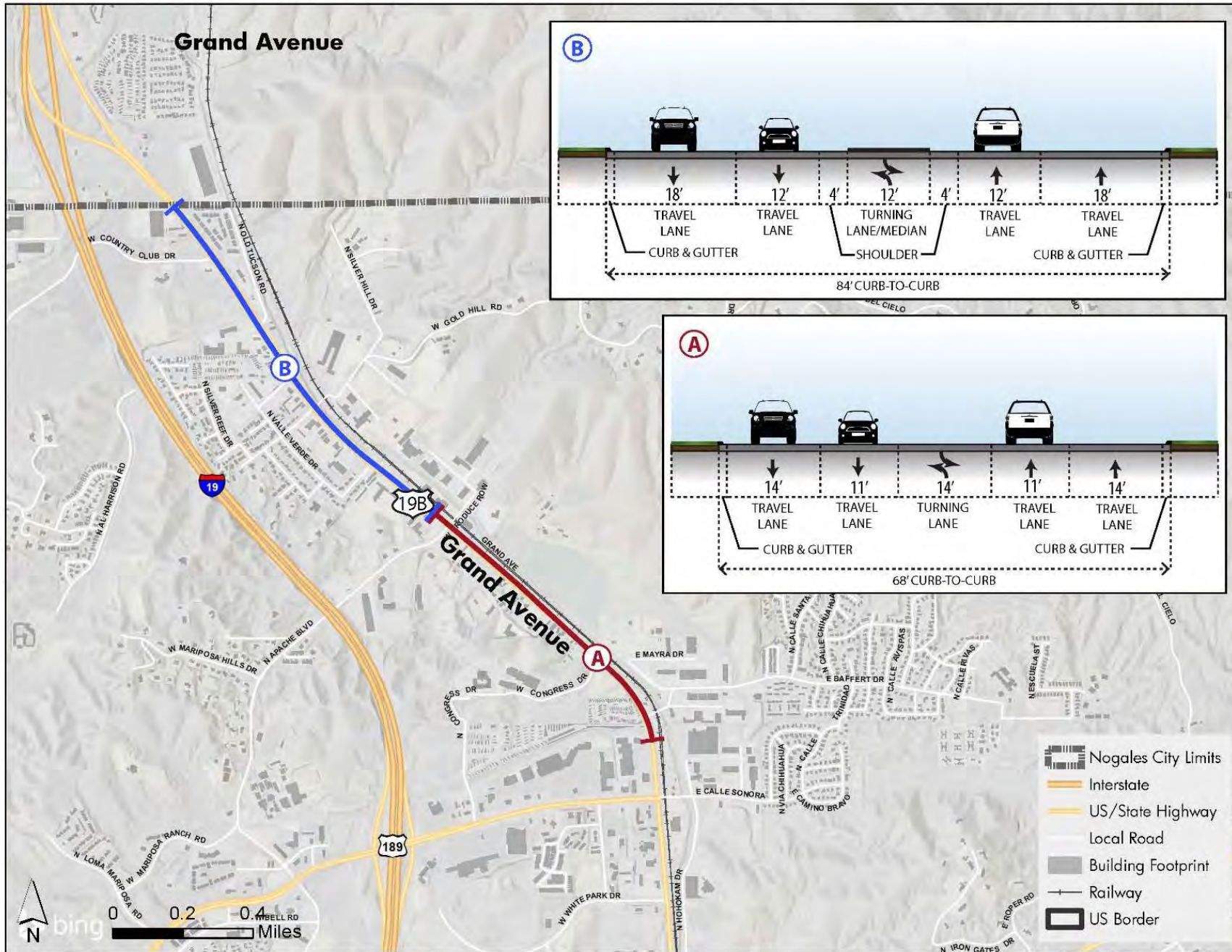


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Figure 4-15 | Critical Corridor - Grand Avenue

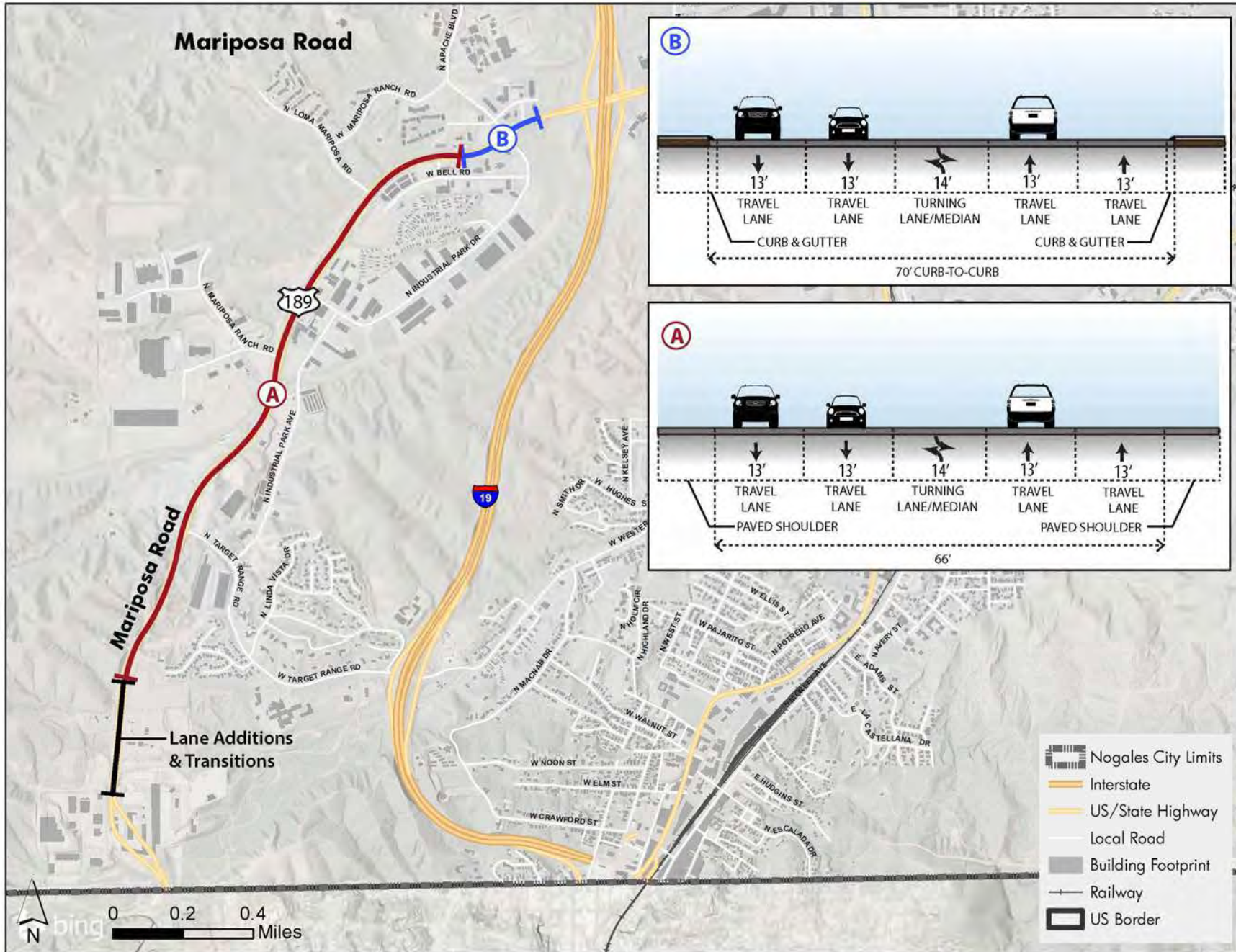


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Transportation Network



Figure 4-16 | Critical Corridor - Mariposa Road

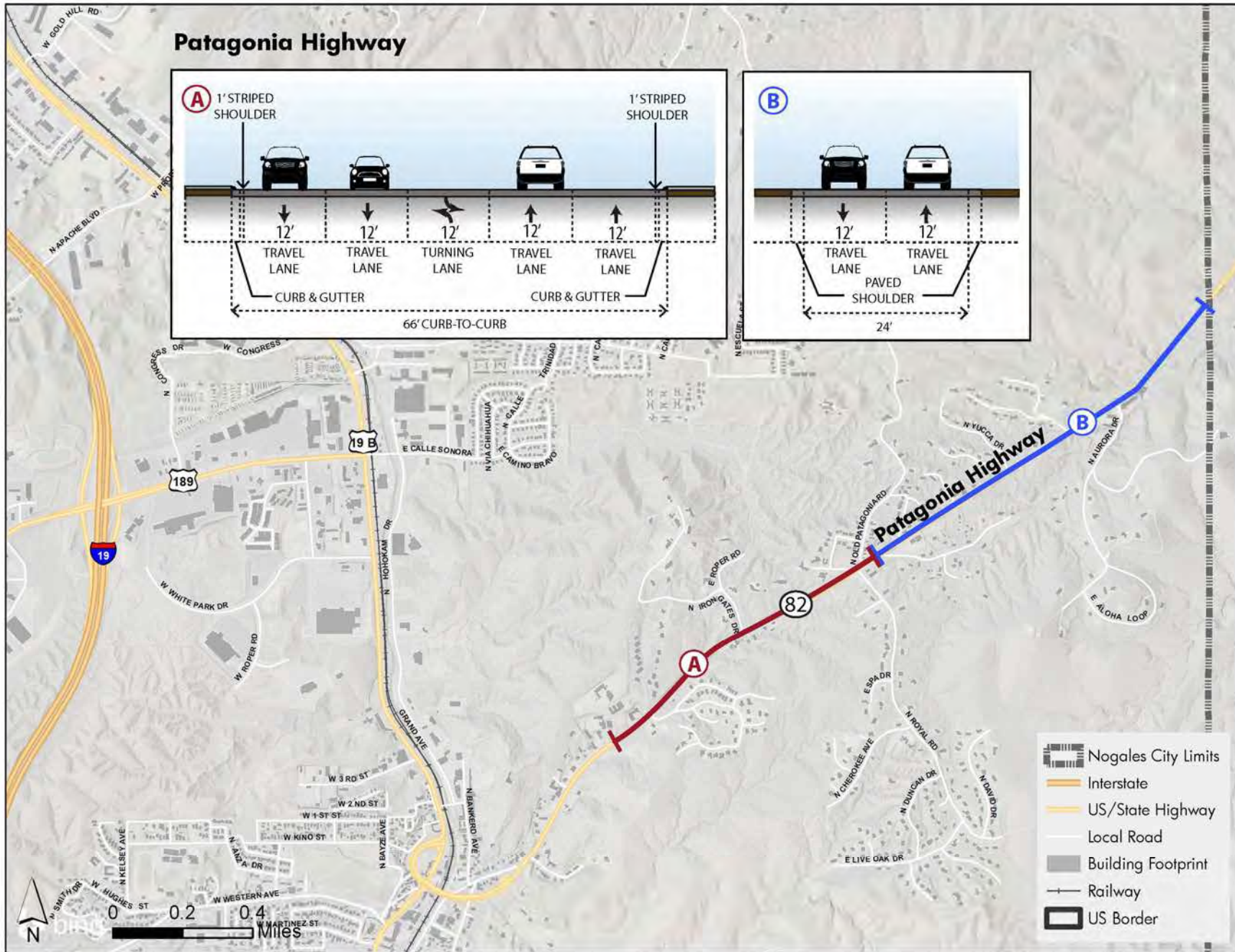


4

Transportation Network



Figure 4-17 | Critical Corridor - Patagonia Highway

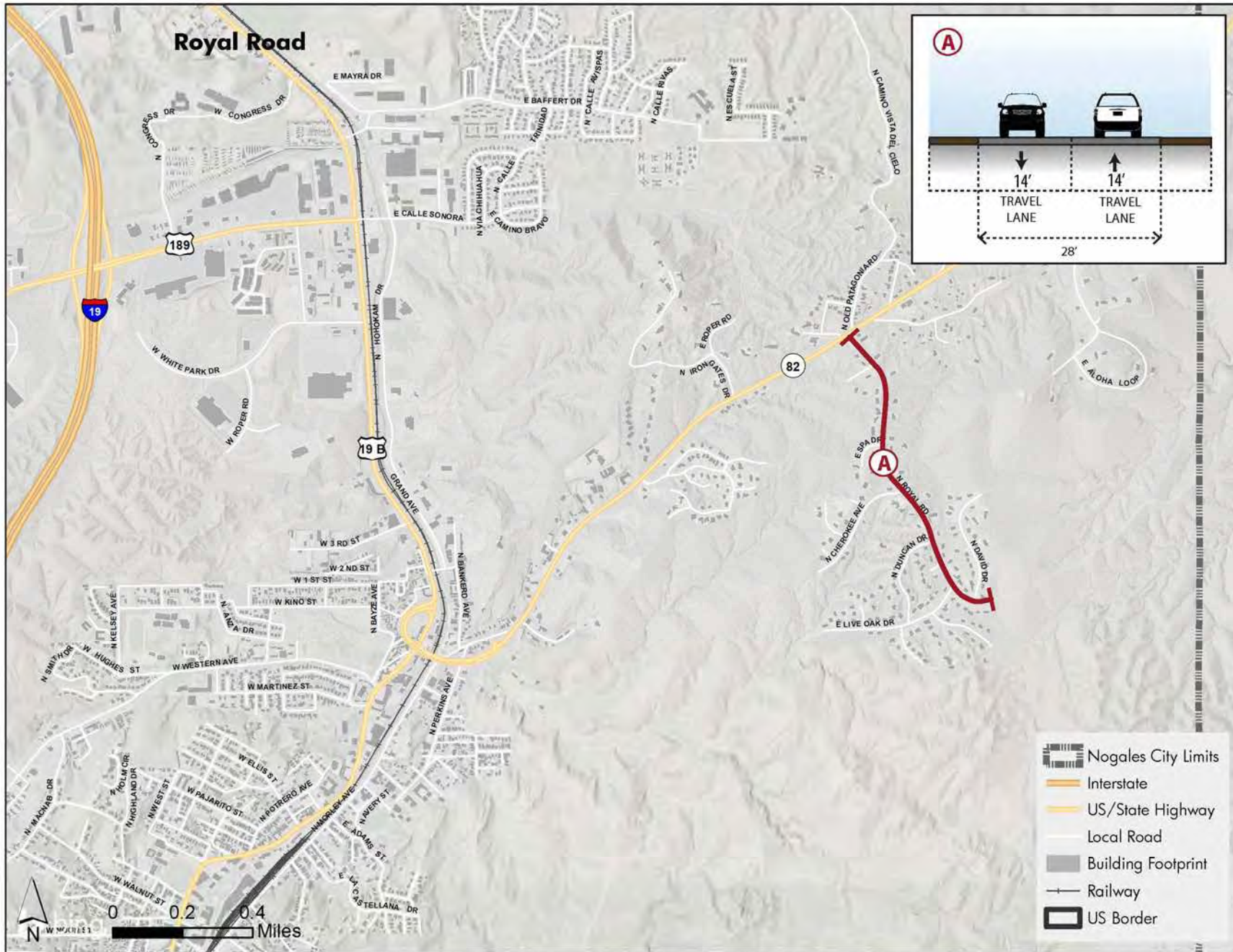


4

Transportation Network



Figure 4-18 | Critical Corridor - Royal Road

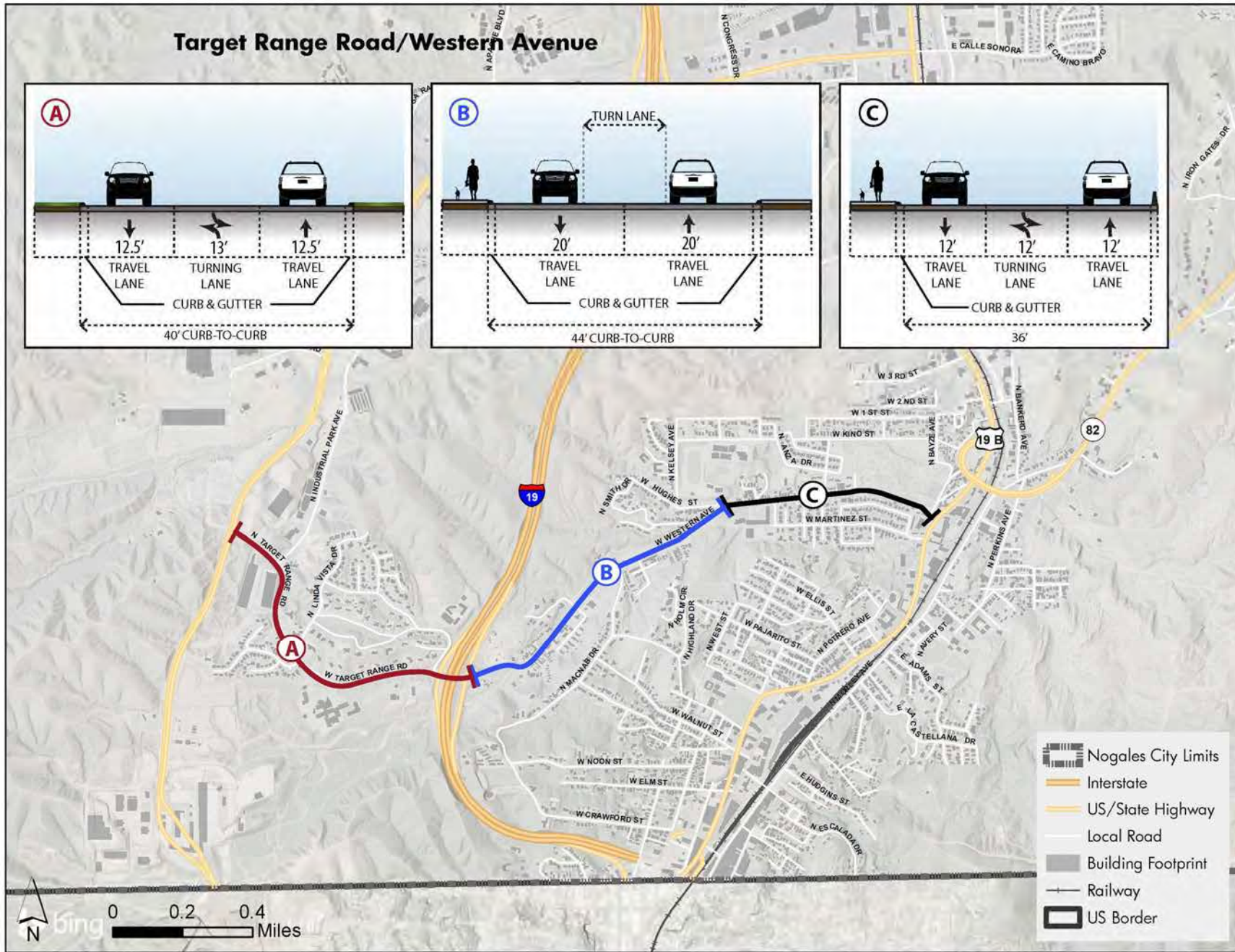


4

Transportation Network



Figure 4-19 | Critical Corridor - Target Range Road/Western Avenue

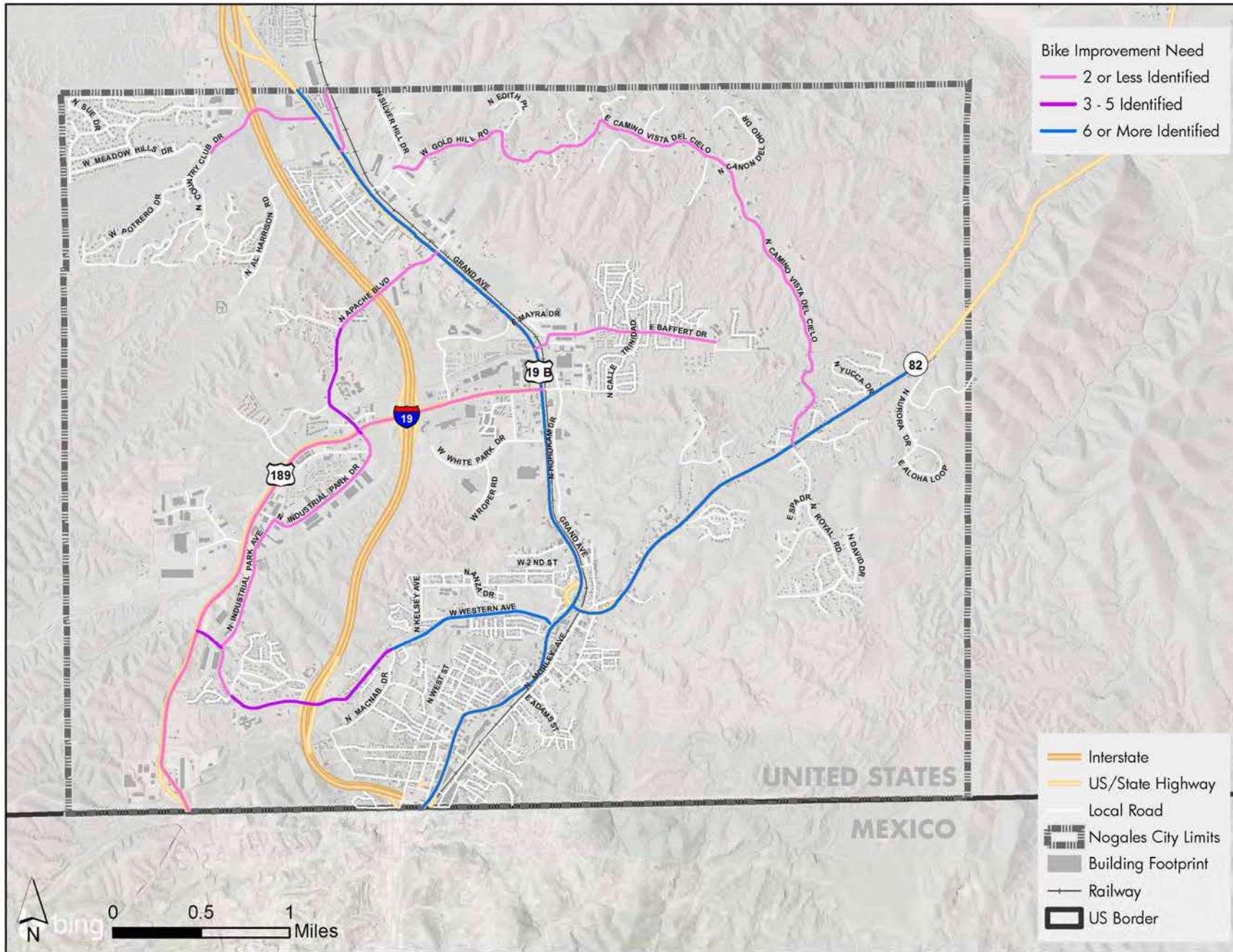


4

Transportation Network



Figure 4-20 | Identified Bike Improvement Needs

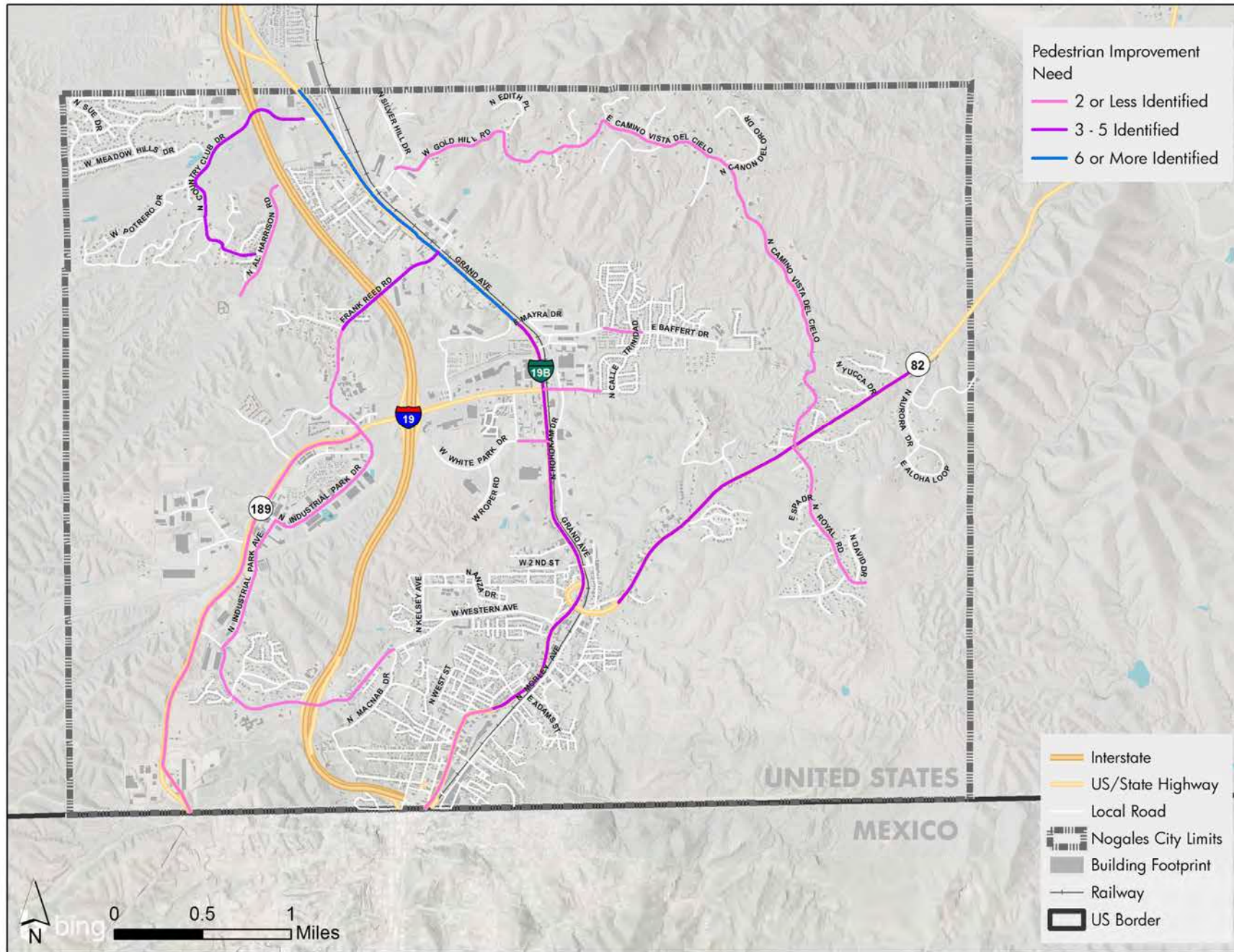


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Transportation Network



Figure 4-21 | Identified Pedestrian Improvement Needs





4.6 | Crash Density

An important consideration to the safety of a roadway is the location of crashes. Table 4-4 depicts a summary of crashes in Nogales from 2012 till 2016. Overall, there were 1,210 crashes within the City of Nogales, with many occurring near the I-19/Mariposa Road interchange and the commercial node at Mariposa Road/Grand Avenue just to the east of the interchange. Out of all 1,210 crashes, nine resulted in fatalities, and thirteen resulted in a serious injury. Figure 4-22 displays the relative crash density of the 1,210 crashes from 2012 till 2016. Crashes tend to occur at the I-19 interchange at Mariposa Road, the intersection of Mariposa Road and Grand Avenue, and at various intersection locations along Grand Avenue.

Severe Crashes

Overall, crash severity is fairly low, with only 2% of crashes resulting in a serious injury or a fatality. Figure 4-23 displays the density of these severe crashes and the locations of fatal crashes. Primarily, severe crashes have occurred along I-19, on Mariposa Road between I-19 and Grand Ave/US-19B, and along Grand Avenue near the Patagonia Highway Interchange. Fatalities tend to occur on higher-speed and volume roadways, but are distributed across the city.

Table 4-4 | Nogales Crash Summary (2012-2016)

Total		Fatal Crashes		Serious Injury Crashes		Sub-Total (Fatal + Serious Injury)		Other Injury Crashes		Property Damage Only Crashes		Grand Total	
		Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
		All Crash Totals	9	1%	13	1%	22	2%	223	18%	965	100%	1210

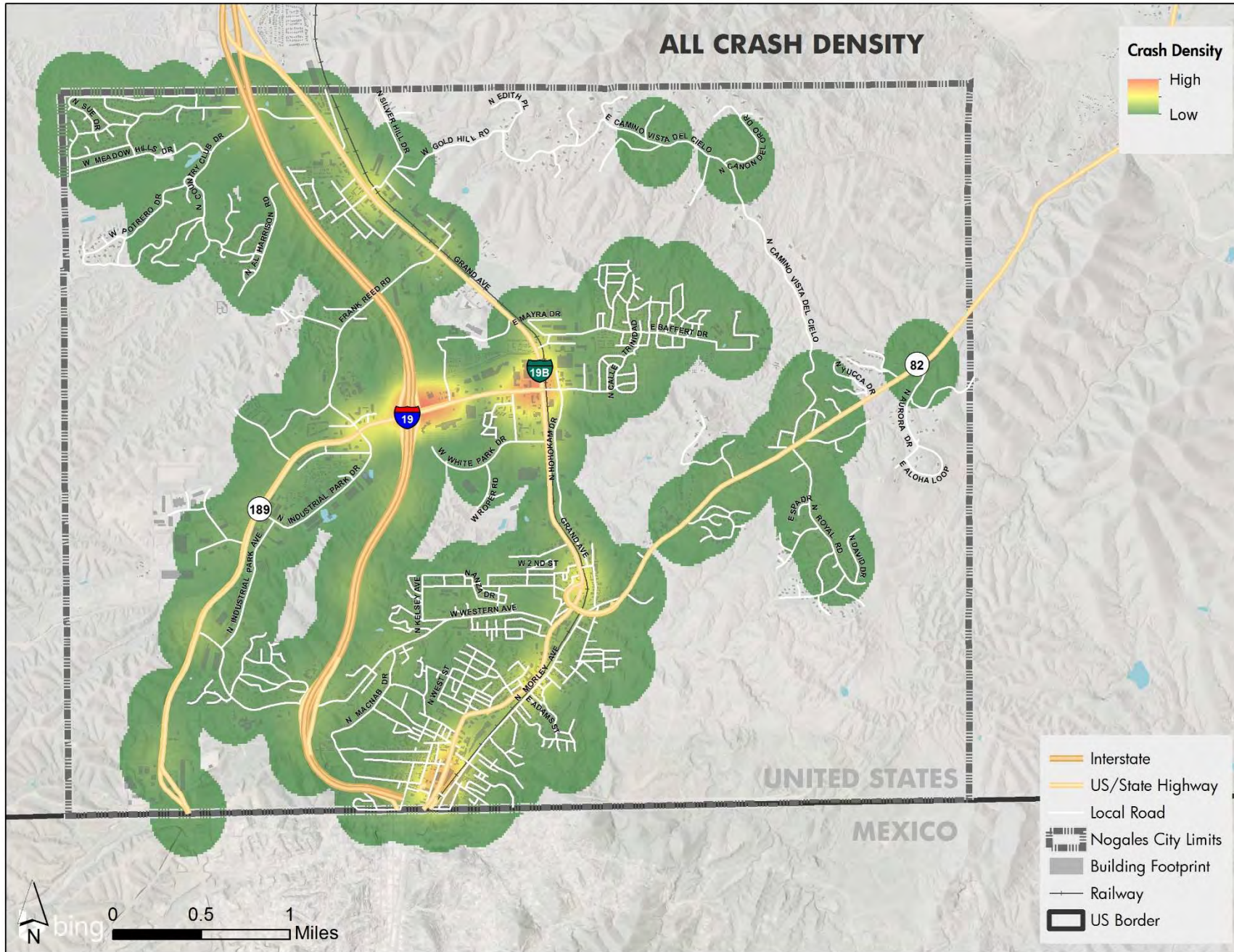
Harmful Event		Fatal Crashes		Serious Injury Crashes		Sub-Total (Fatal + Serious Injury)		Other Injury Crashes		Property Damage Only Crashes		Grand Total	
		Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
		Pedestrian	2	16.7%	0	0.0%	2	16.7%	9	75.0%	1	8.3%	12
Bicycle	0	0.0%	0	0.0%	0	0.0%	3	75.0%	1	25.0%	4	100.0%	
Crash Totals	2	13%	0	0%	2	13%	12	75%	2	13%	16	100%	

4

Transportation Network



Figure 4-22| All Crash Density (2012 - 2016 All Severity Crash Data)





Pedestrian Crashes

Pedestrian crashes are of great importance due to the lack of protection pedestrians have when in a roadway. Additionally, the risk of a serious injury or fatality is much greater on higher speed roadways. As shown in Table 4-5, there have been two pedestrian fatalities and no pedestrian serious injuries in Nogales. There were twelve total pedestrian-involved crashes in Nogales, nine of which were classified as non-incapacitating injury or suspected injury. Figure 4-24 shows that the majority of all pedestrian crashes are occurring in the central commercial district. This area has a great number of pedestrian crossings and is an active commercial area.

Bike Crashes

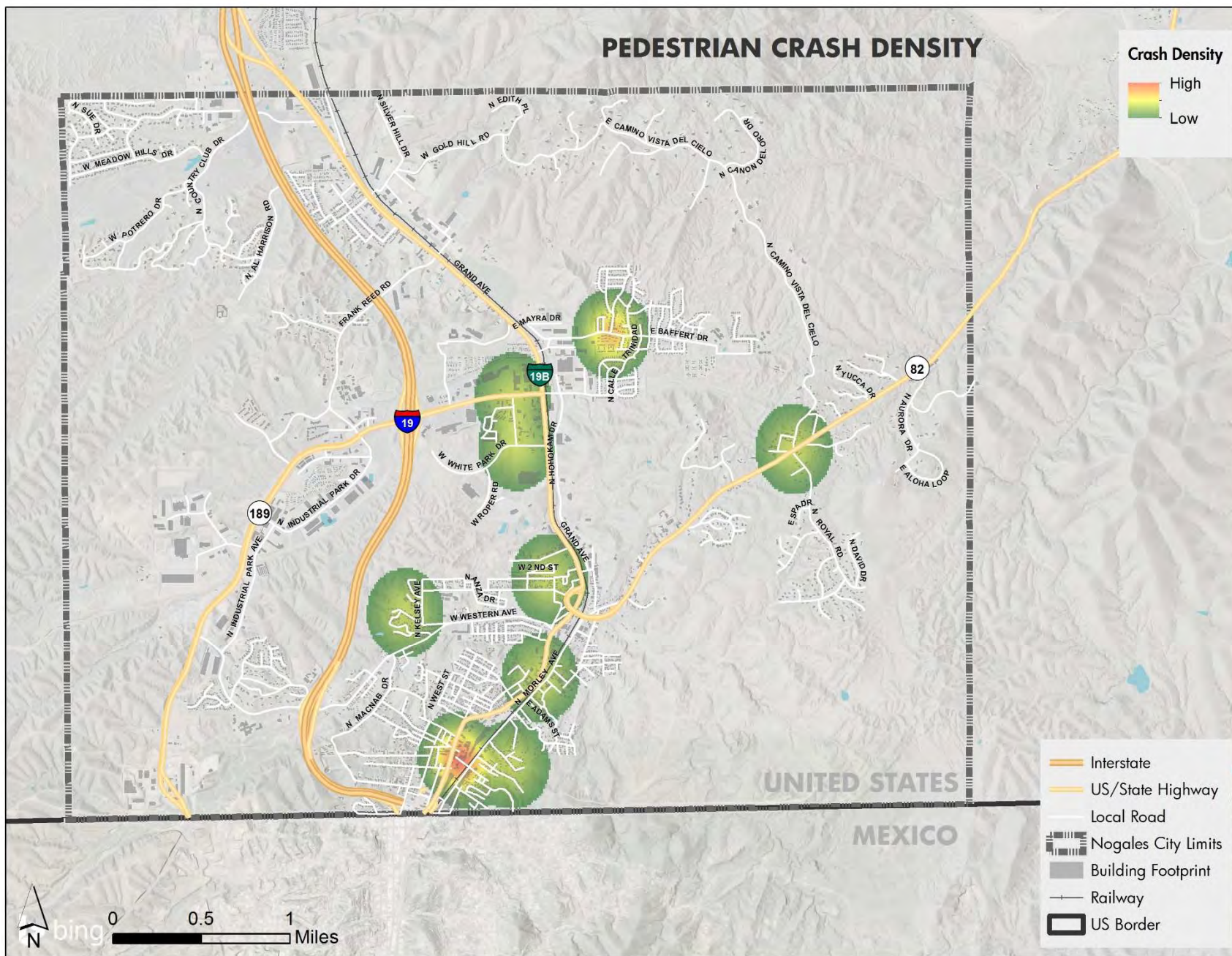
Bike crashes are fairly low in Nogales. As shown in Table 4-5, there have been four total bicycle-involved crashes in Nogales. Of these four crashes, none resulted in a fatality or a serious injury. As shown in Figure 4-25, the relative density of the four crashes tend to occur along Grand Avenue, with two of the crashes occurring in a similar location. It should be noted that the red “hot-spot” displayed in Figure 4-25 represents two crashes.

4

Transportation Network



Figure 4-24 | Pedestrian Crash Density (2012 - 2016 All Severity Crash Data)

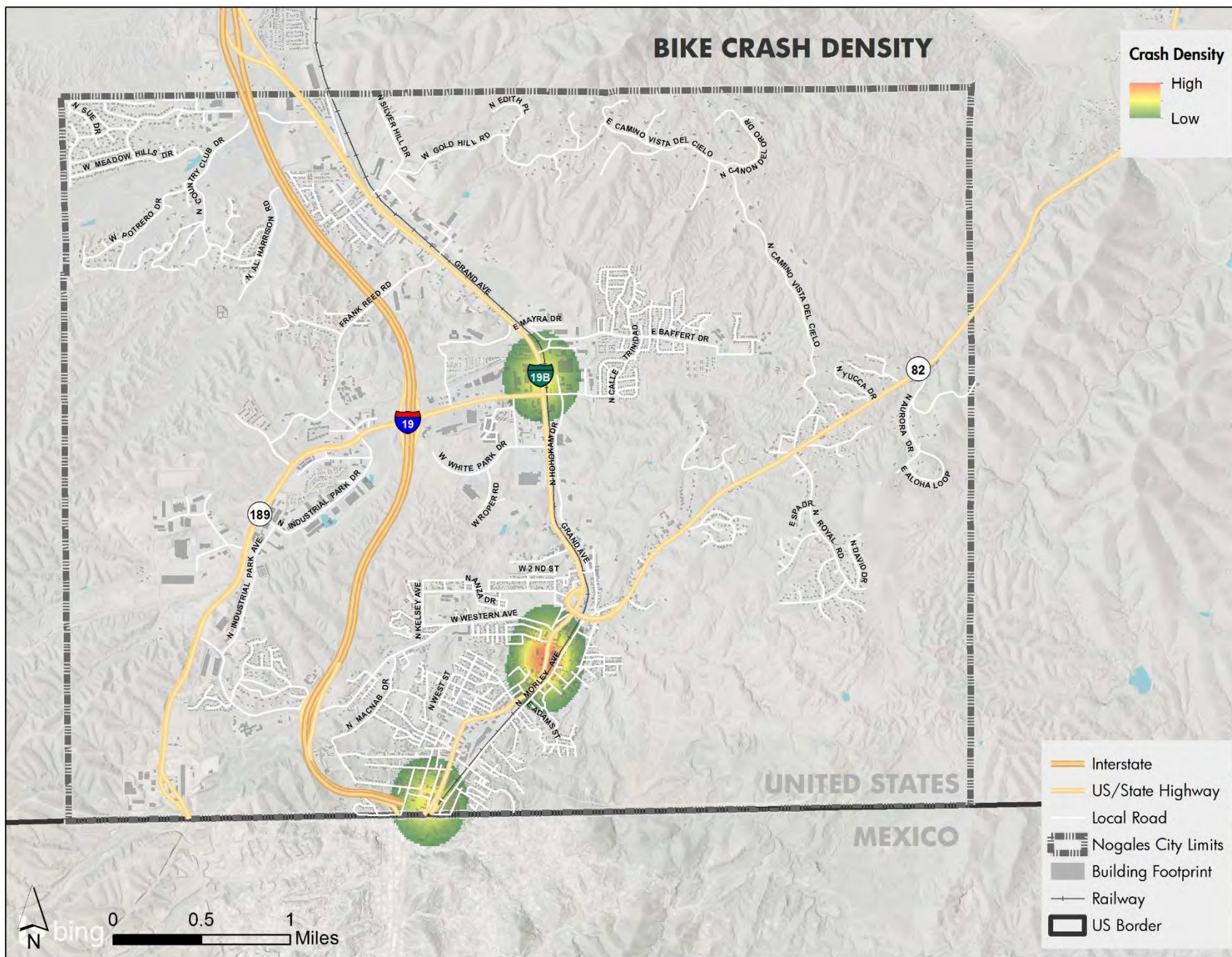


4

Transportation Network



Figure 4-25 | Bike Crash Density (2012 - 2016 All Severity Crash Data)





4.7 | Key Transportation Network Findings

The review of Nogales existing conditions resulted in several key findings which will help in developing context-specific solutions which increase the safety and mobility of pedestrians and cyclists.

Critical Mobility Corridors

Six corridors were initially identified by the City of Nogales to be studied in detail throughout the existing conditions process. The following chapter identifies a total of twelve corridors that are included in this study, in order to provide a comprehensive network that allows adequate travel options for bicyclists and pedestrians. As shown in Table 5-1, four of these corridors were identified by a majority of stakeholders as needing improvement:

- Grand Avenue
- Patagonia Highway
- Frank Reed Road
- Target Range Road/ Western Avenue

Improvements to these corridors would increase safety, access and increase mobility for pedestrians.

Table 4-5 | Stakeholder input on Critical Corridors

Name	Location	Identified Bike Need	Identified Pedestrian Need
Grand Avenue	North of Baffert Drive	6 +	6 +
Patagonia Highway (SR-82)	East of existing sidewalks	6 +	3 - 5
Frank Reed Road	North of Nogales High School	3 - 5	3 - 5
Mariposa Road	From the existing Land Port of Entry (LPOE), to I-19	2	2
Target Range Road/Western Avenue	East of Mariposa Road to Grand Avenue	3 - 6	6 +
Royal Road	South of Patagonia Highway	0	1

Interstate Crossings

Due to the edge that I-19 presents, Interstate crossing locations in Nogales are key for getting cyclists and pedestrians past I-19. An evaluation of the vertical and horizontal geometry is key creating a safe and connected route for users who pass under the Interstate facility. The crossing at I-19 and Mariposa Road/SR-189 has a high level of traffic volume, traffic collisions, and is adjacent to a several key commercial and school locations.

Standard Cross Sections

As the community develops more of an understanding of how their overall transportation network can facilitate multimodal travel, a standard cross section for each roadway type would help in facilitating consistency across the network. This in turn will increase driver, cyclist, and pedestrian confidence with the road network.



5.0 | Public Input

Community involvement throughout the planning process is key for a successful Nogales Bicycle and Pedestrian Master Plan. Various methods of fielding stakeholder and public input were used throughout the planning process including surveys, open-ended comment cards, public meetings, Council briefings, and leveraging input from the local bicycle advocacy organization, ØS3.

5.1 | Stakeholder Involvement

The project used an advisory committee of local stakeholders to help direct the study. Various City departments; ADOT, the Santa Cruz County Health Department' Mariposa Community Health Center; and ØS3 members provided this direction throughout the study, and also provided document reviews for the Existing Conditions Working Paper 1, Working Paper 2 – Plan for Improvements, and this final report. The bicycle and pedestrian facilities identified in this plan are on roadways with varying jurisdictional responsibility. Additionally, planned facilities connect to numerous community facilities and attractions, and provide the opportunity for health benefits for those that choose to walk or bicycle with safe accommodation.

5.2 | Public Meeting #1

There were two public meetings to share information about the Bicycle and Pedestrian Master Plan, and collect feedback from the community. The first public meeting was held at City Hall May 9th, 2018, with 50 attendees. The majority of attendees requested to receive project updates. The information shared was related to what the study team and Advisory Committee was seeing and experiencing in the community, relating to walking and bicycling. The community was asked questions to assist the team to narrow down on key issues and topics to find improvement topics or locations to focus on (Figure 5-1). At the same meeting, a separate blank form was provided to encourage any other additional comments that may, or may not be related to this study effort. Based on the Limited English Proficiency (LEP) of some residents in Nogales, all public meeting materials (Including flyers, signage, meeting boards, and survey forms) were printed in both English and Spanish to enhance and facilitate communication with all residents of Nogales. Feedback from the public supported the focused attention to the corridors illustrated in Figure 5-2.

Figure 5-1 | Public Comment Survey

SURVEY

Thank you for providing valuable input regarding walking and biking in Nogales!

The City of Nogales is working to develop a Bike and Pedestrian Master Plan. This plan will help City staff create a community that works well not only for vehicles but also for those who choose to take or walk. Your input on this survey will help the City understand the needs of residents and visitors as they develop the Master Plan.

GENERAL

1. What is your primary mode of travel within the community?

- Vehicle
- Bus
- Other (please specify): _____
- Bicycle
- Walk

BICYCLING

2. How often do you or a family member bicycle in Nogales?

- Daily
- Weekly
- Monthly
- Occasionally
- Never

3. What destinations are you bicycling to? (select all that apply)

- I ride to work
- I ride to school
- I ride to community facilities (i.e. library, religious institution, city hall, post office, banks, etc.)
- I ride to parks, recreational centers, or gyms
- I ride to errands (i.e. shopping, doctor, dry cleaners, etc.)
- I ride for recreation, there is no destination
- I don't ride a bike
- Other: _____

4. What are the obstacles to bicycling in the community? (select up to 3)

- Lack of bicycle lanes or shared use paths
- Troublesome intersections
- Speed limits for cars
- Discourteous drivers
- Inadequate signage and pavement markings
- Condition of pavement
- Inconsistent driveways
- On-street parking
- Insufficient lighting

5. Which improvements would most greatly enhance bicycle ridership in the community? (select up to 3)

- More dedicated bicycle facilities (e.g. bicycle lanes)
- More shared use paths
- Intersection improvements
- Lower speed limits
- Signage
- Improved lighting
- More bicycle racks
- Closing some driveways
- Remove on-street parking
- Safe routes for bicycling maps
- Public education on vehicle/bicycle etiquette and rights of bicyclists

Additional Comments? **¿Comentarios adicionales?**

If you have any additional comments regarding the materials displayed at tonight's public meeting or concerns related to bicycling and walking in Nogales, please write them in the space provided below. Thank you for your input!

Si tiene algunos comentarios adicionales sobre los materiales demostrados en la reunión pública de esta noche o acerca de ir en bicicleta o caminar en Nogales, por favor escribalos en el espacio proporcionado aquí abajo. ¡Gracias por su aporte!

*Key notes: There is no sidewalk from the west main rd to Front Ave
Cross/curbless intersection and avoid/buffer heavy commercial
Veh. High Road*

*Schools
Connection from NE Madison to Mariposa Hills*

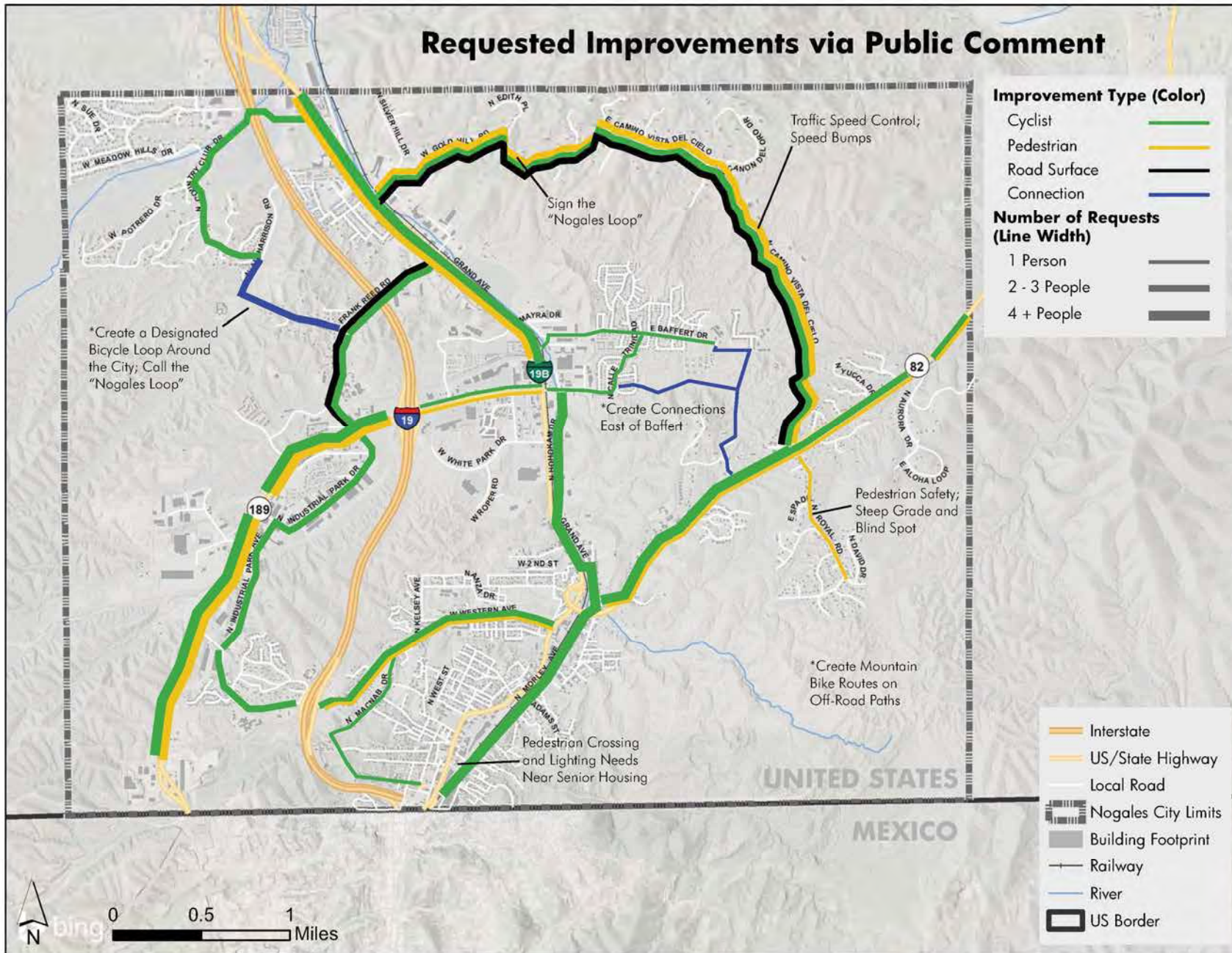
Bike Racks

*A Harrison Rd there are no sidewalks and need bike lanes due to
the large amount of Veh. Traffic and high speed.*

5 Public Input



Figure 5-2 | Public Comment Map





Following the meeting, 36 survey responses and 15 additional comments were received. Some key findings from the survey were:

- 36% of respondents identified bicycle as their primary mode of travel;
- 85% of respondents bicycle at least weekly;
- Primary obstacle to bicycling identified as "lack of bicycle lanes or shared use paths"
- Respondents identified signage/pavement markings, pavement conditions, and lighting as obstacles to bicycling;
- 75% of respondents walk at least weekly; and
- Lack and condition of sidewalks are biggest obstacles to walking, along with insufficient lighting.

Many of the responses included detailed information including specific locations where improvements are needed. These comments were then summarized into a map which categorized the improvements by type and by number of requests. This feedback parallels the recommended corridors chosen for bicycle and pedestrian facilities and helps to validate the corridors identified throughout the planning process.

The second public meeting was held on November 14, 2018 at the Public Works building. The meeting included a short presentation of the findings from the study, and recommendations for improvements. Display boards illustrated the improvement strategies by corridor, so the public could provide feedback based on a corridor-by-corridor understanding and discussion. Eleven comment cards were completed that demonstrated excitement for the plan and reinforced the strong need for bicycle and pedestrian accommodation in the community. Additionally, the attendees further supported the system of proposed improvements that were recommended.

5.3 | Council Briefings

Two Council briefings were given throughout the project. The first one on May 2, 2018 was a “Call to the Public” which provided a brief overview of the project and an open invitation to both participate in the project and notification of the public meeting held on May 9, 2018. The second Council briefing was held on November 14, 2018, the same evening as the open house. The briefing was an overview of the recommendations that were also being displayed for community feedback at the open house.

5.4 | Community Brochure

A brochure was developed that provided an overview of the study, and recommended strategies for implementation. The brochure was handed out at the second public meeting to allow the community members an opportunity to look at the options and plan, and have time to provide feedback.



6.0 | Network Recommendations (Corridor by Corridor)

The project team has evaluated each corridor by a series of metrics to accurately gauge existing conditions, measure the performance of the roadway from a bicyclist's perspective and provide a set of recommendations to best serve the overall network. Each factor in a roadway's performance has been considered and quantified in a Level of Traffic Stress (LTS) Evaluation (Figure 6-1). LTS scores range from 1 to 4 where low values relate to lower level of traffic stress and are preferable.

LTS 1: Strong separation from all except low speed, low volume traffic. Simple crossings. Suitable for children.

LTS 2: Except in low speed / low volume traffic situations, cyclists have their own place to ride that keeps them from having to interact with traffic except at formal crossings. Physical separation from higher speed and multilane traffic. Crossings that are easy for an adult to negotiate. Corresponds to design criteria for Dutch bicycle route facilities. A level of traffic stress that most adults can tolerate, particularly those sometimes classified as “interested but concerned.”

LTS 3: Involves interaction with moderate speed or multilane traffic, or close proximity to higher speed traffic. A level of traffic stress acceptable to those classified as “enthused and confident.”

LTS 4: Involves interaction with higher speed traffic or close proximity to high speed traffic. A level of stress acceptable only to those classified as “strong and fearless.”

Source: Mineta Transportation Institute

There are multiple factors which influence the level of traffic stress a cyclist might experience, including:

- Vehicle Speed;
- Availability of on-street parking;
- Traffic volume;
- Number of travel lanes per direction;
- Number of traffic signals per mile;
- Roadway functional classification;

Furthermore, these factors are differentiated by varying street conditions (i.e. speed thresholds, parking type). The result is a level of stress scoring criteria which defines the effect to bicycle LTS that each street condition has by facility type (see Figure 6-1). Each corridor is then analyzed by the existing section and the LTS scores are summed and averaged per facility type. This results in a scoring gradient where the lower the score, the more preferable the facility on said roadway section.

6

Network Recommendations



The ranking from this analysis led to a set of recommendations and roadway sections proposed for safe and adequate access for bicyclists and pedestrians while maintaining sufficient vehicular capacity.

Figure 6-1 | Level of Traffic Stress (LTS) Scoring Criteria

STREET CONDITIONS		LEVEL OF TRAFFIC STRESS (LTS) BY BICYCLE FACILITY TYPE						
		No facility	Bike Boulevard	Share the Road	Share the Road - Paved Shoulder	Bike Lane	Buffered Bike Lane	Cycle Track/ Multi-Use Path
Vehicle Speed	≤ 25 mph	1	1	1	1	1	1	1
	30 mph	2	2	2	2	2	2	1
	≥ 35 mph	4	Not recommended	4	3	3	2	1
		4	4	4	3	3	2	1
On-Street Parking	No Parking	1	1	1	1	1	1	1
	Parallel Parking	4	2	4	Not recommended	4	2	1
	Diagonal Parking	4	4	4	Not recommended	4	3	1
	Back-In Diagonal	3	4	3	Not recommended	3	3	1
	1	1	1	1	1	1	1	
Traffic Volume	< 1500 Per Day	1	1	1	1	1	1	1
	< 5000 Per Day	3	3	3	2	2	2	1
	> 5000 Per Day	4	Not recommended	4	3	3	2	1
		4	4	4	3	3	2	1
Travel Lanes per Direction	1 lane	1	1	1	1	1	1	1
	2 Lanes	3	Not recommended	3	2	2	2	1
	≥ 3 Lanes	4	Not recommended	4	3	3	2	1
		3	4	3	2	2	2	1
Traffic Control	No signals	1	1	1	1	1	1	1
	2 Signals Per Mile	4	4	4	3	2	2	1
	4 Signals Per Mile	4	4	4	3	3	2	2
	6 Signals Per Mile	4	4	4	4	4	3	3
	4	4	4	3	2	2	1	
Functional Classification	Local	1	1	1	1	1	1	1
	Collector	4	4	3	2	2	1	1
	Principal Collector	4	4	4	3	3	3	1
	Minor Arterial	4	4	4	4	4	4	2
	Major Arterial	4	4	4	4	4	4	2



6.1 | Frank Reed Road/ Industrial Park Drive

Frank Reed Road and Industrial Park Drive are important collector roads which facilitate mobility between residential neighborhoods, the industrial park, and Nogales High School. This corridor also serves as a means for east-west access across Interstate 19. The nearest underpass for I-19 is further to the south and also operates as a full diamond interchange, making bicycle and pedestrian access more challenging.

Existing Sections

There are three sections along the Frank Reed Road/ Industrial Park Drive corridor. Section A is a three-lane roadway with a center turn lane and curb and gutter. Sections B and C are two-lane roadways varying in width without curb and gutter. Details of these differences can be seen in Figure 6-2. Some minor alterations to the typical sections exist at the intersection of Highway 189 where there is a median and additional turn lanes.

Bicycle LTS Evaluation

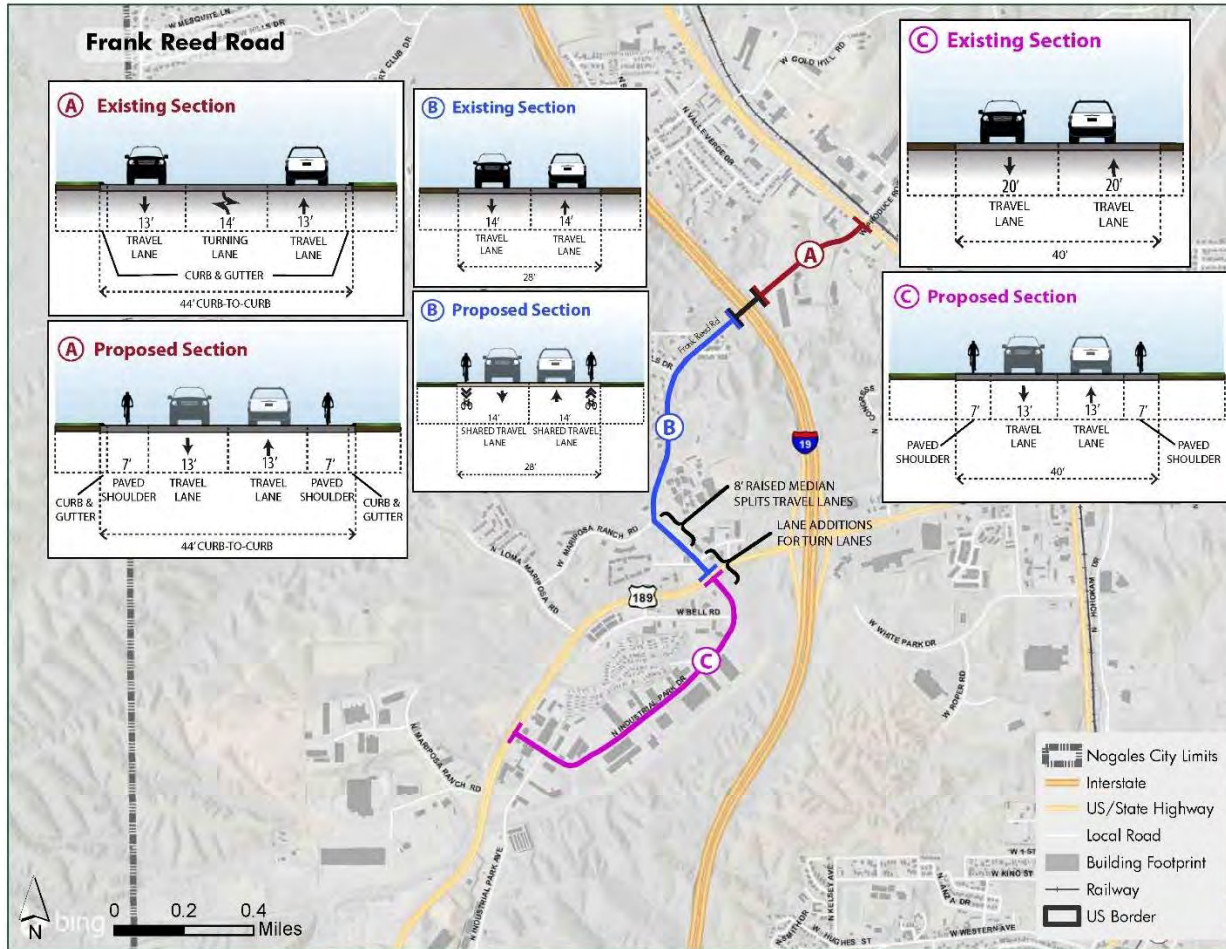
As part of the recommendation for new bicycle facilities on a roadway, there are many factors that play a role in the safety and perceived level of stress. The LTS evaluation shown in Figure 6-2 illustrates the unique conditions of this roadway including; vehicle speed, on-street parking, average daily traffic volume, number of travel lanes, whether a traffic signal is present on the corridor and the classification of the roadway, and the correlation to different type of bicycle facilities. As a roadway becomes more heavily traveled, with higher speeds and more lanes, it becomes less comfortable for bicycles.

Proposed Sections

Sections A and B have a limited number of cross streets due to the lack of development in nearby areas. Therefore Section A has a low number of turning movements and very little stacking within the center turn lane. For these reasons, the project team staff are recommending a two-lane section with 13-foot travel lanes for vehicles to allow access for cyclists along within a seven-foot paved shoulder (Figure 6-2). Given this corridor's lower traffic volumes and relatively low speeds, a share-the-road facility would provide an LTS of 2 for Section B, and an LTS of 1.67 for Section C. A challenge exists along this corridor at the I-19 underpass, where the width of the roadway cannot be manipulated due to columns supporting the existing bridge. To allow bicycle access and connect the network, the project team would recommend manipulating the existing retaining wall for the highway embankment to allow an off-street facility behind the existing columns. A separate rendering will be provided for this intervention.



Figure 6-2 | Frank Reed Road / Industrial Park Drive Recommendation



Level of Traffic Stress (LTS)

Frank Reed Rd / Industrial Park Dr			
LTS Score			
Facility Types	Score by Segment		
	A	B	C
No facility	1.83	2.33	1.83
Bike boulevard	1.83	1.83	1.83
Share the Road	1.83	2.33	1.83
Share the Road - Paved Shoulder	1.50	2.00	1.67
Bike Lane	1.50	2.00	1.67
Buffered Bike Lane	1.33	1.67	1.67
Cycle Track / Multi-Use Path	0.83	1.17	0.83

- = Average LTS 1 - 1.99
- = Average LTS 2 - 2.99
- = Average LTS 3 - 3.99
- = Average LTS 4

Signage & Striping Recommendations



Costs

Pedestrian Facility Improvements Cost
\$290,000

Bicycle Facility Improvements Cost
\$20,000

*Does not include roadway surface maintenance costs

Existing Streets





Sidewalk Evaluations

Industrial Park Dr. / Industrial Park Ave. was evaluated as a possible alternative pedestrian route to Mariposa Rd, which currently lacks sidewalk and is a truck route with higher speeds. Currently, there is little sidewalk along the corridor, except for a short segment of sidewalk near where Industrial Park Dr. and Industrial Park Ave. intersect and extending south from Mariposa Rd. along the restaurant property (Figure 6-3).

The land use along the street is mostly industrial, with warehouse or light manufacturing structures built along it. The street is heavily traveled by tractor-trailers and the geometry of the road and access points appears to be designed to accommodate the movement and storage of such vehicles. Most notably, the roadway is close to 40 feet in width, many properties have “ocean style” driveways, where essentially the entire street frontage of the property is a driveway, allowing vehicles to exit the street at any point, which may reduce pedestrian comfort and safety. Addition of sidewalk along the streets would be a significant improvement to pedestrian; however, sidewalks would need to be designed carefully and with input from adjacent property owners in order to avoid impeding access to businesses.

Figure 6-3 | Walking Conditions along Industrial Park Ave

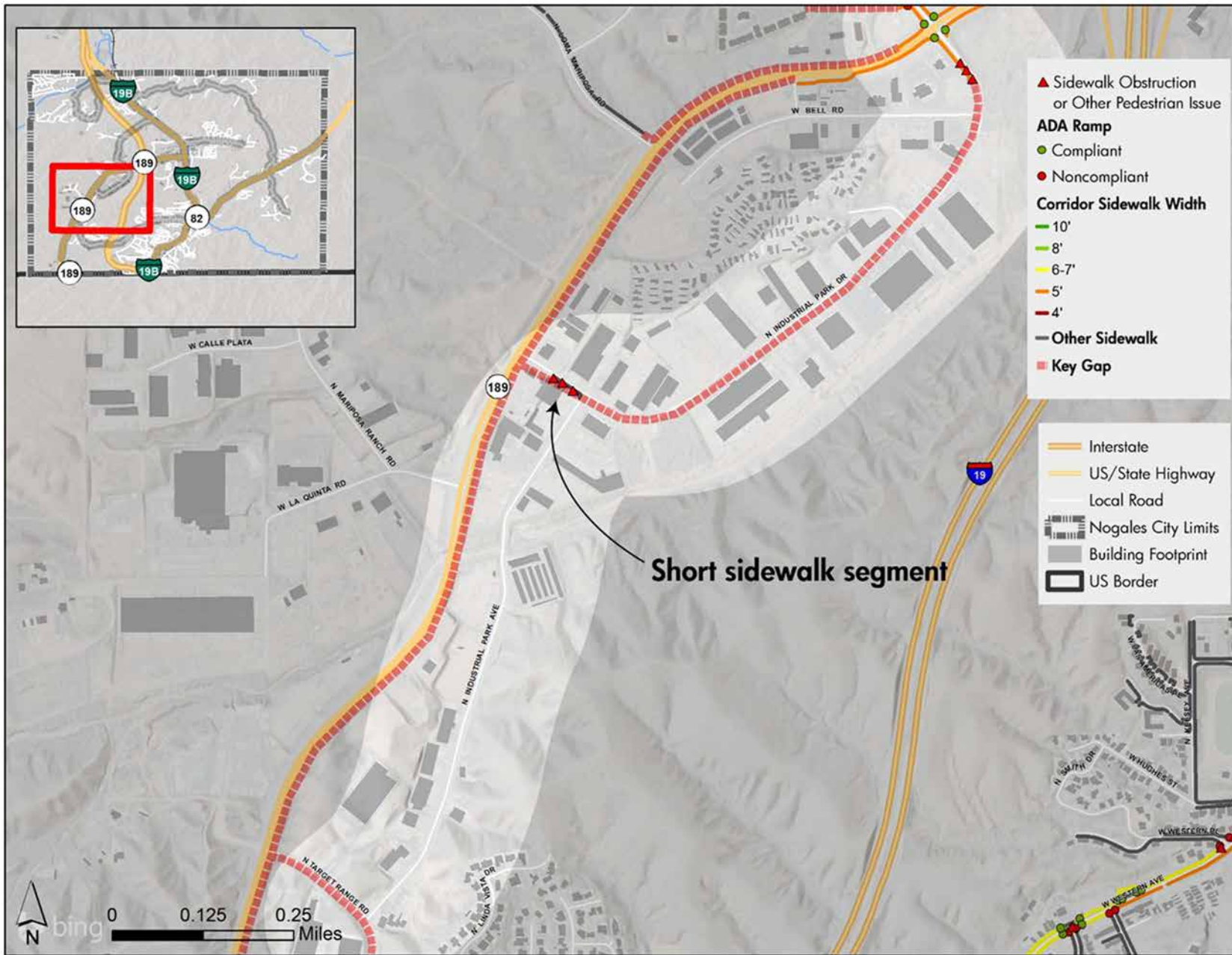


6

Network Recommendations



Figure 6-4 | Industrial Park Drive Sidewalk Recommendation



6

Network Recommendations



About half of Frank Reed Rd’s 1.4-mile length has sidewalk, extending from Mariposa Rd in the south to Mariposa Hills Dr. The sidewalk is generally 5 feet wide, and all of it is attached sidewalk (Figure 6-6). Newer curb ramps on Mariposa Rd are ADA compliant, but roughly a dozen others along Frank Reed are not, as they lack traction pads. Between Mariposa Rd and Mariposa Ranch Rd, there is sidewalk on both sides of the street; then to the north, sidewalk is located only on the south or east side of the street. The sidewalk that exists is generally in good condition and links to important pedestrian destinations, including Nogales High School and retail and dining establishments near the intersection with Mariposa Rd.

Key gaps for pedestrians also exist along the corridor. Sidewalk does not extend to several housing developments, including apartment complexes on Paul Bond Dr and Mariposa Ranch Rd and the subdivision along Placita H. Rivas. These gaps are especially notable because they limit safe travel by foot to the nearby high school.

Several potential pedestrian hazards were noted just south of Mariposa Rd, at what is currently a set of wide driveways allowing truck access to the restaurant parking lot (Figure 6-5). Two driveways (entry and exit) measure approximately 80 feet wide each. Sidewalk leads to and from these driveways, meaning pedestrians are intended to cross the driveways. Currently, there are no crosswalks or “traffic calming” devices in use to alert drivers to the potential presence of a pedestrian or to mitigate erratic entering/exiting of the driveways by motorists, not limited to drivers of tractor trailers.

Figure 6-5 | Walking Conditions along Frank Reed Road



a) Most sidewalk along Frank Reed Rd is 5 feet wide and attached, and is in good condition



b) Several residential developments along Frank Reed Rd do not have sidewalk connections, such as this one on Placita H. Rivas



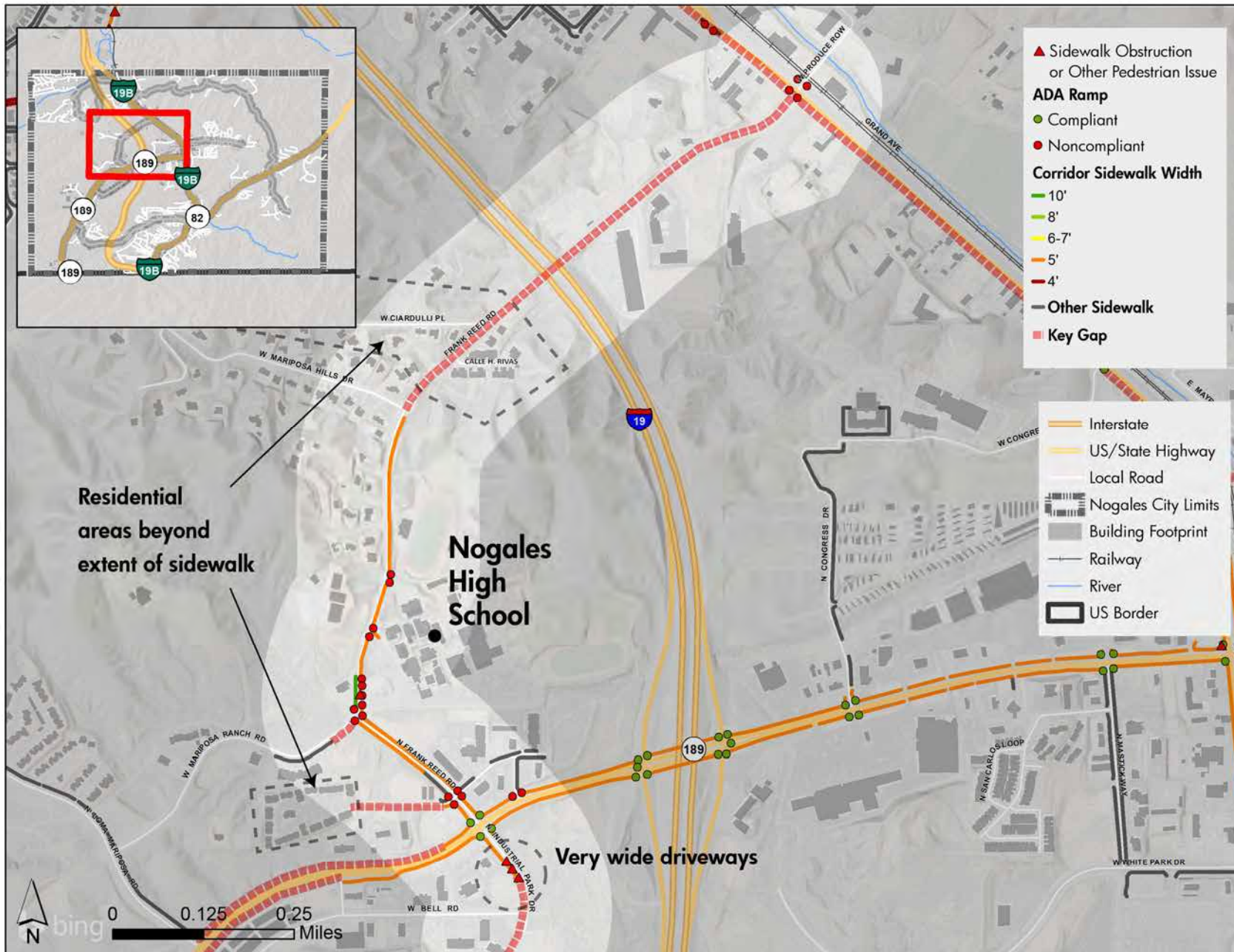
c) Several residential developments along Frank Reed Rd do not have sidewalk connections, such as this one on Placita H. Rivas

6

Network Recommendations



Figure 6-6 | Frank Reed Road Sidewalk Recommendation





6.2 | Target Range Road/ Western Avenue

This corridor comprises of W Target Range Rd. on the west side of Interstate 19 and N Western Ave. on the east side of I-19. This serves as the only east/west connection between the interstate within the southern half of Nogales. The west side of the highway is primarily residential, with the exception of Minim Library and Holy Cross Hospital.

Existing Sections

There are three different roadway sections for this corridor, although very similar in providing two travel lanes for vehicles, a center turn lane with curb and gutter and a sidewalk on the north side of the street. Portions of Section B, have the center turn lane removed, and only provided for certain locations and a sidewalk is not provided within Section A. Details of these existing sections can be found on Figure 6-7.

Bicycle LTS Evaluation

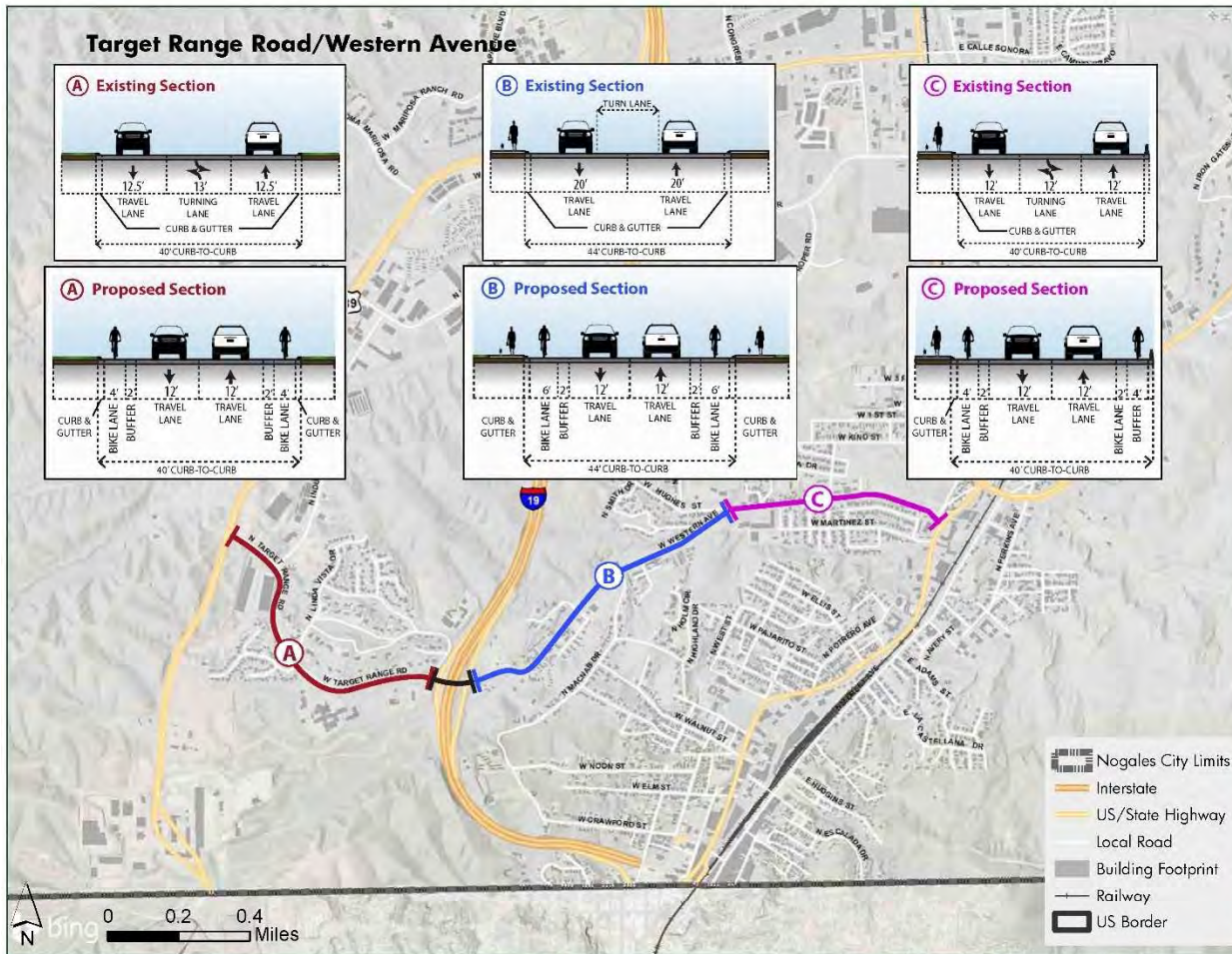
As part of the recommendation for new bicycle facilities on a roadway, there are many factors that play a role in the safety and perceived level of stress. The LTS evaluation shown in Figure 6-7 illustrates the unique conditions of this roadway and the correlation to different types of bicycle facilities. As a roadway becomes more heavily traveled, with higher speeds and more lanes, it becomes less comfortable for bicycles. Given this corridor's classification of a Minor Arterial, the project team are recommending a buffered bike lane provide a comfortable separation between cyclists from vehicles. This treatment provides an LTS between 2 and 2.3 for the different conditions.

Proposed Sections

This corridor has a limited number of cross streets and is lacking a gridded network due to undeveloped areas to the north and south. This produces a low number of turning movements and very little stacking within the center turn lane. For these reasons, the project team are recommending to remove the center turn lane and maintaining two 12-foot travel lanes for vehicles. The reallocated space will allow for buffered bike lanes on both sides of the street, with dimensions varying slightly as the curb-to-curb dimensions change. There are two areas that would benefit from a center turn lane. One being along W Target Range Rd at the hospital, and the other along N Target Range Rd at the intersection of N Mariposa Rd and nearby warehouse/industrial district for the truck traffic. Details of these sections can be seen in Figure 6-7. With a speed limit of 25 mph and lower average daily traffic, the existing conditions can be handled with a two-lane section. Nearby connections such as the library and hospital are key destination points that need to be served by all modes of transportation.



Figure 6-7 | Target Range Road/Western Avenue Recommendation



Level of Traffic Stress (LTS)

Target Range Rd/ Western Ave			
Facility Types	Score by Segment		
	A	B	C
No facility	3.33	3.00	3.00
Bike boulevard	2.50	3.00	3.00
Share the Road	2.50	3.00	3.00
Share the Road - Paved Shoulder	2.17	2.67	2.67
Bike Lane	2.17	2.67	2.50
Buffered Bike Lane	2.00	2.33	2.33
Cycle Track / Multi-Use Path	1.33	1.33	1.17

- Green = Average LTS 1 - 1.99
- Yellow = Average LTS 2 - 2.99
- Orange = Average LTS 3 - 3.99
- Red = Average LTS 4

Signage & Striping Recommendations



Costs

Pedestrian Facility Improvements Cost
\$80,000

Bicycle Facility Improvements Cost
\$90,000

*Does not include roadway surface maintenance costs

Existing Streets





Sidewalk Evaluations

Most of Target Range Rd and Western Ave has sidewalks. There is sidewalk on at least one side of the road to the east of approximately Linda Vista Dr and Camino de la Paloma all the way to the end of Western Ave at Grand Ave. Sidewalk is on both sides of the road from Carondelet Dr (one block west of I-19) to where Western Ave intersects with Hughes St. The sidewalk is generally at least 5 feet wide. Near and under the I-19 overpass, the sidewalk narrows to 4', but some sidewalk to the east of I-19 is as wide as 6' or 7'. Sidewalks are generally in good condition. A significant share of the curb ramps in the corridor appear to have updated to ADA standards, but more than half are still noncompliant.

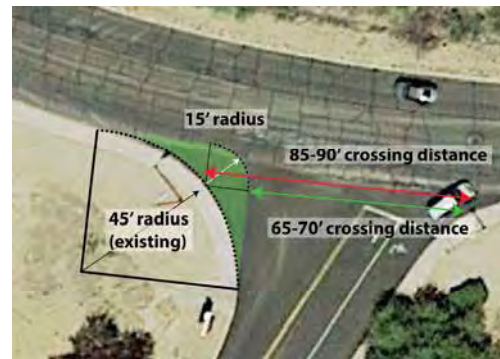
Several pedestrian issue “hotspots” exist along the corridor. Near where the sidewalk begins to the west, mailboxes placed in the sidewalk reduce the clear path to less than 36”, too narrow to let a wheelchair through (Figure 6-8-a). Meanwhile, the driveway entrance to Holy Cross Hospital presents a potential hazard to pedestrians (Figure 6-8-b). The western edge has a very long curb radius. According to the National Association of City Transportation Officials (NACTO), an ideal curb radius in an urban setting is 15 feet. This radius forces vehicles to slow and turn carefully. The radius at the hospital driveway is approximately 45 feet. This likely permits comfortable turning by vehicles into the driveway, which intersects with Target Range road at an angle. The large radius, however, increases the crossing distance for pedestrians and exposes to turning vehicles that might be turning at a high rate of speed. A similar issue is present at Western Ave and Western Place (see Figure 6-9 and Figure 6-10).

A significant ADA obstruction exists just east of I-19 on the north side of Western Avenue. A short bridge traverses a drainage channel for the Ephraim Canyon Wash. The sidewalk on the bridge steps up abruptly by 6-8 inches, making the bridge impassable for a wheelchair or hazardous to cross for other sidewalk users (Figure 6-8-c). There is not continuous sidewalk on the south side of the street that could act as an alternative route.

Figure 6-8 | Walking Conditions along Target Range Rd / Western Ave



a) Mailboxes may obstruct the sidewalk towards the western end of Target Range Rd.



b) An existing wide curb radius at the hospital entrance creates a long crossing distance for pedestrians, exposing them to turning traffic for longer



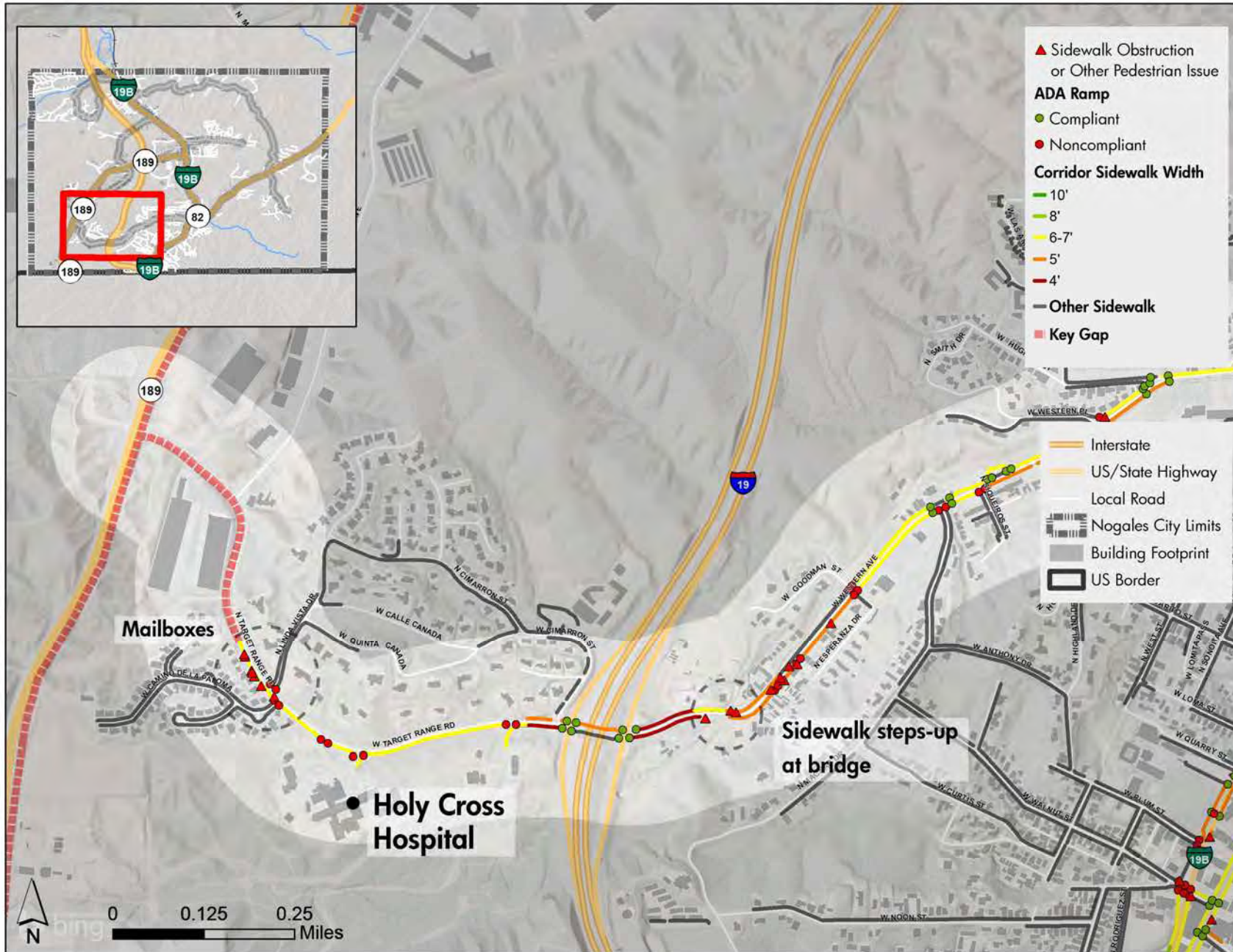
c) The sidewalk steps up on the bridge across the Ephraim Canyon Wash on Western Ave

6

Network Recommendations



Figure 6-9 | Target Range Road/ Western Avenue Sidewalk Recommendation 1

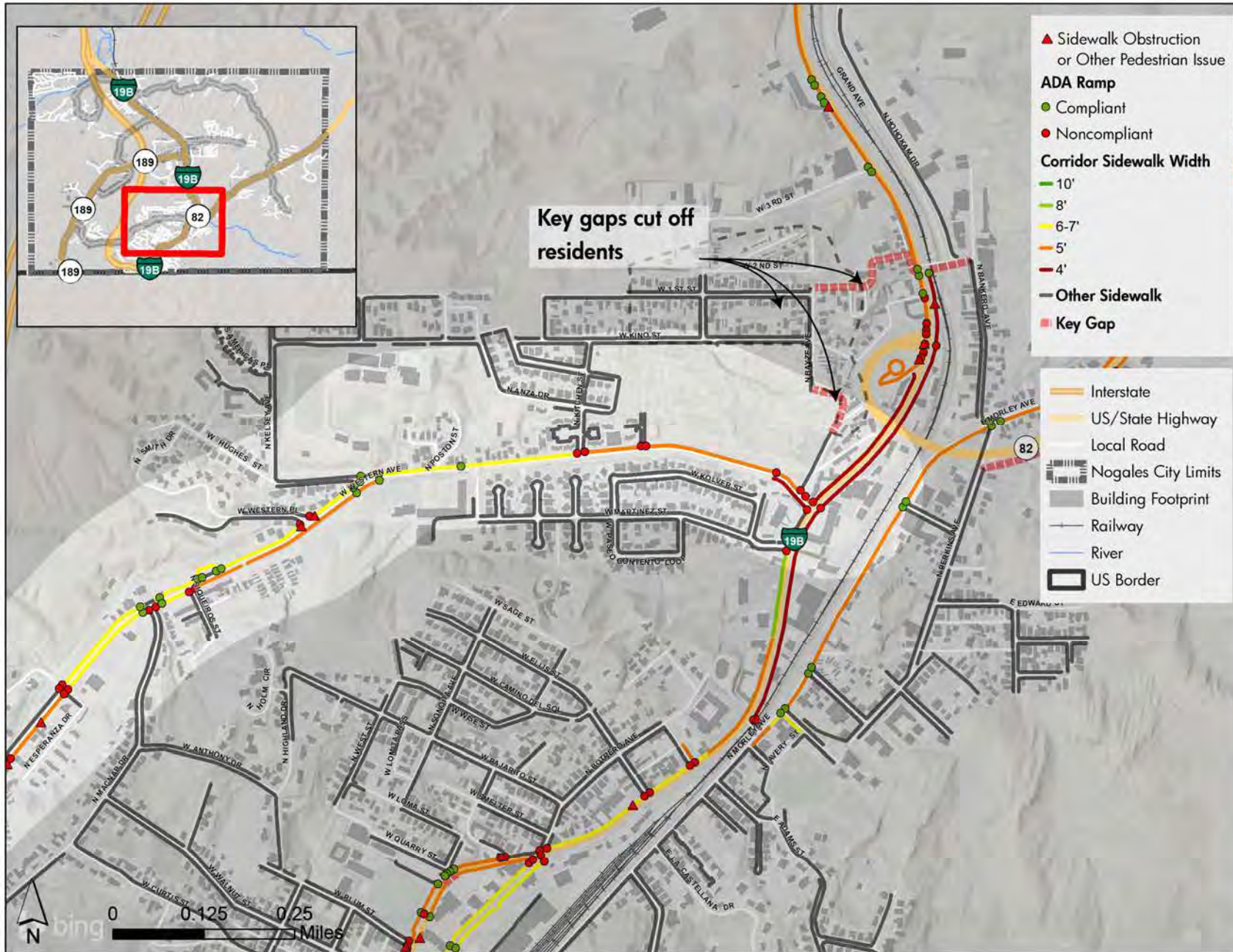


6

Network Recommendations



Figure 6-10 | Target Range Road/ Western Avenue Sidewalk Recommendation 2





6.3 | Mariposa Road

This corridor serves as the major east-west artery for The City of Nogales. With direct access to Interstate 19 via an interchange, the majority of Nogales's commercial and industrial land use is located along this corridor. West of the interstate is a large industrial park, creating a high rate of truck traffic in the area. These factors present a challenge in creating a safe and adequate bicycle network, but also serve as a strong backbone for needing to provide access for all modes of transportation.

Existing Sections

There are three different roadway sections for this corridor, although very similar in providing four travel lanes with a center turn lane. Portions of Section C have a right-turn lane along the north side of the street. Section A does not have curb and gutter, but utilizes a paved shoulder instead. All travel lanes are roughly 12-13-feet wide with a 13-14-foot center turn lane. Details of these existing sections can be found on Figure 6-11.

Bicycle LTS Evaluation

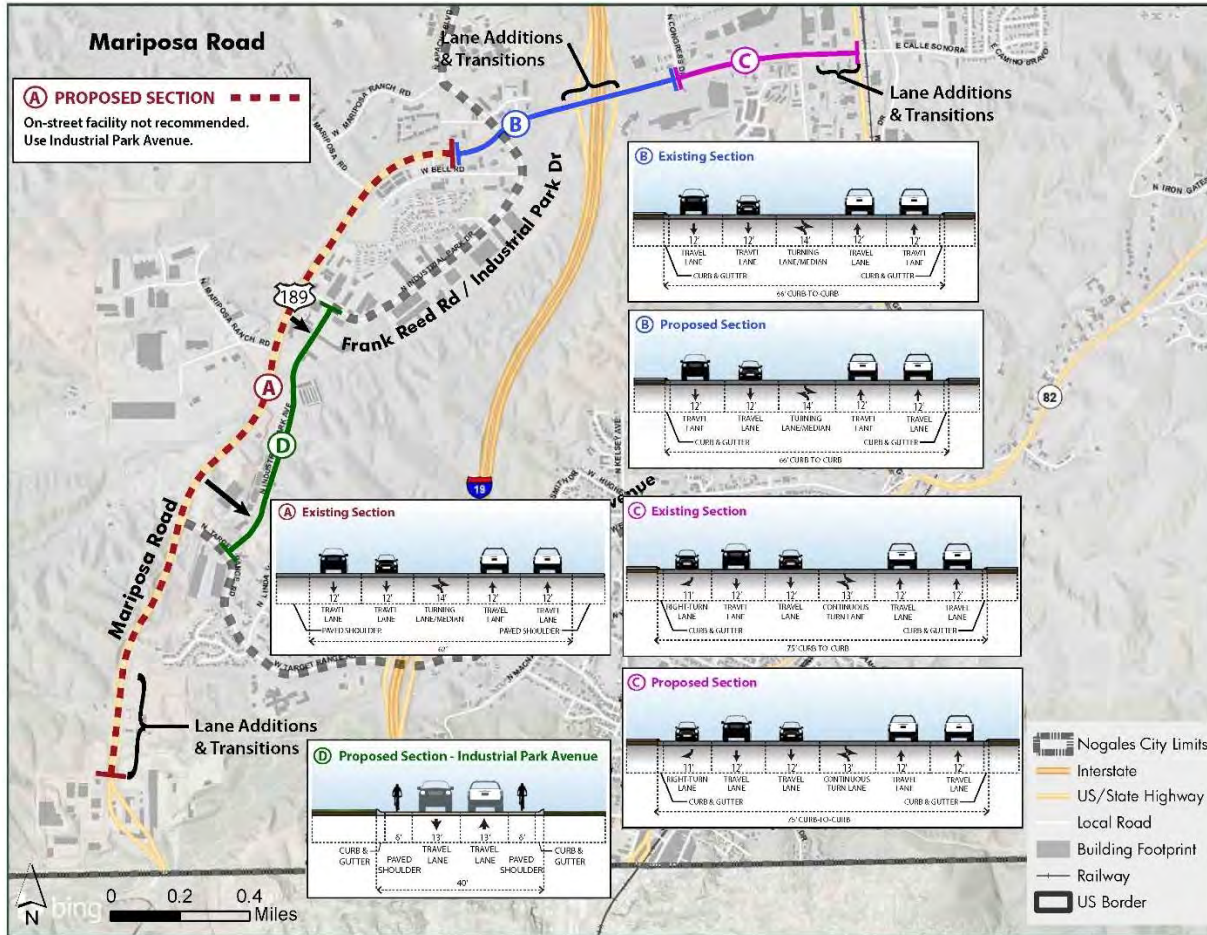
As part of the recommendation for new bicycle facilities on a roadway, there are many factors that play a role in the safety and perceived level of stress. The LTS evaluation shown in Figure 6-11 illustrates the unique conditions of this roadway and the correlation to different types of bicycle facilities. As a roadway becomes more heavily traveled, with higher speeds and more lanes, it becomes less comfortable for bicycles. Given this corridor's classification of a Major Arterial, higher volumes and higher speeds, the project team are recommending paved shoulders as an option for cyclists, and a more safe paralleled route along the lesser traveled N Industrial Park Drive. In order to achieve a safe and comfort LTS, a buffered bike lane or off-street path would be needed, which is difficult to achieve with the number of access points and pavement width constraints.

Proposed Sections

Upon evaluation of this corridor's roadway characteristics and existing conditions, it became apparent that an off-network grid could more safely serve the area. For the southwest and northwest areas of this corridor, few destinations exist actually along the roadway, and more trip-ends are available along the nearby side streets. These side streets have great calm streets characteristics such as slower speeds, lower traffic volumes, less truck traffic and a lesser need or multiple lanes for vehicles. It is recommended to maintain all travel lanes, while only replacing the center turn lane, and reallocating that area for five to eight-foot paved shoulders for cyclists to access, should they choose. In lieu of a facility directly on the southwest portion of Mariposa Road, a six-foot paved shoulder along N Industrial Park Ave would serve as an 'outer road' connection for cyclists. Similarly, Congress Drive was added to provide safe and adequate access in lieu of a direct connection along the northeast portion of Mariposa Road, which can be found in Chapter 6.12. This also serves as a critical connection between the retail corridor and the residential area to the north. Details of these sections, as well as the extents of Section D can be found in Figure 6-11.



Figure 6-11 | Mariposa Road Existing Sections Recommendation



Level of Traffic Stress (LTS)

Facility Types	Score by Segment		
	A	B	C
No facility	3.33	3.33	3.00
Bike boulevard	3.50	3.50	3.00
Share the Road - Paved Shoulder	2.67	2.83	2.67
Bike Lane	2.50	2.83	2.67
Buffered Bike Lane	2.17	2.33	2.33
Cycle Track / Multi-Use Path	1.17	1.50	1.33

- = Average LTS 1 - 1.99
- = Average LTS 2 - 2.99
- = Average LTS 3 - 3.99
- = Average LTS 4

Signage & Striping Recommendations



Costs

Pedestrian Facility Improvements Cost
\$410,000

Bicycle Facility Improvements Cost
\$10,000

*Does not include roadway surface maintenance costs

Existing Streets





Sidewalk Recommendations

A significant portion of Mariposa Rd does not currently have sidewalk. This is the portion between the Mariposa border crossing to west of Frank Reed Rd. While this segment is part of a key corridor, it is also largely undeveloped at this time. Furthermore, due to the high speed limit and high volume of truck traffic traveling to and from the border crossing, Industrial Park Drive is proposed as a future pedestrian corridor instead of Mariposa, until more development on this stretch of Mariposa warrants pedestrian infrastructure.

All sidewalk that exists along Mariposa Rd are in good condition (Figure 6-12-a). All but two curb ramps are ADA compliant.

Sidewalk begins on the corridor on block west of Frank Reed Rd/Industrial Park. For about a half-block, the sidewalk, located on the south side of Mariposa Rd, is set back 20-30 feet from the road (Figure 6-12-b). While the separation from moving vehicles may improve pedestrian comfort and safety, vegetation present during the rainy season also completely hides the path from view, which may present a personal safety issue or perception of one. At about the halfway point of this block, the sidewalk shifts towards the road and becomes an attached sidewalk. At this point, attached sidewalk also begins on the north side of Mariposa Rd.

From this location west of Frank Reed Rd/Industrial Park Dr, 5-foot sidewalk exists on both sides of the street to the east, all the way to the end of Mariposa Rd at Grand Ave (See Figure 3-19, Figure 3-20, and Figure 3-21). Note: The road becomes Calle Sonora to the east of Grand Ave – sidewalk does continue on Calle Sonora.

Figure 6-12 | Walking Conditions along Mariposa Rd



a) The sidewalk along Mariposa is in good condition



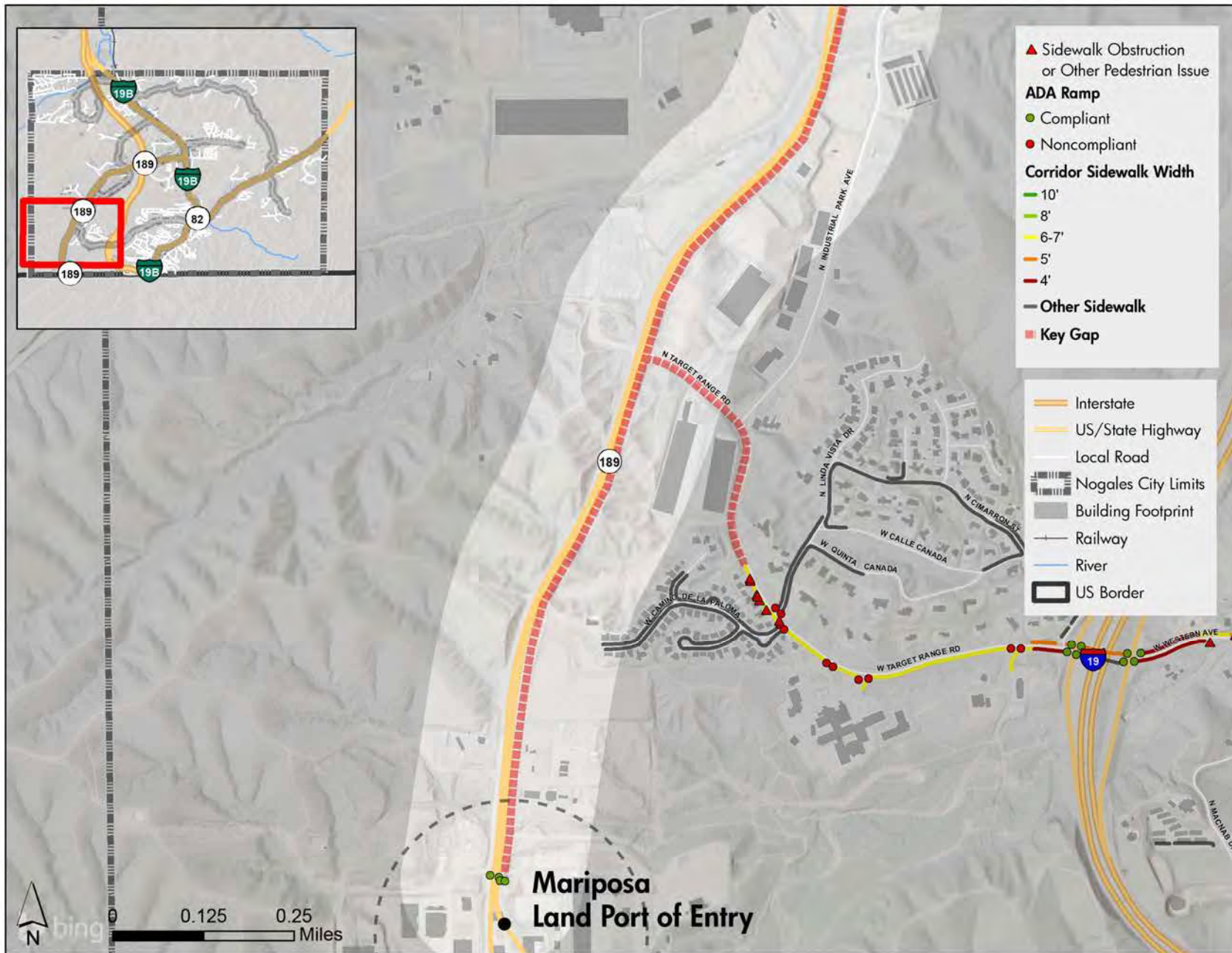
b) A segment of sidewalk west of Frank Reed Rd shifts away from Mariposa Rd and is hidden from view at times, presenting a possible personal safety hazard

6

Network Recommendations



Figure 6-13 | Mariposa Road Sidewalk Recommendation 1

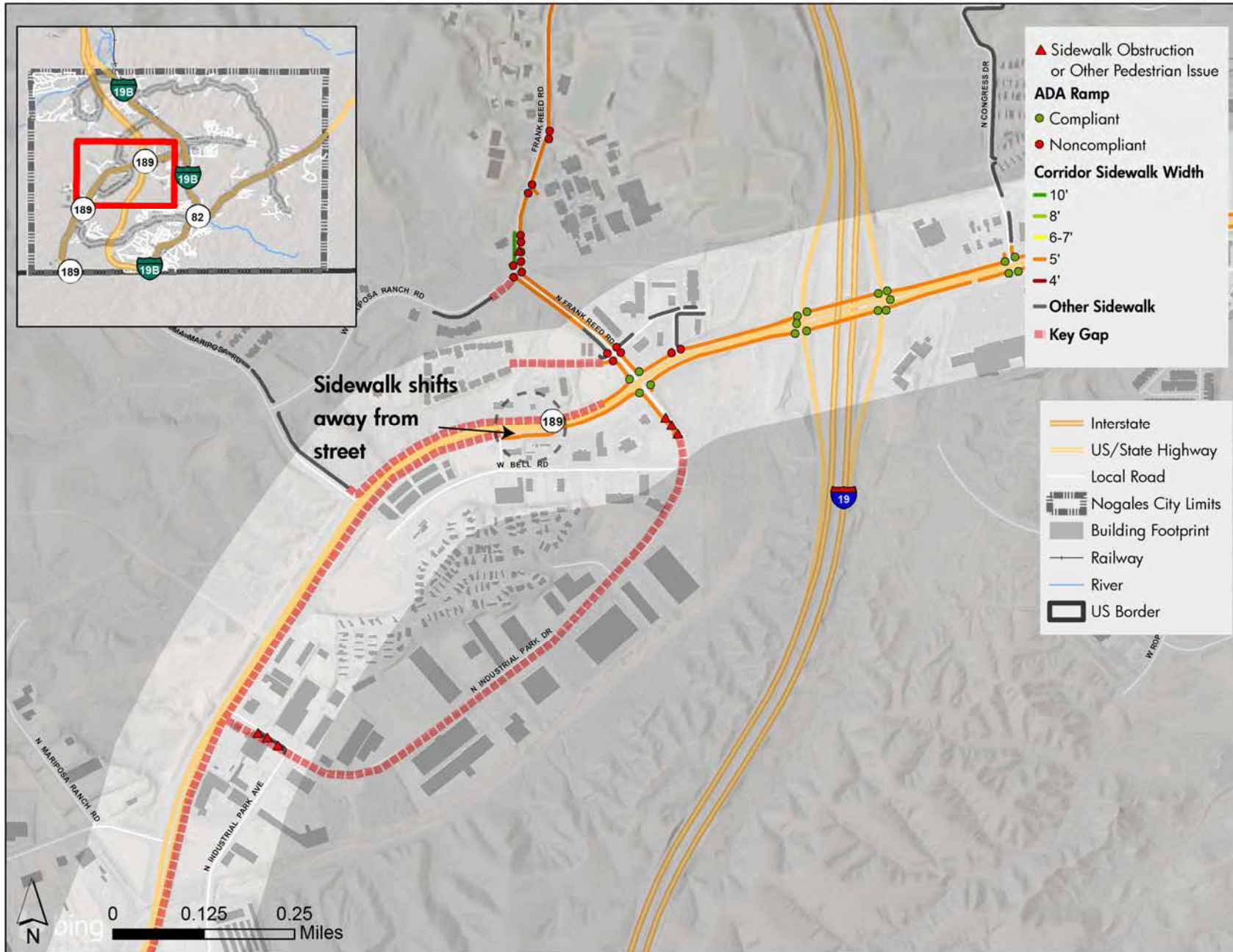


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Network Recommendations



Figure 6-14 | Mariposa Road Sidewalk Recommendation 2

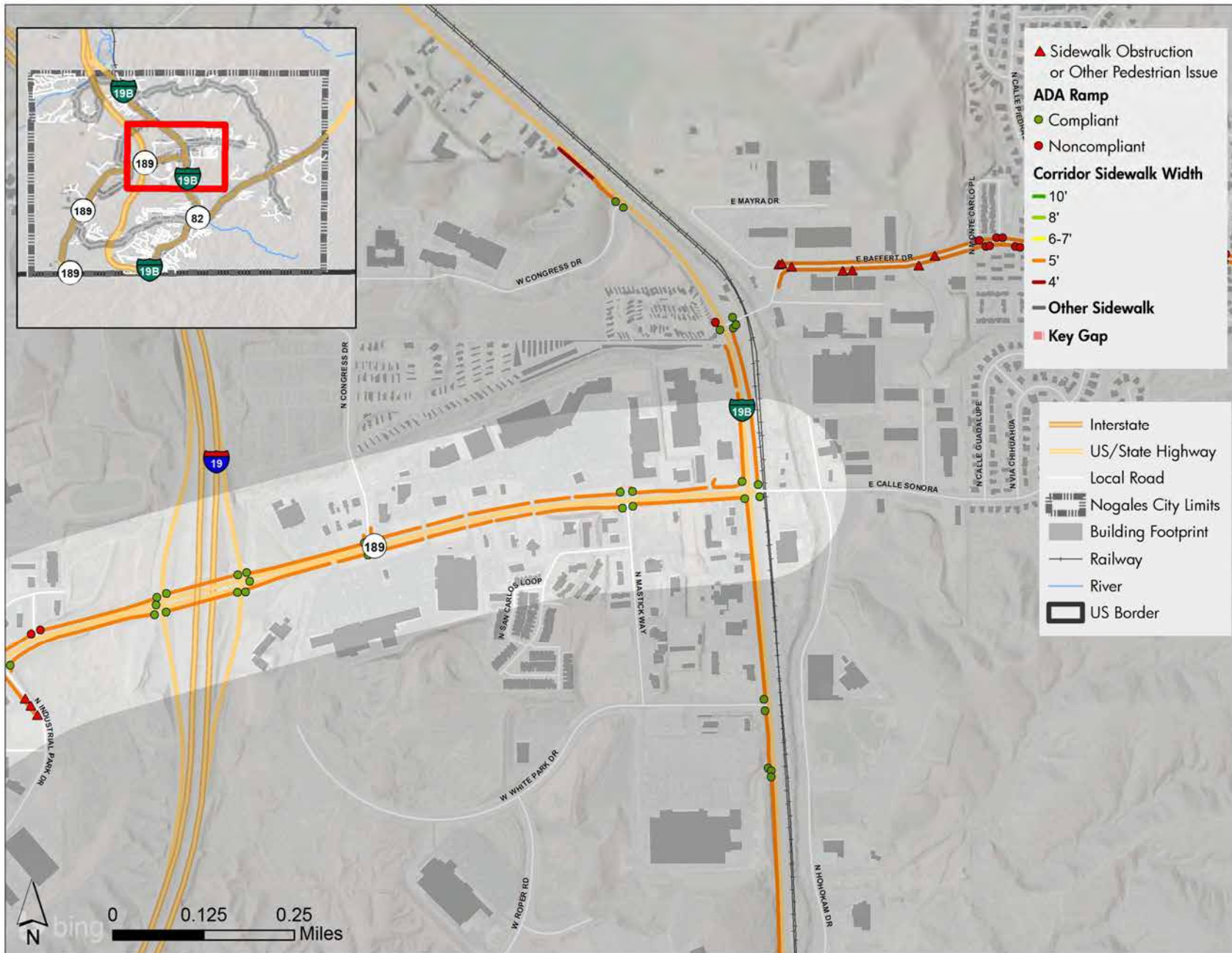


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Network Recommendations



Figure 6-15 | Mariposa Road Sidewalk Recommendation 3





6.4 | Grand Avenue (North)

This portion of Grand Ave. is a heavily trafficked corridor within the City of Nogales. With the railroad and creek paralleling it to the east, most traffic in the nearby vicinity ends up being funneled through Grand Avenue. A large amount of Nogales's commercial and retail land use is located along this corridor.

Existing Sections

Generally, this corridor is a five-lane section with two travel lanes in each direction and a center turn lane with curb and gutter. The northern portion, Section B, has a center median with a four-foot shoulder buffering it from the through lanes. The median allows some left turns into access points that serve larger areas, but the median has a fairly continuous curb-line. Section A, the southern portions, utilizes 11-foot inside travel lanes and 14-foot outside travel lanes with a 14-foot center turn lane. Details of these existing sections can be found on Figure 6-16.

Bicycle LTS Evaluation

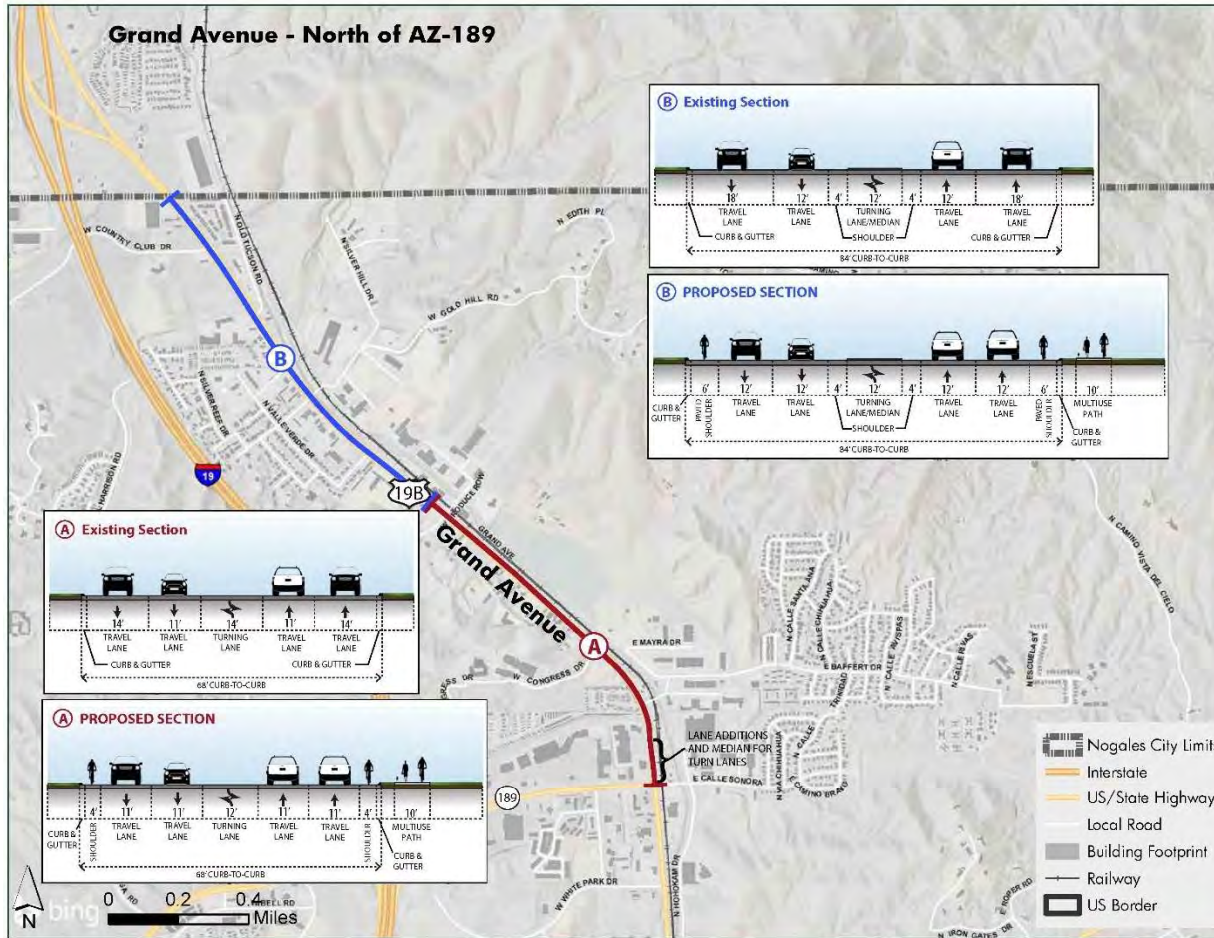
As part of the recommendation for new bicycle facilities on a roadway, there are many factors that play a role in the safety and perceived level of stress. The LTS evaluation shown in Figure 6-16 illustrates the unique conditions of this roadway and the correlation to different types of bicycle facilities. Given this corridor's classification of a Major Arterial, higher volumes and higher speeds, the project team are recommending paved shoulders as an option for cyclists and an off-street multi-use path in the event construction becomes an option.

Proposed Sections

Due to the high traffic volumes, speeds and truck traffic, it is recommended to maintain all travel lanes. Since the lane widths are wider than needed, the project team would recommend reallocating that area for a four to six-foot paved shoulders for cyclists to access the corridor, and provide a 10-foot off-street multi-use path as a more safe option. Details of these sections, as well as the extents of Section D can be found in Figure 6-16.



Figure 6-16 | Grand Avenue (North of Mariposa Rd / AZ-189) Recommendation

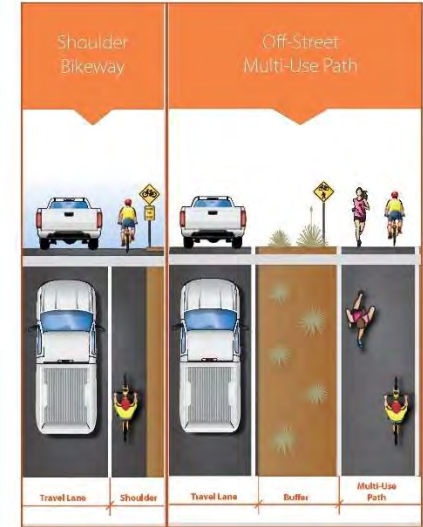


Level of Traffic Stress (LTS)

Grand Ave - North		
Facility Types	LTS Score	
	A	B
No facility	3.33	3.33
Bike boulevard	3.50	3.50
Share the Road	3.33	3.33
Share the Road - Paved Shoulder	2.67	2.67
Bike Lane	2.50	2.50
Buffered Bike Lane	2.17	2.17
Cycle Track / Multi-Use Path	1.17	1.17

- = Average LTS 1 - 1.99
- = Average LTS 2 - 2.99
- = Average LTS 3 - 3.99
- = Average LTS 4

Signage & Striping Recommendations



Costs

Pedestrian Facility Improvements Cost
\$310,000

Bicycle Facility Improvements Cost
\$600,000

*Does not include roadway surface maintenance costs

Existing Streets





Sidewalk Recommendations

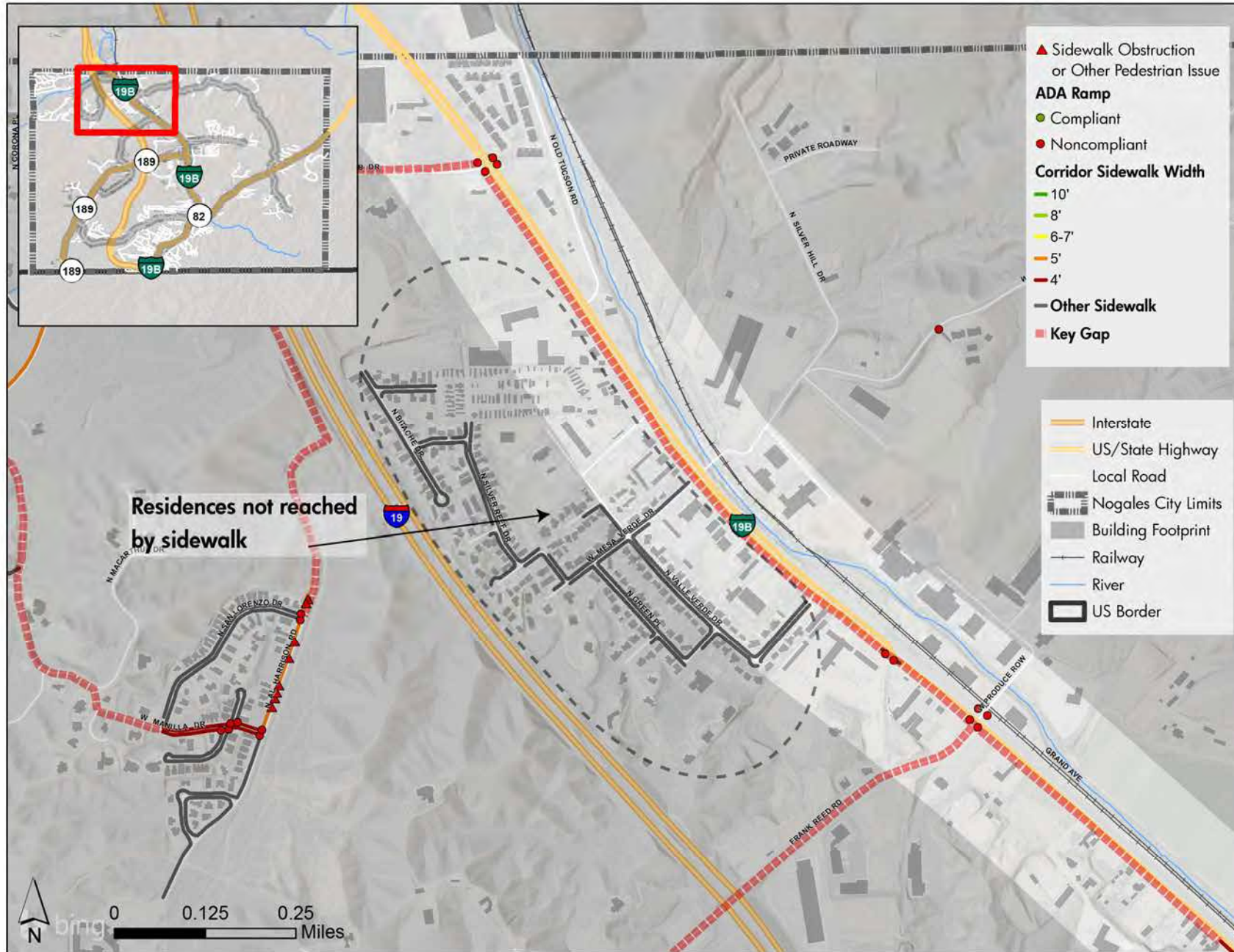
North of Mariposa Rd, Grand Ave mostly lacks sidewalk on either side of the street (Figure 6-17 and Figure 6-18). Sidewalk does exist between Mariposa Rd and Baffert Dr, on both sides. This sidewalk is 5 feet wide and in good condition.

There is also a short, unconnected segment on the west side of Grand Ave, extending about 560 feet from Congress Dr before ending mid-block. The southern half of this sidewalk appears very new and is in good condition; meanwhile, the northern half is a little older and is in fair condition due to some overgrowth of grass and weeds.

The lack of sidewalk means there is no pedestrian connection to the rest of the city for residents of the subdivision north of Frank Reed Rd, or for residents living in the developments accessed via Country Club Rd.



Figure 6-17 | Grand Avenue (North of Mariposa Rd / AZ-189) Sidewalk Recommendation 1

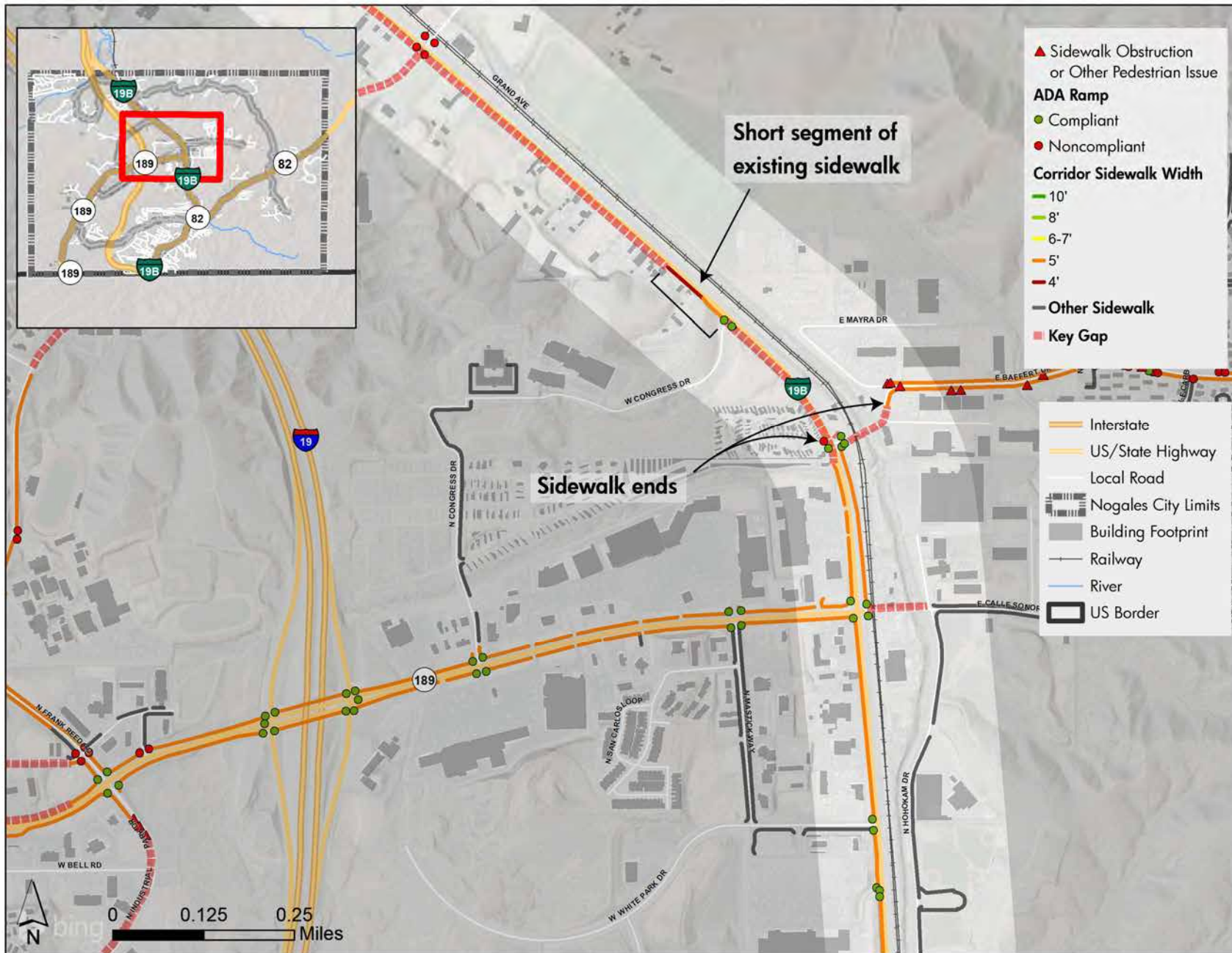


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Network Recommendations



Figure 6-18 | Grand Avenue (North of Mariposa Rd / AZ-189) Sidewalk Recommendation 2





6.5 | Grand Avenue South / Morley Bankerd Hohokam

This portion of Grand Ave. is a heavily trafficked corridor in The City of Nogales. The northern half of this corridor has the railroad and creek paralleling it to the east, causing most traffic in the vicinity to be funneled through Grand Avenue. A large amount of Nogales's commercial and retail land use is located along this corridor. The southern half of this corridor is the most densely populated area with the most gridded surrounding street network. The southernmost point of this corridor terminates at the U.S. - Mexico border. The southernmost half-mile of the corridor splits NB and SB traffic with a center median and on-street parking is provided as well, making bicycle facilities more challenging.

Existing Sections

Generally, this corridor has a five-lane section with two travel lanes in each direction and a center turn lane with curb and gutter. The northern portion, Section A, has a center median with a four-foot shoulder buffering it from the through lanes. The median allows some left turns into access points that serve larger areas, but the median has a fairly continuous curb-line. Section A, the southern portions, utilizes 11-foot inside travel lanes and 14-foot outside travel lanes with a 14-foot center turn lane. Details of these existing sections can be found on Figure 6-19.

Bicycle LTS Evaluation

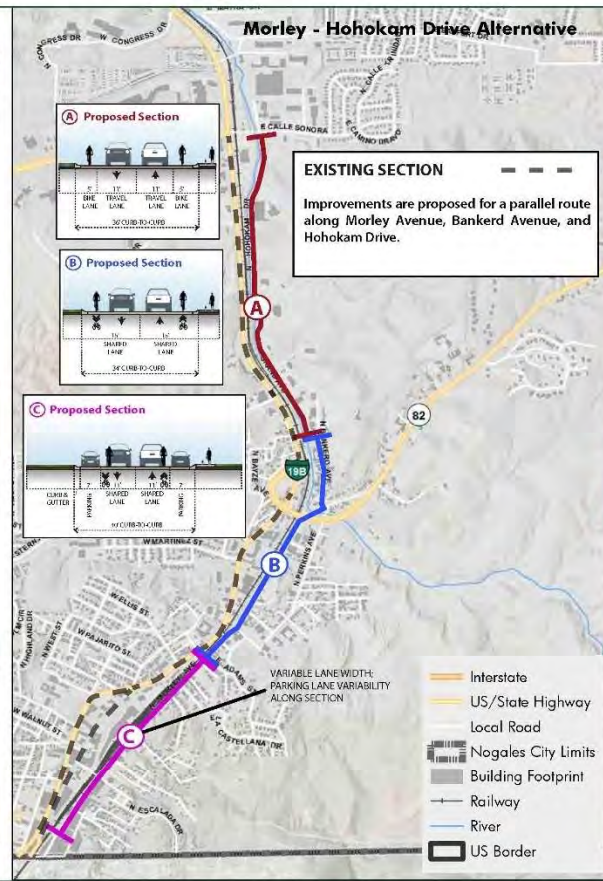
As part of the recommendation for new bicycle facilities on a roadway, there are many factors that play a role in the safety and perceived level of stress. The LTS evaluation shown in Figure 6-19 illustrates the unique conditions of this roadway and the correlation to different types of bicycle facilities. Given this corridor's classification of a Major Arterial, higher volumes and higher speeds, the project team are recommending that a bicycle facility would be safer and more widely utilized if on a nearby parallel set of roadways to the east. This recommended network has all of the characteristics of a safe and calm street that would be a more safe and enjoyable route for all cycling abilities.

Proposed Section

Due to the high traffic volumes, speeds and truck traffic, it is recommended to maintain all travel lanes and existing conditions along Grand Avenue. Since this corridor is paralleled by Morley Ave, Bankerd Ave and Hohokam Dr, with much less ADT and lower speeds and providing similar access to the area, the project team would recommend relocating the bicycle network along this corridor as a safer and more enjoyable route. This route has also been previously identified by the City as a viable option for a bicycle facility. All three of these roadways utilize two-lanes of vehicular traffic. The two northernmost roadways, Sections A and B, have wide enough travel lanes to allow the reallocation for a bike lane and share-the-road facility. Section C, furthest south, has on-street parking and only enough lane-width to allow for a share-the-road configuration. Details of these sections, as well as the extents of the sections can be found in Figure 6-19.



Figure 6-19 | Grand Avenue (South of Mariposa Rd / AZ-189) Recommendation



Level of Traffic Stress (LTS)

Grand Ave - South

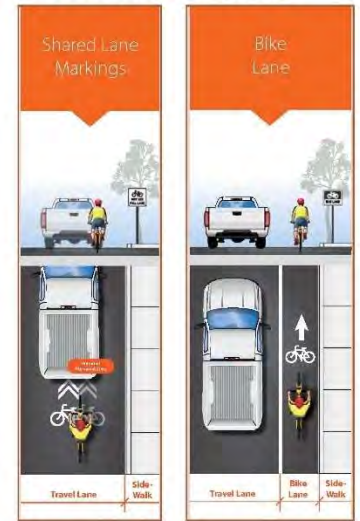
Facility Types	Score by Segment		
	A	B	C
No facility	3.33	3.33	3.33
Bike boulevard	3.50	3.50	3.17
Share the Road	3.33	3.33	3.33
Share the Road - Paved Shoulder	2.67	2.67	2.83
Bike Lane	2.50	2.50	2.67
Buffered Bike Lane	2.17	2.17	2.17
Cycle Track / Multi-Use Path	1.17	1.17	1.17

■ = Average LTS 1 - 1.99
■ = Average LTS 2 - 2.99
■ = Average LTS 3 - 3.99
■ = Average LTS 4

Morley - Hohokam Dr

Facility Types	Score by Segment		
	A	B	C
No facility	1.83	2.33	2.83
Bike boulevard	1.83	2.33	2.50
Share the Road	1.67	2.33	2.83
Share the Road - Paved Shoulder	1.33	2.00	2.50
Bike Lane	1.33	1.83	2.33
Buffered Bike Lane	1.17	1.83	2.00
Cycle Track / Multi-Use Path	1.00	1.17	1.17

Signage & Striping Recommendations



Costs



Existing Streets





Sidewalk Recommendations

The portion of Grand Ave located to the south of Mariposa Rd traverses the most densely populated and developed corridor in Nogales. Sidewalk exists on at least one side of the street throughout this entire segment, and the street south of Doe St (see Figure 6-20) has sidewalk on both sides.

From the pedestrian's perspective, this segment can be divided into two parts, based on the characteristics of the development and of the pedestrian environment (see Figure 6-21 and Figure 6-22). The first part is the segment of Grand Ave from Mariposa Ave to Potrero Ave, where the southbound lanes of Grand Ave become Arroyo Blvd and Grand Ave becomes one-way northbound. This portion of Grand Ave is generally characterized by strip-style commercial development in which parking is located between the sidewalk and the fronts of buildings. On-street parking is not permitted along this stretch of Grand Ave. Along with strip malls, there are several hotels, office buildings, and the City Hall complex located here.

The sidewalk through segment is generally 5 feet wide, though some is as wide as 6 feet. The large number of parking lots corresponds to a large number of driveways that cross the sidewalk, creating pedestrian-vehicle conflict points. The sidewalk is generally in fair to good condition, though some spots are experiencing buckling. Several of the curb ramps north of Doe St are ADA compliant; however, the remaining to the south until Potrero Ave are non-compliant.

The southern portion is located between Potrero Ave and the end of Grand Ave at the DeConcini Port of Entry. Here, the development includes some strip-style development, but there is a more "traditional" commercial pattern, with building frontages meeting the sidewalk and parking located either on the street or behind the building. Sidewalks here are wider, most of them 6 feet wide – with some as wide as 8 feet.

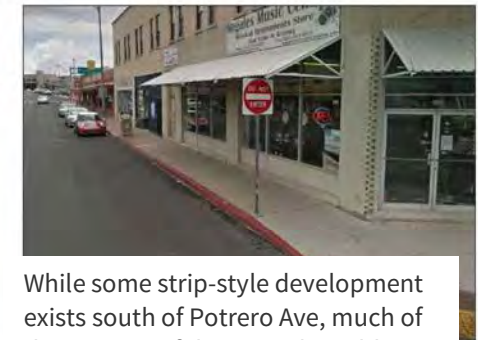
Figure 6-20 | Typical Development & Parking Patterns, Grand Ave (South)

North of Potrero Ave



The section of Grand Ave between Potrero Ave and Mariposa Rd has many strip mall-style structures, with parking in front. Many driveways (designed to allow access to the parking lots) cross the sidewalk and on-street parking is not permitted.

South of Potrero Ave



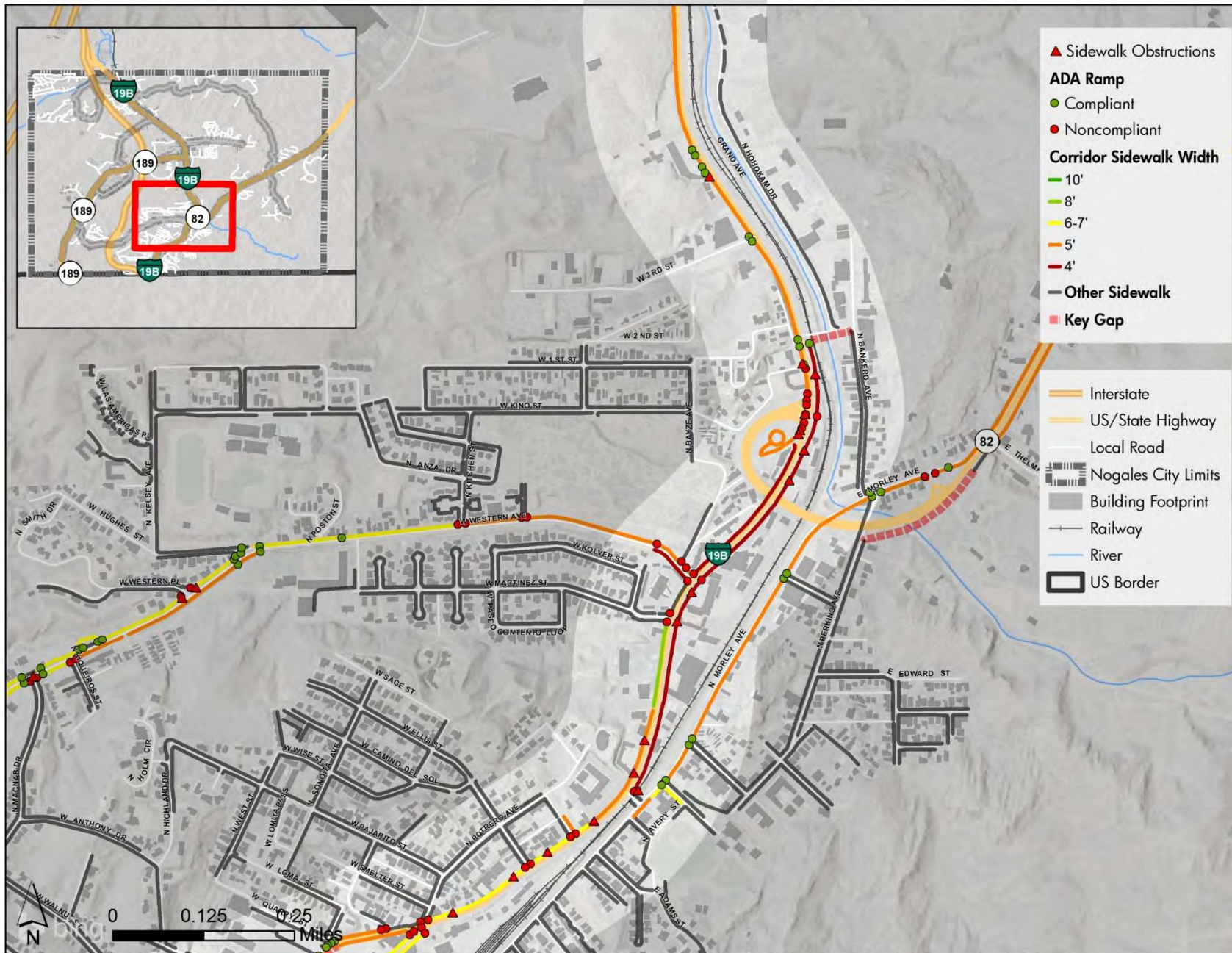
While some strip-style development exists south of Potrero Ave, much of this portion of the street has older commercial buildings that extend directly to the sidewalk. Sidewalks are generally wider, driveways are less frequent, and on-street parking is permitted. This results in an environment that is more comfortable for pedestrians and that has fewer potential conflict points.

6

Network Recommendations



Figure 6-21 | Grand Avenue South / Morley Bankerd Hohokam Sidewalk Recommendation 1

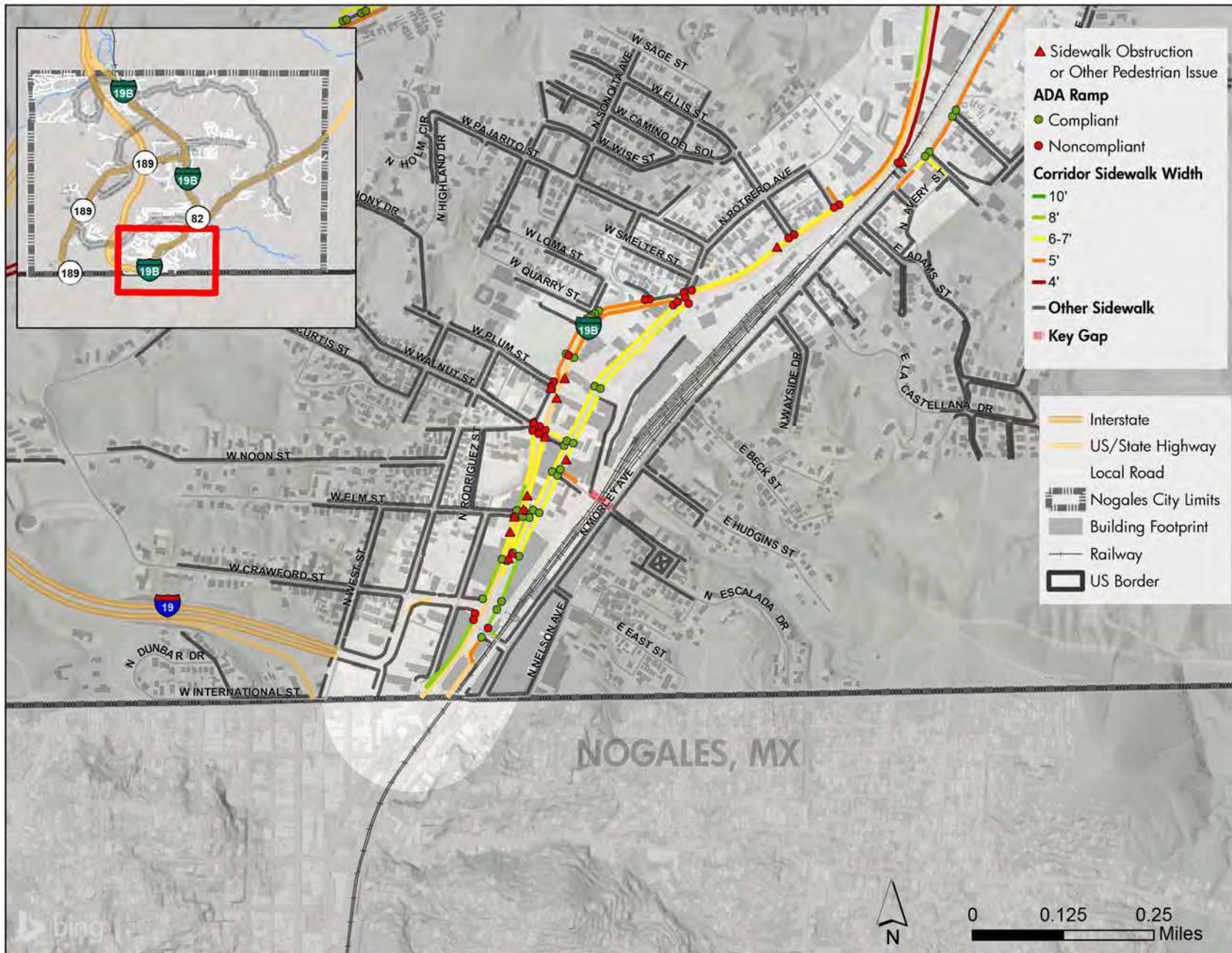


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Network Recommendations



Figure 6-22 | Grand Avenue South / Morley Bankerd Hohokam Sidewalk Recommendation 2





6.6 | Baffert Drive

Baffert Drive extends east of N. Grand Ave from a three-way signalized intersection and does not continue west. This portion of Baffert Drive serves as one of the few connections over the creek and also provides an at-grade crossing over the railroad tracks. This serves as a key connection for truck traffic associated with the nearby warehouses, many single-family homes as well as further east to the Challenger Elementary School. Because of the need to provide access for semi-trucks, the lane widths and turning radii are significantly larger in the western portion of this roadway. As E. Baffert continues to the east, it converts to narrower lane widths and standard turning radii for passenger vehicles.

Existing Sections

Currently, there are three different roadway sections along this corridor (Figure 6-23). The majority of it, Section B, is a three-lane section with 11-foot travel lanes and a 14-foot center turn lane. The western-most end is the most narrow as it is constrained by a creek and railroad crossing. With multiple wide turns for truck traffic, the lane width varies but is generally 14-feet wide in each direction with no curb and gutter. Section B consists of a three-lane roadway with curb and gutter with sidewalks on the north and south side of the street. Section C, furthest to the east and tying into the Elementary School, is a two-lane roadway 36-feet wide with only sidewalk and curb and gutter to the north.

Bicycle LTS Evaluation

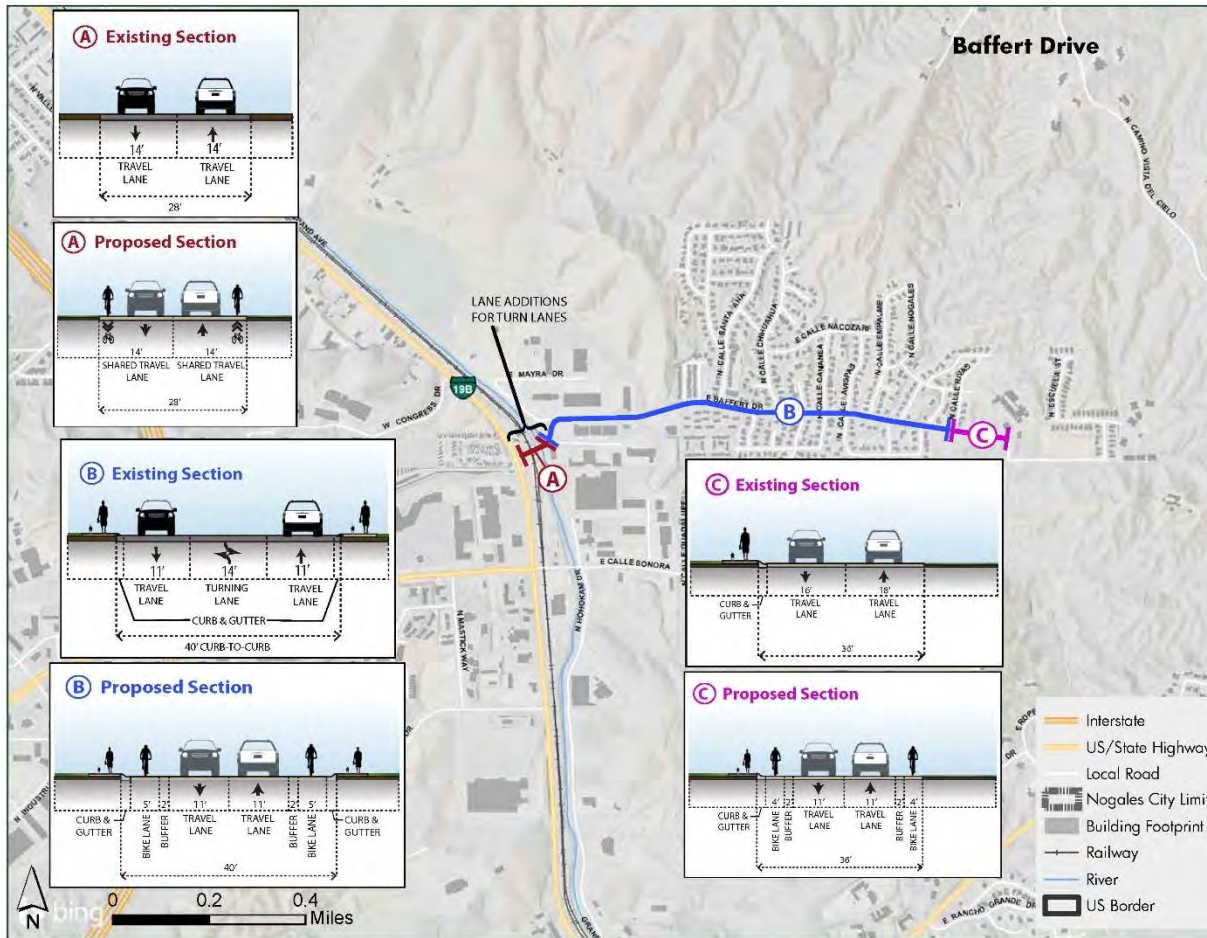
As part of the recommendation for new bicycle facilities on a roadway, there are many factors that play a role in the safety and perceived level of stress. The LTS evaluation shown in Figure 6-23 illustrates the unique conditions of this roadway including; vehicle speed, on-street parking, average daily traffic volume, number of travel lanes, whether a traffic signal is present on the corridor and the classification of the roadway, and the correlation to different type of bicycle facilities. As a roadway becomes more heavily traveled, with higher speeds and more lanes, it becomes less comfortable for bicycles. Given the street conditions found within the chart, this portion of E. Baffert could comfortably accommodate the recommended share-the-road with an LTS of 2, and buffered bike lanes with an LTS of 1.67.

Proposed Sections

Because of the larger turning radii needed along the western part of this corridor, the addition of dedicated bike lanes would not allow for adequate maneuvering of semi-trucks. Therefore, the project team are recommending a share the road configuration for the 14-foot travel lanes to accommodate all users of the roadway (Figure 6-23). As you travel east and the roadway becomes three-lanes with low density residential to the north and south, warranting minimal turning movements. With a speed limit of 25 mph and low average daily traffic, the existing conditions can be handled with a two-lane section. Therefore, the project team is recommending to remove the 14-foot center turn lane and reallocate that space for a five-foot bike lane and two-foot buffer on each side of the street. Further east, near the elementary school, there's adequate lane width to reduce the vehicle travel lanes to 11-feet and provide a four-foot bike lane and two-foot buffer on each side of the street. The curb and gutter is not considered usable space by a vehicle or bicycle, therefore lane widths differ on the north and south side of the street because a two-foot curb and gutter is only present on the north side of the street.



Figure 6-23 | Baffert Drive Recommendation

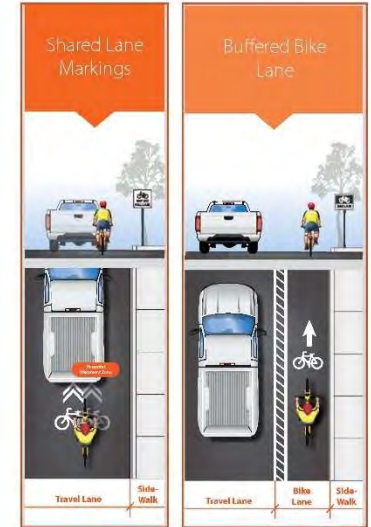


Level of Traffic Stress (LTS)

Facility Types	LTS Score		
	A	B	C
No facility	2.17	2.17	2.17
Bike boulevard	2.33	2.33	2.33
Share the Road	2.00	2.00	2.00
Share the Road - Paved Shoulder	1.67	1.67	1.67
Bike Lane	1.67	1.67	1.67
Buffered Bike Lane	1.67	1.67	1.67
Cycle Track / Multi-Use Path	1.00	1.00	1.00

- = Average LTS 1 - 1.99
- = Average LTS 2 - 2.99
- = Average LTS 3 - 3.99
- = Average LTS 4

Signage & Striping Recommendations



Costs

Pedestrian Facility Improvements Cost
\$20,000

Bicycle Facility Improvements Cost
\$30,000

*Does not include roadway surface maintenance costs

Existing Streets





Sidewalk Recommendations

Sidewalk exists on both sides of the street from Mayra Dr to west to Calle Rivas to the east, then on the north side of the street east to Challenger Elementary School. The sidewalk is generally in 5 feet wide and is in good condition. With a well-developed sidewalk network on the side streets adjacent to Baffert Dr, the sidewalk on Baffert Dr itself provides a viable and important link for getting around on foot.

To the east of the residential area lies a block occupied by warehouse and light industrial land uses. The design and condition of the sidewalk along this segment of the street might create some hazards for pedestrians. Many of the properties here are fronted by “ocean driveways,” where essentially the entire street frontage of the property is a driveway, allowing vehicles to exit the street at any point (Figure 6-24-a). Because of the industrial use along this segment of Baffert, these driveways likely exist to permit maneuvering of tractor trailers and other larger vehicles. This driveway design is clearly beneficial to some of the businesses but it also reduces pedestrian comfort and safety. As sidewalk or the properties along this segment are rebuilt over time, the City should work with property owners to carefully evaluate the need for the wide driveways, or explore ways to temporarily narrow the driveways when the need for truck maneuvering is reduced (for instance, when the tenant/use of the property changes). Several probable obstructions along this stretch of the road reduce the clearance to less than 3 feet.

A key gap in the sidewalk network exists towards Grand Ave. While much of Baffert Dr has good pedestrian infrastructure, there is no sidewalk connection to Grand Ave, which is a key north-south route through the city. Sidewalk ends just south of Mayra Dr, forcing pedestrians to walk in the street, which is often busy with car and truck traffic and includes a handful of confusing intersections (Figure 6-24-b). Sidewalk briefly resumes on the bridge across the Nogales River but then ends again before the railroad crossing next to Grand Ave (See Figure 6-25).

Another safety issue – one that affects children who walk to school – is present close to Challenger Elementary. Near the intersection of Baffert Dr with Calle Rivas, the sidewalk on the south side of the street ends. A marked crosswalk extends across Baffert Dr to link pedestrians to the sidewalk on the north, which continues eastbound; however, the crosswalk is located beyond the end of the sidewalk on the south side, forcing pedestrians to walk in the street or on the ground to reach the marked crossing.

The design of the access for the grocery market at Baffert Dr and Calle Santa Ana poses a hazard to pedestrians (Figure 6-24-c). Almost the entire parking lot of the market extends right to the street, with no sidewalk or driveway present to control access. With no access control, a pedestrian cannot know where to anticipate entering/exiting vehicles and vehicles can also maneuver at a high rate of speed into/out of the lot.

6

Network Recommendations



Figure 6-24 | Walking Conditions along Baffert Dr



a) Where industrial uses are located along Baffert, wide “ocean driveways” are common, and several obstructions from utility poles are present



b) Accessing the bridge to cross the river and reach Grand Ave is hazardous due to lack of sidewalk and high traffic volume, especially from large trucks



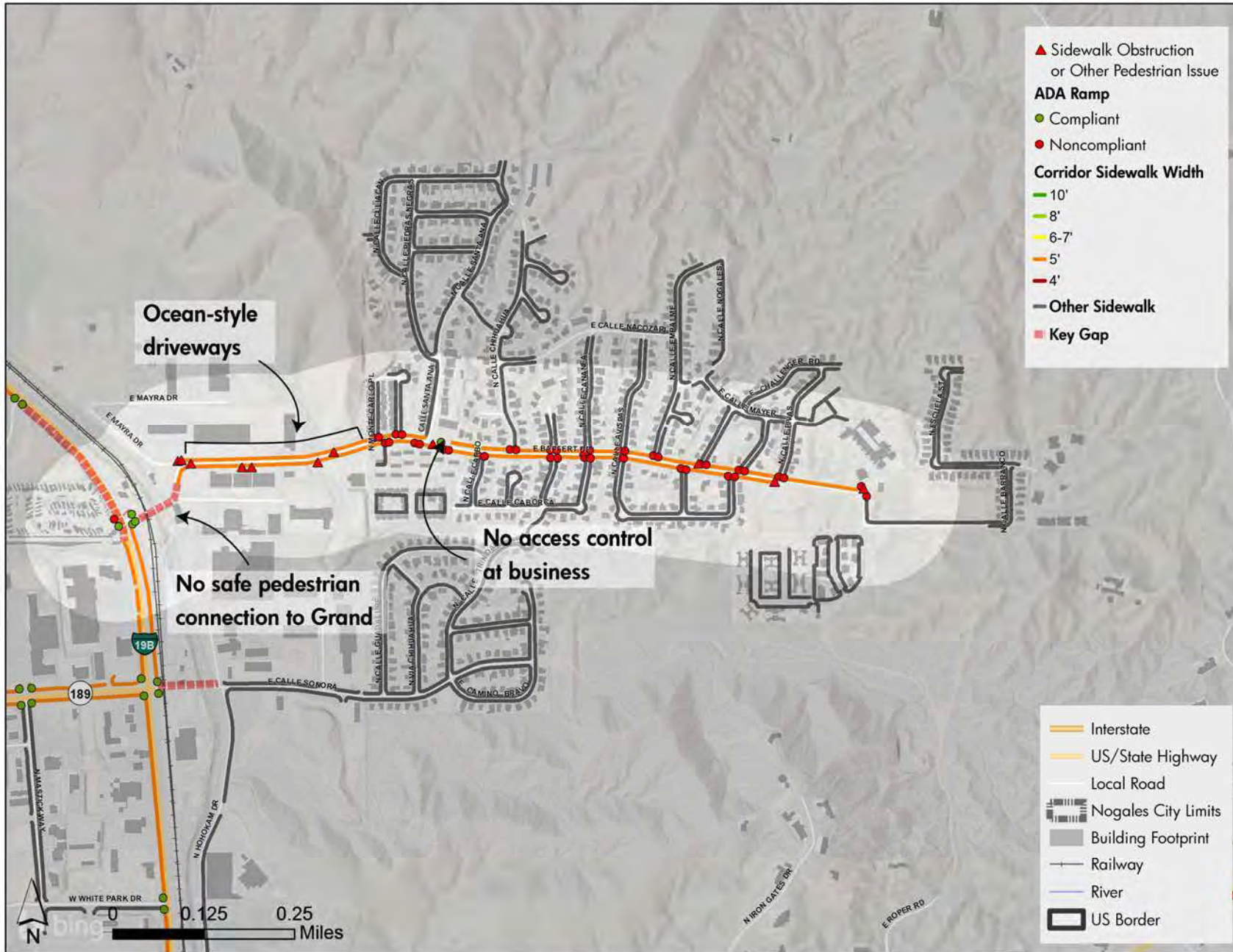
c) There is no access control to the parking lot of the grocery market at Calle Santa Ana, making the most of the street frontage of the property a possible conflict point

6

Network Recommendations



Figure 6-25 | Baffert Drive Sidewalk Recommendation





6.7 | Country Club Drive/ Manilla Drive

Country Club and Manilla Drive is a loop road extending east of N. Grand Ave, under Interstate 19 and looping south, then utilizing N. Al Harrison Drive to continue east and I-19 Frontage Road to connect north back to the highway underpass. W. Country Club Drive is one of the few east/west connections under the interstate for the area. The entirety of this portion of roadway is two-lanes and relatively low volumes due to the lack of destinations and surrounding low-density residential.

Existing Sections

There are two different roadway sections for this corridor, although both very similar being two-lanes with no curb and gutter. Section A, which connects under the interstate, is 28-feet wide with two 14-foot travel lanes. Section B is a 22-foot wide street serving the majority of homes along the corridor. Details of these existing sections can be found on Figure 3-38.

Bicycle LTS Evaluation

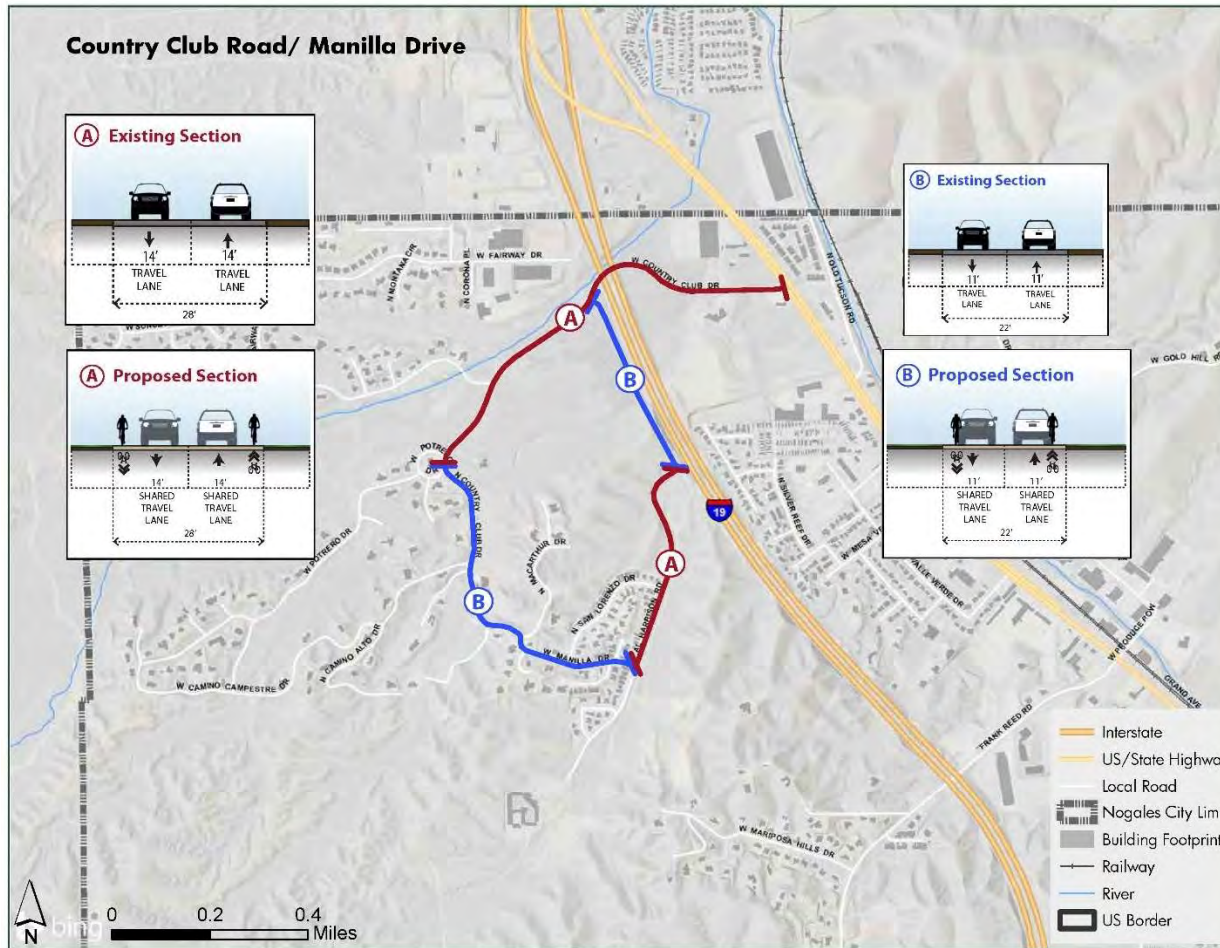
As part of the recommendation for new bicycle facilities on a roadway, there are many factors that play a role in the safety and perceived level of stress. The LTS evaluation shown in Figure 3-39 illustrates the unique conditions of this roadway including; vehicle speed, on-street parking, average daily traffic volume, number of travel lanes, whether a traffic signal is present on the corridor and the classification of the roadway, and the correlation to different type of bicycle facilities. As a roadway becomes more heavily traveled, with higher speeds and more lanes, it becomes less comfortable for bicycles. Given the conditions for all of the roadways within this corridor, any bicycle facility application would be within the green level of comfort. The recommended share-the-road facility has an LTS of 1.33.

Proposed Sections

Because of the limited width of the roadways within this corridor, overall low average daily traffic and a posted 25 mph speed limit, the project team are recommending a share the road configuration for this entire corridor (See Figure 3-40). With a stream/runoff area to the north and existing low-density residential homes, it is not anticipated that drastic additional growth will happen in the near future that will affect traffic volumes.



Figure 6-26 | Country Club Drive/ Manilla Drive Recommendation



Level of Traffic Stress (LTS)

Country Club Dr / Manilla Dr		
Facility Types	Score by Segment	
	A	B
No facility	2.17	1.33
Bike boulevard	1.33	1.33
Share the Road	1.33	1.33
Share the Road - Paved Shoulder	1.17	1.17
Bike Lane	1.17	1.17
Buffered Bike Lane	1.17	1.17
Cycle Track / Multi-Use Path	1.00	1.00

- = Average LTS 1 - 1.99
- = Average LTS 2 - 2.99
- = Average LTS 3 - 3.99
- = Average LTS 4

Signage & Striping Recommendations



Costs

Pedestrian Facility Improvements Cost
\$320,000

Bicycle Facility Improvements Cost
\$30,000

*Does not include roadway surface maintenance costs

Existing Streets





Sidewalk Recommendations

There is limited sidewalk along the Country Club Dr-Manilla Dr-Harrison Rd loop. No sidewalk connecting the neighborhood to Grand Ave, the major north-south route through the city, and Grand Ave lacks sidewalk this far north.

There are two segments of sidewalk in this loop, unconnected from each other. Farther north, sidewalk extends from the roundabout one block north to Meadow Hills Dr, then extends west on Meadow Hill Dr for just over a block before ending. The sidewalk is in good condition, though the land adjacent to the sidewalk is almost all undeveloped. To the south, a four-foot sidewalk exists on Manilla Dr between San Lorenzo Dr and Harrison, and then transitions to a 5-foot sidewalk for just over a block north. The portion on Manilla Dr has some vegetation overgrowth (Figure 6-27-a). The segment on Harrison Rd is constrained at times because of mailboxes installed in the sidewalk. Generally, these mailboxes allow for 3 feet of clearance, but a few appear to be limiting the path to less than that width (Figure 6-27-b). The sidewalk evaluation map can be seen in Figure 6-28.

Figure 6-27 | Walking Conditions along Country Club Dr / Manilla Dr / Harrison Rd



a) Significant overgrowth on the sidewalk occurs at several points along Manilla Dr



b) Mailboxes may constrain the clearance to less than 3 feet along Harrison Rd

6

Network Recommendations



Figure 6-28 | Country Club Drive/ Manilla Drive Sidewalk Recommendation





6.8 | Patagonia Highway (SR 82)

The Patagonia Highway currently consists of a four and five-lane highway extending east from Grand Ave. to the Nogales city limits. The eastern half of the corridor transitions to a two-lane section, as there are fewer developments and less density. The western portion of this corridor has primarily commercial in nature, with limited single-family residences.

Existing Sections

There are three different roadway sections for this corridor. Sections A and C utilize four travel lanes at 12 or 13-feet wide, with a median in Section C and a center turn lane in Section A. Section B provides two travel lanes at 12-feet each, and a six-foot shoulder with no curb and gutter. Details of these existing sections can be found on Figure 6-29.

Bicycle LTS Evaluation

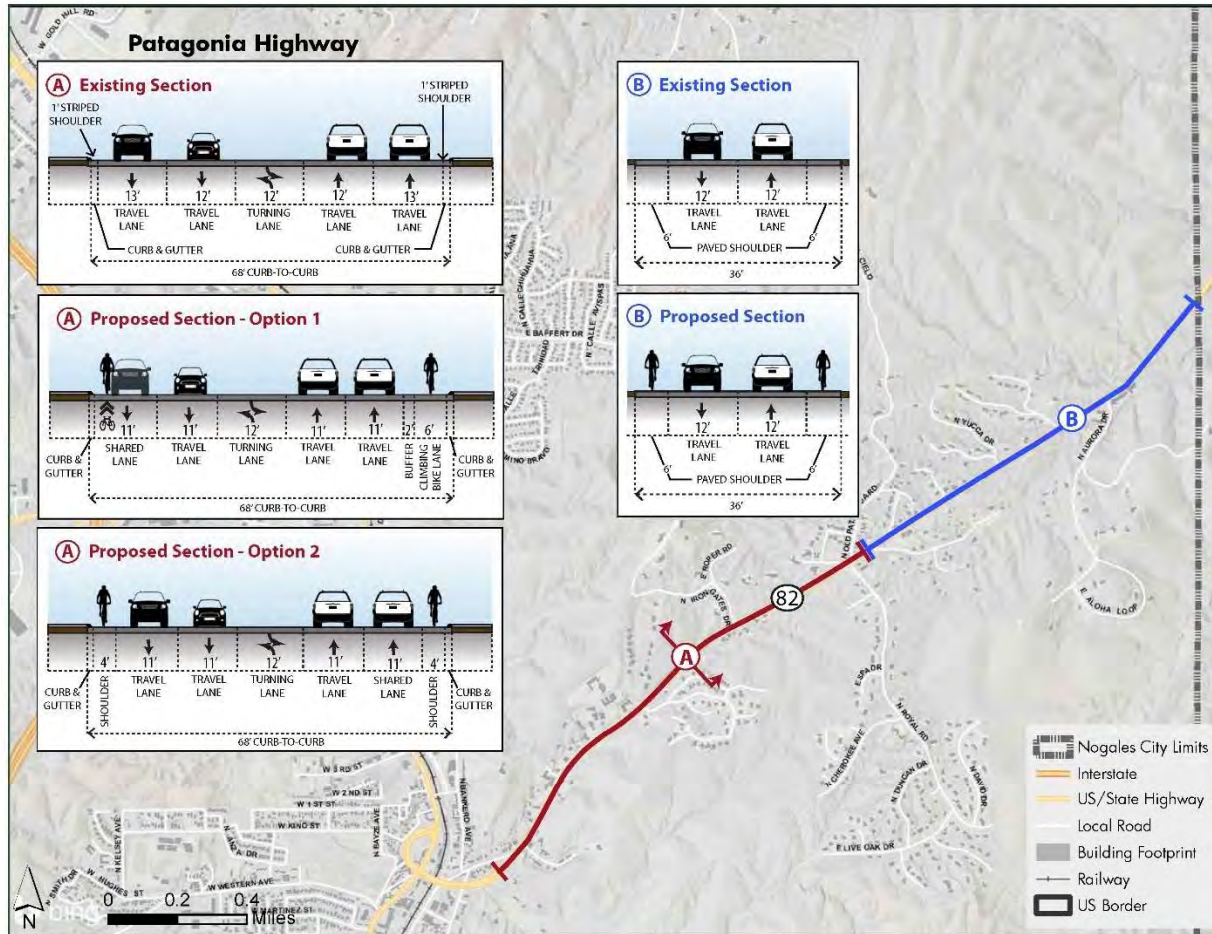
As part of the recommendation for new bicycle facilities on a roadway, there are many factors that play a role in the safety and perceived level of stress. The LTS evaluation shown in Figure 6-29 illustrates the unique conditions of this roadway including; vehicle speed, on-street parking, average daily traffic volume, number of travel lanes, whether a traffic signal is present on the corridor and the classification of the roadway, and the correlation to different type of bicycle facilities. Given the conditions for the five-lane roadway in section C, a minimum of a dedicated bike lane or shoulder would be needed to achieve an LTS below 2. The recommended shoulder facility on Section B has an LTS of 1.83.

Proposed Sections

Section C of this corridor essentially serves as an on-ramp for the Patagonia Highway, therefore there is not an opportunity for a bicycle facility. The recommended bicycle facility along S Grand Ave. would allow connections to Section A of this corridor. Two options have been provided by the project team, that utilize more narrow travel lanes and provide either a four-foot shoulder that could accommodate cyclist, or a slight shift in lanes to provide a sharrow on one side of the street and a six-foot bike lane with a two-foot buffer on the other side of the street. This wider bicycle facility would serve as a climbing lane for cyclists going uphill, where they would be going significantly slower than passing vehicles. For the two-lane portion of the roadway further east in Section B, staff would suggest utilizing the existing six-foot shoulders a bicycle route separate from passing vehicles. Details of these sections can be found in Figure 6-29.



Figure 6-29 | Patagonia Highway (SR82) Recommendation



Level of Traffic Stress (LTS)

Patagonia Highway

LTS Score

Facility Types	Score by Segment		
	A	B	C
No facility	3.33	2.50	2.50
Bike boulevard	3.00	2.50	2.50
Share the Road	2.67	2.33	2.33
Share the Road - Paved Shoulder	2.00	1.83	1.83
Bike Lane	2.00	1.83	1.83
Buffered Bike Lane	1.50	1.33	1.33
Cycle Track / Multi-Use Path	1.00	1.00	1.00

■ = Average LTS 1 - 1.99
■ = Average LTS 2 - 2.99
■ = Average LTS 3 - 3.99
■ = Average LTS 4

Signage & Striping Recommendations



Costs

Pedestrian Facility Improvements Cost
\$160,000

Bicycle Facility Improvements Cost
 Average \$50,000
 Shoulder Option2 \$20,000

*Does not include roadway surface maintenance costs

Existing Streets





Sidewalk Evaluations

Sidewalk exists on Patagonia for about a half-mile north of Morley Ave. Sidewalk is found on both sides of the road and is in fair to good condition, with occasional minor overgrowth. Beyond this sidewalk to the north, a half-dozen pairs of curb ramps are constructed at the end of each street that intersects – even though they don't connect to sidewalk (see Figure 6-30-a). The gap between Royal Rd and the end of the existing sidewalk is considered a key gap because of the large number of residents that currently lack a pedestrian connection (Figure 6-31 and Figure 6-32). The city may eventually evaluate the feasibility of extending sidewalk as far north as Aurora Dr.

For a pedestrian, the way Patagonia Hwy connects to the rest of the road network towards the south is an issue. Patagonia Hwy connects with Grand Ave to the south via an overpass that crosses over Grand Ave, then loops back to connect to Grand Ave from the west (see Figure 6-30-b). This allows motorists to access Patagonia Hwy efficiently from Grand Ave and vice versa. Unfortunately, the overpass does not have a sidewalk or other type of pedestrian walkway. Currently, the only way for someone traveling on foot on Patagonia to cross the Nogales River and the railroad tracks, or to reach Grand Ave is to walk to a quarter-mile north to Doe St or a half-mile south to where Morley Ave crosses over the river. The lack of a direct pedestrian connection between Patagonia Hwy/Morley Ave and Grand Ave is marked as a key gap.

The on-ramp from Morley Ave to Patagonia Hwy is also classified as a key gap on Figure 6-30-b. Though there is a continuous sidewalk connection from Morley Ave to Patagonia Hwy on the north side, there is no safe crossing point for a pedestrian to then cross to the south side of Patagonia Hwy, making the sidewalk on the south side (and any destinations on the south side) hard to access. Extending sidewalk from Morley Ave on the on-ramp could address this.

Figure 6-30 | Walking Conditions along Patagonia Hwy



a) Several curb ramps have been constructed at intersections to the north – even though no sidewalk exists there



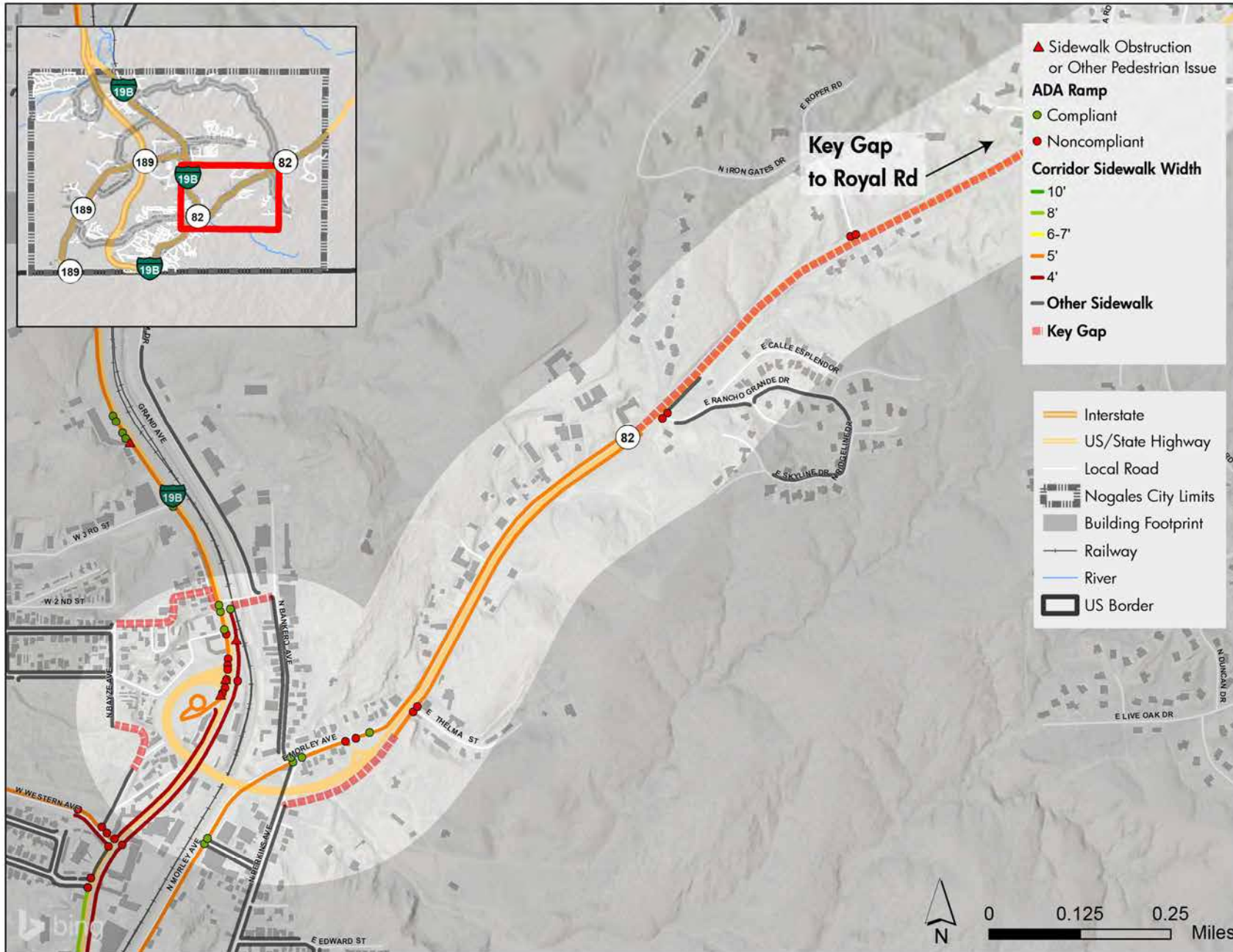
b) With no sidewalk on the overpass, pedestrians cannot access Grand Ave via Patagonia Hwy

6

Network Recommendations



Figure 6-31 | Patagonia Highway (West) Sidewalk Recommendation 1

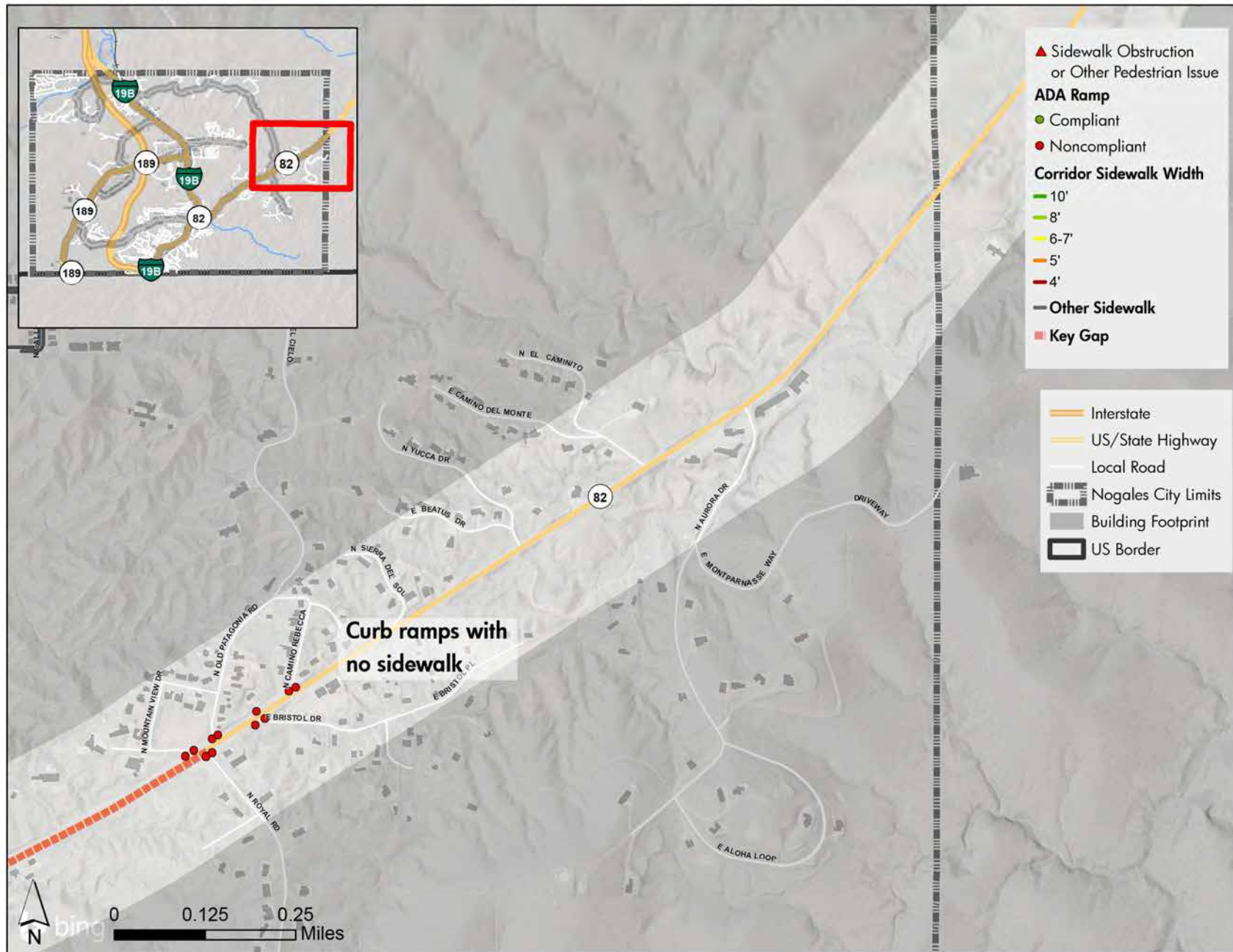


6

Network Recommendations



Figure 6-32 | Patagonia Highway (East) Sidewalk Recommendation 2





6.9 | Royal Road/ Camino Vista Del Cielo

The Royal Road/ Camino Vista Del Cielo corridor is a collector roadway comprised of Royal Road, Camino Vista Del Cielo, and Gold Hill Road. This corridor serves as a major connection for the area, as it is limited by topographical constraints. The two-lane corridor helps to circulate residential traffic from the Northeast of Nogales to arterial facilities (Patagonia Highway and Grand Avenue). The majority of the surrounding land uses are large lot, single-family residential, but the connection to N Grand Ave facilitates a few commercial/warehouse properties. This four-way signalized intersection provides one of the few connections over the railroad tracks and nearby creek.

Existing Sections

Currently, there are two different roadway sections along this corridor, although both very similar providing one travel lane in each direction without curb and gutter. Generally, the corridor has 11-foot travel lanes, with some instances of 14-foot lanes along Section A. Section B has very minimal access points given challenging topography along the corridor. Turn lanes are not necessary as access points only serve one home, and decal lanes are not required given the 25mph speed limit. Details where the Sections begin and end can be seen in Figure 6-33.

Bicycle LTS Evaluation

The LTS evaluation shown in Figure 6-33 illustrates the unique conditions of this roadway including; minimal average daily traffic, no on-street parking, 25 mph speed limit with no signals and the correlation of these factors to different types of bicycle facilities. Given the street conditions found within the chart, this entire corridor could comfortably accommodate the recommended share-the-road bicycle facility with an LTS of 2 for Section A, and an LTS of 1.67 for Section B. Any other facility type would require additional roadway width and potentially right-of-way.

Existing Sidewalks

There are not any sidewalks on Royal Road/ Camino Vista Del Cielo. Currently, people walk along the shoulder in this rural section.

Proposed Sections

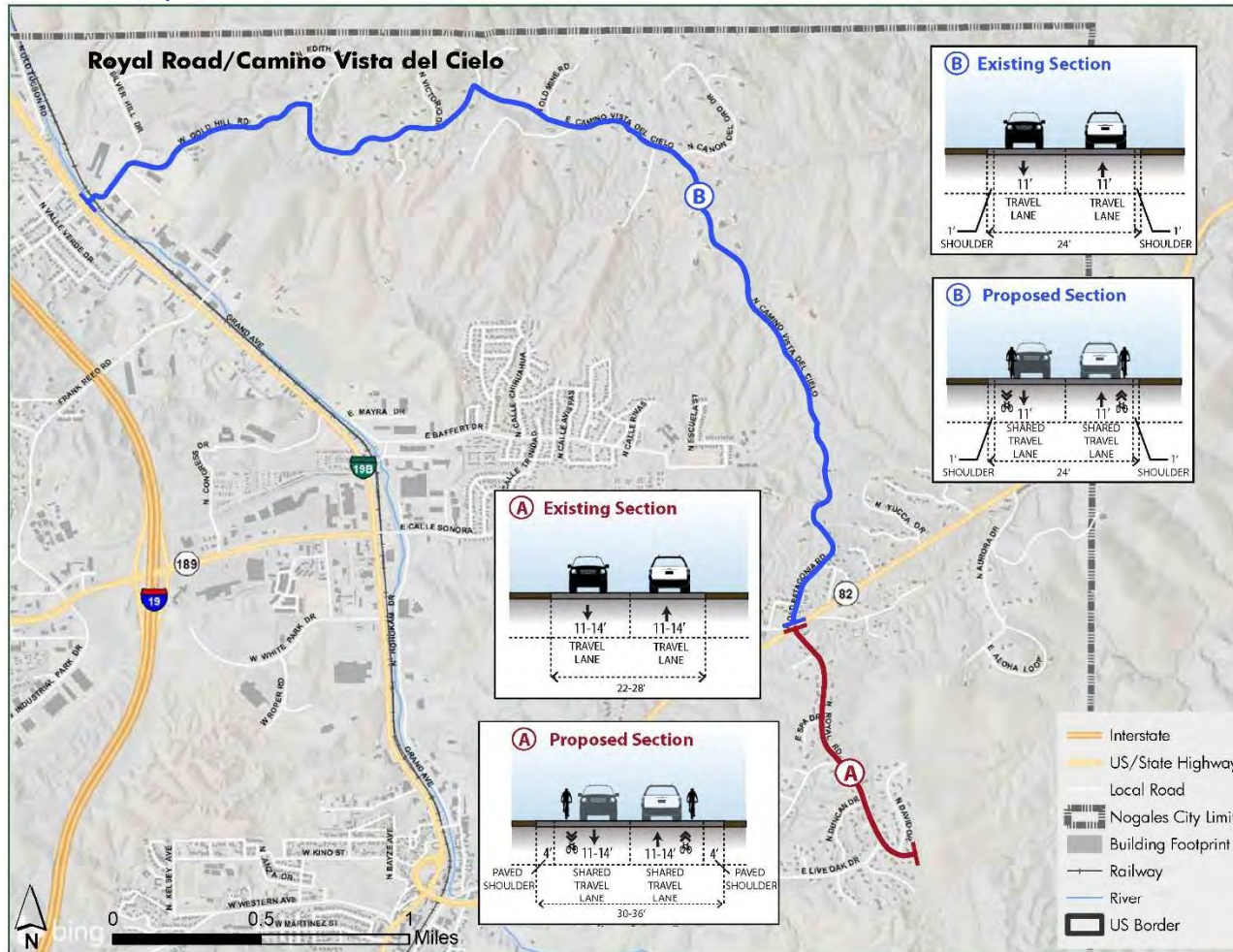
As previously mentioned, this corridor has challenging topography making it difficult to widen the roadway to provide additional lane width for vehicles, bicycles or off-street facilities. The LTS evaluation has provided great reason to believe that the proposed share-the-road facility type could safely accommodate bicycles along this corridor. Figure 6-33 provides more detail regarding Section A providing an 11-foot shared travel lane with a one-foot shoulder, and Section B providing an 11 to 14-foot shared travel lane without shoulder.

6

Network Recommendations



Figure 6-33 | Royal Road / Camino Vista del Cielo Recommendation



Level of Traffic Stress (LTS)

Royal Road / Camino Vista del Cielo

Facility Types	Score by Segment	
	A	B
No facility	2.17	2.17
Bike boulevard	1.83	2.33
Share the Road	1.67	2.00
Share the Road - Paved Shoulder	1.33	1.50
Bike Lane	1.33	1.50
Buffered Bike Lane	1.17	1.33
Cycle Track / Multi-Use Path	1.00	1.00

Legend:

- Green = Average LTS 1 - 1.99
- Yellow = Average LTS 2 - 2.99
- Orange = Average LTS 3 - 3.99
- Red = Average LTS 4

Signage & Striping Recommendations



Costs

Bicycle Facility Improvements Cost
\$60,000

*Does not include roadway surface maintenance costs

Existing Streets





6.10 | Macnab Drive

Macnab Drive is a two-lane principal collector roadway serving as a main connection between W Western Ave and N Grand Ave, utilizing W Crawford Street to connect. The two-lane corridor helps to collect residential traffic bound on the east side of Interstate 19. This corridor serves as a key connection for nearby residences to access the commercial corridor near the US and Mexico border crossing, and N Western Ave, which provides access across I-19.

Existing Sections

This corridor is a 36-foot roadway providing an 18-foot travel lane in each direction with parallel parking allowed on both sides of the street. The addition of turn lanes and travel lanes are present at the southeastern portion of W Crawford Street. Additional design and detail will be needed to find the best application of a bicycle facility in this area. Details of the corridor and roadway section can be seen in Figure 6-34.

Bicycle LTS Evaluation

The LTS evaluation shown in Figure 6-34 illustrates the unique conditions of this roadway including; on-street parallel parking, low speed limit with no signals and the correlation of these factors to different type of bicycle facilities. Given the street conditions found within the chart and utilizing existing curb width, this corridor would be best suited for a buffered bike. However, that would require the removal of on-street parking. Given the lack of cross streets found from a network evaluation, the project team feel a share-the-road facility comfortably accommodate bicycles. This facility type along this corridor has an LTS of 2.33.

Existing Sidewalks

There are sidewalks on two-thirds of the Macnab Drive corridor. A half-mile gap in sidewalks exists on the westernmost portion of this corridor where little development has occurred.

Proposed Sections

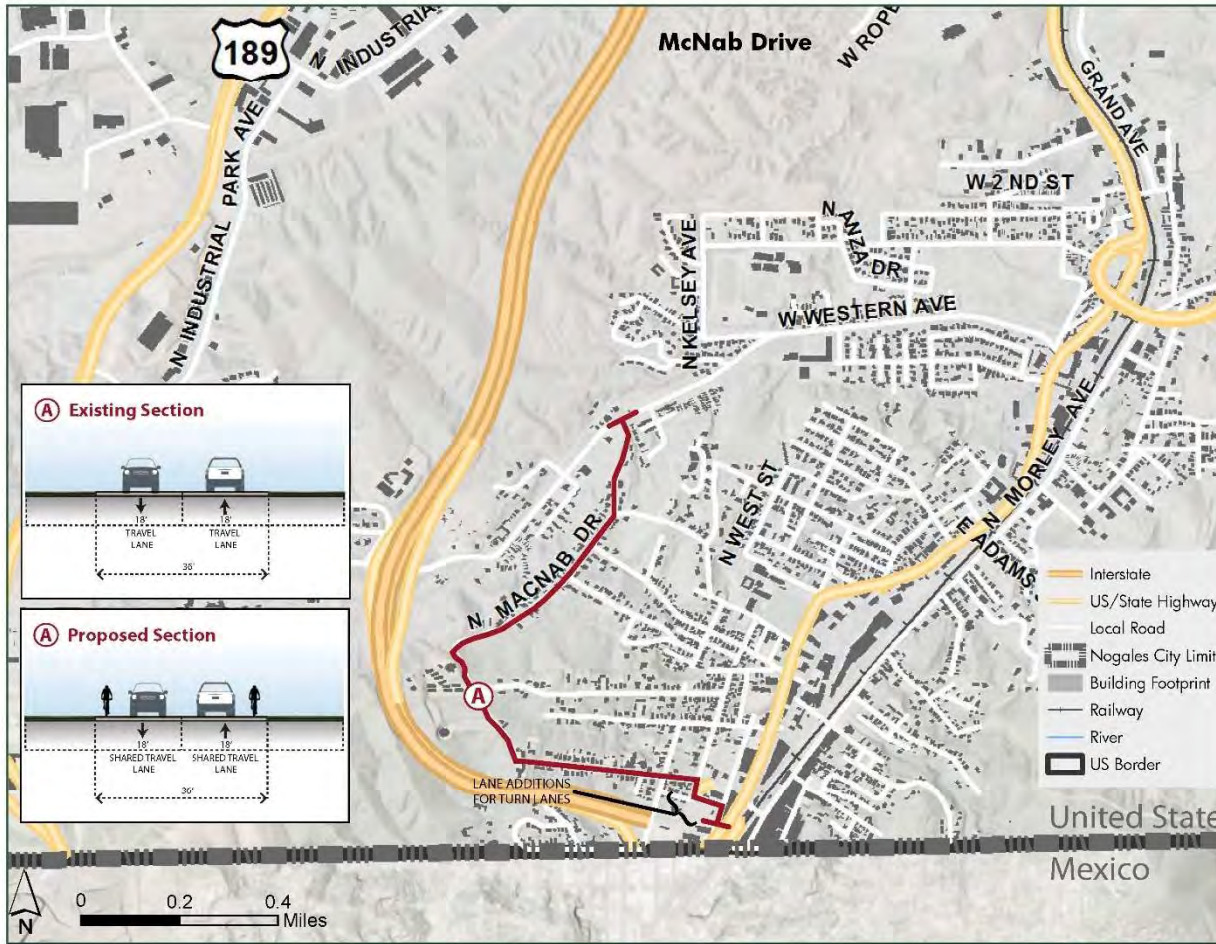
The existing 18-foot travel lanes provide adequate space for vehicles and bicycles along this corridor. The on-street parking is used very sparingly, almost serving as refuge areas along the way for bicycles. Low traffic volumes along the corridor would provide minimal overlap where vehicles would be required to yield to cyclist. See Figure 6-34 for the proposed section.

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Network Recommendations



Figure 6-34 | Macnab Drive Recommendation



Level of Traffic Stress (LTS)

Facility Types	Score
No facility	2.17
Bike boulevard	2.00
Share the Road	2.33
Share the Road Paved Shoulder	2.00
Bike Lane	2.00
Buffered Bike Lane	1.67
Cycle Track / Multi-Use Path	1.00

- Green = Average LTS 1 - 1.99
- Yellow = Average LTS 2 - 2.99
- Orange = Average LTS 3 - 3.99
- Red = Average LTS 4

Signage & Striping Recommendations



Costs

Pedestrian Facility Improvements Cost
\$80,000

Bicycle Facility Improvements Cost
\$20,000

*Does not include roadway surface maintenance costs

Existing Streets





6.11 | Bejarano Street

The Bejarano Corridor is a two-lane roadway utilizing N Bejarano St, N Bayze Ave, W 1st St and N Gila St to bypass the on-ramp for State Route 82 along the Patagonia corridor. This half-mile route provides connections from proposed bicycle facilities along Western Ave and Grand Ave serving as a key component in the overall network. This corridor is surrounded by single-family land uses and a cemetery, while terminating to the south at commercial properties. The majority of the roadway provides a sidewalk on one side of the street, though alternating back and forth.

Existing Sections

This two-lane corridor provides 18-foot travel lanes in each direction with no curb and gutter. It utilizes a series of local streets through a residential neighborhood without traffic signals. The roadway width may vary slightly through different streets and along curves, but is generally 36-feet wide. Details of the corridor and roadway section can be seen in Figure 6-35.

Bicycle LTS Evaluation

The LTS evaluation shown in Figure 6-35 illustrates the unique conditions of this roadway including; a low posted speed limit of 25mph, no on-street parking, no traffic signals and the correlation of these factors to different type of bicycle facilities. Given the street conditions found within the chart and utilizing existing curb width, the project team feel a share-the-road facility would safely and comfortably accommodate bicycles. This facility type along this corridor has an LTS of 1.83.

Existing Sidewalks

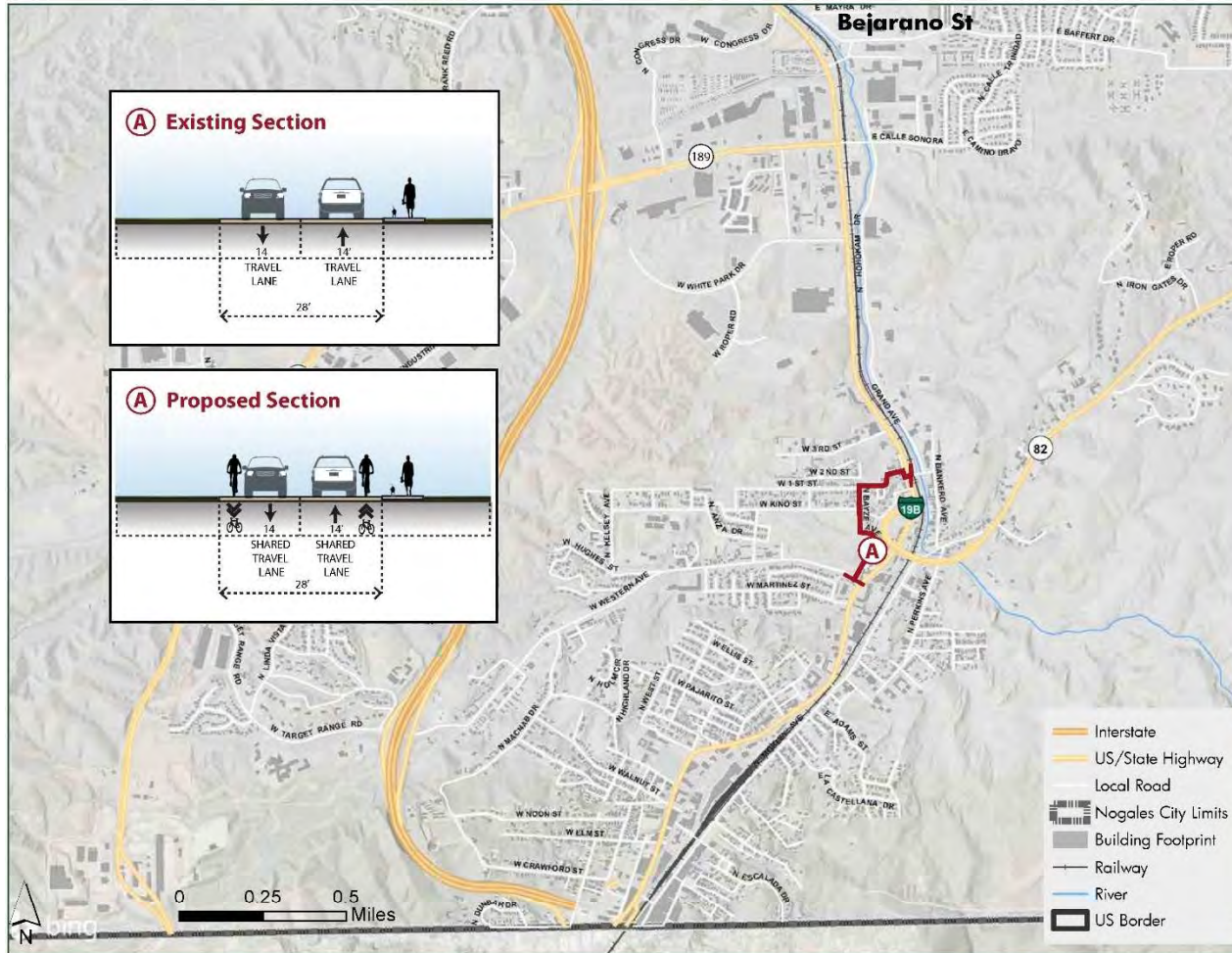
There are sidewalks on half of the Bejarano Street corridor. There are two small sidewalk gaps on this corridor, one of which is a small gap where Bejarano Street makes a tight curve into Bayze Avenue, and the second where 1st street makes a tight curve as it continues east to Ronquillo Way.

Proposed Sections

The existing 14-foot travel lanes does not provide enough width for a separated bicycles facility, while keeping both travel lanes. Given the surrounding network and LTS evaluation, signage and on-street markings for a share-the-road facility would allow cyclists a reasonable connection to nearby destinations and access to the larger bicycle network. See Figure 6-35 for the proposed section.



Figure 6-35 | Bejarano Street Recommendation



Level of Traffic Stress (LTS)

Bejarano St

LTS Score

Facility Types	Score
No facility	1.83
Bike boulevard	1.83
Share the Road	1.83
Share the Road - Paved Shoulder	1.50
Bike Lane	1.50
Buffered Bike Lane	1.50
Cycle Track / Multi-Use Path	1.00

- = Average LTS 1 - 1.99
- = Average LTS 2 - 2.99
- = Average LTS 3 - 3.99
- = Average LTS 4

Signage & Striping Recommendations



Costs

Pedestrian Facility Improvements Cost
\$50,000

Bicycle Facility Improvements Cost
\$10,000

*Does not include roadway surface maintenance costs

Existing Streets





6.12 | Congress Drive

The Congress Drive corridor serves as a 'calm street' route option for cyclists in the area to by-pass the more heavily traveled corridors; Mariposa Road and Grand Ave. With few connections to a larger street network, and only serving single-family residential, the most traffic is local and not associated with commercial trips. Nearby destinations such as the shopping district, Santa Cruz County Court Administration and Sheriff's Office are key points that need to be served by all modes of transportation.

Existing Sections

There are three different roadway sections for this corridor, although fairly similar in providing two travel lanes for vehicles, with curb and gutter for Sections A and B. Section A, connecting the residential area to the shopping district along Mariposa Road, is the only portion of the corridor with sidewalks on both sides of the street. Section C will prove to be the most challenging to accommodate bicycles as the travel lanes are only 11-feet wide, without a shoulder or curb and gutter and is fairly steep for westbound traffic. Details of these existing sections can be found on Figure 6-36.

Bicycle LTS Evaluation

The LTS evaluation shown in Figure 6-36 illustrates the unique conditions of this roadway and the correlation to different types of bicycle facilities, based on these factors. Given the characteristics of Sections A and B, the project team feel that any facility could safely and comfortably accommodate a bicycle facility. For the recommended treatment of a buffered bike lane along Section A, an LTS of 1.17 would be achieved. Section B, utilizing a shared travel lane, would provide an LTS of 1.33. Section C has additional factors in bicycle safety including topography requiring a slow climb for cyclists traveling west, and low visibility for following vehicles due to a curve. Details of this evaluation can be found in Figure 6-36.

Existing Sidewalks

There are currently sidewalks on approximately half of the Congress Drive corridor. Sidewalks primarily are located along section A (Figure 3-58), with no sidewalks along section B or section C.

Proposed Sections

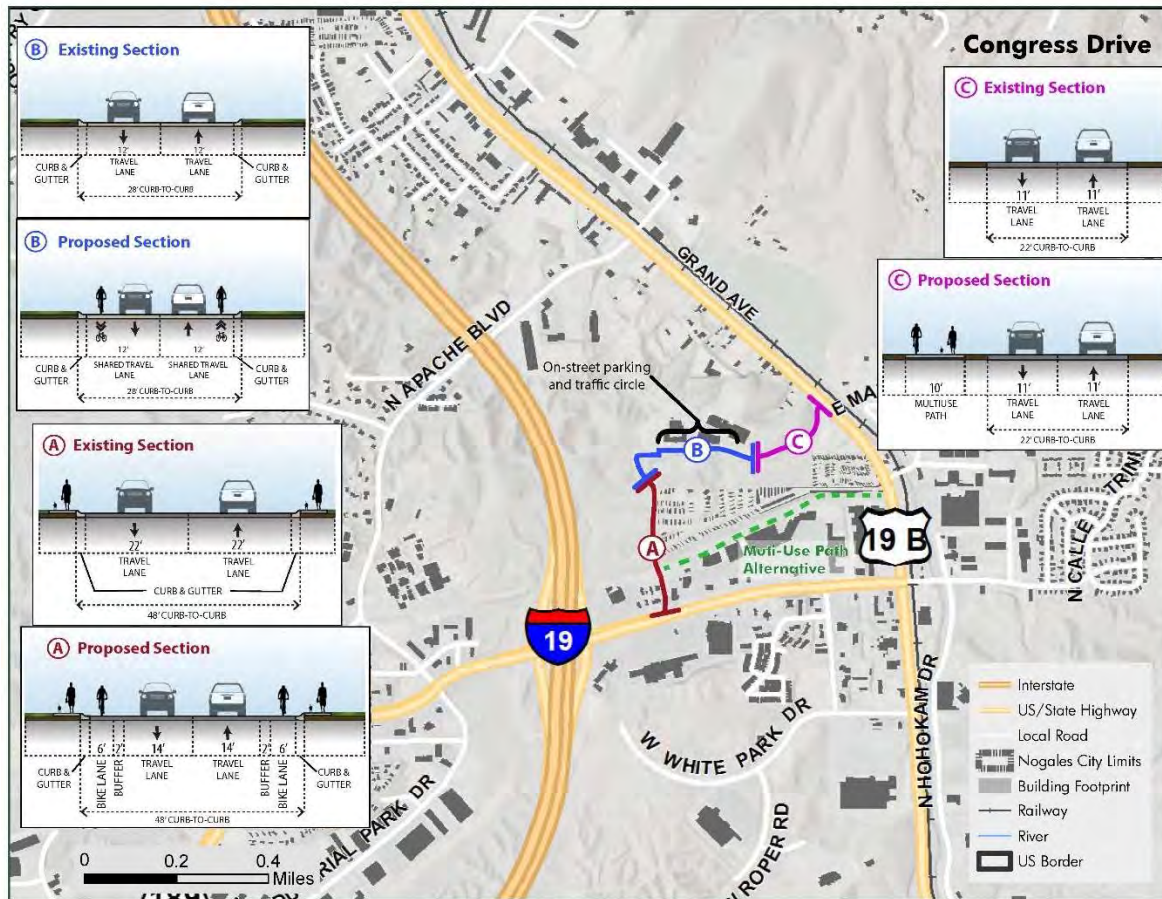
The project team feel that adequate roadway widths are existing to provide a six-foot bike lane with a two-foot buffer in Section A and to utilize the 12-foot lane as a shared travel lane in Section B. Section C has topographical challenges that coincide with sight distance issues for climbing cyclists traveling west. Within the current pavement width in Section C, the project team would not suggest a shared travel lane along this portion of the roadway, and would instead suggest a separated multi-use path to connect to Grand Ave. Details of these sections can be seen in Figure 6-36.

6

Network Recommendations



Figure 6-36 | Congress Drive Recommendation



Level of Traffic Stress (LTS)

Facility Types	Score by Segment		
	A	B	C
No facility	2.17	1.33	1.83
Bike boulevard	1.83	1.33	1.83
Share the Road	1.67	1.33	1.67
Share the Road - Paved Shoulder	1.33	1.17	1.33
Bike Lane	1.33	1.17	1.33
Buffered Bike Lane	1.17	1.17	1.17
Cycle Track / Multi-Use Path	1.00	1.00	1.00

- Green = Average LTS 1 - 1.99
- Yellow = Average LTS 2 - 2.99
- Orange = Average LTS 3 - 3.99
- Red = Average LTS 4

Signage & Striping Recommendations



Costs



Multi-Use Path Alternative



Existing Streets





6.13 | Calle Sonora

The Calle Sonora corridor serves as a 'calm street' route option for cyclists in the area to by-pass the more heavily traveled corridors; Baffert Drive and Grand Ave. This corridor has few connections to a larger street network, lower speeds and traffic volumes. This corridor makes for a great bicycle route as the eastern half is residential, a bus stop is at the halfway point and the western half is a destination commercial node.

Existing Sections

There are three different roadway sections for this corridor, although fairly similar in providing two travel lanes for vehicles, with curb and gutter for Sections B and C. Section A is a short portion that is constrained by the bridge over the creek, crossing railroad tracks and connecting Grand Avenue. A sidewalk is present only on the south side of the bridge for this portion of the corridor. Section B is the widest portion at 36-feet with sidewalks on both sides of the street. This part of the corridor makes the connection from residential to commercial and industrial properties. Section C, Calle Trinidad, serves as the local residential connector street between Baffert Drive and Calle Sonora. This is a calm street at 28-feet wide with sidewalks on both sides. Details of these existing sections can be found on Figure 6-37.

Bicycle LTS Evaluation

The LTS evaluation shown in Figure 6-37 illustrates the unique conditions of this roadway and the correlation to different types of bicycle facilities, based on these factors. Given the characteristics and available roadway width of Sections A and C, the project team feel that this corridor could safely accommodate a share-the-road bicycle facility. Given the characteristics and wider roadway along Section B, the project team would recommend a buffered bike lane, providing an LTS of 1.17.

Existing Sidewalks

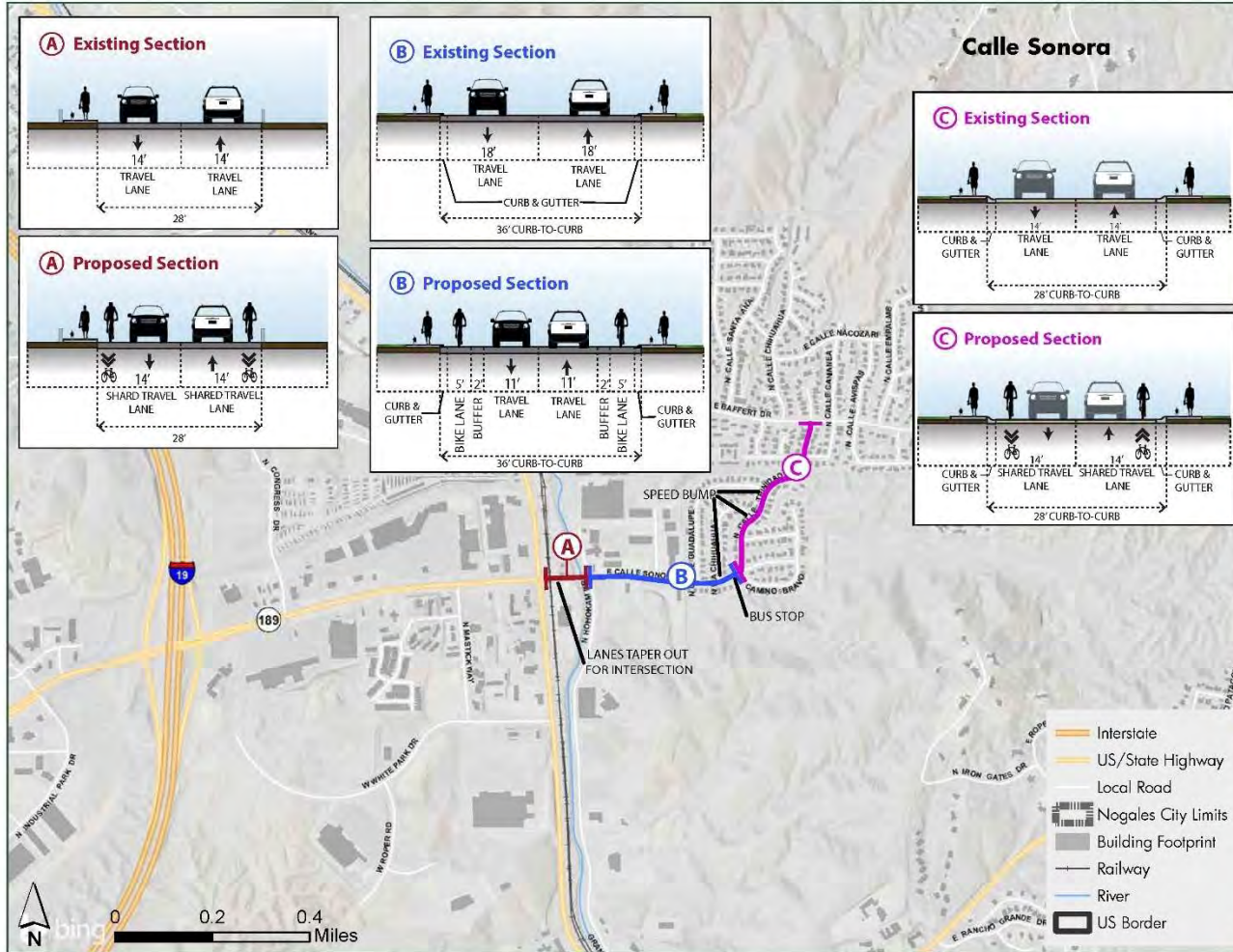
There are currently sidewalks on approximately 90% the Calle Sonora corridor. Sidewalks are lacking at the western connection to N Grand Ave, however the bridge over the creek in the area does have one sidewalk on the south side.

Proposed Sections

The project team feels that adequate roadway widths are existing to provide a share-the-road configuration for Sections A and B. Within the current curb-to-curb widths in Section B, the project team feels that adequate space is available to allow a five-foot bike lane with a two-foot buffer of both sides of the street while still allowing 11-feet of travel for each vehicle lane. Details of these sections can be seen in Figure 6-37.



Figure 6-37 | Calle Sonora Recommendation



Level of Traffic Stress (LTS)

Calle Sonora

LTS Score

Facility Types	A	B	C
No facility	1.83	1.83	1.50
Bike boulevard	1.83	1.83	1.50
Share the Road	1.67	1.67	1.33
Share the Road - Paved Shoulder	1.33	1.33	1.17
Bike Lane	1.33	1.33	1.17
Buffered Bike Lane	1.17	1.17	1.00
Cycle Track / Multi-Use Path	1.00	1.00	1.00

■ = Average LTS 1 - 1.99
■ = Average LTS 2 - 2.99
■ = Average LTS 3 - 3.99
■ = Average LTS 4

Signage & Striping Recommendations



Costs



*Does not include roadway surface maintenance costs



7.0 | System Implementation

The recommendations in this section are a culmination of existing conditions analysis, technical assistance from city leaders and planning/engineering professionals, public input, and a detailed network evaluation based on safety, rider comfort, and connectivity.

These factors ultimately influence the “bikeability” of a community. Strategic bicycle routes are determined by examining the existing context of a community and the travel behavior of both the drivers and bicyclists. Determining a successful route requires an understanding of bicyclist and driver expectations. It also requires an understanding of the land use and development patterns, origins and attractions, traffic volumes and speed, roadway width and roadway configuration, among other community characteristics. Figure 7-1 illustrates the physical features, urban design qualities, and individual perceptions that contribute to a bikeable environment.

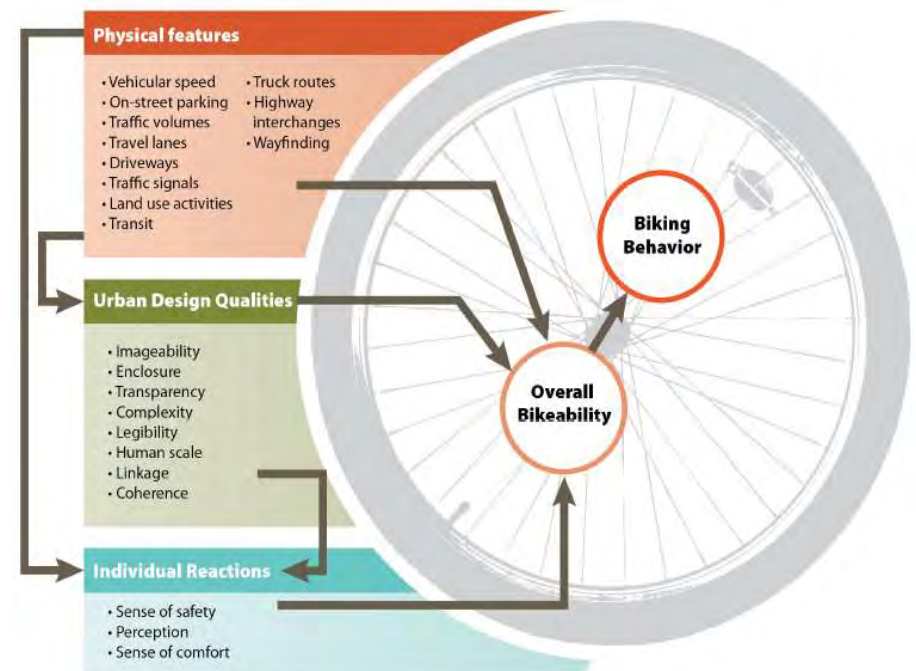
7.1 | Bicycle Network

Each bicycle route described in previous sections plays a key role in facilitating bicycle traffic; however, the relationship between these routes is just as important in facilitating safe and comfortable movement throughout the city.

The proposed bicycle network seeks to (Figure 7-2):

- Connect cyclists from residential to commercial areas and places of employment;
- Largely able to be implemented within current roadway constraints (i.e. – road width, right-of-way);
- Leverage the “critical-mass” of a dense network of facilities to encourage a mode switch away from automobiles;
- Provide safe routes for cyclists at all skill levels;
- Create a circuitous route around the outside of the city;
- Align routes to the needs of the public;
- Eliminate gaps between residential areas and schools; and
- Provide adequate facilities on high-capacity routes.

Figure 7-1 | Bikeability Factors

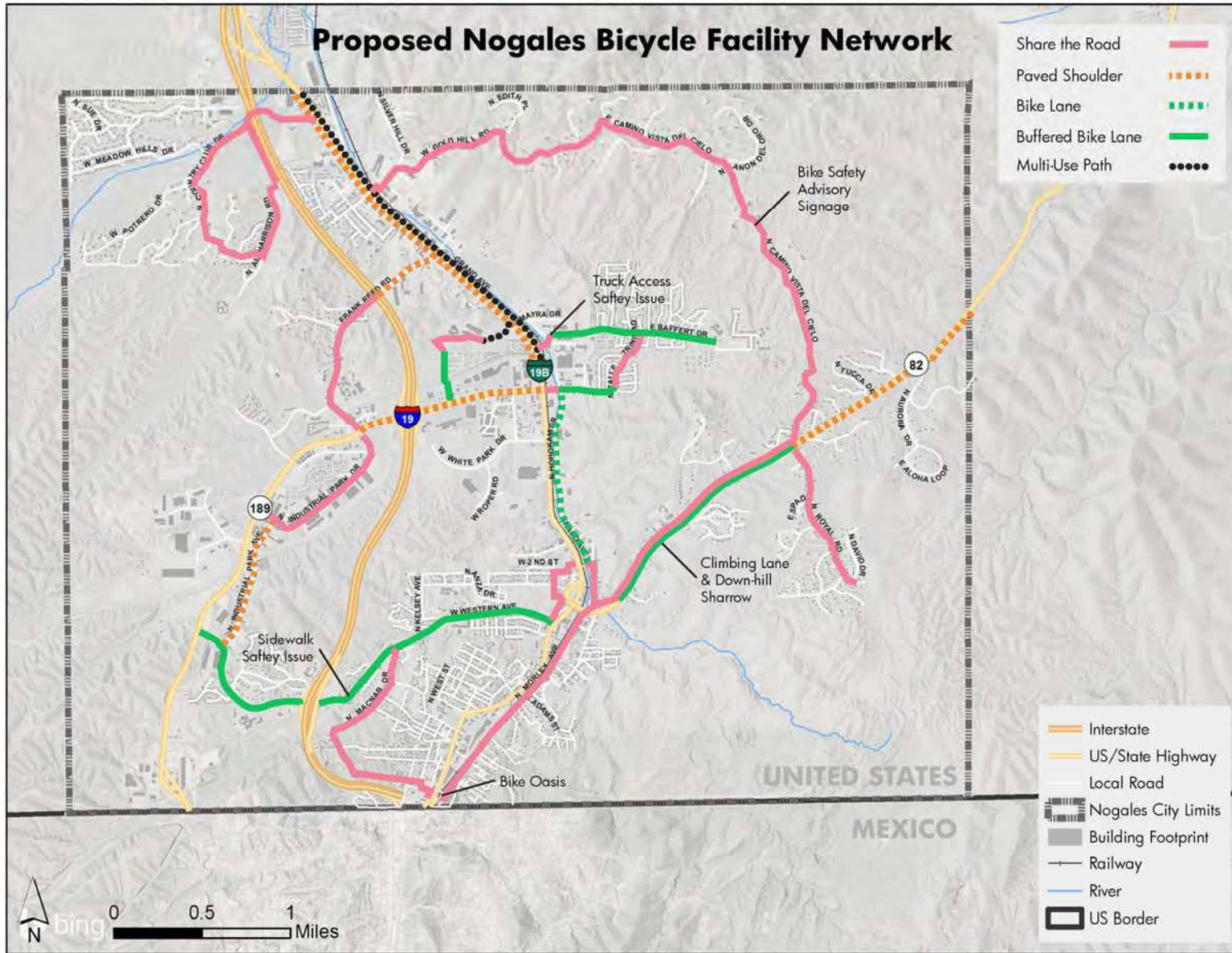


7

System Implementation



Figure 7-2 | Nogales Bicycle Facility Network



7 System Implementation



Table 7-1 summarizes the planning-level costs associated to implement the recommendations. Key to the successful implementation of this network is the ongoing maintenance of cleaning, striping and signing the roadways for bicycle accommodation.

Table 7-1 | Nogales Bicycle Facility Improvements Cost Matrix

Preliminary Bicycle Facility Improvements Cost Matrix																
Corridor	Segment	Length	Share the Road*		Paved Shoulder		Bike Lane**		Buffered Bike Lane***		Multi-Use Path****		Corridor Total			
			Cost/ml	Total	Length	Cost/ml	Total	Length	Cost/ml	Total	Length	Cost/ml		Total		
Frank Reed Rd/ Industrial Park Dr	A				0.42	\$ 5,280.00	\$ 2,217.60									
	B	0.93	\$ 11,200.00	\$ 10,416.00												
	C				0.96	\$ 5,280.00	\$ 5,068.80								\$ 17,702.40	
Target Range Road/ Western Ave	A								0.9	\$ 23,760.00	\$ 21,384.00					
	B								1.89	\$ 23,760.00	\$ 44,906.40					
	C								0.63	\$ 23,760.00	\$ 14,968.80			\$ 81,259.20		
Mariposa Road/ Industrial Park Ave	A				0.8	\$ 5,280.00	\$ 4,224.00									
	B				0.73	\$ 5,280.00	\$ 3,854.40									
	C				0.53	\$ 5,280.00	\$ 2,796.40							\$ 10,876.80		
Grand Ave (North)	A				1.09	\$ 5,280.00	\$ 5,755.20					1.09	\$ 261,000.00	\$ 284,490.00		
	B				1.17	\$ 5,280.00	\$ 699.60					1.17	\$ 261,000.00	\$ 305,370.00		
Grand Ave (South)/ Morley-Bankerd- Hohokam	A							1.04	\$ 18,480.00	\$ 19,219.20						
	B	0.87	\$ 11,200.00	\$ 9,744.00												
	C				0.77	\$ 11,200.00	\$ 8,624.00							\$ 37,587.20		
Baffert Drive	A	0.07	\$ 11,200.00	\$ 784.00												
	B									0.85	\$ 23,760.00	\$ 20,196.00				
	C										0.1	\$ 23,760.00	\$ 2,376.00			\$ 23,356.00
Country Club Drive/ Manilla Drive	A	1.24	\$ 11,200.00	\$ 13,888.00												
	B	1.1	\$ 11,200.00	\$ 12,320.00										\$ 26,208.00		
Patagonia Highway (SR 82)	A	1.3	\$ 5,600.00	\$ 7,280.00												
	B									1.3	\$ 23,760.00	\$ 30,888.00			\$ 45,824.00	
	Shoulder				2.75	\$ 5,280.00	\$ 14,520.00							\$ 14,520.00		
Royal Road	A	0.94	\$ 11,200.00	\$ 10,528.00												
	B	4.25	\$ 11,200.00	\$ 47,600.00										\$ 58,128.00		
Macnab Drive	A	1.3	\$ 11,200.00	\$ 14,560.00										\$ 14,560.00		
Bejarano Street	A	0.5	\$ 11,200.00	\$ 5,600.00										\$ 5,600.00		
Calle Sonora	A	0.37	\$ 11,200.00	\$ 4,144.00												
	B									0.32	\$ 23,760.00	\$ 7,603.20			\$ 12,867.20	
	C															
Congress Drive	A	0.32	\$ 11,200.00	\$ 3,584.00												
	B										0.3	\$ 23,760.00	\$ 7,128.00			\$ 94,232.00
	C															
Trail Alt											0.32	\$ 261,000.00	\$ 83,520.00			
												0.59	\$ 261,000.00	\$ 153,990.00	\$ 153,990.00	

General Note: Linear striping costs based on annual maintenance (2 applications of water-based paint per year). Does not include roadway surface maintenance cost.

* Share the road facility cost based recent AZ bid tabulations - cost per direction includes one narrow thermoplastic pavement marking every 200 feet at \$160 each, and 4 signs per mile (no annual maintenance)

** Bike lane facility cost based on recent AZ bid tabulations - cost per direction includes 2 water-based paint stripes, and one bike thermoplastic pavement marking every 200 feet at \$160 each, and 4 signs per mile

*** Buffered Bike lane facility cost based on recent AZ bid tabulations - cost per direction includes 2 water-based paint stripes, diagonal buffer striping and one bike thermoplastic pavement marking every 200 feet at \$160 each, and 4 signs per mile

**** Multi-Use Path facility cost based on the median average cost of a paved multi-use path - cost is based on national averages summarized here: http://www.pedbikeinfo.org/cms/downloads/Countermeasure%20Costs_Report_Nov2013.pdf

Legend:

Corridor Alternative

7.2 | Bicycle Standards

The standards that are recommended in this section are considered the best option based on extensive review of each of the corridors, related previous studies, and collaboration with both influential members of the community and public outreach. The suggestions offered have been developed to create an optimal option for the most users under most conditions. Whenever possible and appropriate, these recommendations should be adopted by the City to be used during roadway construction/development.

7 System Implementation



Signage and Pavement Markings

Having a well-designed road allows users to proceed safely and fluidly to their destination, and should require minimal signing. Adversely, an overabundance of warnings and signage often indicates an underlying safety issue with the roadway and can limit bicyclist usage. The attention of drivers and bicyclists should be on the road/lane, not on the signs on the side of the road. The goal is to successfully and safely guide roadway users without causing unnecessary distractions. Due to language barriers, the message should be conveyed by signs that are easily understandable, with symbols being preferred over text. Signage should always be placed adjacent to roadways, outside of the accessible pedestrian routes.

Shared Lane Signage and Pavement Markings

Shared Lane Markings (SLMs), or “sharrows,” are road markings used to indicate a shared lane environment for bicycles and automobiles. The shared lane marking is a pavement marking with a variety of uses to support a complete bikeway network; it is not a facility type and should not be considered a substitute for bike lanes, cycle tracks, or other separation treatments. The roadway does not always have markings indicating it is a shared lane, but in some heavily populated areas with higher traffic volumes, it is suggested to include SLM’s/sharrows and signage. Figure 7-3 showcases sharrows along a shared lane and examples of the different signage that can be used to indicate a shared lane.

Figure 7-3 | Shared Lane Markings & Signage



7 System Implementation



Shoulder Bikeway Signage and Pavement Markings

In general, no signs are required for shoulder bikeways. Bicyclists riding on shoulder bikeways are well served with adequate width and smooth pavement. Markings are normal four inches wide fog line stripe is used on shoulder bikeways. Figure 7-4 illustrates a bicyclist utilizing a shoulder bikeway.

Bike Lane Signage and Pavement Markings

Bike lane signage and pavement markings help indicate to bicyclists that they are on a designated bikeway, and detours motorists from using that specific part of the roadway. The standard guidelines for signage and markings indicates that markings should be present over ¼ to ½ mile on off-street facilities and every two to three blocks along bicycle facilities, and should be placed soon after turns to confirm destination(s). Pavement markings will also act as confirmation that a bicyclist is on a preferred route. Figure 7-5 showcases roadway pavement markings and signage used to inform users about the presence of a bike lane.

Figure 7-4 | Shoulder Bikeway



Figure 7-5 | Bike Lane Signage & Markings



7 System Implementation



Buffered Bike Lane Signage and Pavement Markings

Buffered bike lanes are conventional bicycle lanes paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. Ideally, the buffer shall be marked with two solid white lines, and would have a width of 18 inches. The buffer area could also have interior diagonal cross hatching, or chevron markings, if three feet or wider. Figure 7-6 showcases the diagonal cross hatching inside the three foot buffer between the bicycle lane and motorists. Bicycle lanes should be marked with word and/or symbol to designate that portion of the street for preferential use by bicyclists.

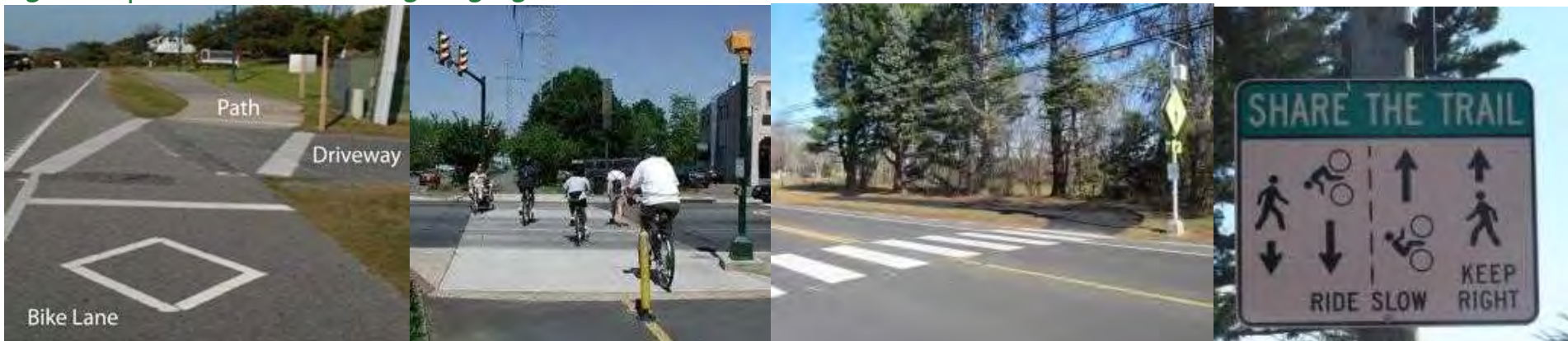
Multi-Use Path Signage and Pavement Markings

Signage and markings for multi-use paths can vary. Figure 7-7 illustrates examples of pavement markings and traffic control devices to use when multi-use paths intersect with roadways. Identified in Figure 7-7 also shows recommended signage options for multi-use paths, which illustrate proper use of the path, path etiquette, and path routing/wayfinding.

Figure 7-6 | Buffered Bike Lane Markings



Figure 7-7 | Multi-Use Path Crossing & Signage





Minimum Widths/ Typical Sections

Within the City of Nogales, there are several facility types suggested to help improve the mobility and safety for pedestrians and bicyclists. The National Association of City Transportation Officials (NACTO) and American Association of State Highway and Transportation Officials (AASHTO) have formulated a set of standards regarding the suggested widths of travel lanes used by both motorists and bicycles in order to reduce risk and improve safety.

When considering the width of a shared lane facility type, the NACTO/AASHTO guidelines indicate that it is required to have a minimum street width of 12 to 15 feet; unless the lane is also used by buses, in which case it would be better to extend the minimum outside lane plus shoulder width to 15 to 16 feet with striping to identify a paved shoulder to support safety for bicyclists.

Shoulder bikeways require a minimum of four to six feet according to NACTO/AASHTO standards; however, we suggest the City should adopt a minimum shoulder width of five to eight feet with the inclusion of a rumble strip which will allow a larger separation between motorists and bicyclists and a possible diversion for motorists if they begin to infringe into the bicycle shoulder area.

Many of the proposed roadways include the option to add a bike lane. The NACTO/AASHTO guidelines for bike lanes require a minimum of four feet separated with a six-inch wide white solid stripe. We have recommended a continuous five-foot bike lane along these roadways which can be adopted due to the existing lane widths.

A buffered bike lane option would require a minimum of a four to five-foot bicycle lane and a two-foot minimum buffer according to the NACTO/AASHTO standards. We recommend a seven-foot bicycle lane along these proposed corridors which can allow for side by side bicyclists and additional clearance from motorists. Regarding the option to include a multi-use path option, the NACTO/AASHTO guidelines indicate a minimum of eight to twelve feet to accommodate pedestrian and bicycle traffic along proposed routes. We feel that there is enough available room to accommodate ten feet of lane width for multi-use path options.

For the system to operate safely after the initial implementation, ongoing maintenance of restriping the roadways is critical. It is typical for a roadway with high traffic volumes to be restriped every year as a “double application” or one application twice per year. Maintaining roadway striping has shown to greatly enhance safety for all roadway users. Also, a review of the signs for presence and reflectivity is important to maintain the level of recognition of the facility use.

7.3 | Pedestrian Network

The existing pedestrian facilities in Nogales can be classified in two types: detached sidewalks and attached sidewalks. These two facility types are not exclusive to the downtown or suburban development patterns. The two facility types can be integrated along any functional classified street and are considered a base standard for streetscape design.



Detached Sidewalks

Detached sidewalks are sidewalks that incorporate a buffer between the traffic lane and the pedestrian zone. These buffers can be merely concrete extensions of the sidewalk or they can be landscaped with bollards, planters, grass, textured surfaces, or trees. The main idea is to provide a barrier between the street and pedestrian zone. Detached sidewalks are also much more likely to meet Americans with Disabilities Act (ADA) design standards, particularly if many driveways are present.

The width of the sidewalk is important in understanding the functionality of the sidewalk space and its capacity for pedestrian movement. A four foot detached sidewalk typically is designed to accommodate the lowest amount of pedestrian traffic and is wide enough for one person to walk comfortably. The most common application of this type of facility is along residential streets. A five foot detached sidewalk is very similar in function to the four foot detached sidewalk but allows for up to two people to walk comfortably side-by-side. A seven- or eight-foot detached sidewalk will allow up to three people to walk comfortably and can accommodate larger volumes of pedestrian traffic; this type of detached sidewalk is more appropriate in areas with higher amounts of commercial or institutional land uses. Lastly, ten-foot detached sidewalks are the optimum facility for pedestrians in heavily trafficked commercial areas. This sidewalk type can accommodate four people abreast and has a larger capacity to handle higher than normal pedestrian activity, such as along the commercial district on Morley Avenue. Additionally, in less developed areas a ten-foot pedestrian route may be designed and engineered to operate as a multi-use path accommodating both pedestrians and bicyclists, such as the recommendation on Grand Avenue. Figure 7-8 illustrates common types of detached sidewalks; the buffer zone of a detached sidewalk can vary depending on local or state design standards.

Figure 7-8 | Common Detached Sidewalk Types



Detaching the sidewalk and path from the curb and gutter can offer several advantages, including:

- Increased safety for the pedestrian;
- Lower cost for maintenance since the sidewalk and curb/gutter are not monolithic;
- Pedestrians would potentially not be impacted by roadway and curb/gutter maintenance activities;
- Improved ability to maintain sidewalk use during maintenance activities; and
- Improved ADA accessibility, particularly during roadway maintenance activities.



Pedestrian Comfort

Utility placement and pedestrian comfort go hand and hand. Comfort for the pedestrian is very important and should not be overlooked since it ultimately is the determining factor if sidewalks are used or not. Other factors such as sidewalk width, proximity to a building or fence, obstructions, and aesthetics all come into play for the comfort of pedestrians.

Safety

Walkways are defined by FHWA as either sidewalks or wide paved shoulders. Sidewalks with a curb and gutter provide an additional barrier between the motor vehicle and pedestrian, and the detached sidewalk provides the greatest safety since there is a buffer zone that the motor vehicle would have to go through before hitting the pedestrian.

From Federal Highway Administration (FHWA) “Safety Benefits of Walkways, Sidewalks, and Paved Shoulders”:

Annually, around 4,500 pedestrians are killed in traffic crashes with motor vehicles in the United States. Pedestrians killed while “walking along the roadway” account for almost 8 percent of these deaths. Many of these tragedies are preventable. Providing walkways separated from the travel lanes could help to prevent up to 88 percent of these “walking along roadway crashes.”

Attached Sidewalks

Attached sidewalks are sidewalks that are not separated or protected from the curb. This facility type is more common in older or historic blocks where there are large concentrations of commercial and public/institutional uses. This is the common type of sidewalk facility in Nogales. This facility type is also found along commercial corridors and sometimes in residential developments where there may be a smaller right-of-way. Generally, attached sidewalks do not accommodate as many pedestrians as detached sidewalks; this is because pedestrians tend to shy away from vehicular traffic. For this reason, attached sidewalks are not recommended for highly trafficked corridors. In the instance of a road right-of-way being narrow, attached sidewalks can be implemented as long as there is ample width given the demand of the facility. Figure 7-9 illustrates four common applications of attached sidewalks; the difference in types is that as the width increases the capacity of the pedestrian zone increases.

Figure 7-9 | Common Attached Sidewalk Types



Through the various channels used for input throughout the study, Figure 7-10 summarizes the key pedestrian corridors identified by the stakeholders and community for prioritized improvements for safety and accommodation for pedestrians.

7

System Implementation



Figure 7-10 | Nogales Key Pedestrian Corridors

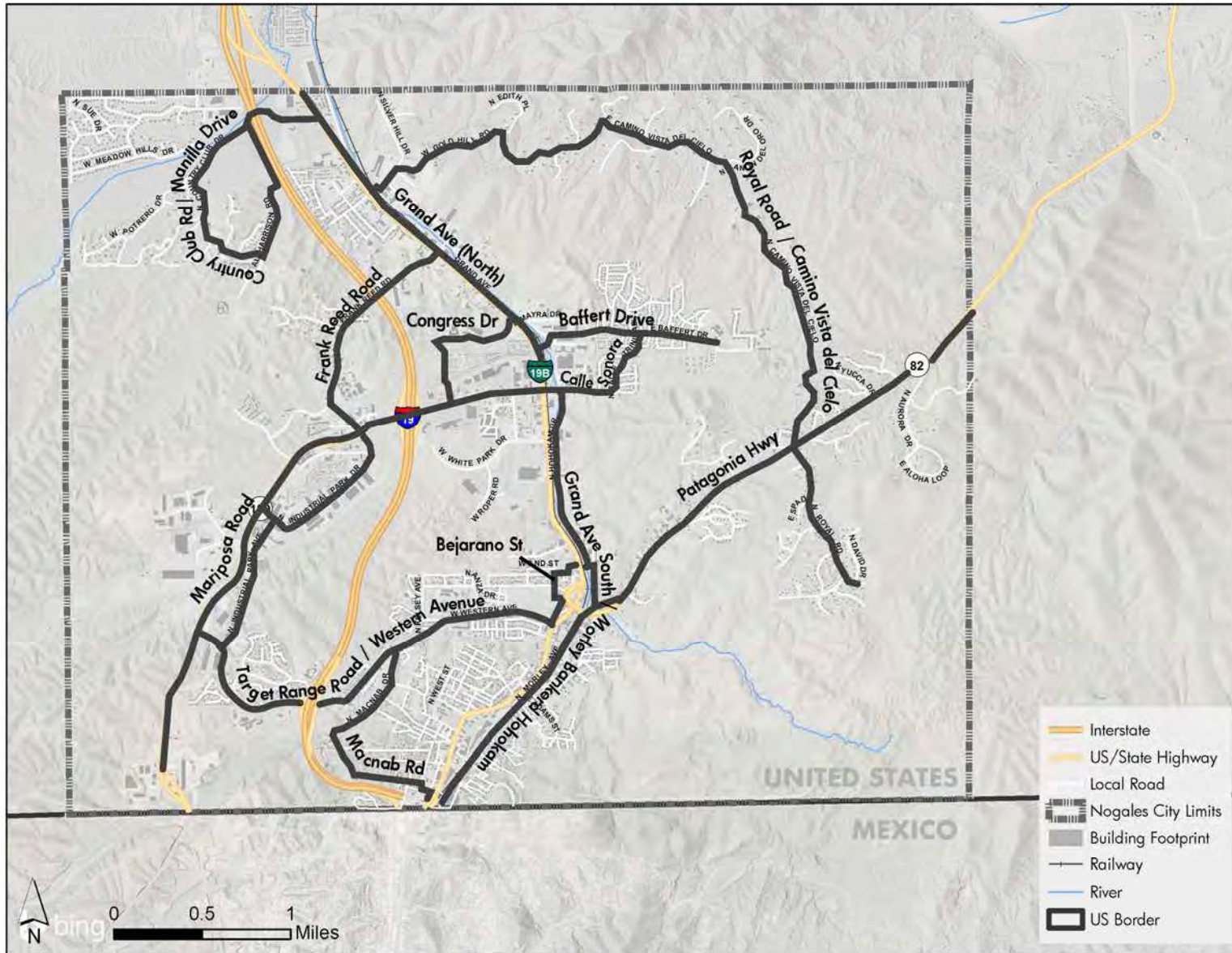




Table 7-2 | Pedestrian Facility Improvements Cost Matrix

Preliminary Pedestrian Facility Improvements Cost Matrix					
Corridor	Segment	Key Sidewalk Gap			Corridor Total
		Length (ft)	Cost/LF	Total	
Frank Reed Rd/ Industrial Park Dr	Paul Bond Dr - Frank Reed Rd to apartment complex	681	\$ 31.00	\$ 21,111.00	\$ 287,432.00
	Mariposa Ranch Rd - Frank Reed Rd to apartment complex	218	\$ 31.00	\$ 6,758.00	
	Industrial Park Dr - End of sidewalk near Mariposa & Frank Reed to Mariposa	4660	\$ 31.00	\$ 144,460.00	
	Frank Reed Rd - End of sidewalk at Mariposa Hills Dr to Grand Ave	3713	\$ 31.00	\$ 115,103.00	
Target Range Road/ Western Ave	Target Range Rd - End of sidewalk to Mariposa Rd	1934	\$ 31.00	\$ 59,954.00	\$ 75,423.00
	Bayze/Bejarano	499	\$ 31.00	\$ 15,469.00	
Mariposa Road/ Industrial Park Ave	Mariposa Rd - North side - Loma Mariposa Rd to End of Sidewalk near Frank Reed Rd	2054	\$ 31.00	\$ 63,674.00	\$ 405,511.00
	Mariposa Rd - Mariposa LPOE to Frank Reed Rd	11027	\$ 31.00	\$ 341,837.00	
Grand Ave (North)	Calle Sonora - Grand Ave to Smokey Ln	434	\$ 31.00	\$ 13,454.00	\$ 310,434.00
	Grand Ave - Terminal Dr to Cl Villa Hermosa	7810	\$ 31.00	\$ 242,110.00	
	Grand Ave - North of Terminal Produce Dr to Congress Dr	1333	\$ 31.00	\$ 41,323.00	
	Baffert Dr - Grand Ave to Mayra Dr	437	\$ 31.00	\$ 13,547.00	
Grand Ave (South)/ Morley-Bankerd- Hohokam	Arroyo Blvd - Intersection of Arroyo Blvd and Quarry St	121	\$ 31.00	\$ 3,751.00	\$ 50,282.00
	Court St - End of sidewalk across railroad tracks to Morley Ave	188	\$ 31.00	\$ 5,828.00	
	Doe St - Grand Ave to Bankerd Ave	312	\$ 31.00	\$ 9,672.00	
	First Street - Bayze Ave to Ronquillo Ave/Grand Ave	1001	\$ 31.00	\$ 31,031.00	
Country Club Drive/ Manilla Drive	Country Club Dr - Grand Ave to Meadow Hills Dr	3728	\$ 31.00	\$ 115,568.00	\$ 319,331.00
	Country Club Rd - Potrero Dr to San Lorenzo Dr	2874	\$ 31.00	\$ 89,094.00	
	Harrison Rd - Country Club Rd to San Lorenzo	3699	\$ 31.00	\$ 114,669.00	
Patagonia Highway (SR 82)	Patagonia On-Ramp - Perkins Ave to end of sidewalk	992	\$ 31.00	\$ 30,752.00	\$ 157,449.00
	Patagonia Hwy - End of sidewalk to Royal Rd	4087	\$ 31.00	\$ 126,697.00	
Macnab Drive	Crawford to end of sidewalk	2419	\$ 31.00	\$ 74,989.00	\$ 74,989.00
Bejarano Street	1st St to Tucson Nogales Hwy	1045	\$ 31.00	\$ 32,395.00	\$ 48,143.00
	Bejarano to Bayze Ave	508	\$ 31.00	\$ 15,748.00	
Congress Drive	End of sidewalk to North Grand Ave	1324	\$ 31.00	\$ 41,044.00	\$ 45,384.00
	Driveway on the south end	140	\$ 31.00	\$ 4,340.00	
Calle Sonora	Tucson Nogales Hwy to Smokey Ln	422	\$ 31.00	\$ 13,082.00	\$13,082.00
Baffert Drive	N Grand Ave to Baffert Dr	541	\$ 31.00	\$ 16,771.00	\$16,771.00

* Sidewalk facility cost based recent AZ bid tabulations - cost per linear foot (LF) is based on 5 foot sidewalks at \$5 per square foot of concrete sidewalk & an additional factored-in cost of \$6 per linear foot for 2 curb ramps (\$2,100 each) placed at intersections with an average distance of 720 feet

Table 7-2 summarizes the costs to improve the pedestrian network on the identified corridors previously displayed in Figure 7-10.



Driveway Safety

Driveway access is a critical roadway characteristic that has a direct impact on the level of safety for all right-of-way users including motorists, bicyclists and pedestrians. More specifically, commercial driveways can pose a significant safety issue due to heavier traffic volumes, wider driveway widths, the presence of a left-hand turn lane, and more frequent use of the driveway when compared to residential driveways. Figure 7-11 illustrates how closely spaced driveways can have a negative impact on pedestrian and bicycle safety. This situation is very prevalent in commercial areas where shared or cross-access is not provided across adjacent properties.

7.4 | Prioritization

As pedestrian and bicycle improvements are contemplated for the built environment of Nogales, the improvements will need to be prioritized due to funding constraints. Below is a list of suggested criteria to consider when prioritizing bicycle and pedestrian improvements:

Speed: The higher the traffic speeds are the more critical it is to provide pedestrian safety.

Street Classification: Arterial streets usually move higher volumes of traffic than collectors, so higher priority should be given to major arterial roads.

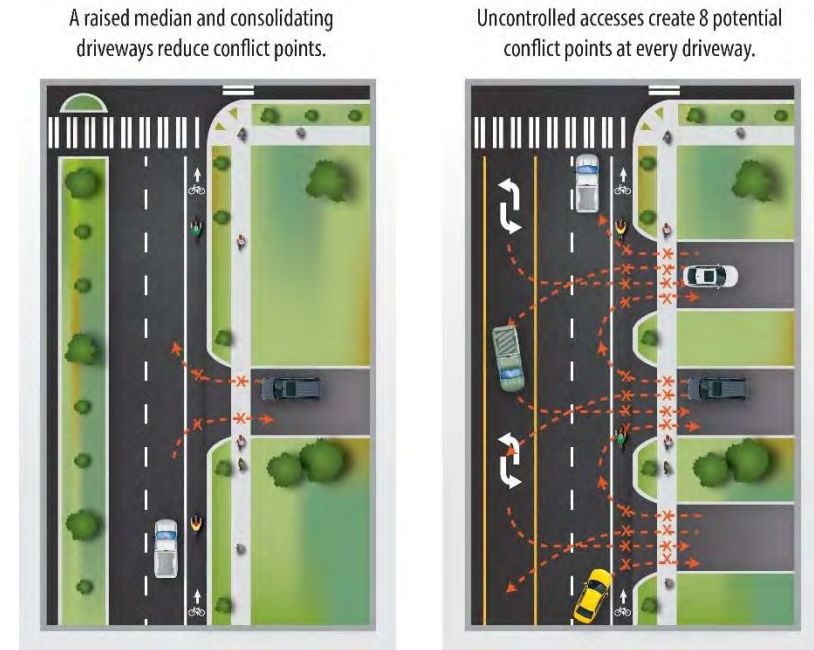
Crash Data: If there is crash data, it may be helpful to find a trend of where crashes occur. But note that, crashes do not typically occur always at one particular location, but rather in a general area or street, so sidewalk improvements should be continuous not point repairs.

School Walking Zones: It is important to provide access to safe walking zones particular to children. Many children may walk to and from school, so sidewalks should be continued into the surrounding neighborhoods.

Transit Routes: Transit patrons walk to their transit stops; therefore, providing walking options can increase the ease of using transit, thus increasing ridership. Additionally, it is important to provide for the disabled, since disabled persons typically rely on public transit more than the general populous. Special consideration should be paid to adding accessible ramps at bus stops and making shelters accessible.

Neighborhoods with Low Vehicle Ownership: If this information is available it may be helpful in determining prioritization.

Figure 7-11 | Driveway Access and Pedestrian/Bicycle Conflicts



7 System Implementation



Neighborhood Commercial Areas: Walking is a viable form of transportation that is overlooked. Sidewalks that are desirable to walk on can increase walking as a form of transportation for short trips.

Other Pedestrian Generators: Parks, recreation centers, churches, and hospitals all generate pedestrian activity. Areas with these features should be of consideration.

Missing Links: Sometimes sidewalks are installed in critical areas, but right outside of those areas sidewalks are missing. These discontinuous sidewalks can cause pedestrians to walk into the street, or worse leave those with disabilities needing to back track since ramps are not available.

Neighborhood Priorities: Even if there is no commercial activity, people tend to enjoy walking whether it is to a friend's house or for recreation. Many times citizens will speak up if they need a sidewalk in their neighborhood.

Other Mobility Considerations

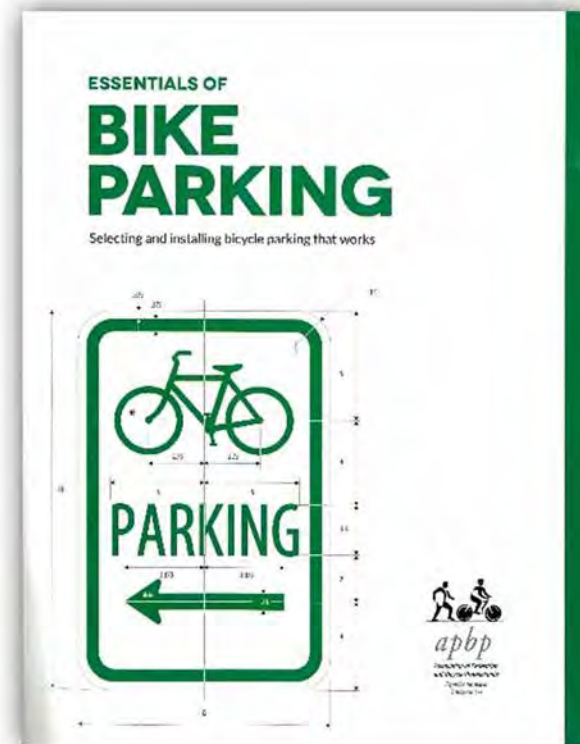
As Nogales completes bicycle and pedestrian improvements in the community, there are other considerations that will be discussed, including:

Complete Streets: Integrating multi-modal elements in a community's transportation system is critical for the ultimate success of achieving community mobility. The movement of "Complete Streets" has been in motion for several years. Complete Streets are designed to serve everyone – pedestrians, bicyclists, transit riders and drivers. Complete Streets in communities improve safety and mobility for all regardless of age or special needs.

Railroad Crossings: Railroad crossings can be dangerous for pedestrians, bicyclists, and especially wheelchair dependent pedestrians. There are several methods to reduce this hazard including approach treatments, signage, crosswalk design, additional warning mechanisms, and materials.

Bicycle Parking: Providing space for bicycle parking is critical to have a successful bicycle program where the network is used and the users believe that their property is safe. The Association of Pedestrian and Bicycle Professionals has a parking guidebook that provides excellent guidance on the types of racks and the space necessary to accommodate bicycle parking (Figure 7-12). In addition, the OS3 has been working in the community to provide bicycle repair stations.

Figure 7-12 | Bike Parking Signage





7.5 | Funding Opportunities

The SouthEastern Arizona Governments Organization (SEAGO) is the Council of Governments for the Nogales area. Councils of Governments (COGs) are the planning coordination agencies that are the primary method to coordinate and compete for funds for study and infrastructure projects. SEAGO receives approximately \$1,525,000 in federal highway construction and safety funds each year for the Transportation Improvement Program, or TIP. These funds are awarded to SEAGO members on a competitive basis, and once the SEAGO Executive Board approves a project, it is placed on the TIP. Use of these funds requires a 5.7 percent cash match from the recipient.

Funding for the SEAGO TIP comes from federal Surface Transportation Program and Highway Safety Improvement Program (HSIP) funds defined below. Also described below are various grant and funding programs that provide funding for bicycle and pedestrian related improvements.

BUILD Grants

The Better Utilizing Investments to Leverage Development, or BUILD Transportation Discretionary Grant program, provides a unique opportunity for the DOT to invest in road, rail, transit and port projects that promise to achieve national objectives. Previously known as Transportation Investment Generating Economic Recovery, or TIGER Discretionary Grants, Congress has dedicated nearly \$7.1 billion for ten rounds of National Infrastructure Investments to fund projects that have a significant local or regional impact.

In each competition, DOT receives hundreds of applications to build and repair critical pieces of our freight and passenger transportation networks. The BUILD program enables DOT to examine these projects on their merits to help ensure that taxpayers are getting the highest value for every dollar invested.

The eligibility requirements of BUILD allow project sponsors at the State and local levels to obtain funding for multi-modal, multi-jurisdictional projects that are more difficult to support through traditional DOT programs. BUILD can fund port and freight rail projects, for example, which play a critical role in our ability to move freight, but have limited sources of Federal funds. BUILD can provide capital funding directly to any public entity, including municipalities, counties, port authorities, tribal governments, MPOs, or others in contrast to traditional Federal programs which provide funding to very specific groups of applicants (mostly State DOTs and transit agencies). This flexibility allows BUILD and our traditional partners at the State and local levels to work directly with a host of entities that own, operate, and maintain much of our transportation infrastructure, but otherwise cannot turn to the Federal government for support.

Infrastructure For Rebuilding America

The INFRA Grants program provides dedicated, discretionary funding for projects that address critical issues facing our nation's highways and bridges. INFRA grants will support the Administration's commitment to fixing our nation's crumbling infrastructure by creating opportunities for all



levels of government and the private sector to fund infrastructure, using innovative approaches to improve the necessary processes for building significant projects, and increasing accountability for the projects that are built.

INFRA advances a grant program established in the FAST Act of 2015 and utilizes updated criteria to evaluate projects to align them with national and regional economic vitality goals and to leverage additional non-federal funding. The program increases the impact of projects by leveraging federal grant funding and incentivizing project sponsors to pursue innovative strategies, including public-private partnerships.

Additionally, the new program promotes the incorporation of innovative technology that will improve the transportation system. INFRA will also hold recipients accountable for their performance in project delivery and operations.

TIFIA Overview

The Transportation Infrastructure Finance and Innovation Act (TIFIA) program provides credit assistance for qualified projects of regional and national significance. Many large-scale, surface transportation projects - highway, transit, railroad, intermodal freight, and port access - are eligible for assistance. Eligible applicants include state and local governments, transit agencies, railroad companies, special authorities, special districts, and private entities. The TIFIA credit program is designed to fill market gaps and leverage substantial private co-investment by providing supplemental and subordinate capital.

The program's fundamental goal is to leverage Federal funds by attracting substantial private and other non-Federal co-investment in critical improvements to the nation's surface transportation system. TIFIA was created because state and local governments that sought to finance large-scale transportation projects with tolls and other forms of user-backed revenue often had difficulty obtaining financing at reasonable rates due to the uncertainties associated with these revenue streams. Tolls and other project-based revenues are difficult to predict, particularly for new facilities. Although tolls can become a predictable revenue source over the long term, it is difficult to estimate how many road users will pay tolls, particularly during the initial "ramp-up" years after construction of a new facility. Similarly, innovative revenue sources, such as proceeds from tax increment financing, are difficult to predict. TIFIA credit assistance is often available on more advantageous terms than in the financial market making it possible to obtain financing for needed projects when it might not otherwise be possible.

Federal Transit Administration Livability Grant Programs

DOT and FTA believe all segments of the population must have access to safe transportation services to get to work, housing, medical services, schools, shopping, and other essential activities. Many of FTA's grant programs offer States, metropolitan areas, rural and small communities the opportunity to create these accessible, livable communities.

FTA provides financial assistance to States, municipalities, transit agencies, and other public bodies for provision and delivery of public transportation services, capital investments in transit systems and facilities, as well for maintenance and repair of public transit systems. Transit provides critical "lifeline" services that connect all members of the community with employment, health, educational, and other important opportunities and services.



The Livable Communities Initiative encourages transportation agencies and local governments to introduce proposed transportation improvements to communities in the early stages of the planning process. The Partnership focuses on improved livability of rural as well as urban communities. FTA is committed to providing rural and non-metropolitan areas with opportunities to invest in public transit service to improve access for residents and offers unique programs tailored particularly for rural and tribal communities in order to increase access to basic human services and employment.

Metropolitan and Statewide Planning

Planning is the underpinning for livable communities. FTA recognizes that to improve planning, States, metropolitan planning organizations (MPOs), regional planning bodies, localities, and transportation providers must focus on the outcomes of their plans and investments. These partner agencies need to coordinate land use and transportation plans to ensure that investments of limited transportation funds support development patterns that are energy efficient, and increase the mobility and accessibility of a community's residents and resources. To increase the capacity of States, regions and localities to meet their transportation planning challenges, FTA provides metropolitan and statewide planning grants and programs. This can provide a foundation for livable communities, encouraging consideration of land use, reduced traffic congestion, the role of walking and biking, including for safe routes to schools, improved quality of life and public health, energy conservation, and environmental protection, including consideration of the environmental impacts of transportation decisions on minority and low-income populations.

Rural and Small Urban Areas (5311)

This program (49 U.S.C. 5311) provides formula funding to states for the purpose of supporting public transportation in areas of less than 50,000 populations. Funds may be used for capital, operating, and administrative assistance to state agencies, local public bodies, Indian tribes, and nonprofit organizations, and operators of public transportation services.

Rural Transit Assistance Program (5311(b)(3))

The Rural Transit Assistance Program (49 U.S.C. 5311(b)(3)) provides a source of funding to assist in the design and implementation of training and technical assistance projects and other support services tailored to meet the needs of transit operators in non-urbanized areas. RTAP has both State and national program components.

Intercity Bus (5311(f))

The Intercity Bus program under FTA's non-urbanized Area formula grant program supports the connection between non-urbanized areas and the larger regional or national system of intercity bus service. The program provides critical transit access to residents in non-urbanized areas to employment, health, educational, and other important "human" services and opportunities.

The Job Access and Reverse Commute Program (JARC)

The Job Access and Reverse Commute (JARC) program was established to address the unique transportation challenges faced by welfare recipients and low-income persons seeking to obtain and maintain employment. Many new entry-level jobs are located in suburban areas, and low-income



individuals have difficulty accessing these jobs from their inner city, urban, or rural neighborhoods. In addition, many entry level-jobs require working late at night or on weekends when conventional transit services are either reduced or non-existent. Finally, many employment related-trips are complex and involve multiple destinations including reaching childcare facilities or other services. A recent study of the economic benefits of employment-related transportation services concluded that transportation funded through the JARC program provided access to approximately 43.4 million jobs, including 21.2 million low-wage jobs.

The New Freedom Formula Grant

Aims to provide additional tools to overcome existing barriers facing Americans with disabilities seeking integration into the work force and full participation in society. Lack of adequate transportation is a primary barrier to work for individuals with disabilities. The 2000 Census showed that only 60 percent of people between the ages of 16 and 64 with disabilities are employed. The New Freedom formula grant program seeks to reduce barriers to transportation services and expand the transportation mobility options available to people with disabilities beyond the requirements of the Americans with Disabilities Act (ADA) of 1990.

Transportation for Elderly Persons and Persons with Disabilities

Provides formula funding to States for the purpose of assisting private nonprofit groups in meeting the transportation needs of the elderly and persons with disabilities when the transportation service provided is unavailable, insufficient, or inappropriate to meeting these needs. Funds are apportioned based on each State's share of population for these groups of people. For persons with mobility limitations related to advanced age, persons with disabilities, and persons struggling for self-sufficiency, transportation within and between our communities needs to be as available and affordable as possible.

Bus Livability Discretionary Grants

The Bus Livability Discretionary Grants program provides unallocated Section 5309 Bus and Bus Facilities money to projects that fulfill the six livability principle of the Interagency Partnership for Sustainable Communities, which consists of EPA, DOT, and HUD. The goal of the program is to invest in projects that increase transportation options, provide access to jobs and affordable housing, encourage economic development, and improve accessibility to transportation for the public. The program funds capital expenses for projects ranging from intermodal facilities, to sustainability oriented buses, to bicycle infrastructure and more. [Past Bus Livability Project Selections](#) awarded through this program.

Every Day Counts – 4: Safe Transportation for Every Pedestrian (STEP) – HSIP Funds

Pedestrians account for over 17.5 percent of all fatalities in motor vehicle traffic crashes, and the majority of these deaths occur at uncontrolled crossing locations such as mid-block or un-signalized intersections. These are among the most common locations for pedestrian fatalities generally because of inadequate pedestrian **crossing facilities** and insufficient or inconvenient **crossing opportunities**, all of which create barriers to safe, convenient, and complete pedestrian networks.



Expecting pedestrians to travel significantly out of their way to cross a roadway to reach their destination is unrealistic and counterproductive to encouraging healthier transportation options. By focusing on uncontrolled locations, agencies can address a significant national safety problem and improve quality of life for pedestrians of all ages and abilities.

Highway Safety Improvement Program (HSIP) funds is a competitive process administered through the Arizona Department of Transportation that can be used to fund safety improvements for pedestrians and bicyclists.

Surface Transportation Block Grant Program (STBG)

The Surface Transportation Block Grant program (STBG) provides flexible funding that may be used by States and localities for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals.

Transportation Alternatives

The Rails-to-Trails Conservancy operates the Transportation Alternatives Data Exchange (TrADE). Many resources were developed under an FHWA cooperative agreement from 1996 through September 2013.

The Fixing America's Surface Transportation (FAST) Act replaced the former Transportation Alternatives Program (TAP) with a set-aside of funds under the Surface Transportation Block Grant Program (STBG) mentioned above. For administrative purposes, the Federal Highway Administration (FHWA) will refer to these funds as the TA Set-Aside. The TA Set-Aside authorizes funding for programs and projects defined as **transportation alternatives**, including on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation and enhanced mobility, community improvement activities such as historic preservation and vegetation management, and environmental mitigation related to stormwater and habitat connectivity; recreational trail projects; safe routes to school projects; and projects for planning, designing, or constructing boulevards and other roadways largely in the right-of-way of former divided highways.

Recreational Trails Program

The **Recreational Trails Program** (RTP) provides funds to the States to develop and maintain recreational trails and trail-related facilities for both nonmotorized and motorized recreational trail uses. The RTP is an assistance program of the Department of Transportation's Federal Highway Administration (FHWA). Federal transportation funds benefit recreation including hiking, bicycling, in-line skating, equestrian use, cross-country skiing, snowmobiling, off-road motorcycling, all-terrain vehicle riding, four-wheel driving, or using other off-road motorized vehicles.



Safe Routes To School

The information on the Safe Routes to School (SRTS) webpages remains in effect for SRTS funds apportioned in Federal fiscal years 2005 through 2012.

The **Moving Ahead for Progress in the 21st Century Act** (MAP-21) authorized the Transportation Alternatives Program (TAP), which replaced the funding from pre-MAP-21 programs including the Transportation Enhancement Activities, Recreational Trails Program, and Safe Routes to School Program (SRTS). MAP-21 did not provide specific funding for SRTS, but SRTS projects are eligible for TAP funds and for Surface Transportation Program (STP) funds. TAP provisions and requirements apply to projects using TAP funds.