Final Report

Navajo County Central Region Transportation Study

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

The purpose of this study was to develop a multi-modal, multi-jurisdictional transportation plan that outlines the region's transportation priority projects and provides a plan for ultimate implementation. The transportation study was focused around identifying regional mobility needs that can accommodate the anticipated future population and employment growth. This transportation study is a joint effort of Navajo County, the City of Holbrook, the City of Winslow and the Arizona Department of Transportation (ADOT).

This chapter provides the background information relating to the study process and study area, and provides a summary of the findings and recommendations. Chapters 2 and 3 identify the current and future socioeconomic conditions used for this study, respectively. Chapters 4-8 provide the findings and recommendations for the study area, Heber-Overgaard, Holbrook and Winslow. Chapter 9 outlines the next steps for short term, mid-term and long-term implementation.

1.1 PROJECT OVERVIEW

Navajo County is located in northeastern Arizona. This region of the State includes one of Arizona's major destinations – the "White Mountains." This area has historically experienced rapid population and economic growth. Navajo County recently completed, in cooperation with Apache County, the *Southern Navajo County/Apache County Sub-Regional Transportation Plan.* That plan addressed growing transportation issues and challenges facing southern Navajo County and the County's White Mountain communities of Snowflake, Taylor, Show Low and Pinetop-Lakeside.

Recent intensification of development activity in other parts of the County, coupled with anticipated natural regional growth, has led to the need for a broader Regional Transportation Study. This study is intended to comprehensively address a range of transportation issues and identify infrastructure needs associated with key County communities and the connectivity of these southern and central population centers. This effort expands upon the *Southern Navajo County/Apache County Sub-Regional Transportation Plan.*

1.2 STUDY FRAMEWORK

Navajo County and the cities of Holbrook and Winslow have teamed up with ADOT to prepare this study. The overall scope of the study is similar to a Small Area Transportation Study (SATS) that ADOT has assisted communities in developing in recent years. The primary objective of ADOT's SATS program is to help communities develop a transportation plan for a defined local area to guide multi-modal planning and programming on local roads over a 20-year timeframe. Development of a SATS involves inventorying current conditions for all travel modes, determining deficiencies, forecasting future needs, and identifying and analyzing alternative solutions. Ultimately, a SATS provides the basis for developing a program of recommended transportation improvements and formulating a staged implementation guide to meet short-, mid-, and long-range needs. This Study accomplishes these same tasks, but the area of study

includes all of Navajo County, exclusive of land and transportation infrastructure within the Indian reservations.

1.3 STUDY PROCESS

This study was guided by a Technical Advisory Committee (TAC) that included representatives from Navajo County, the City of Holbrook, the City of Winslow and ADOT (both Multi-modal Planning Division and District staff). The role of the TAC was to provide technical guidance, to serve as a communication stream to the management and elected officials for the agencies they represent, to offer insight and suggestions regarding local technical issues, to perform document reviews and to provide input throughout the study process.

1.4 STUDY AREA

Navajo County encompasses 9,969 square miles, 67 percent of which is occupied by Indian reservation land. The Study Area as it relates to regional mobility is shown in Figure 1-1, encompassing approximately 3,400 square miles of the County. Figure 1-2 depicts the study area which and excludes reservation lands of the two adjacent Indian communities. The northern boundary of the Study Area follows the southern boundary of the Navajo Nation Tribal lands. The eastern and western boundaries coincide with neighboring Coconino and Apache Counties on the west and east, respectively. The southern boundary follows the northern limits of the Apache Nation Tribal lands, which is coincident with the southern limits of the Apache-Sitgreaves National Forest and the Mogollon Rim. Additionally, the southern boundary does not include the area previously studied in the *Southern Navajo County/Apache Regional Transportation Plan.*

The City of Holbrook, the County seat, and the City of Winslow are located along Interstate 40 (I-40) in the northern portion of the Study Area. Interchanges in both cities afford regional primary roadways access to the Interstate Highway System. Only Holbrook has direct highway connectivity with the southern portion of the Study Area via SR-377 and SR-77. SR-87 south of Winslow provides connectivity to Payson where this route intersects with SR-260 and extends into Phoenix. Directly south of the City of Winslow is the unincorporated town of Heber-Overgaard, which is situated along SR-260. SR-260 is a primary route between the Phoenix metropolitan area and the White Mountain communities.

1.5 PUBLIC INVOLVEMENT

As the study progressed, five public meetings were held. The first set of two public meetings were held at the City of Winslow City Hall and the City of Holbrook City Hall concurrently, on October 28, 2008 regarding current and future conditions. The second set of two public meetings were held again, at the City of Winslow City Hall and the City of Holbrook City Hall concurrently, on July 14, 2009 to discuss future conditions and the alternatives assessment. A final public meeting and Council Work Session was requested by City officials and held on December 16, 2009 in Holbrook to provide a full overview of the study, alternatives and recommendations.

FIGURE 1-1 VICINITY MAP

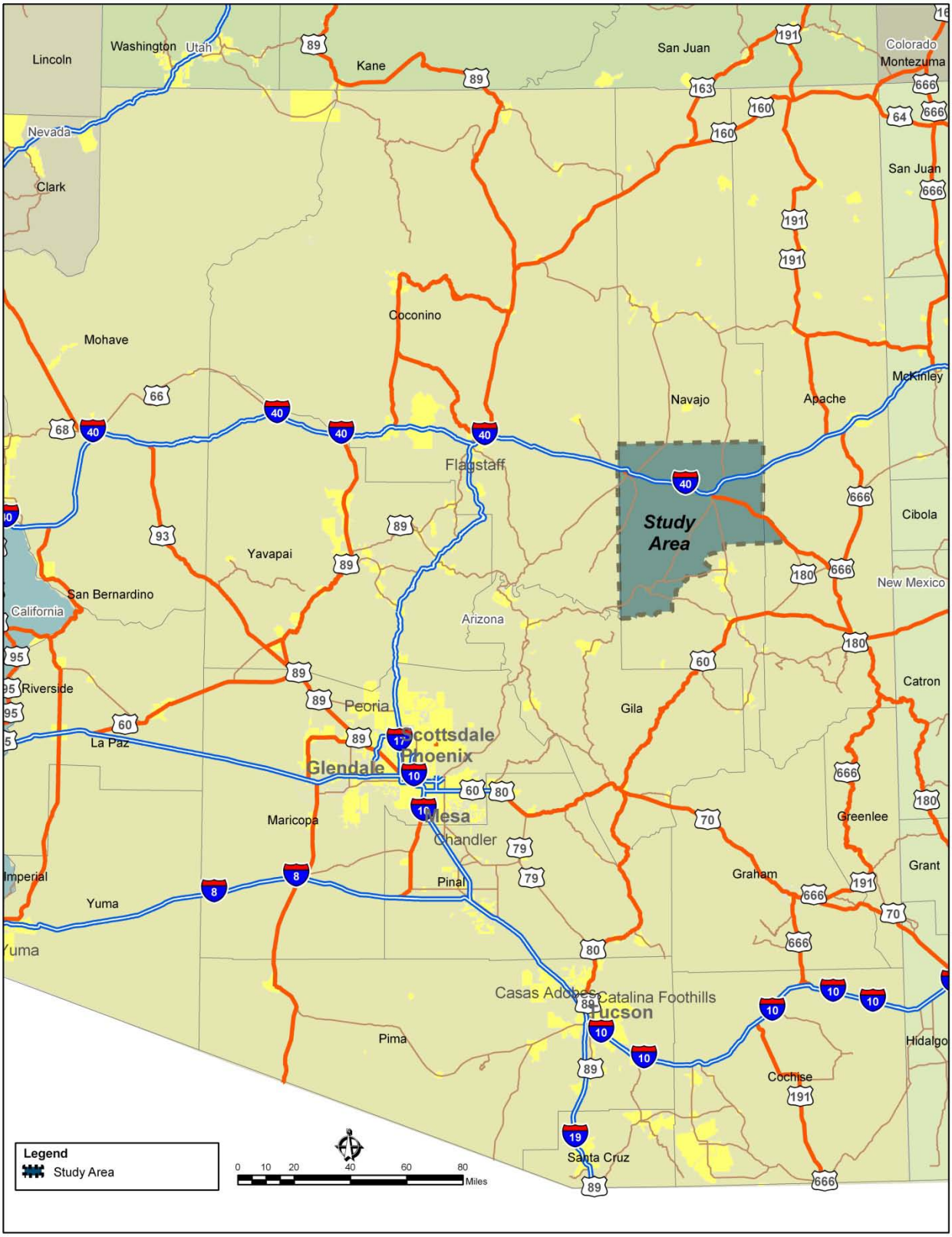
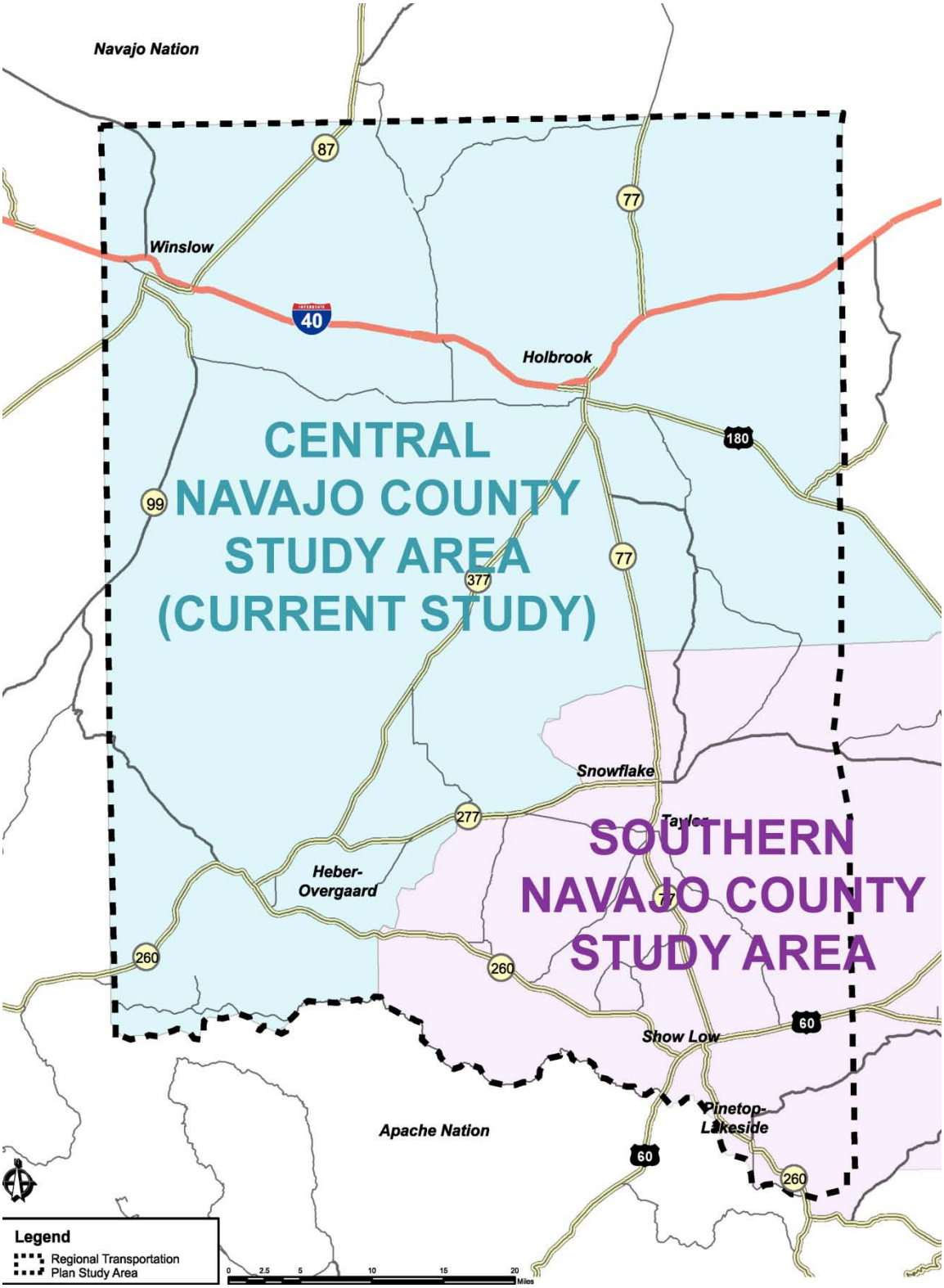


FIGURE 1-2 REGIONAL STUDY AREA



1.6 SUMMARY OF FINDINGS

- The current roadway system functions at a level of service C and above, with the exception of Navajo Boulevard in Holbrook.
- The Burlington Northern Santa Fe Railway (BNSF) "Transcon" line traverses alongside I-40, passing through the communities of Holbrook and Winslow.
- SR-77 is the primary direct route for southern Navajo County residents to access I-40.
- SR-77 is the only BNSF railroad crossing location that is suitable for travel between I-40 and southern Navajo County.
- SR-377 is the route for Heber-Overgaard residents and SR-260 travelers from Payson to access I-40.
- Freight traffic on SR-377 and SR-77 is a large percentage of traffic on these two routes.
- A master plan for 226,000 acres is being proposed south of I-40 and north of SR-277 within the study area.
- The Central Navajo County study area is projected to grow by more than 13,400 households and 5,200 jobs by Year 2030. Much of this growth is attributed to the 226,000 acre development plan previously identified. This does not include growth for Southern Navajo County or growth anticipated after Year 2030.
- The growth forecasted for Southern Navajo County coupled with the growth in Central Navajo County will degrade mobility and safety within Holbrook along Navajo Boulevard, particularly between the Little Colorado River and I-40.
- Within Holbrook, there is a need for an alternate route/emergency route/freight route from the existing SR-77 (Navajo Boulevard) BNSF railroad crossing.
- Within Winslow, proposed commercial/residential development north of I-40 and industrial development south of the BNSF railroad, each consisting of over 1,200 acres will contribute substantially to the future traffic demands in the study area.
- The City of Winslow Williamson Avenue undercrossing is the primary connection for mobility between Payson and I-40 along SR-87. The undercrossing is narrow and has vertical clearance issues.
- Within Winslow, there is a need for an alternate route/emergency route/freight route from the existing SR-87 to I-40.
- The east and west interchanges that service the City of Winslow have circulation and geometric configuration issues.
- There are opportunities to expand upon the successful regional White Mountain Connection transit service between Holbrook and Show Low.
- Heber-Overgaard is anticipated to experience a significant amount of traffic increases due to regional mobility needs. Long range mobility alternatives are

needed to preserve the character of Heber-Overgaard while maintaining acceptable mobility through this portion of Navajo County.

- There is an opportunity to convert the restored Amtrak station in Holbrook to a multi-modal hub servicing Amtrak, Greyhound and the White Mountain Connection.
- The newly restored Downtown, La Posada Hotel and Amtrak Station along with the Winslow Airport in Winslow will continue to serve as a multi-modal transportation hub and they will all serve together as connectors to Reservation lands to the north, Flagstaff to the west, Holbrook to the east and Payson to the south.
- Access management techniques should immediately be implemented in Holbrook and Winslow to preserve system capacity.
- Access management techniques should be implemented study-area wide to preserve investment dollars spent on mobility improvements, enhance safety and improve capacity.
- Transit service between Winslow and Holbrook, and between Winslow and Flagstaff should be explored.

1.7 RECOMMENDATIONS

The study findings provided the framework for short-, mid- and long-range mobility improvements. The recommendations are depicted in Figures 1-3 through 1-6 for the greater Study Area, Heber-Overgaard, the City of Holbrook and the City of Winslow respectively.

FIGURE 1-3 STUDY AREA RECOMMENDATIONS

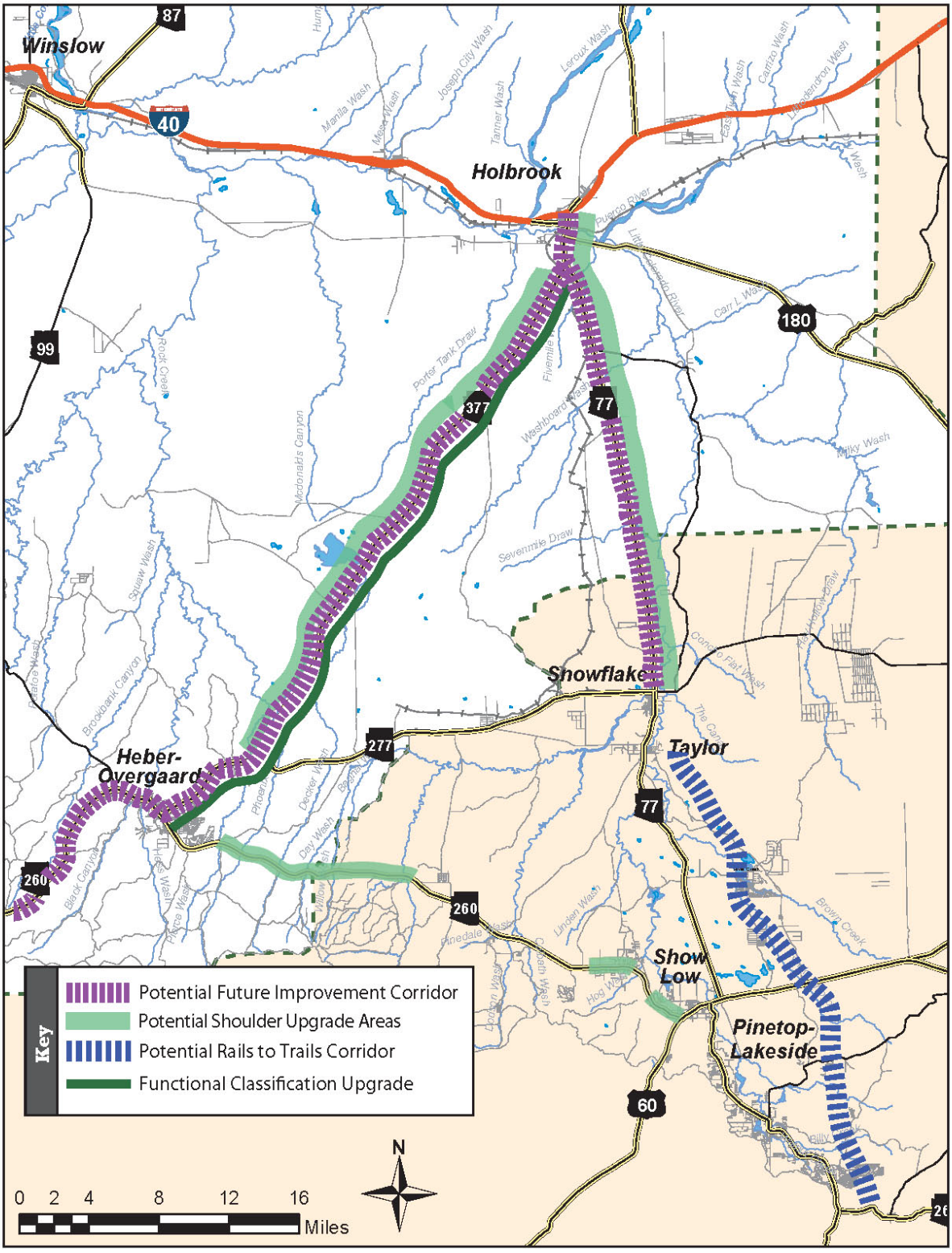


FIGURE 1-4 HEBER-OVERGAARD AREA RECOMMENDATIONS

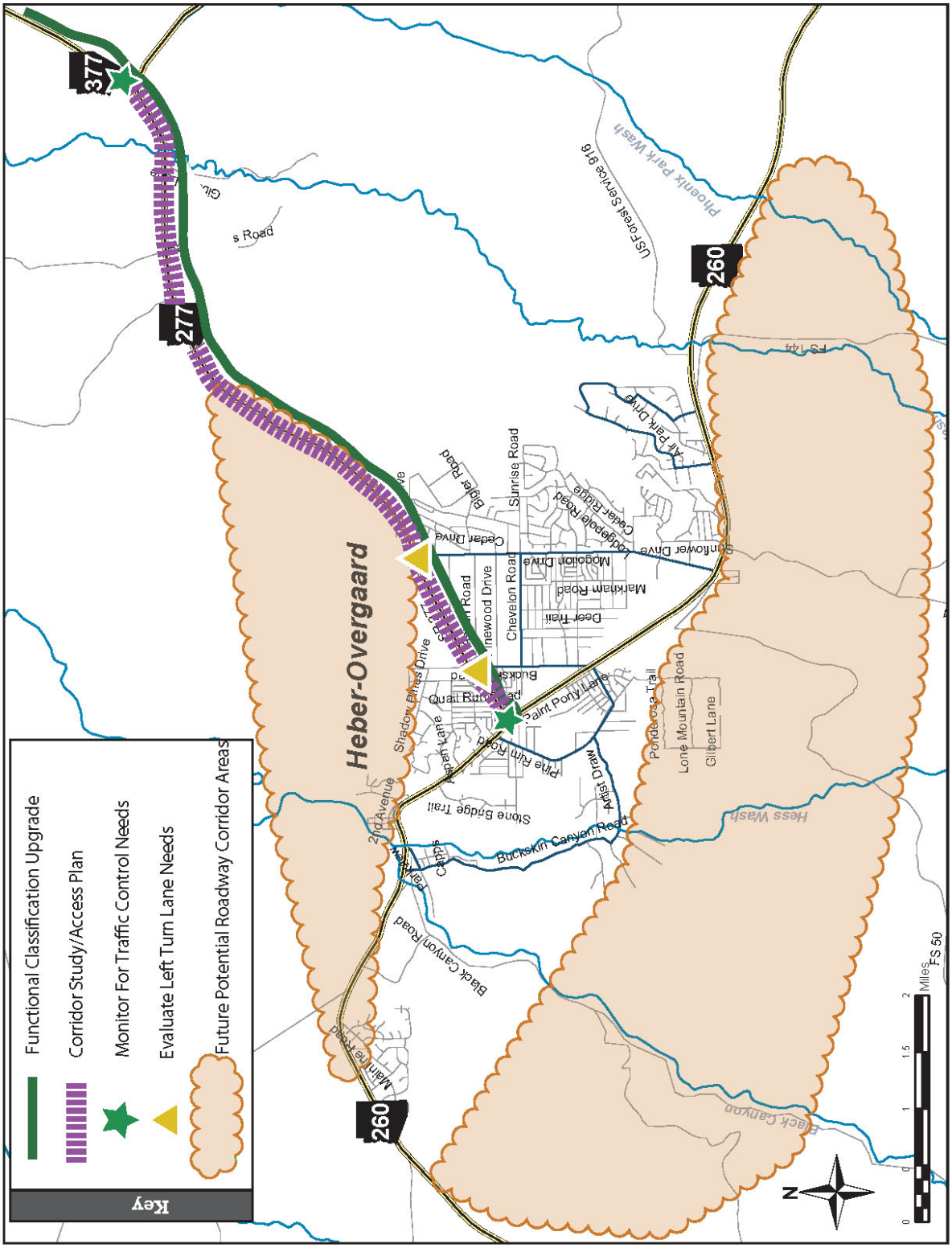


FIGURE 1-5 HOLBROOK AREA RECOMMENDATIONS

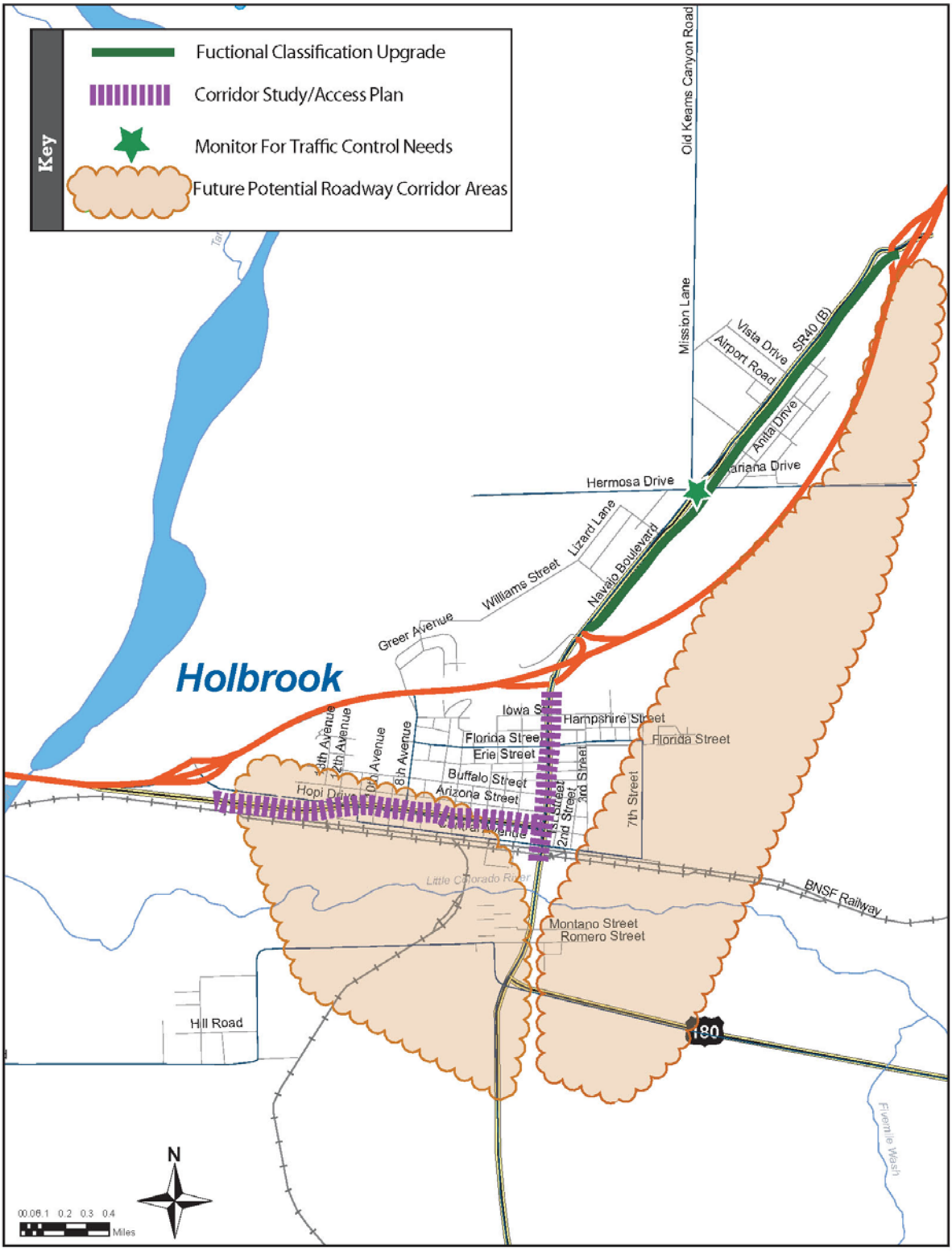
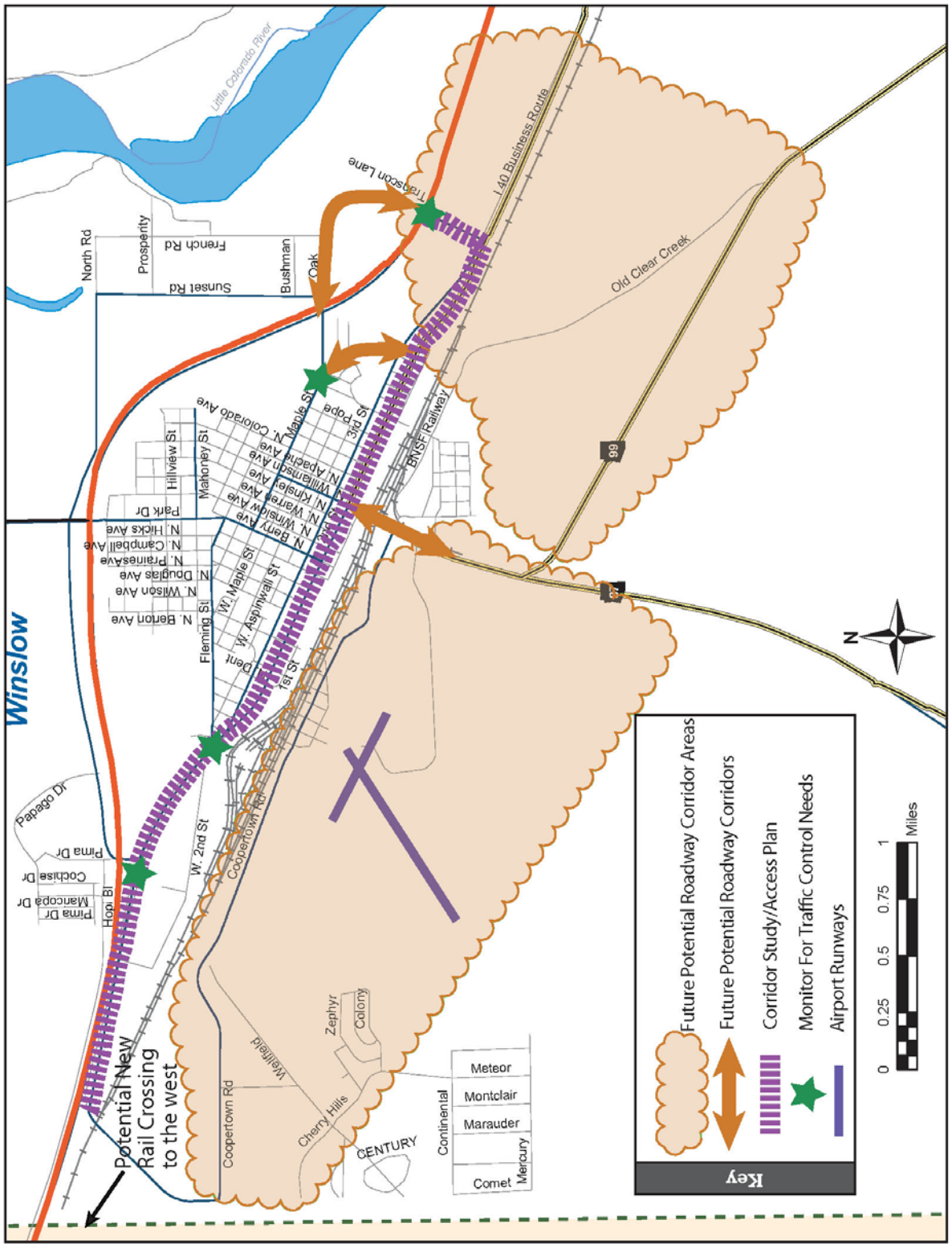


FIGURE 1-6 WINSLOW AREA RECOMMENDATIONS



2.0 EXISTING CONDITIONS

This chapter presents existing conditions information relating to land use and socioeconomic conditions, and multi-modal transportation conditions within the Study Area. It also presents an evaluation of the highway network, which identifies current mobility deficiencies and establishes the basis for determining future transportation needs.

2.1 LAND USE AND SOCIOECONOMIC DATA

Navajo County, exclusive of the Indian reservation lands, is home to six incorporated towns and cities and numerous other unincorporated communities. The generalized land use patterns of the Study Area are identified and an overview of the social and economic characteristics is presented. Year 2006 was used as a base year due to the data availability from the *Southern Navajo County/Apache Regional Transportation Plan*.

2.1.1 EXISTING LAND PATTERNS

Navajo County hosts a mix of land ownership patterns, primarily focused around the communities of southern Navajo County, Holbrook, Winslow and Heber-Overgaard. Outside of these communities, the land use includes a vast amount of state or federal ownership including State and National Forest, State Lands Trust, and Bureau of Land Management (BLM) land holdings, protecting and preserving the lands for future generations.

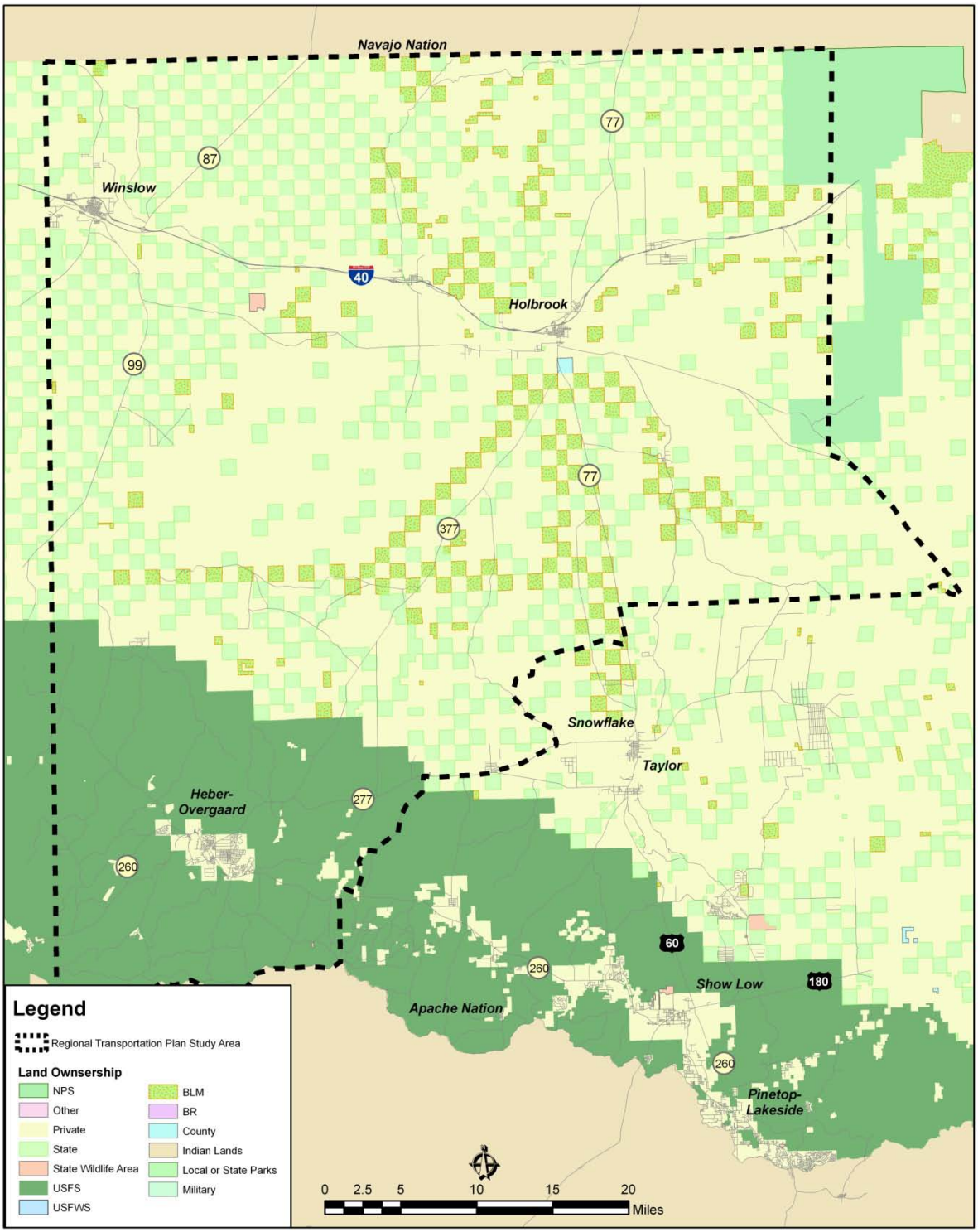
Navajo County is generally rural in nature with areas of focused development. In the Navajo County Comprehensive Plan, these focused development areas are called character areas that represent generalized land uses, development or preservation concepts that recognize and promote existing development patterns. Figure 2-1 depicts the land ownership patterns found within Navajo County.

2.1.2 EXISTING SOCIOECONOMIC CONDITIONS

Areas of Navajo County have experienced fast paced growth, while others have not. Between 1980 and 2000, the City of Holbrook generally did not see any change in dwelling units or population, whereas Winslow saw a 10 percent growth in that same period. Much of the growth in the region was located in the Southern Navajo County study area, primarily in Show Low and Pinetop-Lakeside.

The socioeconomic data for the study was updated to year 2006 conditions using the US Census 2000 data coupled with building permit information supplied by Navajo County. The year 2006 socioeconomic data totals for the study area include 8,062 dwelling units and 10,278 employees. The socioeconomic data was distributed geographically within the Traffic Analysis Zone (TAZ) structure for travel demand modeling purposes.

FIGURE 2-1 LAND OWNERSHIP PATTERNS



Source: USGS

2.2 ENVIRONMENTAL JUSTICE OVERVIEW

"Title VI of the Civil Rights Act of 1964" and related statutes assure that individuals are not excluded from participation in, denied benefit of, or subjected to discrimination under any program or activity receiving federal financial assistance on the basis of race, color, national origin, age, sex, and disability. "Executive Order 12898" on environmental justice, dated February 11, 1994, directs that programs, policies, and activities not have a disproportionately high and adverse human health or environmental effect on minority and low-income populations.

There are three fundamental environmental justice principles. Including:

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

The demographic composition of the study area was calculated using the U.S. Department of Commerce, Bureau of the Census 2000, Census of Population and Housing statistics. Census tracts are small, relatively permanent statistical subdivisions of a county for tallying census information, and do not cross county boundaries. They are delineated with the intention of being maintained over a long period of time to allow statistical comparisons from census to census.

The U.S. DOT Order (5610.2) on environmental justice provides definitions of the four minority groups addressed by the Executive Order. The four groups include:

- Black (a person having origins in any of the black racial groups of Africa);
- Hispanic (a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race);
- Asian American (a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands); and
- American Indian and Alaskan Native (a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition).

Additionally, the U.S. DOT Order defines "low income" as a person whose household income is at or below the Department of Health and Human Services poverty guidelines, which are used to determine the eligibility for Community Service Block Grants.

The intent of the Executive Order regarding environmental justice is to help ensure that those minority communities and low income populations do not burdened by a disproportionate share of an improvement project and benefit equally from the transportation system.

2.2.1 NAVAJO COUNTY DEMOGRAPHICS

An overview of the ethnic and income characteristics of Navajo County and the study area was completed to identify the study area make-up. Table 2.1 summarizes the year 2000 Census demographic data as it pertains to the environmental justice populations.

TABLE 2.1- ENVIRONMENTAL JUSTICE SOCIOECONOMIC CHARACTERISTICS

Characteristic	Study Area	County	State
Racial Composition			
White	43,418	44,752	3,873,611
Black or African American	812	857	158,873
American Indian and Alaska Native	5,149	46,532	255,879
Asian	302	322	92,236
Other	3,040	3,113	603,509
Hispanic or Latino	7,419	8,011	1,295,617
Low Income Statistics			
Persons in Poverty	8,146	28,054	698,669
Median Household Income	$34,581	$27,688	$40,558

Source: 2000 Census

The statistics show that approximately 95 percent of the Black or African American population within the county resides within the study area. Additionally, 94 percent of the Asian and 98 percent of the other race populations reside within the study area. Approximately 93 percent of the Hispanic or Latino populations live within the study area. Only 11 percent of the County's 46,532 American Indian persons live in the study area primarily due to Indian Reservation land making up 67% of the land area.

The 2000 Census data shows that the persons below poverty level within the study area tracts range from 9.4 percent to 28 percent, with an average poverty level of approximately 16 percent. The highest level, 28 percent, was located at the far northwestern portion of the study area, outside of any proposed transportation improvements.

As transportation improvements are implemented for the study area, an evaluation, particularly for the most northwestern portion of the study area, should be completed to ensure that there are no specific races or low income populations that are unfairly burdened by any future improvements. Additionally, an evaluation should be completed detailing any positive impacts in terms of access to the community and transportation options for regional mobility. During the project development process, proactive efforts should be made to ensure the opportunities for all populations to be involved in the process.

2.3 ENVIRONMENTAL OVERVIEW

The growth seen in Arizona reflects the absolute need to plan infrastructure improvements with the natural environment and cultural resources in mind. The state of Arizona has completed a number of studies and efforts to help to ensure that there is an

active awareness to plan with the environment. During 2006, state and federal agencies completed Arizona's Wildlife Linkages Assessment which examined the key habitat linkages to help conserve the wildlife and natural ecosystems that Arizonans and visitors to Arizona travel to enjoy. Additionally, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (Public Law 109-59, (SAFETEA-LU) calls for greater environmental consideration when developing regional transportation plans.

This section will provide a brief overview of the physical, natural and cultural resources that should be accounted for as the transportation system in Navajo County is planned and developed. This overview will also help ADOT by providing the data necessary to complete any early coordination activities that may be needed to successfully determine the level of, and ultimately complete National Environmental Policy Act (NEPA) environmental documentation.

2.3.1 PHYSICAL CONDITIONS OVERVIEW

Navajo County is situated within the majestic White Mountains region of Arizona. Figure 2-2 depicts the topographic features of the study area. As shown, the study area is generally gently sloped with the southern portion of the study area having the greatest amount of natural topography.

Figure 2-2 also illustrates the floodplain areas within the study area based on the Federal Emergency Management Agency floodplain delineations. As depicted in Figure 2-2, much of the areas in the vicinity of Winslow, Holbrook, Snowflake and Taylor are within the 100-year flood zone. The City of Winslow has been working to recertify their levee system, so the flood zone may change.

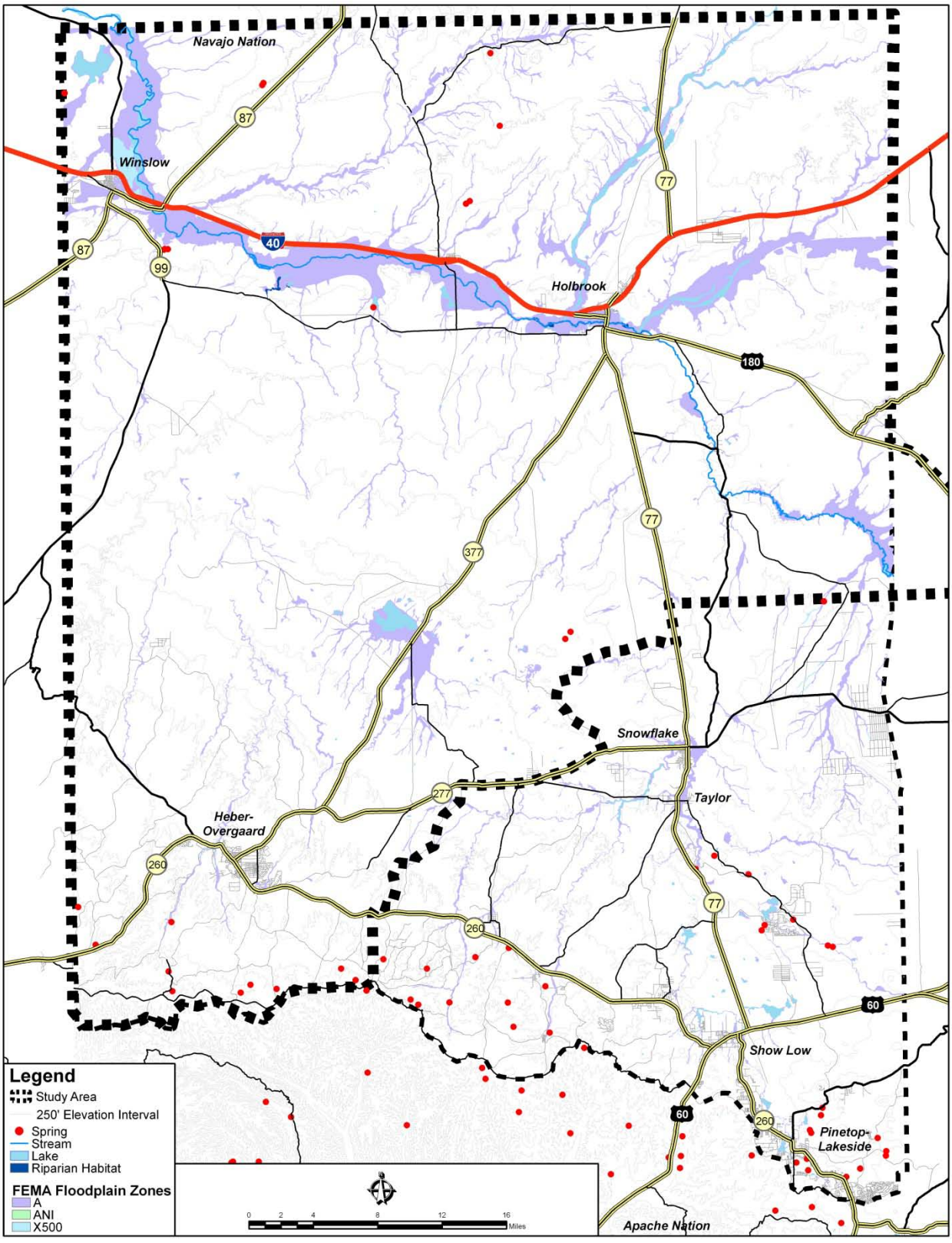
2.3.2 NATURAL RESOURCE OVERVIEW

As an area develops, it is highly recommended to avoid natural resource impacts. There are times when completing a transportation project, and no other alternatives exist, so minimizing or mitigating the impacts can become necessary. This natural resource overview can help identify potential impacts that would later be refined during the project development process.

During 2006, Arizona's Wildlife Linkages Assessment was completed identifying three key linkages within the study area, identified as linkages 27 (between Holbrook and Snowflake), 28 (northeast of Holbrook) and 42 (near Heber-Overgaard). Figure 2-3 depicts the statewide wildlife linkages. These three identified linkages should be understood when any transportation improvement project is being contemplated in these areas. Additionally, as development proposals are proposed, care should be taken to understand and preserve them.

A search using the National Wetland Inventory (NWI) database did not identify any known wetlands within the study area; however only the southern portion of the study area had been surveyed for NWI purposes. As projects are defined, particularly along streams and the Little Colorado River, early coordination with the U.S. Army Corps of Engineers (USACOE) is encouraged to maximize communication to the permitting agency and minimize review time.

FIGURE 2-2 PHYSICAL FEATURES



SOURCE: USGS

2.3.3 CULTURAL RESOURCE OVERVIEW

The White Mountains region has a very strong western heritage. During 2000, Arizona State Parks completed an update to the State Historic Preservation Plan. This Plan identifies five federal agency partners, 21 recognized Tribal Government Partners, 12 State agency partners, 22 local communities offering cultural preservation programs not including the several county programs. The State Historic Preservation Plan identifies two Historic Districts, 32 contributing properties and 33 State and National Register Listings. During year 2000, the cities of Holbrook and Winslow both had certified Local Government Preservation Programs.

As stated in the Winslow General Plan, the early settlers found a crossing of the Little Colorado River in Winslow, which became a focus for regional trails and roads. The railroads discovered Winslow in the late 1800's based on a roadway survey, and eventually Route 66 was developed. Winslow was also a primary stop for Trans World Airlines transcontinental service.

Holbrook houses the Downtown, Railroad and Route 66 Historic Districts that help provide the story of Holbrook. The Historic Preservation Commission in Holbrook plays a primary role in promoting the western heritage and multi-cultural, traditional values seen throughout the region.

2.4 EXISTING TRANSPORTATION SYSTEM

The Navajo County multi-modal transportation system contains federal, state and local roadways to effectively move commerce, citizens and visitors. The backbone of the Navajo County transportation system is developed with several high class roadway facilities. Interstate 40, located towards the northern portion of the study area, plays an important regional and sub-regional role in the transportation system. Additionally, SR-77, SR-277, SR-260 and US-60 also facilitate much of the travel demands in the region. All of the communities evaluated within this Transportation Plan are situated on at least one of these major roadways.

Recently, commuter transit service began servicing the SR-77 corridor connecting Holbrook to Show Low with morning, midday and evening service. Winslow is working to develop a similar service along I-40, connecting to Flagstaff to the west and Holbrook to the east. That, coupled with the locally based services will help to enhance modal options for many of the Navajo County residents.

Rail service is present in the study area, primarily as through service paralleling I-40 with a stop in Winslow for the BNSF railroad yard and Amtrak service.

Air service is available at the Winslow-Lindbergh Regional Airport on a non-schedule basis.

2.4.1 FUNCTIONAL CLASSIFICATION AND GEOMETRY

The transportation system is made up of varying roadway types that provide mobility and access. These roadway types comprise of urban and rural functional classification. Functional Classification of roadways is a critical component of effective transportation planning. The functional classification designations were developed to help manage

mobility and access to preserve capacity, allow for effective land use planning and land use decisions, and to protect property owner's property investment decisions regarding appropriate access and mix of traffic types. Providing facilities that are meant to move traffic and commerce must be in balance with other facilities where key connectivity is needed. All streets and highways are grouped into one of five major classifications depending upon the character of the traffic and surrounding land uses along with the necessary level of access. Typically when congestion occurs, there is an imbalance between the functional classification, access and the surrounding land uses. Unincorporated Navajo County, Heber-Overgaard and Holbrook are considered to have "Rural" functional classifications and the City of Winslow has "Urban" functional classifications due to census designation. The road classifications are defined as follows:

Freeway: A freeway is typically a multi-lane, high-speed divided principal arterial roadway with the primary purpose of moving traffic efficiently. Access is controlled at interchanges only. The purpose of a freeway is to move traffic at high-speed for longer regional or interregional trips.

Principal Arterial: A principal arterial can be two or more lanes, is generally high speed with the primary purpose of moving traffic efficiently. Principal arterial roadways generally connect major activity centers, serve longer trips, and provide primary accesses to freeways at interchanges. Local or individual access driveway is generally not permitted in order to maintain the integrity of the roadway.

Minor Arterial: A minor arterial can also be two or more lanes with the purpose of connecting lower and higher functionally classified facilities. Minor arterials also connect major activity centers, but serve shorter trips and offer connectivity to larger land tracts and larger commercial developments.

Major Collector: A major collector is generally two lanes with the purpose of providing connectivity between the minor collector and local street network to the minor arterial network as well as providing direct commercial and larger residential development access to the roadway network.

Minor Collector: A minor collector is generally two lanes with the purpose of providing local street network access to the major collector and minor arterial roadways. The level of access is greater than the higher classification facilities, providing direct commercial and multi-family residential access to the transportation system.

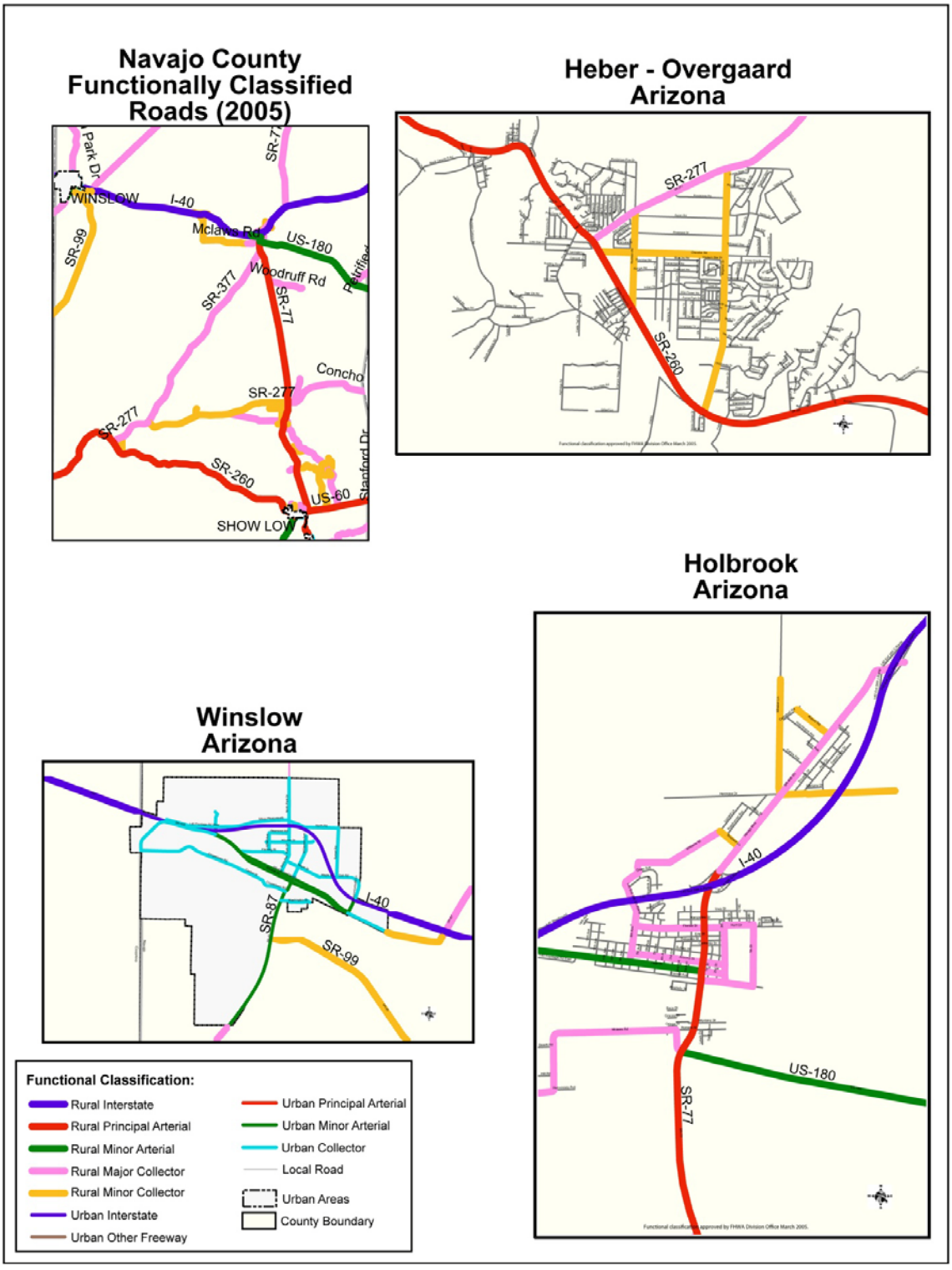
Local: Local roadways provide direct access, and have the greatest amount of access allowed. Through traffic is discouraged on local roadways. Local roadways area not evaluated as part of this Transportation Plan.

Figure 2-4 graphically depicts the primary transportation system in the county and the functional classifications of these facilities. Figure 2-5 illustrates the number of lanes for each facility included in the transportation system.

Currently, ADOT is undertaking a Statewide Access Management Plan in accordance with the policies of the State Transportation Board to develop an access management classification system for the State Highways and to develop a comprehensive access management manual to guide the uniform application of access management throughout the state. The necessity of access management to preserve the function,

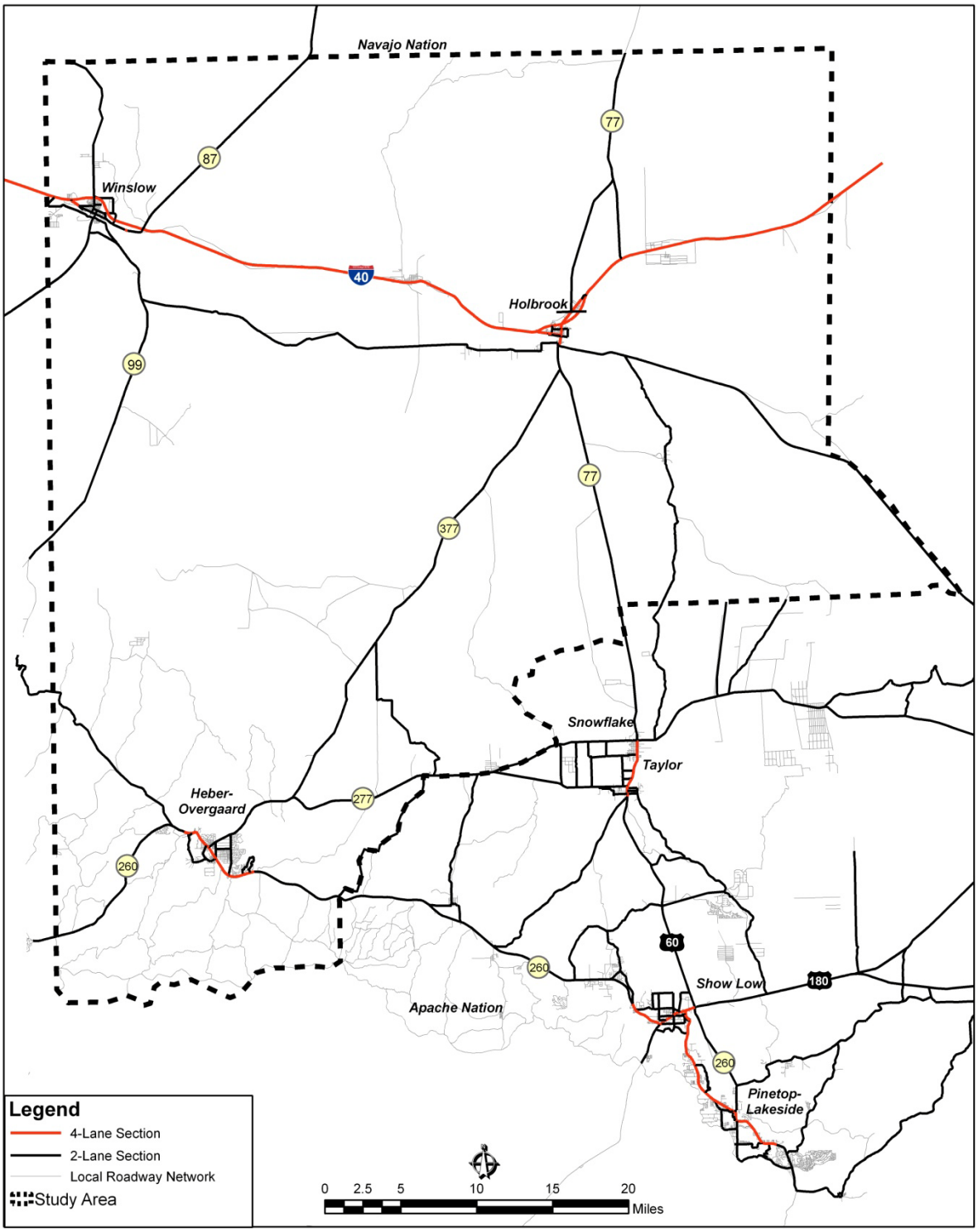
efficiency and safety of state highways has increasingly been recognized throughout the United States and in Arizona. The outcome of this process should be monitored to be reflected in future updates of this plan.

FIGURE 2-4 FUNCTIONAL CLASSIFICATION



Source: Arizona Department of Transportation

FIGURE 2-5 PRIMARY ROADWAY NETWORK TRAVEL LANES



Source: ADOT

2.5 ROADWAY NETWORK OPERATIONAL CONDITIONS

Traffic operations for a Regional Transportation Plan are measured by evaluating the primary roadways to ensure that there is adequate capacity to handle regional and sub-regional travel demands. The roadway segments are examined at a planning level to compare existing and forecasted daily traffic demand with the facilities capacity. Since many of the roadways are two-lanes, the roadway width, level of access, availability of turn lanes, shoulders and functional classification determine the roadway capacity.

2.5.1 TRAFFIC COUNTS

Traffic counts were obtained from participating agencies. These counts provide the foundation for the segment traffic operations analysis, used to identify current capacity needs within the study area. These counts also form the basis for the existing conditions network calibration effort. Figure 2-6 depicts the Year 2006 traffic counts.

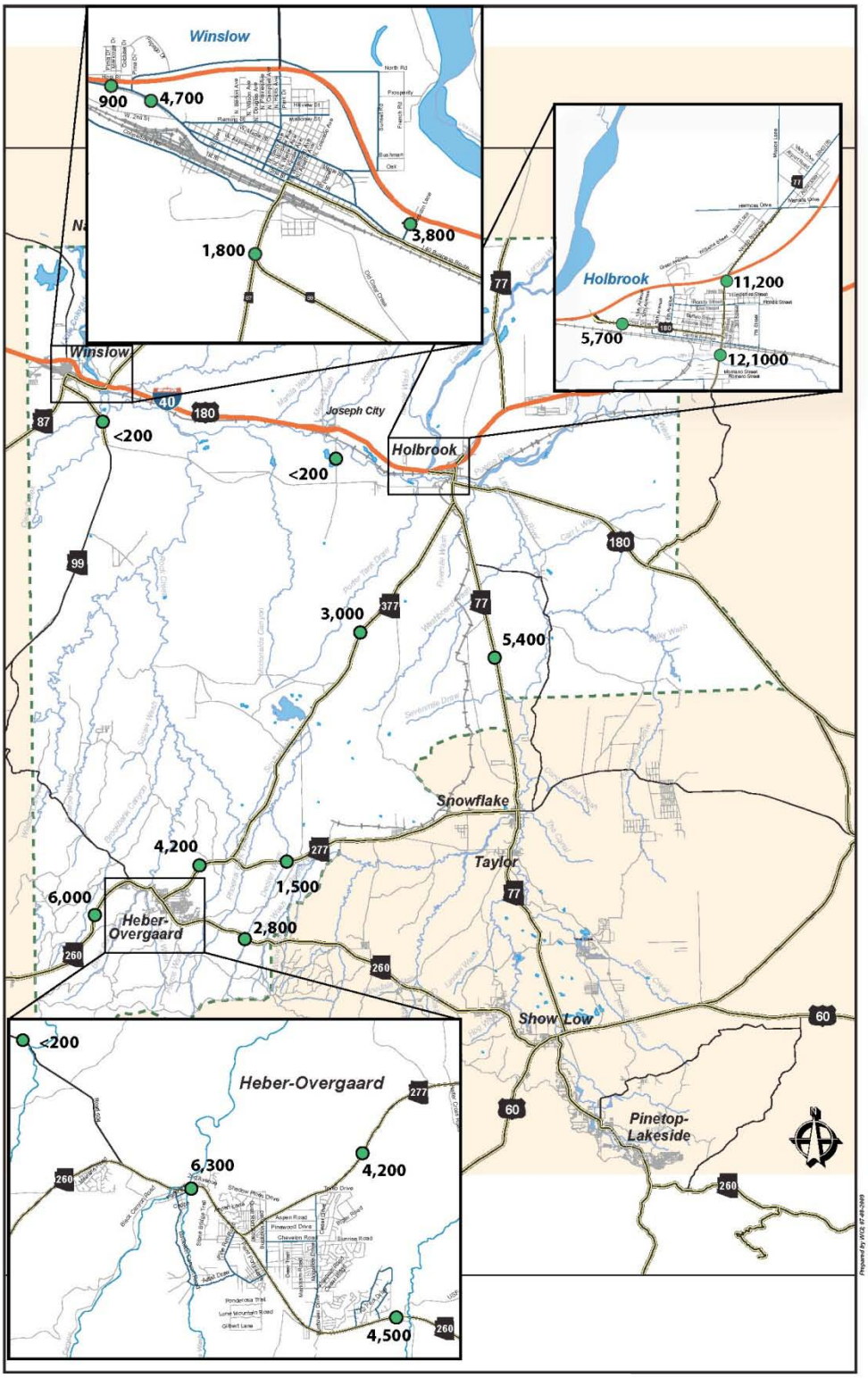
As shown in Figure 2-6, higher volumes are seen on sections of I-40, Park Drive, Berry Ave and Williamson Avenue in Winslow. Higher volumes exist on I-40 in Holbrook. Higher volumes are also seen on sections of SR-77 particularly within Holbrook, White Mountain Road/SR-260 and SR-60 in Show Low and Pinetop-Lakeside.

2.5.2 LEVEL OF SERVICE

The *Highway Capacity Manual* (2000) defines the operational measures of effectiveness for all types of roadways and intersections in terms of qualitative levels of service (LOS). This is the common method to measure traffic capacity and operations. LOS measures the quality of traffic flow, maneuverability, driver comfort, average speed, and the ratio of the level of traffic or traffic volume to the capacity of the roadway. LOS definitions are defined from LOS A through F, including:

- **LOS A:** Free-flow travel conditions, excellent maneuverability, a high level of driver comfort, traveling speeds at the speed limit;
- **LOS B:** Almost free-flow travel conditions, slightly reduced maneuverability, a high level of driver comfort, traveling speeds very close to the speed limit;
- **LOS C:** Traffic congestion is noticeable with somewhat restricted maneuverability, a moderate level of driver comfort as awareness must be increased, and traveling speeds are reduced less than the speed limit.
- **LOS D:** Traffic congestion and associated delays restrict maneuverability and lessen driver comfort. Speeds are slower and much of the roadway capacity is being utilized;
- **LOS E:** Traffic flow is very unstable with extremely restricted maneuverability. Driver comfort is extremely poor with speeds excessively slower than the posted limit and almost all of the roadway capacity is being used.
- **LOS F:** Traffic flow is saturated with practically no maneuverability and driver comfort is extremely poor. Average speeds are extremely slow and are characterized by stop-and-go travel conditions with 100 percent of the roadway capacity being used.

FIGURE 2-6 TRAFFIC COUNTS



Source: ADOT, Navajo County, City of Winslow, and City of Holbrook

2.5.3 Segment Capacity Analysis

A segment capacity analysis was conducted for the primary network using the capacities and traffic counts collected for this study. Figure 2-7 depicts the segment capacity analysis results. As shown, there are not any critical roadway segments over capacity; however there are locations within Winslow and Holbrook that have mobility issues due to the railroad crossings and roadway geometric configurations.

2.5.4 Safety Assessment

ADOT maintains a database of all of the crashes that occur within Navajo County. Traffic safety measurement is a method to identify how safe a roadway is performing. Generally, when traffic crashes are examined over several years, patterns will exist to identify geometric deficiencies, capacity issues, excessive access or traffic control issues. As shown, there are not any critical roadway segments over capacity

ADOT provided crash data for all crashes that occurred from October 1, 2003 through September 30, 2006. The County experienced 4,002 crashes during this period, with 474 crashes occurring on the state routes, 1,875 crashes occurring on the state routes and 1,653 crashes occurring on the County and city maintained roadways. Table 2.2 summarizes the number of crashes by Interstate, state route, or local route facility. Table 2.3 summarizes the 1,653 crashes by severity for the local roadways.

Table 2.2 Crash Severity Summary

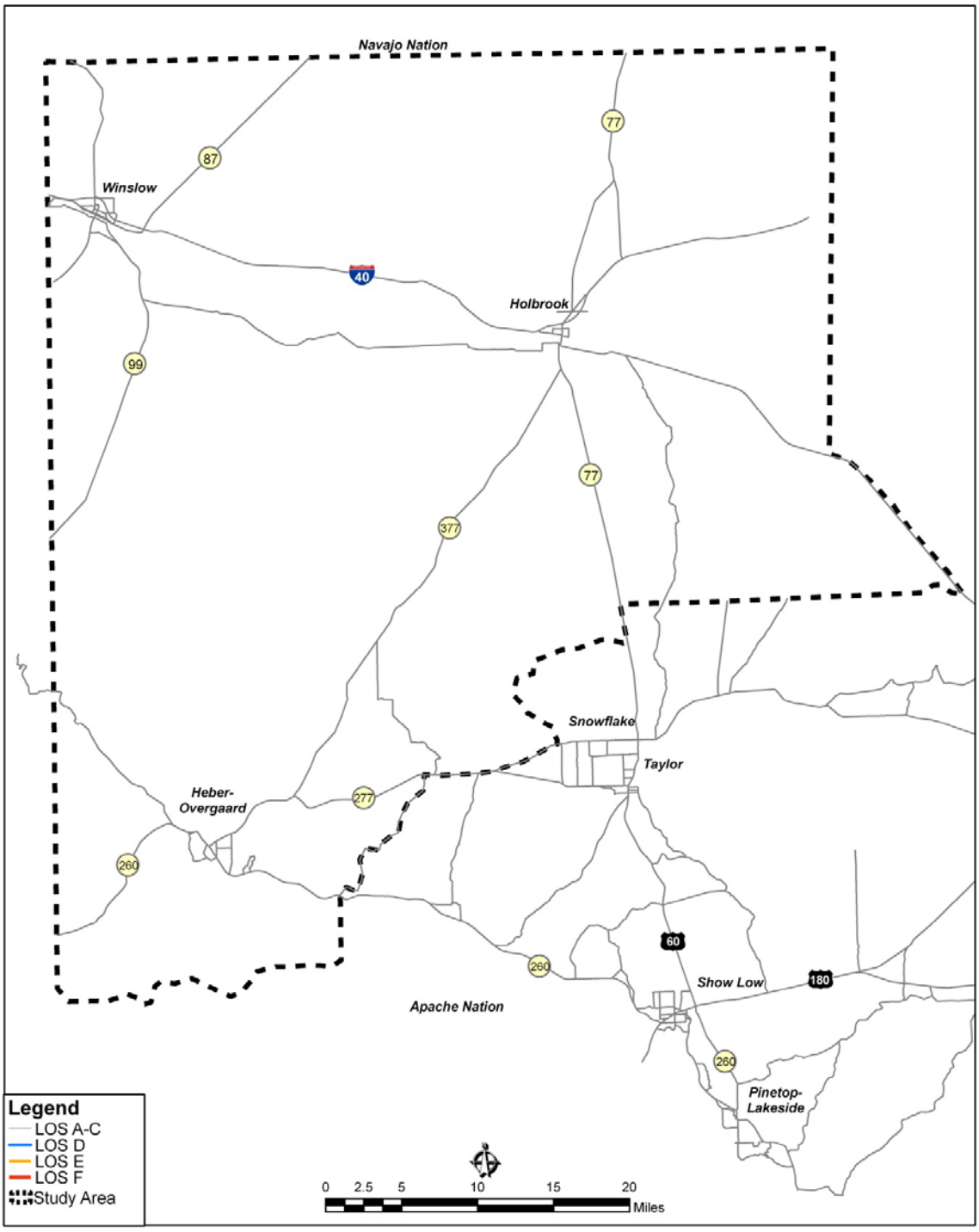
	Interstate		State Route		Local Route		Total	
Injury Severity	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
No Injury	301	64%	1,210	65%	1,054	64%	2,565	64%
Possible Injury	32	7%	250	13%	202	12%	484	12%
Non-incapacitating Injury	81	17%	263	14%	203	12%	547	14%
Incapacitating Injury	32	7%	98	5%	53	3%	183	5%
Fatal	20	4%	35	2%	17	1%	72	2%
Unknown	8	2%	19	1%	124	8%	151	4%
Total	**474**		**1,875**		**1,653**		**4,002**	

Source: ADOT, 2008

Table 2.3 Local Roadway Crash Severity Summary

Crash Severity	Unincorporated County	Holbrook	Pinetop-Lakeside	Show Low	Snowflake	Taylor	Winslow	**Total**
No Injury	259	148	88	177	60	26	296	**1,054**
Possible Injury	70	30	7	27	12	8	48	**202**
Non-incapacitating Injury	84	23	9	20	12	10	45	**203**
Incapacitating Injury	29	4	2	9	2	3	4	**53**
Fatal	11	1	0	0	0	3	2	**17**
Unknown	24	19	9	5	4	4	59	**124**
Source: ADOT, 2008							**Total:**	**1653**

FIGURE 2-7 CAPACITY ANALYSIS



Source: Wilson & Company, Inc.
TransCAD Travel Demand Model

Note: No roadways within the study area show LOS greater than LOS C

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3.0 FUTURE CONDITIONS

This section addresses probable future conditions in the Study Area based on stakeholder and public input regarding future development assumptions and anticipated roadway improvements.

3.1 TRAVEL DEMAND MODELING METHODOLOGY

During September 2007, Navajo County developed a travel demand model for the *Southern Navajo/Apache County Sub-Regional Transportation* Plan. During 2009, ADOT completed the development of a statewide travel demand model. The statewide model was used as the framework to build the central region travel demand model used for this study. The ADOT statewide model provides a statewide travel demand as a background to build upon so to fully include other statewide growth and improvement assumptions. Additionally, the assumptions regarding network and anticipated development forecasted from the *Southern Navajo/Apache County Sub-Regional Transportation Plan,* September 2007, were integrated into this model. The new travel demand model was also developed for this study using TransCAD, a transportation modeling software platform. The Navajo County Central Region Transportation Study model was developed using Geographic Information Systems (GIS) data provided by study participants, available traffic count data for the different communities and ADOT, and socioeconomic data and projections based on census data, State estimates and local input.

3.1.1 MODEL CONSTRAINTS

The TransCAD model used for the Navajo County Central Region Transportation Study is a roadway-only travel demand forecasting tool. Although TransCAD has the capacity to provide a multi-modal evaluation, the transit in the region is not extensive enough to warrant a modal split evaluation.

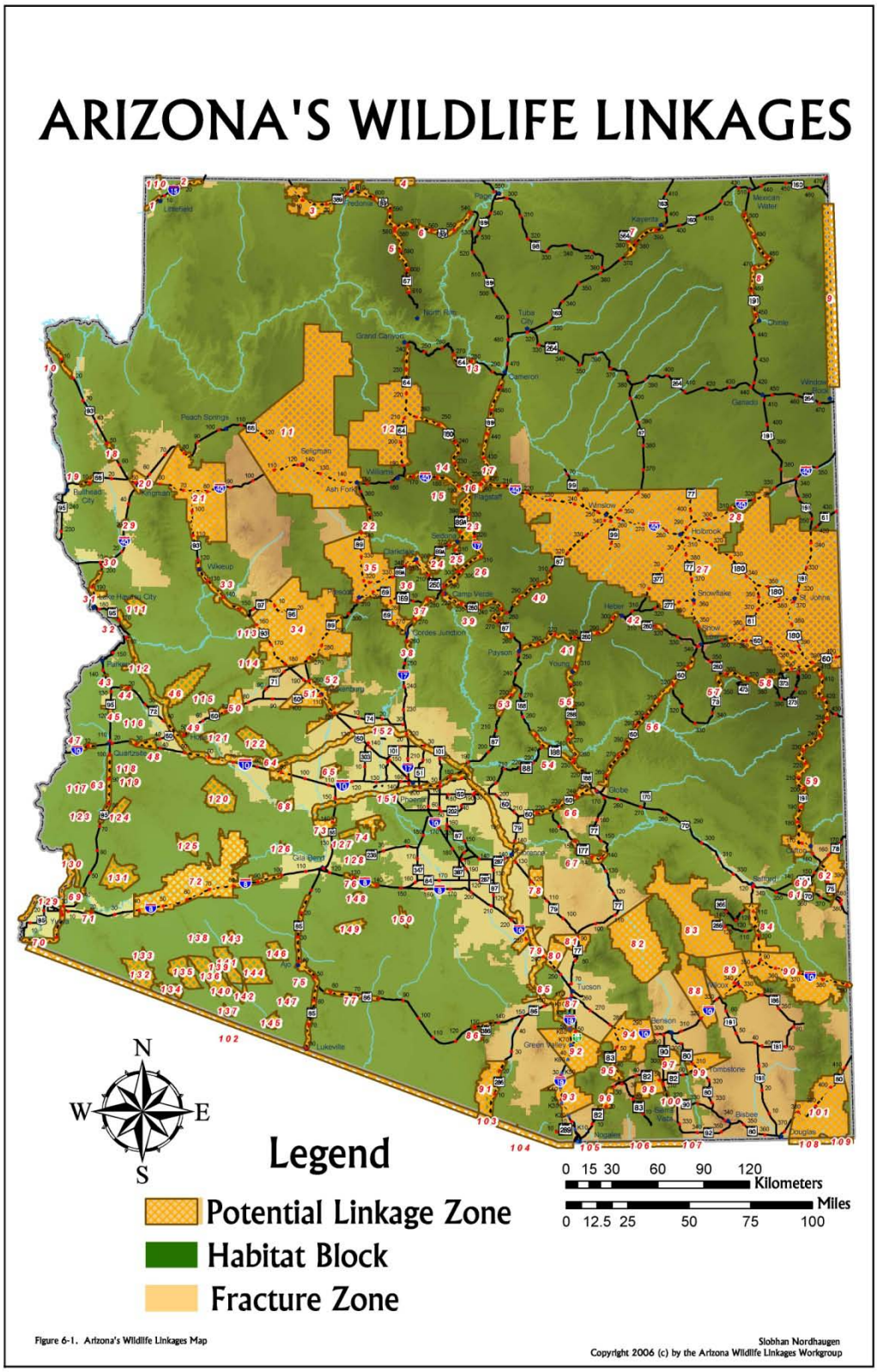
Also, it is important to note that the travel demand model developed for this study is not responsive to radical changes in traffic during the peak tourism season. The adopted model replicates average daily traffic (ADT) conditions on roadway segments, as represented by available current year (2006) traffic counts. ADT conditions are consistent seasonal dwelling unit occupancy patterns identified by Census 2000 population data. The model does have the capacity to model the peak tourism conditions, but extensive data collection activities would need to be conducted to provide adequate base condition data to be effective.

3.1.2 MODEL DEVELOPMENT PROCESS

Figure 3-1 depicts the principal elements of the travel demand model development process. A discussion of the modeling process used for estimating future travel demand and forecasting traffic volumes on streets and highways for this regional study is presented follows.

The travel demand model is based on a four step process employed to determine/forecast traffic volumes for a defined roadway network based on specified inputs and estimates of external trips. The Trip Generation Module converts available

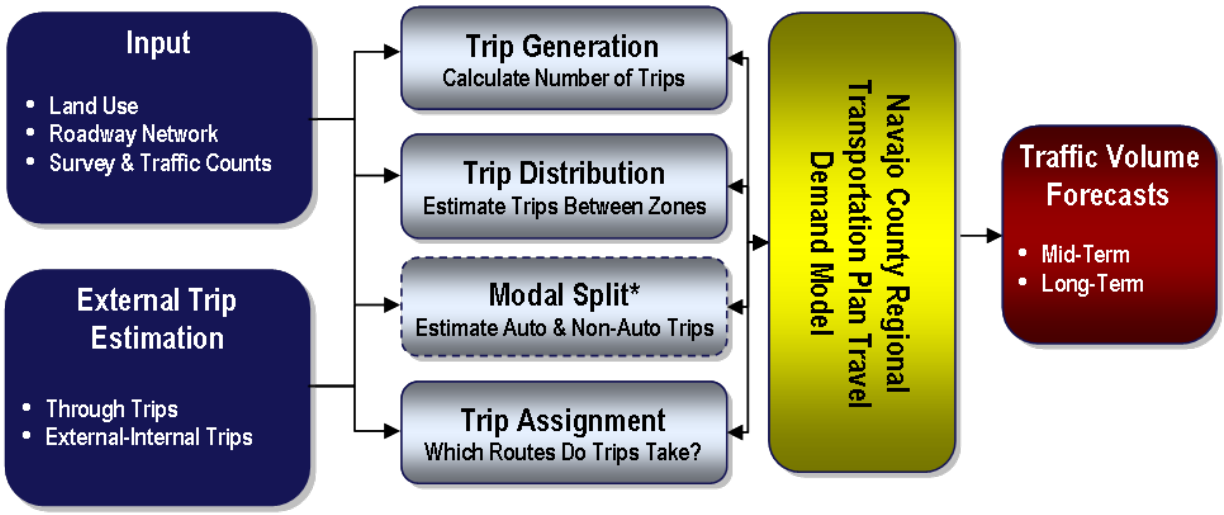
FIGURE 2-3 WILDLIFE LINKAGES



Source: Arizona's Wildlife Linkages Assessment

census information and growth projections, specifically number of dwelling units (DUs), and households (HHs), into the total vehicle trips expected to occur in the region at a given point in time. For this study, trip making estimates were prepared for 2006, 2015, 2020, and 2030. Total vehicle trips were based on an assumption that each HH generates an average of approximately ten trips daily – five separate round-trips.

FIGURE 3-1TRAVEL DEMAND MODEL DEVELOPMENT PROCESS



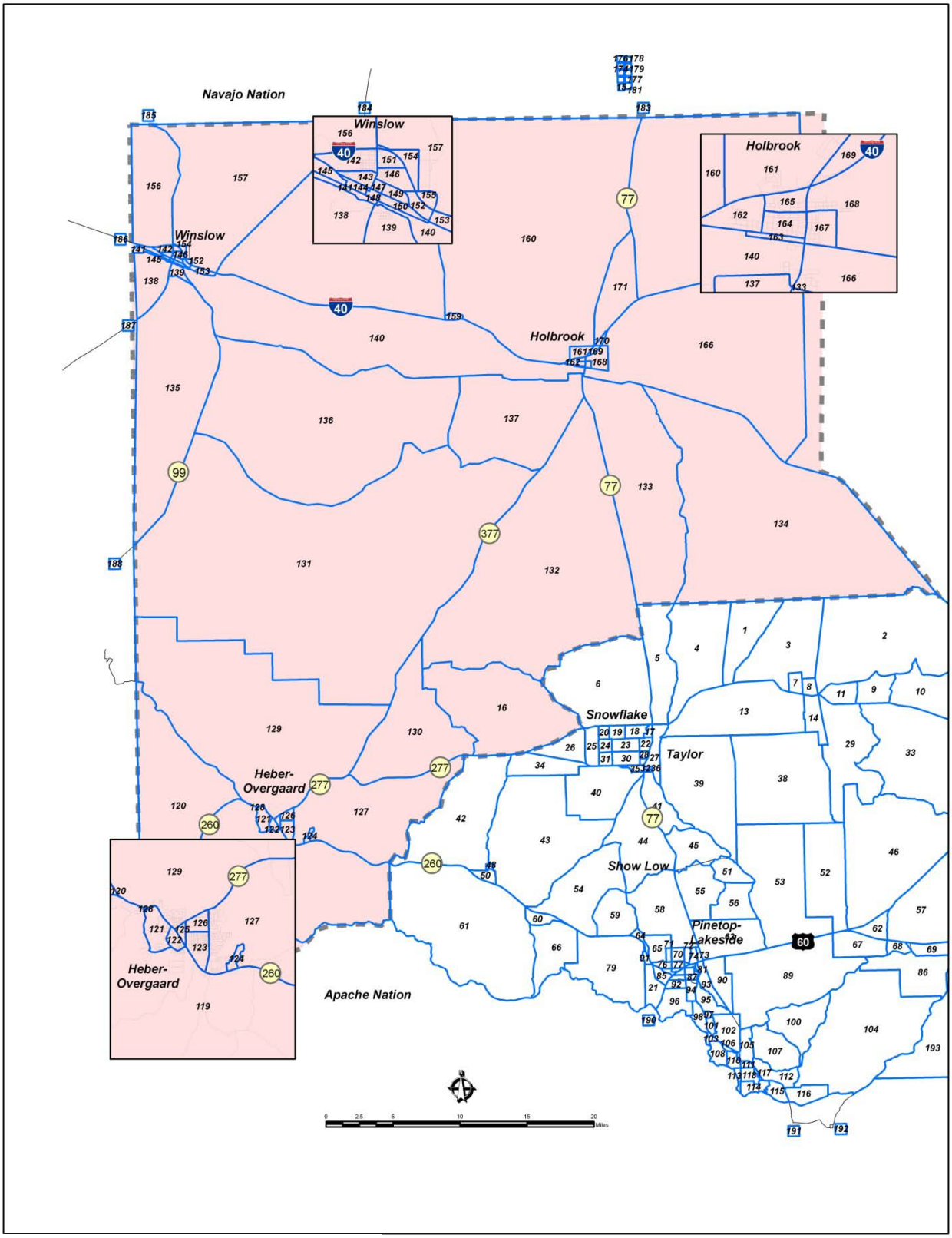
* The model process allows for a Modal Split Module to determine the number of trips or parts of trips by automobile versus transit (or other mode) as part of a trip; this function was not applied for this study.

The Trip Distribution Module relies on employment data to determine where the trips generated by households want to go; it distributes the trips between and among identified transportation analysis zones (TAZs). Figure 3-2 shows the TAZ structure for the Study Area for the Year 2030. Note that the TAZs are more numerous and smaller in the urbanized areas; this permits a finer estimation of trip making potential.

The travel demand model process can incorporate a Modal Split Module. This module is used to estimate the number of trips or parts of trips taken by automobile versus transit (or other mode). As noted previously, this function was not applied for this study, as there is little opportunity for alternative mode travel in the Study Area.

The fourth component of the travel demand model, the Trip Assignment Module, is employed to make a determination as to which routes would be taken by trips originating at Study Area households. The fundamental criteria applied within the Trip Assignment Module are the shortest path in the shortest amount of time. Whereas the Trip Distribution Module is used to estimate the number of trips between TAZs, the Trip Assignment Module is used to select among alternative routes (as may be available) for each trip. Trip assignment takes into account speed, functional classification of the roadway, capacity of the roadway, and the amount of traffic using that route. If a route is too congested, the model will assign trips to a different route that offers a shorter travel time.

FIGURE 3-2 TRAFFIC ANALYSIS ZONES



Source: Wilson & Company, Inc.

The final result of the travel demand modeling process is a forecast of anticipated traffic flows. Traffic flows are based on Study Area socioeconomic characteristics (i.e., households and employment) and the capacity of the available roadway network. Because the anticipated make-up of the roadway network changes for each forecast time period or interval (e.g., 2015 v. 2020), the model aids planners by identifying future utilization of Study Area roadways. This information then can be translated into a program of recommended improvements to assure a future roadway system is safe and adequate for the community of users, which include Study Area residents and non-residents alike.

3.2 PROJECTED HOUSEHOLDS AND EMPLOYMENT

The urbanization process and general population growth is expected to add significantly to the number of households in the Study Area through 2030. Household and employment growth will be driven by a rising demand for the lifestyle and recreational opportunities offered by the White Mountains communities in the southern portion of the Study Area and the Cities of Holbrook and Winslow in the northern portion of the Study Area, which are located on busy I-40. Household and employment projections for 2015, 2020, and 2030 were developed to support 5-, 10-, and 20-year planning horizons.

3.2.1 REGIONAL HOUSEHOLD AND EMPLOYMENT PROJECTIONS

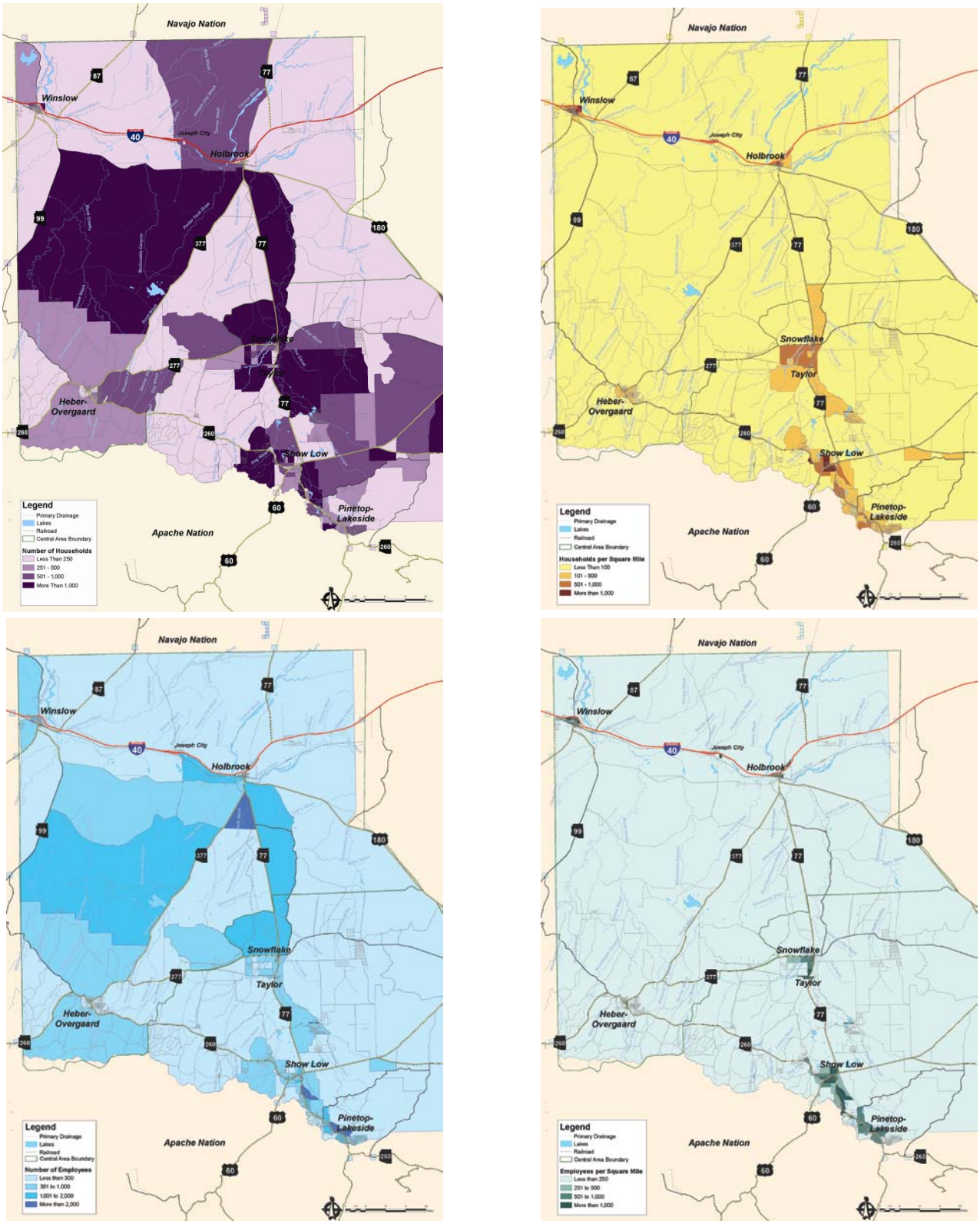
Table 3.1 summarizes the projected growth of households and employment in the region for the years 2006, 2015, 2020, and 2030. The regional household and employment forecasts were included to provide valuable insight to the regional travel demand needs primarily due to the extensive growth in Southern Navajo County. Households in the region will increase substantially through 2030, increasing by 274.6%. Total employment is anticipated to increase, but as a lesser rate. The increase will be driven largely by an increase in industrial sector employment (293.2%) comparable to the projected increase in households. The changing economy of the Study Area is reflected in the expectation that the industrial and retail sectors will outperform the service sector. The hotel sector is not expected to change significantly between 2006 and 2030. Figure 3-3 graphically illustrates the distribution of households and employment in terms of both raw number and density throughout in the Study Area for forecast year 2030.

TABLE 3.1
CENTRAL AND SOUTHERN NAVAJO COUNTY HOUSEHOLD AND EMPLOYMENT GROWTH: 2006 - 2030

Year	Households	Employment Sector			Total Employment
		Industrial	Service	Retail	
2006	24,048	3,023	16,535	8,407	27,965
2015	36,980	4,379	20,531	10,360	35,270
Percent Growth 2006-2015	53.8%	44.9%	24.2%	23.2%	26.1%
2020	48,280	6,501	26,746	13,606	46,853
Percent Growth 2006-2020	100.8%	115.1%	61.8%	61.8%	67.5%
2030	90,088	11,885	40,450	22,055	74,390
Percent Growth 2006-2030	274.6%	293.2%	144.6%	162.3%	166.0%

Source: Wilson & Company, Inc.

FIGURE 3-3 YEAR 2030 STUDY AREA HOUSEHOLDS



3.3 SUBAREA HOUSEHOLD AND EMPLOYMENT PROJECTIONS

The Study Area was defined into six geographic summary subareas. The projections of households and employment for these subareas are presented in the following sections. Southern Navajo County was also included in this summary, as it greatly impacts the City of Holbrook due to SR-77 access to I-40. The summaries are not based on municipal boundaries, but TAZ boundaries and planning areas, so the household or employment totals may differ from official datasets.

3.3.1 HEBER-OVERGAARD AREA

The unincorporated community of Heber-Overgaard, located in the southwestern portion of the Study Area on SR-260, is projected see notable employment growth relative to households (Table 3.2). Service sector employment is projected to increase almost 50% by 2030, supporting overall employment growth exceeding 40%. However, the number of households is projected to increase by less than 25% by 2030.

TABLE 3.2 HEBER-OVERGAARD AREA HOUSEHOLD AND EMPLOYMENT GROWTH: 2006 - 2030

Year	Households	Employment Sector			Total Employment
		Industrial	Service	Retail	
2006	916	72	231	79	382
2015	954	80	261	86	427
Percent Growth 2006 - 2015	4.1%	11.1%	13.0%	8.9%	11.8%
2020	1,004	86	295	95	476
Percent Growth 2006 - 2020	9.6%	19.4%	27.7%	20.3%	24.6%
2030	1,132	95	340	105	540
Percent Growth 2006 - 2030	23.6%	31.9%	47.2%	32.9%	41.4%

Source: Wilson & Company, Inc.

3.3.2 HOLBROOK AREA

The City of Holbrook, located on I-40 in the central part of the northern portion of the Study Area, is expected to experience some growth in both households and employment between 2006 and 2030. Employment growth is projected to exceed the growth in households, and, generally, it is anticipated that employment in all sectors will experience similar growth (Table 3.3). Growth in the Service sector is projected to have the greatest increase.

TABLE 3.3 HOLBROOK AREA HOUSEHOLD AND EMPLOYMENT GROWTH: 2006 - 2030

Year	Households	Employment Sector			Total Employment
		Industrial	Service	Retail	
2006	1,391	29	1,590	665	2,284
2015	1,517	32	1,795	727	2,554
Percent Growth 2006 - 2015	9.1%	10.3%	12.9%	9.3%	11.8%
2020	1,593	34	1,917	763	2,714
Percent Growth 2006 - 2020	14.5%	17.2%	20.6%	14.7%	18.8%
2030	1,759	37	2,177	844	3,058
Percent Growth 2006 - 2030	26.5%	27.6%	36.9%	26.9%	33.9%

Source: Wilson & Company, Inc.

3.3.3 Joseph City Area

Joseph City, a small community approximately 11 miles west of Holbrook on I-40, is projected to increase at about the same rate as Holbrook in terms of households. However, no employment growth is project to occur evaluated (Table 3.4). Only the Industrial sector is expected to experience increased employment.

Table 3.4 Joseph City Area Household and Employment Growth: 2006 - 3030

Year	Households	Employment Sector			Total Employment
		Industrial	Service	Retail	
2006	237	400	0	0	400
2015	262	437	0	0	437
Percent Growth 2006 - 2015	10.5%	9.3%	N/A	N/A	9.3%
2020	277	459	0	0	459
Percent Growth 2006 - 2020	16.9%	14.8%	N/A	N/A	14.8%
2030	309	505	0	0	505
Percent Growth 2006 - 2030	30.4%	26.3%	N/A	N/A	26.3%

Source: Wilson & Company, Inc.

3.3.4 Winslow Area

The City of Winslow, located on I-40 on the western boundary of Navajo County, is projected to experience more household growth than Holbrook and Joseph City (Table 3.5). The community is expected to see increases in the employment sectors evaluated. The City has identified several proposed developments within the study area which include approximately 6,800 new dwelling units and up to 8,300 additional employees in the retail/industrial/service sectors, which are not fully reflected in Table 3.5. Extensive proposed development southeast of Winslow is expected to contribute significantly to increase the employee base for the City.

Table 3.5 Winslow Area Household and Employment Growth: 2006 - 3030

Year	Households	Employment Sector			Total Employment
		Industrial	Service	Retail	
2006	2,776	380	3,512	735	4,627
2015	2,978	393	3,644	762	4,799
Percent Growth 2006 - 2015	7.3%	3.4%	3.8%	3.7%	3.7%
2020	3,352	400	3,720	778	4,898
Percent Growth 2006 - 2020	20.7%	5.3%	5.9%	5.9%	5.9%
2030	4,055	413	3,878	815	5,106
Percent Growth 2006 - 2030	46.1%	8.7%	10.4%	10.9%	10.4%

Source: Wilson & Company, Inc.

3.3.5 Study Area – Other Unincorporated Areas

The unincorporated area outside of Heber-Overgaard, the City of Holbrook, the City of Winslow and Southern Navajo County are generally located south of I-40 and north of SR-260, and may see extensive employment and household growth (Table 3.6), particularly attributable to the anticipated development related to the Aztec Land and Cattle Company.

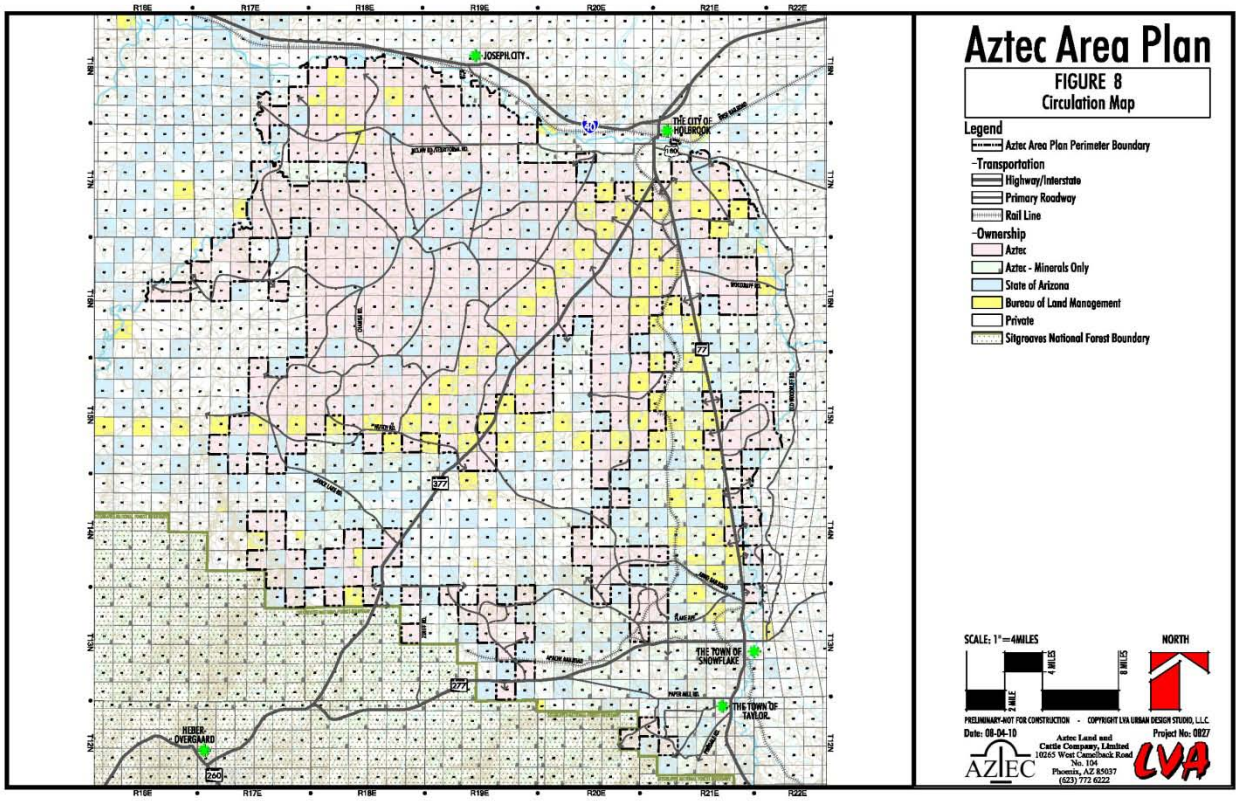
TABLE 3.6 STUDY AREA (UNINCORPORATED) HOUSEHOLD AND EMPLOYMENT GROWTH: 2006 - 2030

Year	Households	Employment Sector			Total Employment
		Industrial	Service	Retail	
2006	2,742	97	1,446	1,042	2,585
2015	3,739	149	1,641	1,011	2,901
Percent Growth 2006 - 2015	36.3%	53.6%	13.5%	6.6%	12.2%
2020	5,032	245	1,920	1,233	3,398
Percent Growth 2006 - 2020	47.1%	98.9%	19.3%	11.7%	19.2%
2030	14,763	2,206	4,305	3,114	9,625
Percent Growth 2006 - 2030	354.9%	2021.6%	164.9%	180.5%	240.8%

Source: Wilson & Company, Inc.

Aztec Land And Cattle Company provided year 2030 development assumptions based on a longer term development buildout. Aztec Land and Cattle Company is currently working through the entitlement processes for approximately 220,000 developable acres within the Study Area. Figure 3-4 depicts the land and anticipated transportation system to support their development by 2030.

FIGURE 3-4 AZTEC LAND AND CATTLE COMPANY
DEVELOPMENT AREA AND ROADWAY NETWORK



The development provided by Aztec Land and Cattle was phased, in order to understand the transportation related needs for years 2015, 2020 and 2030. The assumed development within this land holding is anticipated to occur primarily after year 2020, and occur far beyond year 2030. Close coordination between the land owner, the County and the City is needed to ensure consistent and constant communication.

3.4 TRAVEL DEMAND FORECAST

Information presented in this section includes a series of traffic assignments generated with for the Year 2030 existing plus committed (E+C) network based on the 2030 projections of households and employment. These travel demand model assignments have been developed to reveal where future deficiencies may exist. The assignments provide a basis for testing and evaluating different network improvement scenarios.

3.4.1 YEAR 2030 EXISTING-PLUS-COMMITTED ROADWAY NETWORK

The Year 2030 Study Area roadway network is defined by the existing roadway system plus any improvements supported by authorized funding – committed improvements – and improvements identified in adopted plans that ultimately will be implemented. Nevertheless, it is not certain the planned improvements will be implemented nor is the precise timing of implementation known. The principal components of the E+C roadway system are described in the following sections.

3.4.2 COMMITTED AND PLANNED IMPROVEMENTS

Based on stakeholder and Technical Advisory Committee member input, no major agency transportation improvements are committed and planned transportation improvements throughout the Central Region Study Area. However, the roadway network needed to support the Aztec Land and Cattle development is included. The E+C roadway network provides the basis for examining the adequacy of the primary transportation facilities in the Study Area in the future and identifying potential deficiencies based on the anticipated travel demands from the forecasted socioeconomic conditions.

3.4.3 FUTURE FUNCTIONAL CLASSIFICATION AND GEOMETRY

The future E+C roadway network identified herein will be made up of varying roadway types that provide a hierarchy of mobility and access. The combination of roadway types to form the regional roadway network defines the urban and rural functional classification scheme. Functional classification of roadways, as described in the Existing Conditions Technical Report, is a critical component of effective transportation planning. The functional classification designations are adopted to guide mobility and access decisions. Thus, functional classification of the roadway network is meant to establish a balance among the various facilities serving the community, assuring connectivity where it is needed and an acceptable level of accessibility to surrounding land uses.

The functional classification used for modeling future conditions did not change from the functional classifications identified in Chapter 2, Existing Conditions. The evaluation undertaken for this study does recommend functional classification changes which are identified in the following chapters.

4.0 IDENTIFIED DEFICIENCIES AND NEEDS

The Navajo County Regional Travel Demand Model was developed to evaluate the County roadway network for Years 2015, 2020, and 2030. The results were reviewed to identify and evaluate reasonable transportation improvements to address identified system level and local transportation network deficiencies. The results were also shared with the public to identify additional potential alternatives that should be examined as part of this process.

The following chapters identify and define the alternative transportation improvements designed to relieve potential future over capacity roadway segments. The fatal flaw evaluations of each study region used the following eleven evaluation criteria, including:

- Traffic Flow – Examination of connectivity to primary roadway facilities and required improvements that must occur in conjunction with an alternative
- Level of Service – Traffic level of service on an identified key roadway
- Safety – Anticipated changes in safety due to the alternative improvement
- Access – Required access changes that would be required
- Environmental Impacts – Identified environmental impacts
- Cost – Conceptual cost estimate for the alternative improvement
- Implementation – Key aspects of implementing the improvement/fatal flaw evaluation
- Constructability – Key aspects of constructing the alternative improvement
- Freight Mobility – Anticipated freight mobility aspects
- Pedestrian/Bicycle Mobility – Anticipated pedestrian and bicycle mobility aspects
- Local Support – Level of local support for the alternative

Chapter 4 summarizes the needs and findings relating to study-area wide type improvements to meet the future anticipated travel demand needs. Chapters 5, 6 and 7 summarize the same information, but relate specifically to Heber-Overgaard, Holbrook and Winslow, respectively. Each chapter discusses the travel demand, multi-modal needs and recommendations. Chapter 8 identifies non-project specific recommendations that apply to the Study Area. Chapter 9 outlines the Year 2015, 2020 and 2030 implementation plans.

4.1 TRAVEL DEMAND ANALYSIS

Modeling results indicate the County roadways outside built-up communities will have adequate capacity for forecast travel demand beyond the Year 2020, based on the existing plus committed (E+C) facilities. The three north-south travel corridors, SR-87, SR 377, and SR-77, link the Rim Country communities with I-40 as well as the County seat in Holbrook. SR-260, west of Heber-Overgaard, which along with SR-87 are the primary connections to Payson and the Phoenix metropolitan area, is forecast to be carrying almost 24,000 vehicles per day (VPD) in 2030. SR-87 is forecast to carry

almost 7,300 vehicles per day (VPD) by year 2030. Traffic on SR-277, northeast of Heber-Overgaard, which is the primary route to Holbrook, I-40, and east-west travel, will approach 18,000 VPD in 2030. Similarly, SR-77, which is the only route to Holbrook, and the primary access to I-40 from the White Mountain communities, also is anticipated to carry between 17,800 and 27,000 VPD by year 2030 based on forecasted development in the region and state travel patterns. Figure 4-1 summarizes volumes for years 2006, 2015, 2020 and 2030 for select roadways within the Study Area.

Figure 4-2 shows the expected performance of the E+C roadway network in the Year 2030. A significant number of roadway segments will be at or exceeding the capacity of the facility, as currently planned. The remaining segments of this facility to its junction with SR-73 will be approaching or at capacity. SR-77 will be approaching, at, or exceeding capacity through its entire length between US-60 in Show Low and I-40 in Holbrook, including its de facto extension in the form of Wofford/Porter Mountain Road south of US-60.

In fact, the principal north-south routes providing connectivity with communities between the northern and southern portions of the travel region are forecast to be approaching, at, or exceeding capacity. SR-377, the principal route for accessing I-40 from Heber-Overgaard, is forecast to be over capacity with the exception of a short (approximately four miles) segment north of the Obed Road Loop connection, south of Holbrook. As noted above, SR-77 will be experiencing capacity problems through its entire length between Pinetop-Lakeside and Holbrook.

4.1.1 SR-77

The SR-77 corridor between SR-377 and the town of Snowflake in southern Navajo County is a primary route connecting the southern communities with I-40. This portion of SR-77 is anticipated to have traffic volumes of 9,200 VPD by year 2020, and 17,800 VPD by year 2030 based on the regional and statewide development and travel demand assumptions.

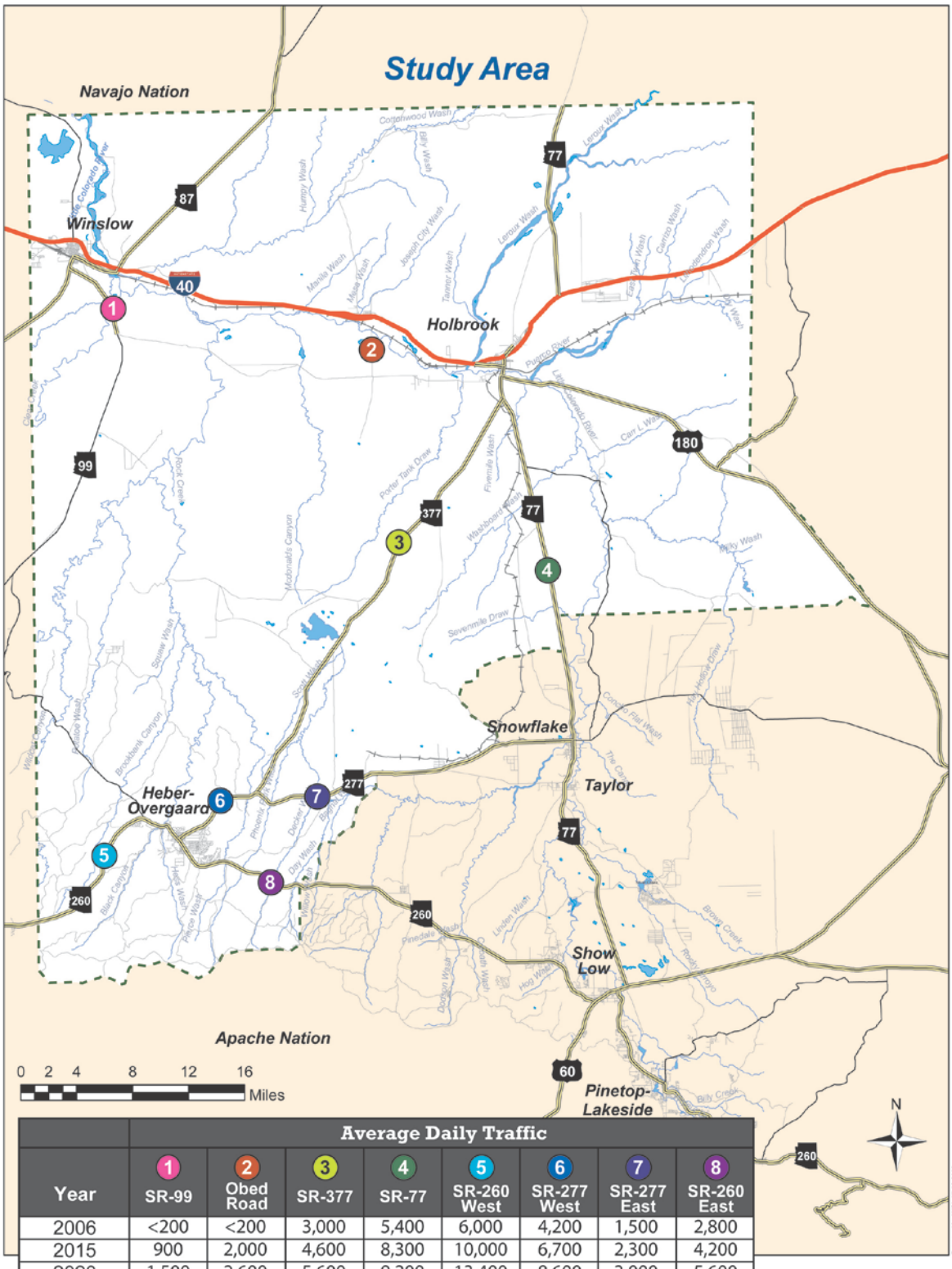
On SR-77 Looking South

Currently, the corridor is fairly level with excellent sight distance for much of the corridor. There is one southbound passing lane section on SR-77, and several locations where the roadway striping identifies passing is allowed.

Passing lanes are locations where a lane is added in at least one travel direction, providing an opportunity to pass without crossing into the oncoming traffic lane. Passing lanes have three general objectives, including:

- Reducing delays at bottlenecks;
- Improving overall traffic operations on two-lane highways by providing passing opportunities; and
- Improving safety by providing safe passing opportunities regardless of oncoming traffic levels.

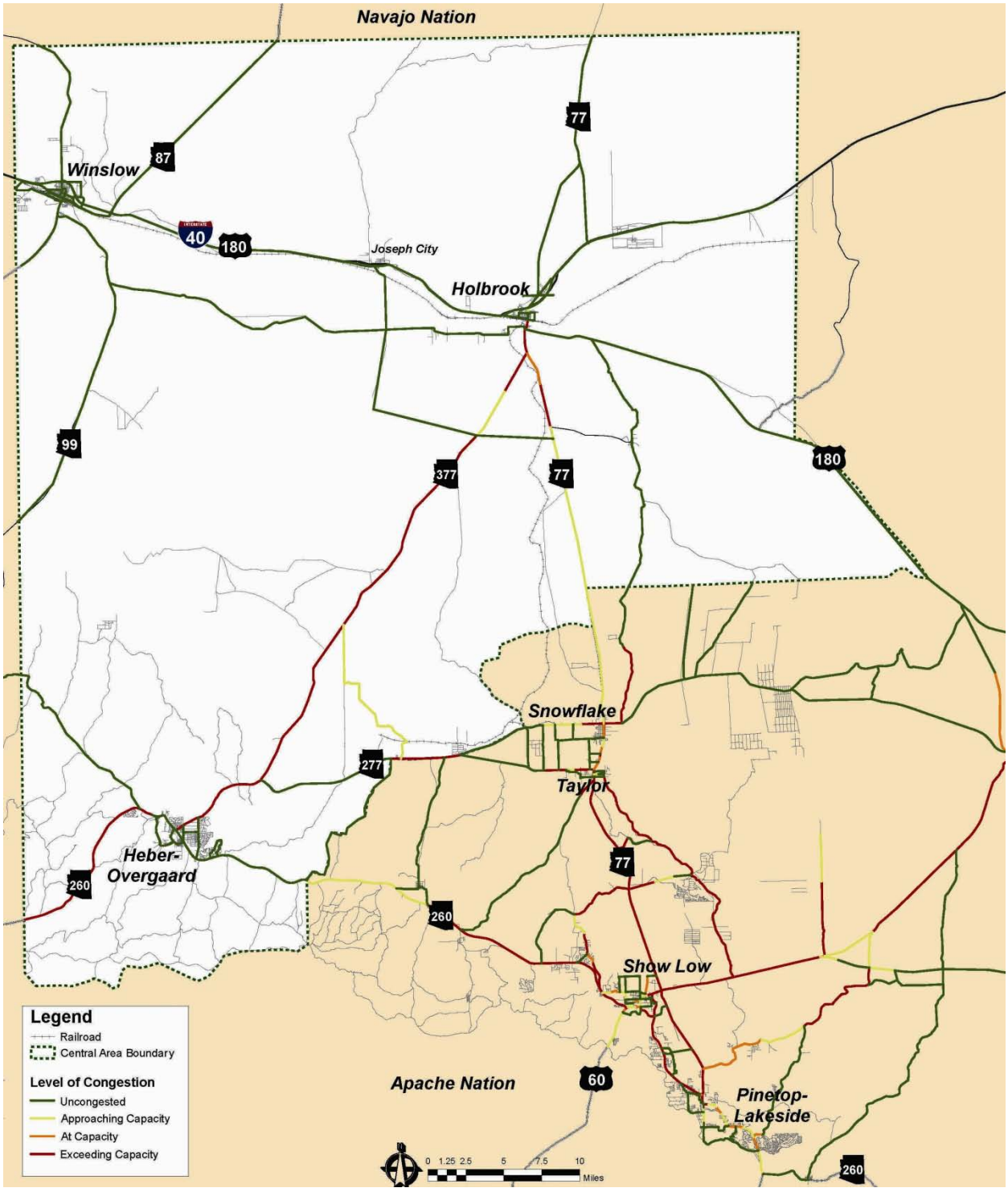
Figure 4-1 Year 2030 Study Area Traffic Forecasts



Year	Average Daily Traffic							
	1 SR-99	2 Obed Road	3 SR-377	4 SR-77	5 SR-260 West	6 SR-277 West	7 SR-277 East	8 SR-260 East
2006	<200	<200	3,000	5,400	6,000	4,200	1,500	2,800
2015	900	2,000	4,600	8,300	10,000	6,700	2,300	4,200
2020	1,500	2,600	5,600	9,200	13,400	8,600	3,000	5,600
2030	6,100	5,300	11,200	17,800	23,800	17,900	6,400	13,900

Source: Wilson & Company, Inc.

FIGURE 4-2 YEAR 2030 STUDY AREA NETWORK PERFORMANCE



Source: Wilson & Company, Inc.

The focus of improving the SR-77 corridor between Holbrook would focus on the second and third bullets by providing improved traffic operations and by improving corridor safety by assuring motorists of locations where they can pass.

On SR-77 Looking South

Much of the SR-77 corridor is in flat terrain with two primary drainages on the corridor. Based on the *Highway Capacity Manual*, 2000, and the *Manual of Uniform Traffic Control Devices*, the optimal passing lengths that should be considered for SR-77 would be between 1.0 and 2.0 miles long in both directions. Many Departments of Transportation have used passing lanes extensively to reduce the need to improve a 2-lane to a four-lane highway. The SR-77 corridor provides several opportunities for low-cost passing lane improvement locations.

Options for passing lane locations can include locations where passing opportunities are given to a travel direction, to generally provide a 3-lane roadway within the passing lane area. This strategy allows for this type of improvement with a reduced amount of right-of-way need.

The distance between Holbrook and Snowflake is approximately 27 miles. The Texas Transportation Institute has completed extensive research on "Super-2" highways. Based on applying their criteria to the SR-77 corridor, passing lane locations should be provided approximately every 4.0 miles, and be at least 1.5 to 2.0 miles in length.

This study recommends that a corridor evaluation be completed on SR-77 between SR-377 and Snowflake to identify the proper treatment for safety and operational improvements.

4.1.2 SR-377

The SR-377 corridor between SR-277 near Heber-Overgaard and SR-77 near Holbrook is a two-lane highway that is the primary travel way between Heber-Overgaard and Holbrook. The corridor is approximately 34 miles long. The volumes on SR-377 are lower than those seen on SR-77 to the east; however the needs on this corridor are greater.

To the south, SR-377 is a T-intersection with SR-277. SR-277 has an eastbound left-turn lane to remove turning traffic from the thru traffic. Currently, there are few passing opportunities on SR-377. The corridor was generally laid on existing terrain with few cut and/or fill sections,

On SR-377 Looking South at SR-277 TEE Intersection

providing several horizontal and vertical sight-distance issue areas. The corridor has a speed limit of 55 MPH, with narrow shoulders and warning speed posted curves, ultimately reducing the capacity of the roadway.

There are few driveways and intersecting roadways along SR-377. However, where the driveways exist, left-turn or right-turn lanes generally are not present. The terrain and vertical profile coupled with the need for turn lanes will be more apparent as development occurs.

The SR-377 is another example corridor that could benefit from horizontal and vertical profile improvements to provide greater sight distance, fewer curves, and the potential to implement passing lanes. The long term corridor needs show that future volumes could be greater than 11,000 VPD, which is greater than the current facility capacity offers.

This study recommends that a corridor evaluation be completed on SR-377 between SR-277 and SR-77 to identify the proper treatment for smoothing horizontal and vertical curves, and identifying potential safety and operational improvements.

4.1.3 SR-87

The SR-87 corridor is a primary route between Winslow, Payson and Phoenix. The corridor between Payson and Winslow has varying terrain. South of Winslow, the corridor is generally developed to Minor Arterial standards including paved shoulders and good horizontal and vertical curve geometry. In the proximity of the National Forest Road Route 3, the terrain changes dramatically reflecting steep grades and sharp curves, including slow speeds in the towns of Strawberry and Pine.

4.1.4 Functional Classification Changes

Due to the travel demands on SR-277 and SR-377 between Heber-Overgaard and Holbrook, the functional classification of these facilities, at a regional level, should be upgraded to reflect the current and future anticipated use. Currently these facilities are functionally classified as Rural Major Collectors. The SR-377 corridor between SR-77 and SR-277, and the SR-277 corridor between SR-260 and SR-377 functions as a higher class facility and should be upgraded to a Rural Minor Arterial.

4.2 MULTI MODAL NEEDS

4.2.1 Multi-Modal Needs

In 2008, ADOT completed the Arizona *Rural Transit Needs Study*. That study identified that there are numerous unmet needs for rural transit services in Arizona. Presently, only 18 percent of the estimated rural transit demand is currently being met. Existing rural transit services are projected to meet only 13 percent of the total ridership need in 2016 if no additional services are introduced. The study described the vision that rural transit service in Arizona should be expanded significantly through the year 2016 to address the rapidly growing transportation demands and needs of rural residents statewide. Within Navajo County, there are several opportunities that should be examined further that can promote this vision.

Three goals were established in the *Rural Transit Needs Study* as well. They include:

- Goal #1: Provide services in multiple geographic areas, including transit services that operate within designated rural areas, services that connect rural areas with each other, and services that connect rural areas with urbanized areas;
- Goal #2: Address needs of particular market segments that use rural transit services, including but not limited to the elderly, persons with disabilities and persons of low income; and
- Goal #3: Serve a variety of trip purposes for rural Arizona residents including employment, medical, shopping and personal business needs.

The Rural Transit Needs Study did not necessarily address specific regional or subregional travel demand, but based the needs on elderly and low income unmet demand. Within Navajo County, particularly within Central Navajo County, there are several additional opportunities that should be examined further to enhance transit access to this region of the state.

4.2.2 Study Area Multi-Modal Needs

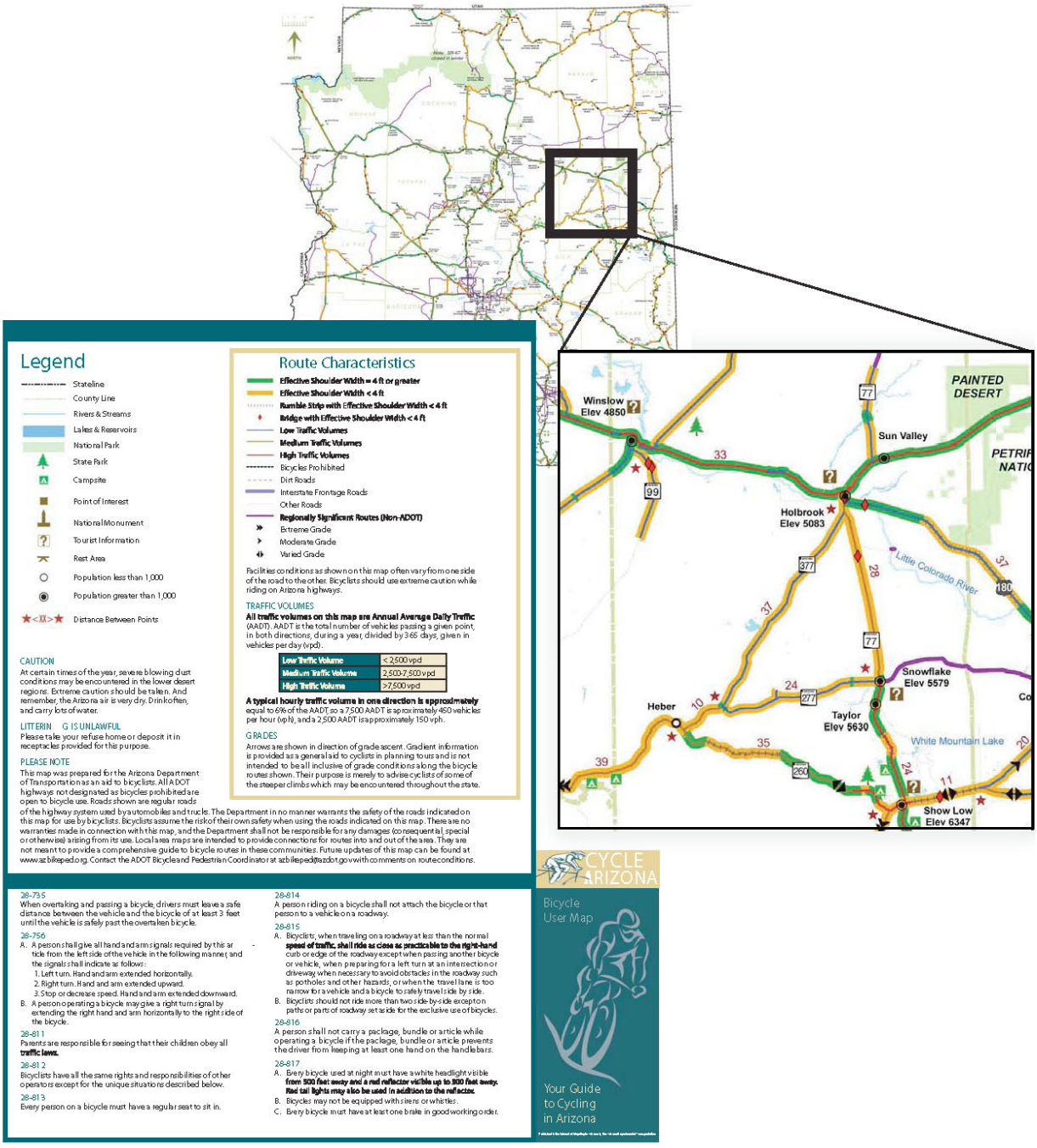
The 2008 Arizona *Rural Transit Needs Study* identified that Navajo County warranted additional transit service, primarily along the SR77 corridor (Figure 4-3). During 2009, Navajo County was the recipient of a new 5311 program that provides rural transit service between Holbrook and Show Low. Currently, there is no transit service within the Heber-Overgaard area, so there is a current unmet need that should be examined closer. Transit connectivity between Heber-Overgaard and Show Low should be examined to provide connectivity to the Holbrook to Show Low service and Show Low to Pinetop Lakeside service. The City of Winslow has taken steps to establish transit service with the White Mountain Connection line to the east and the Mountain Line Transit system to the west.

Bicycle connectivity between the communities of Heber-Overgaard, Winslow, Holbrook with the southern Navajo County communities is limited. ADOT provides a map (Figure 4-4) that illustrates the cyclist friendly routes for sub-regional travel using the state highways. Primarily, the map illustrates available shoulder width on the state highways so cyclists can understand if there is greater than, or less than 4-feet of shoulder width available to ride on.

FIGURE 4-3
RURAL TRANSIT NEEDS STUDY RECOMMENDATIONS

Source: ADOT

FIGURE 4-4 BICYCLE USER MAP



Source: ADOT

This information allows cyclists to identify and plan safe routes if available. The study area roadway assessment identified that the SR-77, SR-277 and SR-377 corridors should be studied further to remove horizontal and vertical curves and provides additional passing opportunities. Those corridors should also be examined to improve shoulder width to a total paved shoulder width of 4-feet or greater. There are also segments of SR-260 that should be examined to identify opportunities to provide a consistent minimum of 4' paved shoulder width. Additionally, during the duration of this assessment, an opportunity within the Southern Navajo County study area emerged. There is an abandoned railroad corridor between Snowflake and Pinetop-Lakeside that used to serve the mill in McNary. The corridor extends from the vicinity of Oak Street in McNary, through the Sitgreaves National Forest and parallels SR-77 into Snowflake.

Amtrak does provide passenger rail service within the Central Region study area. The Southwest Chief Amtrak service maintains a stop in Winslow; however in order to access that stop, patrons would need to drive, or use Greyhound. There is a City of Holbrook abandoned train station at the Navajo Boulevard railroad crossing. This train station could serve as a transit center that provides a transit node for a new Amtrak stop, a relocated Greyhound stop, and a park-n-ride location for patrons that would like to use the Holbrook to Show Low daily commuter service. This station could be the regional transit node that services the northern portion of the study area. Connectivity between modes is highly desired based on the recently completed Rural Transit Needs Study.

4.3 STUDY AREA RECOMMENDATIONS

The findings and conclusions from the study area evaluations are summarized herein. The recommendations include short, mid-term and long-range improvements associated with improved multi-modal mobility, safety, and traffic operations. The study included a regional examination of long-range (Year 2030) transportation needs based on historic and anticipated development within the study area, coupled with the forecasting efforts at a statewide level. Development of the Transportation Plan is the first step in the process to provide partnership funding opportunities, whether it is through Federal or State participation, or private investment. Any future improvements that are sought will require additional study and engineering to avoid, minimize or mitigate environmental impacts and determine actual improvements. All future improvements within the Study Area are driven by the communities with several opportunities for public, stakeholder, agency and elected official participation to identify any potential solutions and investment. A detailed assessment and design of any furthered alternative must complete the ADOT Design Concept Report (DCR) and environmental clearance processes.

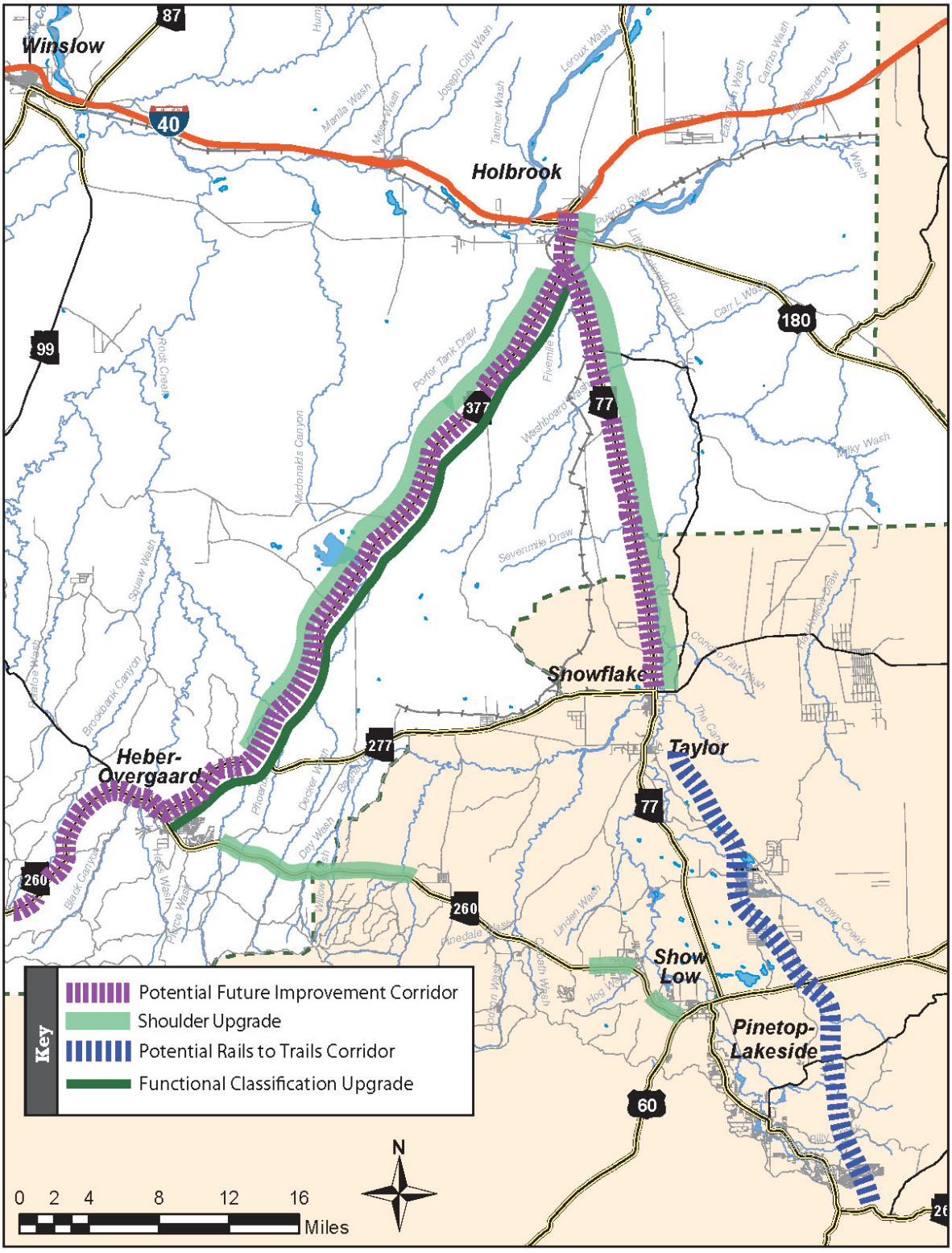
Based on the financial evaluation, most, if not all of the anticipated funding based on existing revenue sources will only provide funding for maintenance and operation activities. No major capacity improvement activities can be funded with the current revenue sources and historic allocation percentages. Federal reauthorization and non-typical funding opportunities may be available as partially or fully funded allocations; however the major improvement projects identified herein cannot be funded by current, in place local or state funding programs.

The Study Area recommendations focused on the SR-87, SR-77, SR-277 and SR-377 corridors, as they provide regional mobility and connectivity throughout the study area. The following recommendations are associated with overall study area mobility, including:

- SR-77, between Snowflake and Holbrook, should be evaluated to identify potential safety and capacity improvements by year 2020.
- SR-87, between Payson and Winslow and north to the Reservations, should be evaluated to identify potential safety and capacity improvements by year 2020.
- SR-277, between Heber-Overgaard and SR-377, should be evaluated for potential geometric, safety and capacity improvements by Year 2020.
- The intersection of SR-277 and SR-377 should be examined in more detail to determine the need for future capacity improvements, understanding that the SR-277/SR-377 travel demand is very high.
- SR-377, between SR-277 and SR-77, should be examined for geometric, safety and capacity improvements by Year 2030.
- The intersection of SR-77 and SR-377 should be examined for future geometric, safety and capacity improvements.
- SR-260 between Heber-Overgaard and Snowflake should be examined to identify the potential to improve shoulder width in segments where shoulders are less than 4-feet wide.
- US-180 between Holbrook and the Petrified Forest National Park should be examined to identify the potential to improve shoulder width in segments where shoulders are less than 4-feet wide.
- The functional classification on SR-277 between SR-260 and SR-377 should be upgraded from Rural Major Collector to a Rural Minor Arterial.
- The functional classification on SR-377 between SR-277 and SR-77 should be upgraded from Rural Major Collector to a Rural Minor Arterial.
- Within Southern Navajo County, examine the potential to establish a rails-to-trails corridor using the abandoned railroad between Snowflake and McNary.

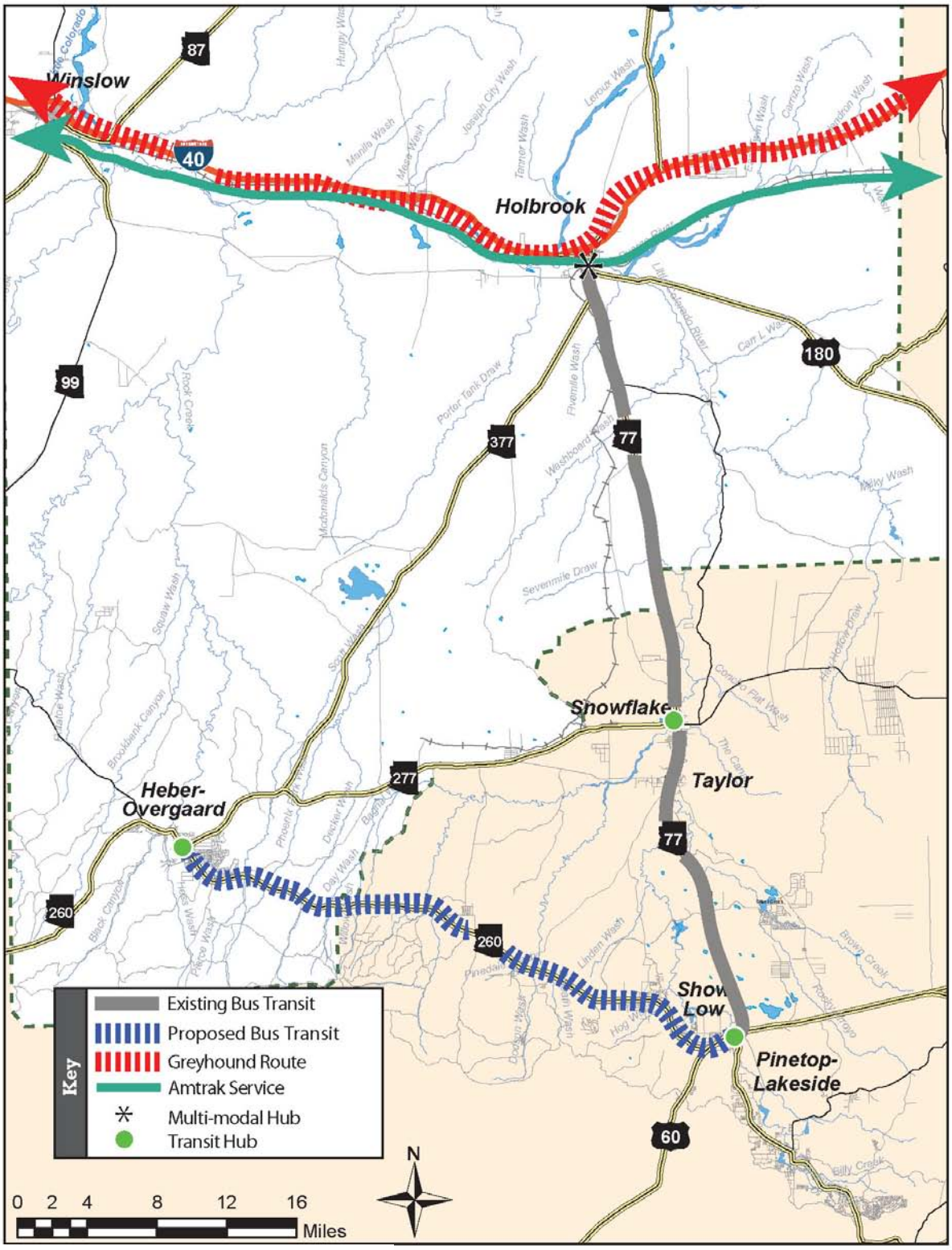
Figure 4-5 illustrates the above listed study area recommendations. Figure 4-6 illustrates the transit related recommendations.

FIGURE 4-5 STUDY AREA RECOMMENDATIONS



Source: Wilson & Company, Inc.

FIGURE 4-6 STUDY AREA TRANSIT RECOMMENDATIONS



Source: Wilson & Company, Inc.

5.0 HEBER-OVERGAARD DEFICIENCIES AND NEEDS

Heber-Overgaard is situated along SR-260, which is a five-lane arterial roadway. There are very limited development opportunities within Heber-Overgaard as the national forest surrounds the community.

Figure 5-1 illustrates the year 2030 traffic volumes. SR-260 has ample capacity to handle local area traffic demands and some future regional thru-traffic demand. Approximately 40 percent or 11,100 of the anticipated 27,900 vehicles per day travelling on SR-260 during year 2030 will also use SR-277 accessing the City of Holbrook and Town of Snowflake. This significant turning traffic will eventually require a traffic signal or higher capacity facility to regulate traffic flows, which will also decrease the functional capacity of the SR-260 corridor within Heber Overgaard. The forecasted level of traffic could potentially require additional traffic lanes for through and turning traffic movements.

The anticipated traffic demand on SR-277 could potentially warrant upgrading SR-277 to a five-lane arterial roadway between SR-260 and the Sitgreaves National Forest land located north of Tonto Drive along SR-277. Alternatives were developed to try to minimize potential disruption within Heber-Overgaard while enhancing regional mobility.

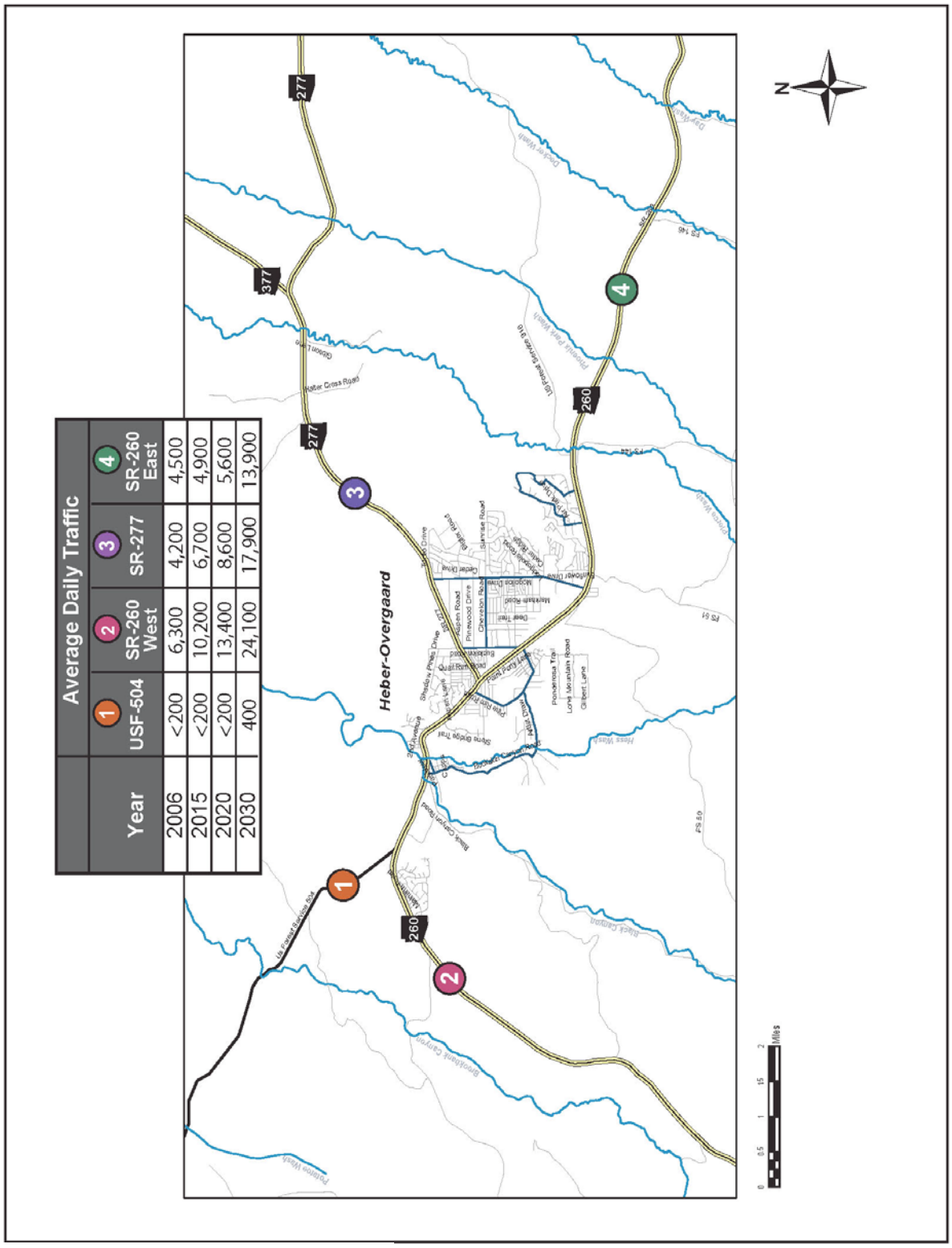
5.1 HEBER-OVERGAARD ALTERNATIVE ROUTES

Year 2030 regional and local travel demand evaluations show that traffic demand within Heber-Overgaard would reach approximately 27,900 vehicles per day, greater than the traffic volume currently seen on SR-260 near Penrod Lane within Pinetop Lakeside. Of those 27,900 vehicles, more than 11,000 vehicles per day travel on SR-277 north of SR-260.

A north side alternative route could provide direct connectivity between SR 260 and SR 277 along the north side of Heber Overgaard. This alternative was developed to identify a long-range transportation concept to minimize the potential for future required major transportation improvements within Heber-Overgaard that would disrupt downtown Heber Overgaard, including SR-260 and SR-277. This alternative could provide an option for regional travel demand needs by removing through traffic from the Heber-Overgaard core, including the intersection of SR-260/SR-277. This facility could also enhance freight travel options, reduce conflicts between freight and local traffic, and preserve pedestrian and bicycle mobility within Heber-Overgaard.

A south side alternative route was also examined to facilitate additional travel operations within the Heber-Overgaard core. The south side alternative route would not alleviate the need to improve the SR-260/SR-277 intersection, and would ultimately require upgrading the SR-277 corridor between SR-260 and Tonto Drive.

FIGURE 5-1 HEBER-OVERGAARD YEAR 2030 TRAFFIC FORECASTS



Source: Wilson & Company, Inc.

5.1.1 HEBER-OVERGAARD MULTI-MODAL NEEDS

The Town of Heber-Overgaard does not have any transit dependent, elderly or other related transit services. The recent White Mountain Connection transit service between Holbrook and Show Low is an excellent opportunity to expand upon, to service Heber-Overgaard and provide regional and statewide transit travel opportunities.

The widening project on SR-260 did include attached sidewalks as part of the improvement project. The side roads to SR-260 generally do not provide sidewalk accessibility. Future improvement projects that connect with SR-260 should consider including sidewalks or paths to provide safe pedestrian mobility.

5.2 HEBER-OVERGAARD RECOMMENDATIONS

The Heber-Overgaard area recommendations include short, mid-term and long-range improvements associated with improved multi-modal mobility, safety, and traffic operations. The study included a regional examination of long-range (Year 2030) transportation needs based on historic and anticipated development within the study area, coupled with the forecasting efforts at a statewide level. Development of this Transportation Plan is the first step in the process to provide partnership funding opportunities, whether it is through Federal or State participation, or private investment. Any future improvements that are sought will require additional study and engineering to avoid, minimize or mitigate environmental impacts and determine actual improvements. All future improvements within the Heber-Overgaard area are driven by the community with several opportunities for public, stakeholder, agency and elected official participation to identify any potential solutions and investment. A detailed assessment and design of any furthered alternative must complete the ADOT Design Concept Report and environmental clearance process.

Based on the financial evaluation, most, if not all of the anticipated funding based on existing revenue sources will provide funding for maintenance and operation activities. No major capacity improvement activities can be funded with the current revenue sources and historic allocation percentages. Federal reauthorization and non-typical funding opportunities may be available as partially or fully funded allocations; however the major improvement projects identified herein cannot be funded by current, in place funding programs.

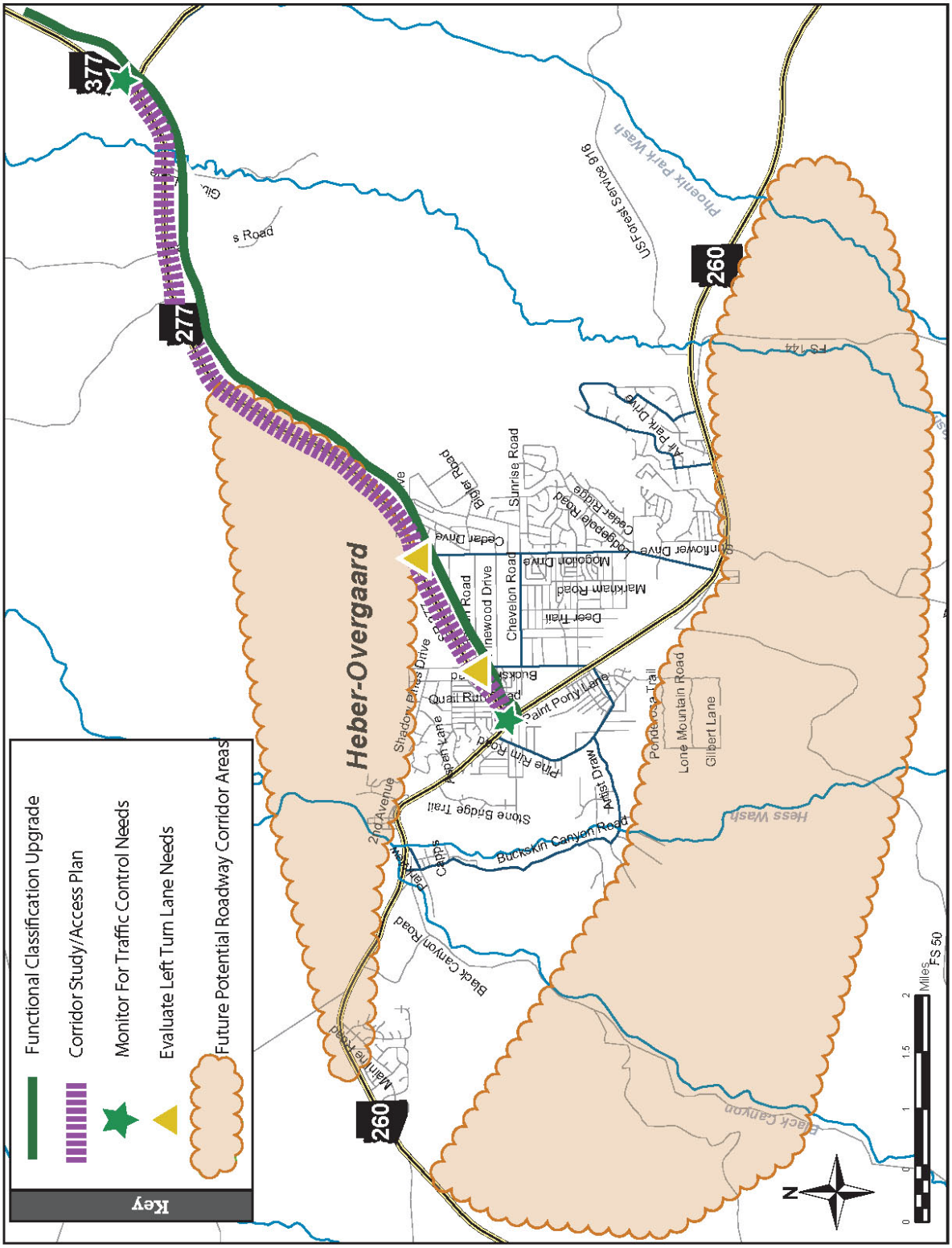
The following recommendations are associated with Heber-Overgaard mobility, including:

- Forecast traffic volumes on SR-260 west of Heber-Overgaard exceed anticipated capacity, and can potentially negatively affect Heber-Overgaard. A north side alternative route between SR-260 and SR-277 should be examined to improve capacity, safety (motorist, cyclist and pedestrian) and improve freight mobility.

- Left turn lanes should be evaluated on SR-277 at the intersections of SR-277/Mogollon Drive and SR-277/Buckskin Road to improve short-term capacity safety needs. Ultimately, a corridor study should be conducted to examine safety and capacity needs.
- The network of roadways within Heber-Overgaard is sufficient for forecasted growth anticipated by year 2030.
- Examine the potential to provide Heber-Overgaard to Show Low transit service enhance in-town mobility and connect to other regional transit opportunities. The service should try to interface with the newly established White Mountain Connection service between Holbrook and Show Low.
- When roadways meet paving requirements, the County should evaluate providing sidewalks if the surrounding land uses warrant walkability. Both the Federal Highway Administration (FHWA) and the Institute of Transportation Engineers (ITE) recommend a minimum width of 1.5 m (5 ft) for a sidewalk or walkway, which allows two people to pass comfortably or to walk side-by-side. Wider sidewalks should be installed near schools, at transit stops, in downtown areas, or anywhere high concentrations of pedestrians exist. Sidewalks should be continuous along both sides of a street and sidewalks should be fully accessible to all pedestrians, including those in wheelchairs.
- The functional classification on SR-277 between SR-260 and SR-377 should be upgraded from Rural Major Collector to a Rural Minor Arterial.
- The functional classification on SR-377 between SR-277 and SR-77 should be upgraded from Rural Major Collector to a Rural Minor Arterial.

Figure 5-2 illustrates the Heber-Overgaard recommendations.

FIGURE 5-2 HEBER-OVERGAARD RECOMMENDATIONS SUMMARY



Source: Wilson & Company, Inc.

6.0 CITY OF HOLBROOK DEFICIENCIES AND NEEDS

The City of Holbrook is in a not-so-unique situation where the City has developed along the railroad tracks to one side and has an Interstate highway to the other. When I-40 was developed, the shift in travel demand from Route 66 to I-40 played a strong role in how the City of Holbrook had to work hard to retain and attract new economic development opportunities for its residents and business owners.

Navajo Boulevard, which is also SR-77, is the primary route through the City of Holbrook, providing access to I-40. To the south, SR-77 is the only crossing of the railroad tracks and Little Colorado River within the city limits. The railroad crossing is an at-grade crossing, with four traffic lanes.

6.1 COMMUNITY ROADWAY NETWORK

This at-grade railroad crossing makes travel very unpredictable. The railroad crossing is the BNSF "Transcon" mainline track providing freight service between the Port of Los Angeles and the Port of Long Beach with points east. It is one of the busiest rail lines in the country. There are two directional tracks that SR-77 crosses at-grade. During 2007 the Transcon would average around 100 trains per day, with up to 140-150 trains per day on the weekends. Currently, the average is approximately 70 trains per day, but business has been increasing of late and will eventually return to higher levels with improvement in the economy. The line is also host to Amtrak No. 3 and 4, the westbound and eastbound *Southwest Chief*. This level of railroad activity often causes congestion on Navajo Boulevard as there can be as many as 12 trains crossing Navajo Boulevard in any given hour.

Looking South towards Navajo Blvd from NW Central Ave

When the railroad is open for train traffic, often times they run in, what is known as fleeting, where trains will run on ten minute headways when traveling in the same direction, so there can be up to six trains per hour during fleeting periods. Train activity on the weekends can be a constant flow of traffic without much in the way of breaks. During the week, however, traffic levels are lower, providing opportunities for track maintenance. A large portion of the traffic moves at night which aids in developing construction windows during the daytime.

Train length has grown considerably in the last few years. When the at-grade crossing was constructed, 5,000-foot long trains were long trains. Since then, they have moved up to 7,000, then 8,000, then 10,000, and now BNSF is examining running 12,500-foot long trains. Plans are already in place to study 15,000-foot long trains. A primary issue is that Winslow terminal congestion during heavy traffic periods causes trains to back up

and stop outside of Winslow, where there is no room to get into Winslow Yard. Winslow is a crew change point, so all trains will stop there. This causes trains in both directions to be held outside of Winslow if there is no room in the yard or all of the main tracks are in use. During the very heavy periods, trains are parked out to Holbrook and possibly further east for westbound movements. The train crews try very hard to avoid blocking crossings when they stop but it is sometimes unavoidable.

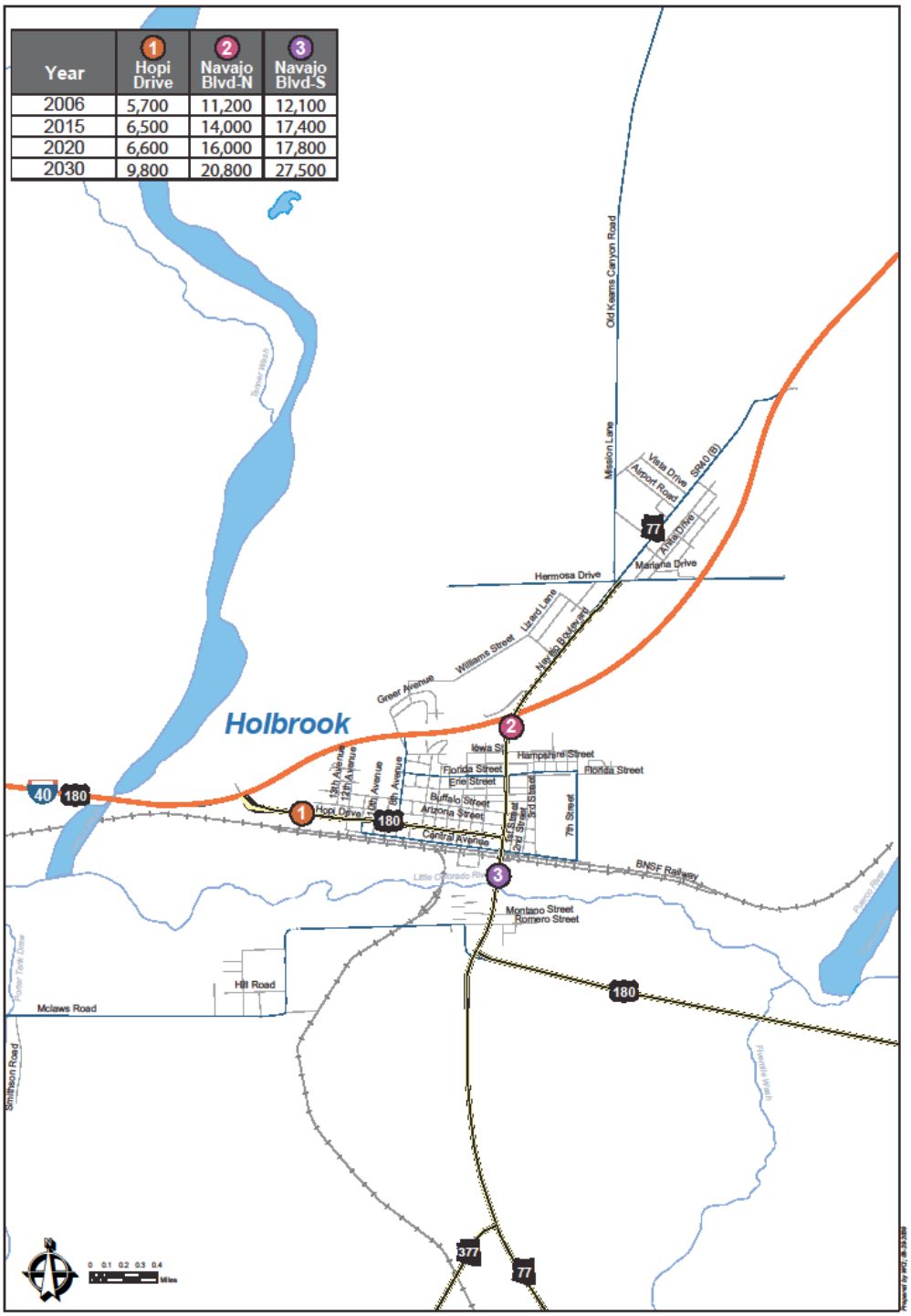
Navajo Boulevard (SR-77) is the primary route through Holbrook. Navajo Boulevard is a 4-lane arterial roadway. The inside travel lanes of Navajo Boulevard between Florida Street and the BNSF at-grade crossing generally act as left-turn lanes. This narrow Navajo Boulevard roadway section cannot be widened without severe impacts. Any roadway widening to Navajo Boulevard would severely impact the historic buildings and businesses that line Navajo Boulevard. The SR-77 at-grade BNSF Transcon railroad crossing coupled with the inability to effectively increase traffic capacity between the railroad and Florida Street due to business impacts, historic structure impacts and bicycle and pedestrian impacts has caused the region to examine potential future alternative routes to cross the river and railroad.

On Navajo Blvd Looking North at Hopi Dr

These alternative routes would play a primary role in moving freight traffic, while providing a grade separated solution of crossing the BNSF Transcon rail line. Each train that crosses SR-77 can cause between 2- and 10-minutes of stopped traffic. Based on 10-minute fleeting schedules, SR-77 could be stopped for a minimum of 24-minutes in any given hour if the railroad was operating at full capacity (12 trains per hour – 6 in each direction), therefore reducing the capacity on SR-77 by almost 50 percent. This issue, coupled with the lack of left-turn lanes between the railroad crossing and Florida Street has greatly degraded the capacity of Navajo Boulevard. Currently there are 12,100 vehicles per day that use Navajo Boulevard at the railroad crossing. Based on anticipated regional traffic demand increases and anticipated development that would use Navajo Boulevard to access Holbrook and I-40, it is anticipated that a daily traffic demand of approximately 27,500 vehicles per day could occur. Between Florida Street and the railroad crossing, the capacity of Navajo Boulevard is approximately 14,000 vehicles per day which is about 50 percent of the future year demand. That, coupled with the reduction of capacity due to the railroad crossing could diminish the existing capacity to 7,000 vehicles per day depending upon the train activity.

Figure 6-1 displays the traffic forecasts for the Holbrook area for the Year 2030. The highest forecast volume – 27,500 vpd – is shown on the bridge crossing the Little Colorado River. This level of traffic is close to that forecast for I-40 east of Holbrook at Boyse Road, 31,800 vpd. This high traffic demand across the Little Colorado River demonstrates the need for a second crossing location as Navajo Boulevard between the BNSF railroad tracks and Florida Street does not have the capacity to handle the forecasted traffic demand.

FIGURE 6-1 YEAR 2030 CITY OF HOLBROOK TRAFFIC FORECASTS



Source: Wilson & Company, Inc.

Other than traffic on I-40, the City's roadway system is forecast to experience daily traffic levels in the low 20,000's on N. Navajo Boulevard (SR-77) between Hopi Drive (US-180) and I-40. Hopi Drive is forecast to carry 14,700 vpd in the central business district between 5th Avenue and N. Navajo Drive and approximately 10,000 vpd close to the Hopi Drive interchange.

6.2 HOLBROOK ALTERNATIVE/EMERGENCY ROUTES

East and west side alternative routes were examined to identify the feasibility of providing an additional crossing of the Little Colorado River and BNSF tracks. Great care was taken to develop alternatives that would remain within the City of Holbrook. Alternative routes were tested to identify options to accommodate the future travel demand, including freight traffic, and accounted for future developments and associated traffic. The alternatives examined the potential of using existing infrastructure and interchange access along I-40.

This study examined the potential, from a fatal flaw engineering standpoint to understand if a crossing could technically be accomplished, while providing a grade separated crossing of the railroad. This study found that there are options on both the east and west sides of SR-77 to provide an additional crossing.

Initial travel demand modeling identified that an east side alternate route can provide an efficient and access controlled connectivity. However, the anticipated travel demand is very low. It is anticipated that even if an east side alternate route was constructed, the traffic on Navajo Boulevard would still exceed the capacity of that roadway between the BNSF crossing and Florida Street. For this reason, the east side alternate route should not be considered a stand-alone alternative for traffic operational improvements, freight mobility or bicycle and pedestrian enhancements.

A west side alternative route can also provide direct, access controlled connectivity with moderate to high traffic demand. It is anticipated that, if designed in a manner that helped balance the transportation need, Navajo Boulevard would still carry approximately 11,100 vehicles per day, and the new river crossing could carry approximately 17,400 vehicles per day. The traffic on Navajo Boulevard after completion of an additional connection would generally be at the year 2006 traffic volumes based on the anticipated growth for the study area and region. A western route can provide an opportunity for Navajo Boulevard to be more bicycle and pedestrian friendly as it would be anticipated that no additional traffic signals would meet congestion level warrants along Navajo Boulevard, ultimately a balanced use of the three I-40 interchanges within the City of Holbrook.

6.3 HOLBROOK MULTI-MODAL NEEDS

The City of Holbrook currently has local elderly and transit dependent service, in addition to the newly developed commuter service to Show Low, and the regional service provided by Greyhound. An opportunity that should be pursued is developing a new Amtrak station at the abandoned station located at the Navajo Boulevard rail crossing. The last train to call here was Santa Fe #23/24, remnant of the onetime *Grand Canyon Limited*. 1968 timetables show this as a station stop. Amtrak, since its inception, has sped through Holbrook at track speed, stopping the *Southwest Chief* at

Winslow, some thirty miles away, instead. The Holbrook Amtrak station could serve as a regional multi-modal node promoting and providing service throughout the populated areas of Navajo County.

In 2005, a contract was awarded from a 1999 grant from ADOT to restore the depot to its former appearance, with appropriate architectural details.

Bicycle opportunities within the City of Holbrook are focused off of Navajo Boulevard. Navajo Boulevard is a very narrow, four-lane roadway that cannot be widened without severe cultural resource impacts due to the proximity of historic buildings that line Navajo Boulevard. Bicyclists should be encouraged to use the parallel roadways to Navajo Boulevard for north/south connectivity. Providing guide signing for cyclists on Navajo Boulevard steering cyclists onto the parallel roadway network of low-volume roadways would provide additional safety for all Navajo Boulevard users. Additionally, bicycle connectivity could be enhanced between Holbrook and the Petrified Forest National Park with shoulder upgrades on US-180 west of SR-77.

The City of Holbrook has provided attached sidewalks for pedestrian access. Most of the sidewalks were developed prior to passage of the American with Disabilities Act of 1990, as amended (ADA). Both FHWA and ITE recommend a minimum width of 1.5 m (5 ft) for a sidewalk or walkway, which allows two people to pass comfortably or to walk side-by-side. Wider sidewalks should be installed near schools, at transit stops, in downtown areas, or anywhere high concentrations of pedestrians exist. Sidewalks should be continuous along both sides of a street and sidewalks should be fully accessible to all pedestrians, including those in wheelchairs. The City of Holbrook should work with ADOT to perform an ADA assessment throughout the City to ensure that the sidewalks, crossings and signage are ADA compliant.

6.4 CITY OF HOLBROOK RECOMMENDATIONS

The findings and conclusions from the study area evaluations are summarized herein. The recommendations include short, mid- term and long-range improvements associated with improved multi-modal mobility, safety, and traffic operations. The study included a regional examination of long-range (Year 2030) transportation needs based on historic and anticipated development within the Study Area, coupled with the forecasting efforts at a statewide level. Development of this Transportation Plan is the first step in the process to provide partnership funding opportunities, whether it is through Federal or State participation, or private investment. Any future improvements

that are sought will require additional study and engineering to avoid, minimize or mitigate environmental impacts and determine actual improvements. All future improvements within the City of Holbrook are driven by the community with several opportunities for public, stakeholder, agency and elected official participation to identify any potential solutions and investment. A detailed assessment and design of any furthered alternative must complete the ADOT DCR and environmental clearance process.

Based on the financial evaluation, most, if not all of the anticipated funding based on existing revenue sources will provide funding for maintenance and operation activities. No major capacity improvement activities can be funded with the current revenue sources and historic allocation percentages. Federal reauthorization and non-typical funding opportunities may be available as partially or fully funded allocations; however the major improvement projects identified herein cannot be funded by current, in place funding programs.

The City of Holbrook findings and recommendations are focused to relieve anticipated capacity, mobility and safety issues relating to Navajo Boulevard. Navajo Boulevard is the primary arterial route within Holbrook. Primary issues with Navajo Boulevard include:

- The at-grade crossing of the BNSF railroad makes travel unpredictable
- The at-grade crossing causes health, safety and welfare issues due to potential emergency service delays
- The at-grade crossing causes traffic congestion on Navajo Boulevard. The traffic capacity for Navajo Boulevard south of Florida Street is 14,000 vehicles per day; however, train activity can cause the capacity of Navajo Boulevard in the vicinity of the BNSF railroad crossing to be reduced to 7,000 vehicles per day.
- The narrow roadway on Navajo Boulevard cannot be widened south of Florida Street due to community, economic and historic impacts
- Freight must travel on Navajo Boulevard to access the communities south of Holbrook.
- The inside travel lanes on Navajo Boulevard are used as left-turn lanes, severely decreasing the capacity of Navajo Boulevard.

Short term recommendations for mobility enhancements within the City of Holbrook include:

- Conduct a focused traffic operations and pedestrian/bicycle mobility study on Navajo Boulevard from US-180 to I-40 east interchange and on Hopi Drive between Navajo Boulevard and I-40. This effort should include:
  - An access control plan to identify driveway closures/modifications
  - Traffic signal enhancements to enhance synchronization and capacity (Navajo Boulevard)

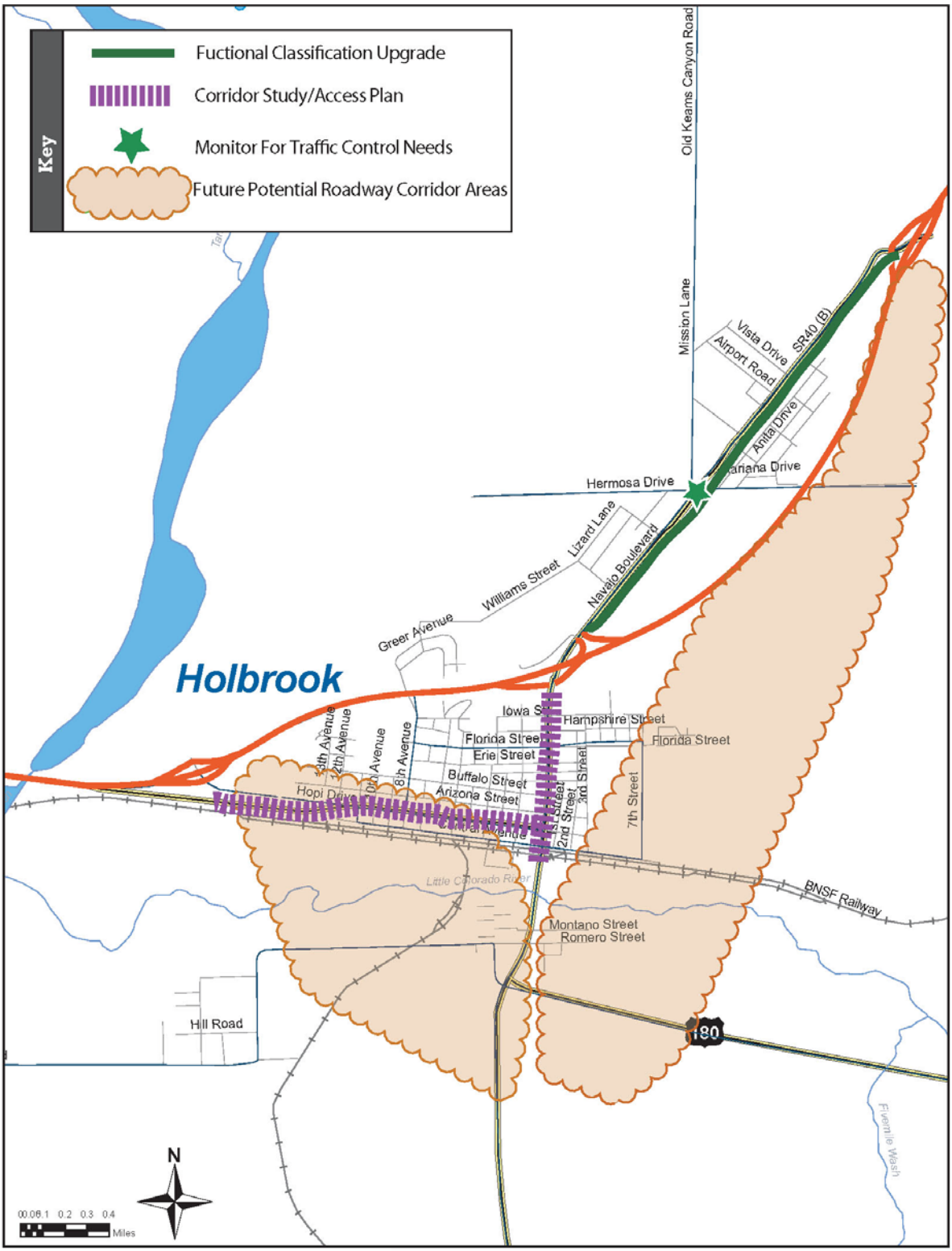
  - Left-turn evaluation on Navajo Boulevard between railroad crossing and Florida Street
  - Examine Navajo Boulevard capacity (current 4-lane versus 2-lane plus two-way left-turn lane (also known as a 3-lane section)).
  - Roadway striping evaluation
  - Roadway sign and guide sign evaluations, and
  - Detailed safety assessment
- No new traffic signals should be installed on Navajo Boulevard between I-40 and the railroad crossing.
- Update the General Plan element with Study recommendations and desired characteristics.
- Understand major regional development efforts as they impact Holbrook
- Examine the potential of developing the abandoned and recently refurbished Amtrak station into a multi-modal center that can facilitate regional travel for the White Mountain Connector transit service, Greyhound, Amtrak and other services.
- Perform an ADA assessment to identify walkability issues and develop a city-wide program to update the pedestrian infrastructure to be ADA compliant.
- Provide bicycle guide-signing to encourage cyclists to use parallel roadways to Navajo Boulevard, ultimately improving the corridor safety.
- The functional classification on Navajo Boulevard between the north Navajo Boulevard interchange and the south Navajo Boulevard interchange should be upgraded to a Rural Minor Arterial.

Future Year Efforts (when traffic volume on Navajo Boulevard reaches 13,500 vpd, additional traffic signal warrants are met, or train activity increases to more than 100 trains per day at the BNSF crossing)

- Complete a detailed Alternative Route evaluation within the City of Holbrook for both east and west side crossings of the BNSF railroad and Little Colorado River
- Complete an update of the travel demand model to better understand timing based on updated regional socioeconomic data forecasts
- Implement Navajo Boulevard Study Recommendations from above. Potential options may also include:
  - Restrict left-turns on Navajo Boulevard between Florida Street and railroad crossing
  - Change signal phases to allow northbound movements to flow separately from southbound movements (protected/permissive northbound left-turn)
  - Restripe Navajo Boulevard to 3-lanes between I-40 and the BNSF crossing.

Figure 6-2 illustrates the City of Holbrook recommendations listed above.

FIGURE 6-2 HOLBROOK RECOMMENDATIONS



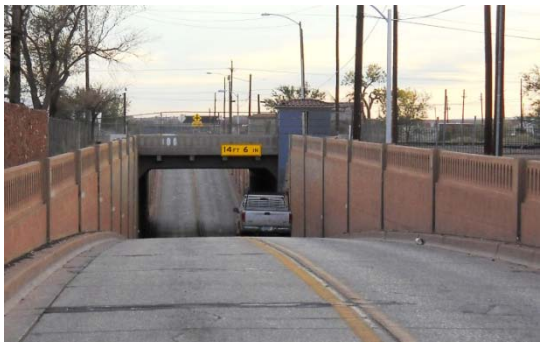
Source: Wilson & Company, Inc.

7.0 CITY OF WINSLOW DEFICIENCIES AND NEEDS

The City of Winslow is in a similar situation as the City of Holbrook where they are surrounded by the BNSF railroad to the south and I-40 to the north; however there are two grade separated crossings of the BNSF.

7.1 COMMUNITY ROADWAY NETWORK

The primary southern crossing is a tunnel along SR-87 at Williamson Avenue. The existing street underpass in downtown Winslow follows the style of many underpass structures built nationwide during the late 1930's. These underpasses were part of public works projects in the depression era to create jobs while helping to develop the nation's infrastructure. Many of these structures still exist, especially in the West, and perform successfully while remaining in very good condition.



On N Williamson Ave. Looking South at BNSF

These bridges have all performed very well from a railroad structure point of view, but they have all tended to suffer from inadequacies over time from functionality for vehicular traffic. Minimum overhead clearances have increased and lack of shoulders and narrow lanes have introduced some functional obsolescence into the grade separation structures. This is not to say that they need to be replaced because of that. Depending upon the type of foundation used for the substructures, it may be possible to lower the roadway to increase vertical clearances to meet modern standards. Horizontal clearances are more problematic, however, and need to be examined on a case-by-case basis.

The rail line through Winslow and across this bridge is the BNSF "Transcon," one of the busiest rail lines in the country. During 2007 the Transcon would average around 100 trains per day, with up to 140-150 trains per day on the weekends. Currently, the average is approximately 70 trains per day, but business has been increasing of late and will eventually return to higher levels with improvement in the economy. The line is also host to Amtrak No. 3 and 4, the westbound and eastbound *Southwest Chief*. BNSF trains will start to slow down about 1.5 miles outside of Winslow (at least westbound; eastbound, they are climbing a pretty steep grade and they slow down naturally coming into Winslow). Winslow terminal congestion during heavy traffic periods causes trains to back up and stop outside of Winslow because there is no room to get into Winslow Yard. Winslow is a crew change point, so all trains must stop there. This causes trains in both directions to be held outside of Winslow if there is no room in the yard or all of the main tracks are in use.

The secondary crossing is a two lane overpass over the BNSF at Coopertown Road. Motorists using this crossing generally use the Hipkoe Drive interchange to access I-40. Coopertown Road is a two lane paved roadway that parallels the south side of the

BNSF tracks and Winslow Yard. It also traverses through the Coopertown community just east of SR-87.

Figure 7-1 displays the traffic forecasts for the Winslow area for the Year 2030. The highest traffic volumes in the City of Winslow are forecast to occur on I-40 and range from 26,000 between North Park Drive and the I-40 junction with US-180/SR-99 to 29,900 east of Transcon Lane. In the central city, the highest volumes are forecast to occur on SR-87 south of the 2nd Street/3rd Street one-way pair (7,300 vpd) and on North Park Drive just south of I-40 (10,200 vpd). Volumes of six to eight thousand vpd are forecast for North Park Drive north of Cherry Street. Based on the second set of proposed development levels that the City provided, but not used for this evaluation, traffic demand at the SR-87 tunnel could exceed 25,000 VPD, causing severe system level congestion.

7.2 ALTERNATIVES AND ALTERNATIVE ROUTE OPTIONS

Several options were explored to examine the feasibility of enhancing future year mobility with available routes and/or potential new routes. If the City of Winslow would like to pursue any of these, or other alternative routes, additional study is required. All alternative routes would ultimately have to balance the transportation system with the anticipated land use needs.

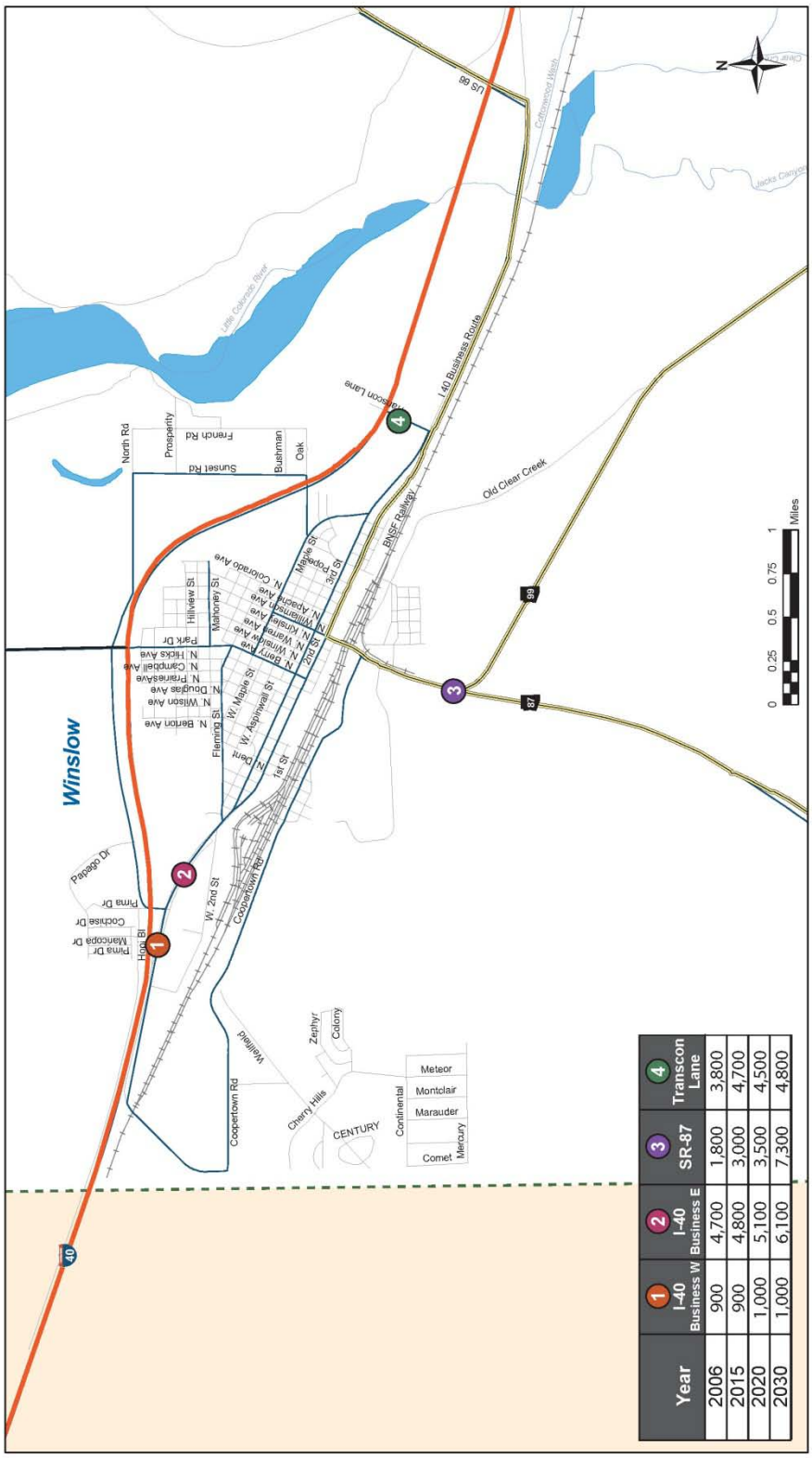
7.2.1 EAST AND WEST ALTERNATIVE ROUTE OPTIONS

The City of Winslow has been examining options to accommodate north/south traffic demand. Currently, there are two options to cross the BNSF tracks that traverse the southern portion of the City. Williamson Avenue (SR-87) is the primary route for traffic to cross under the railroad. This historic structure has limited capacity due to the narrowness and the proximity of the Second Street signal at the top of the grade. The second option is to use the west side overpass via West Third Street. This relatively new crossing of the tracks has ample capacity, however the transportation system that supports this crossing has limited capacity including Coopertown Road to the south of the BNSF tracks and the Hipkoe Drive interchange with I-40 to the north.

East, central and west side alternative rail crossings were examined to identify the feasibility of providing an additional grade separated crossing the BNSF tracks. The evaluations examined utilizing existing infrastructure and interchanges as much as possible. The evaluations concluded that it is technically feasible to provide additional north/south connectivity along SR-87 with a parallel tunnel to the existing tunnel, or cross over the railroad east or west of the SR-87 corridor. Western alignments can avoid potential levee and potential floodplain issues due to the higher elevation terrain. A more in-depth evaluation of where to cross with a consent-based public involvement program should occur to identify specific options at a finer level of detail regarding potential development, access and multi-modal mobility. The City of Winslow is looking at a combination of a parallel tunnel along with a a western alternative “truck route” as alternatives to be studied further.

Transcon Lane in east Winslow has an accessibility issue due to the Flying J truck stop located at the southeast quadrant of the interchange. Trucks wait on the eastbound I-40 off ramp until traffic exiting the truck stop has exited. This occurs because the

FIGURE 7-1 YEAR 2030 CITY OF WINSLOW TRAFFIC FORECASTS



Source: Wilson & Company, Inc.

driveway geometrics cause large vehicles turning northbound to cross into oncoming southbound traffic. This issue causes backups onto the mainline I-40 when the truck stop is significantly congested. For an east side alternative route to be effective, the geometrics at the Flying J driveway and up to the interchange must be remedied.

Initial modeling conducted for this evaluation identified that more traffic demand could be directed to an eastern alternative route, rather than a west alternative route; however, more in-depth evaluation is needed to identify if there is a preferential route. A western alternative route does provide additional development opportunities to support the industrial development desired south and west of the airport. Additionally, the State of Arizona is examining locating a new prison in the same vicinity of the existing prison.

7.2.2 Expand the Existing Tunnel Under the BNSF

The City provided an alternative to an east or west side alternative to examine the feasibility of expanding the current tunnel at Williamson Avenue under the BNSF. The existing tunnel has a capacity of approximately 5,000 vehicles per day due to horizontal and vertical constraints and inconsistent closures. The tunnel and Williamson Avenue/2nd Street intersection will function as the bottleneck in the downtown. The existing tunnel is historically significant and should not be impacted with any future project, but should be examined as the vertical clearance should be increased to accommodate truck traffic. Expanding the current tunnel could include boring an adjacent tunnel west of the existing tunnel to create two separate one-way tunnels. This alternative could provide one-lane in each tunnel with room for shoulders and potentially a sidewalk. The two separate one-way tunnels could provide additional capacity, safety and security enhancements to this rail undercrossing including having the ability to access a crash or address tunnel closure issue. This in turn, would provide enhanced emergency response service time. Additionally, with the existing and proposed prisons on the south side of the tracks, the additional tunnel would provide an enhanced and more secure way to provide emergency services to the prison.

Initial evaluation shows that there would be ample capacity on the existing street network to accommodate this projected traffic demand. The intersection geometry at the Williamson Avenue/2nd Street intersection currently jogs to the east to line up with the existing tunnel geometry. This alternative has the potential to fix the geometry offset issue and enhance the safety and capacity of this intersection, ultimately enhancing the capacity in the intersection and tunnel.

If no other connectivity improvements were made to the north/south transportation system in south Winslow, this alternative would require all truck traffic to still use the Williamson Avenue undercrossing or the Coopertown Road overpass. The Coopertown Road overpass would require traffic to traverse through “Coopertown” – a small residential development on the south side of the BNSF. If this alternative is furthered, Coopertown Road should also be improved.

7.2.3 Coopertown Road Realignment and Expansion

The City of Winslow developed an additional alternative that provides connectivity between SR-87 and the BNSF overpass on the western edge of Winslow along the

south side of the BNSF. The Coopertown Road realignment would include utilizing the existing Coopertown Road for much of the corridor, with a realignment of the existing roadway around the Coopertown neighborhood and corridor roadway upgrade.

This alternative has a low impact on traffic issues within the City of Winslow, particularly on Williamson Avenue. However, this route could be signed and identified as a truck route to access I-40. If this alternative were pursued, and trucks were restricted to only use this new route, there would be a potential for decreased truck traffic within the City of Winslow, primarily on 2nd and 3rd Streets.

Improving Coopertown Road does provide additional development opportunities to support the industrial development desired in the vicinity of the airport. This route can accommodate higher traffic volumes if and when additional development occurs.

7.3 WINSLOW MULTI-MODAL NEEDS ASSESSMENT

The City of Winslow currently has local elderly and transit dependent service, in addition to the regional service provided by Greyhound, non-scheduled air service and rail service by Amtrak. With the newer development north of I-40 and south of the railroad, coupled with the rejuvenation currently occurring in downtown Winslow, local circulator service within the City of Winslow should be furthered examined. This new service could also provide connectivity with the Greyhound and Amtrak service currently available within Winslow. Working from this Amtrak Station hub, Winslow desires to develop inner-city regional transit service connectivity to Flagstaff to the west and Holbrook to the east.

Bicycle opportunities within the City of Winslow have been focused on 2nd and 3rd Streets, except in the downtown area. Most desirable bicycle routes in the downtown area are eastbound on 1st Street and westbound on Aspinwall Street. Due to the excessive number of driveways coupled with the traffic volumes in the downtown area, bicyclists should be encouraged to use these parallel roadways to help promote enhanced safety for cyclists and motorists alike.

The City of Winslow has provided attached sidewalks for pedestrian access. Most of the sidewalks were developed prior to today's ADA requirements; however the City has been very active in updating the sidewalk crossings and signage to be ADA compliant. Both FHWA and the ITE recommend a minimum width of 1.5 m (5 ft) for a sidewalk or walkway, which allows two people to pass comfortably or to walk side-by-side. Wider sidewalks should be installed near schools, at transit stops, in downtown areas, or anywhere high concentrations of pedestrians exist. Sidewalks should be continuous along both sides of a street and sidewalks should be fully accessible to all pedestrians, including those in wheelchairs. The City's Renaissance projects, focusing on making Winslow a more walkable community, have made great strides towards making Winslow a multi-modal community.

7.4 CITY OF WINSLOW RECOMMENDATIONS

The findings and conclusions from the study area evaluations are summarized herein. The recommendations include short term and long range improvements associated with improved multi-modal mobility, safety, and traffic operations. The study included a regional examination of long-range (Year 2030) transportation needs based on historic and anticipated development within the study area, coupled with the forecasting efforts at a statewide level. Development of a Transportation Plan is the first step in the process to provide partnership funding opportunities, whether it is through Federal or State participation, or private investment. Any future improvements that are sought will require additional study and engineering to avoid, minimize or mitigate environmental impacts and determine actual improvements. All future improvements within the City of Winslow are driven by the community with several opportunities for public, stakeholder, agency and elected official participation to identify any potential solutions and investment. A detailed assessment and design of any furthered alternative must complete the ADOT DCR and environmental clearance process.

Based on the financial evaluation, most, if not all of the anticipated funding based on existing revenue sources will provide funding for maintenance and operation activities. No major capacity improvement activities can be funded with the current revenue sources and historic allocation percentages. Federal reauthorization and non-typical funding opportunities may be available as partially or fully funded allocations; however the major improvement projects identified herein cannot be funded by current, in place funding programs.

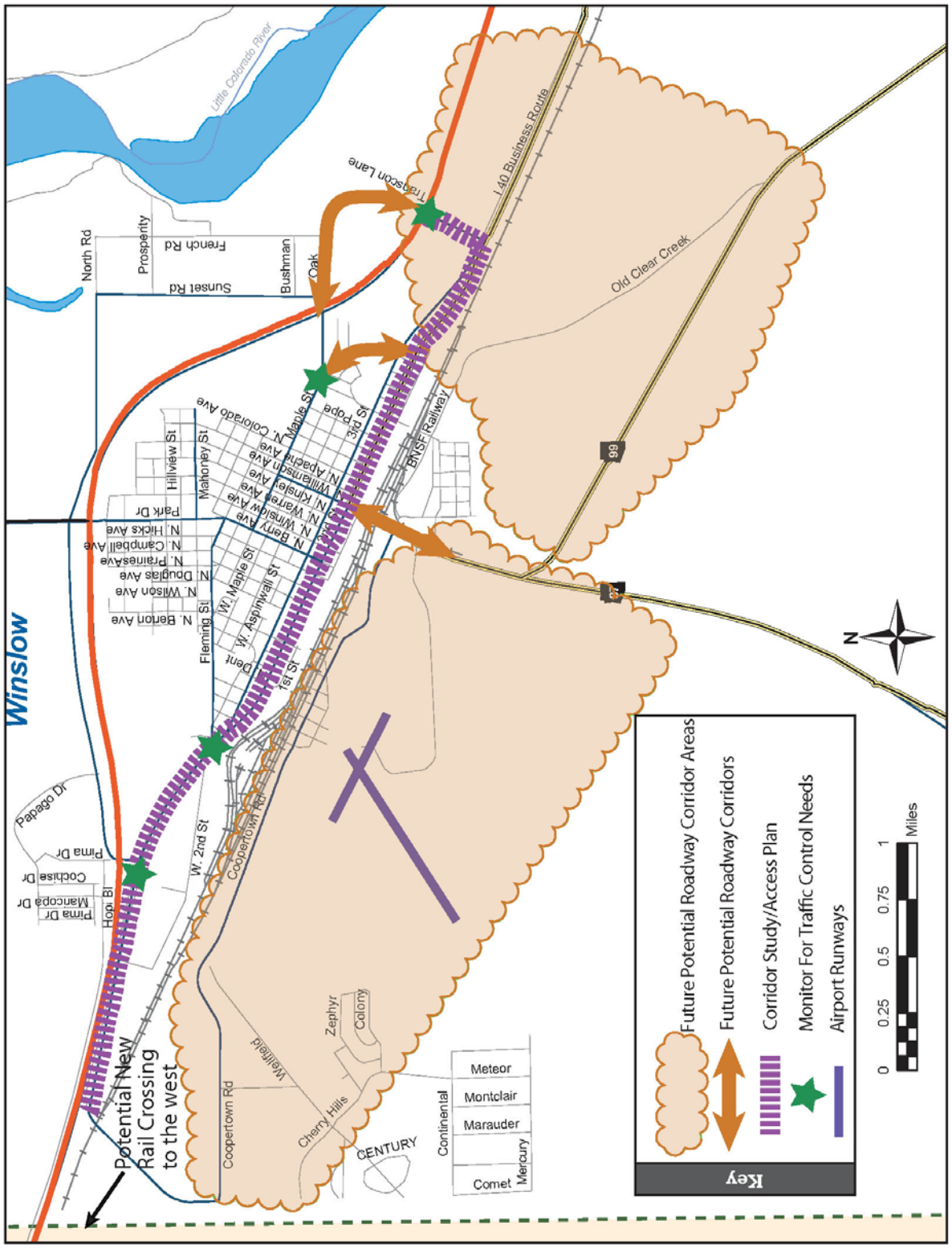
The City of Winslow findings and recommendations are focused to relieve anticipated capacity, mobility and safety issues within Winslow.

- A study should be conducted on 2nd Street and on 3rd Street to improve mobility and safety through access management. Bicycle and pedestrian safety would be enhanced with any access management enhancements made on these two primary one-way streets. 2nd Street, east of Williamson Avenue should be examined to reduce the pavement width. The extra pavement could be used for local area parking or other uses.
- A detailed evaluation of the Flying J truck stop driveway geometry and the ramp geometry should be completed to enhance large vehicle operation in this critical area of Winslow. Geometric improvements related to the driveway with correct throat radii should be examined to correct turning truck issues causing back-ups on the I-40 eastbound exit ramp.
- Examine local circulator transit service to enhance in-town mobility and connect to other regional transit opportunities.
- The Amtrak Station should be further restored and enhanced to better serve as a multi-modal hub for Winslow and the region.
- Provide bicycle guide-signing to encourage cyclists to use parallel roadways to 2nd and 3rd Streets to include 1st, 4th and Aspinwall Streets within the core areas of Winslow.

- A detailed evaluation of an additional BNSF crossing should be conducted to examine potential crossing locations between Hipkoe Drive and the Leupp interchange located west of the study area and compare/contrast the options presented in this report with any additional crossing opportunities.
- If any west side alternatives are furthered, a detailed examination of the Hipkoe Drive interchange, the Hipkoe Drive/2nd Street intersection and the 2nd Street corridor would need to be assessed. The Hipkoe Drive interchange has steep grades and has limited opportunities for capacity enhancements due to the geometric constraints and surrounding development. Additionally, the eastbound interchange ramp terminal is located very close to 2nd Street. Future signalization of the interchange ramp terminal and/or Hipkoe Drive/2nd Street should be carefully scrutinized due to intersection spacing and grades. Alternative intersection treatments should be examined if this intersection requires capacity or safety improvements.

Figure 7-2 depicts the Winslow area recommended transportation improvements.

FIGURE 7-2 WINSLOW RECOMMENDATIONS



Source: Wilson & Company, Inc.

8.0 REGION-WIDE RECOMMENDATIONS

Navajo County, along with the cities of Holbrook and Winslow have opportunities to promote quality design and multi-modal influences as new projects are constructed and development/redevelopment occurs. The following sections provide recommendations regarding programs that can help preserve capital transportation investment functionality by instituting design elements when development occurs.

8.1 ACCESS MANAGEMENT

Access management is defined by the Transportation Research Board (TRB) in its *Access Management Manual, 2003*. Access management is the "systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway." Application of the best practices of access management has benefits for motorists, bicyclists, pedestrians, transit riders, business people, government agencies, and communities.

The desired outcomes of access management are highways that:

- Are safer for vehicular and pedestrian traffic;
- Allow motorists to operate vehicles with fewer delays, less fuel consumption, and fewer emissions;
- Provide reasonable access to properties;
- Maintain their functional integrity and efficiency, helping to protect the investment of taxpayer dollars;
- Reflect coordination between land use and transportation decisions; and
- Are used for the purposes (functions) for which they are designed.

8.1.1 ARIZONA ACCESS MANAGEMENT

Access permitting is currently carried out pursuant to Arizona Revised Statutes (ARS) §28-7053, which prohibits unauthorized encroachments in state highways. For an encroachment to be lawful, it must be authorized by the State DOT Director. The Director has adopted administrative rules (regulations) governing encroachments. These rules are published as Arizona Administrative Code, R17-3-501 Highway Encroachments and Permits - which includes access connections to state highways. The rule states that each encroachment requires a permit. Permits for driveways (encroachments) onto a state highway may be granted by ADOT's Engineering Districts, a delegation from the Director. Further, in accordance with a policy of the Arizona State Transportation Board, ADOT has been working towards establishing a Statewide Access Management Program which has the intent of preserving the functional integrity of the State Highway System. The Program includes the development of an access management classification system for state highways, and a comprehensive manual to guide the uniform application of access management throughout the State. Upon initiation of the formal rulemaking process, ADOT will then solicit public comment on the Program. The ADOT Intermodal Transportation Division, Traffic Engineering Group oversees the Arizona Access Management Program.

8.1.2 Access Management Strategies

There are three main access management implementation mechanisms. Planning-based approaches typically develop functional classification, roadway system, or corridor based practices that specify access management characteristics. Regulatory methods apply permitting procedures to manage access development. Design-based approaches define engineering standards and methods. Each separate implementation mechanism is a piece of an overall strategy that makes a successful access management program. Various strategies have differing benefits. A successful Access Management Program may use measures from all three main implementation mechanisms.

A. Planning-Based Access Management

Planning-based access management approaches develop access management programs using the transportation planning tools available. All of the following examples typically require adoption by the appropriate Commissions, Councils, and Boards to be used in planning decision making. Examples include:

- Integrating access management into the Comprehensive Land Use Plan and/or General Plan;
- Establishing a Major Roadway Plan that identifies and classifies the roadway network within a plan area;
- Developing an access classification system with standards that directly relate to the established roadway functional classification system;
- Defining the appropriate level of access for each classification to include property access, types of allowed movements and identifying potential traffic controls allowed;
- Establishing spacing criteria for intersections;
- Establishing spacing criteria for signalized intersections;
- Ensuring coordination with appropriate agencies for review authority; and
- Creating these planning mechanisms by involving the stakeholders and the public.

Planning-based mechanisms create the base understanding where the public and policy makers establish and define how the system will develop (if undeveloped) or evolve (if developed). Once the community desires for access management are intertwined into the adopted plans and regulations, the connection between land use planning and access spacing occur. Also, by integrating access management strategies into adopted planning documents, then expectations can be understood by those desiring to develop or redevelop property.

B. Regulatory-Based Access Management

A regulatory-based access management approach applies permitting procedures to best regulate corridor access. Examples include:

- Planning permits for driveways;

- Engineering permits for design standards;
- Engineering permits for traffic control by all affected agencies; and
- Creating a link between zoning and the adjacent and surrounding transportation system.

Permitting processes and trained staff to conduct the permitting activities, are critical for a successful access management program. The TRB *Access Management Manual* defines a permit as, "a legal document that grants approval to construct and operate a driveway or other access of a certain design at a specified location on a given roadway for specific purposes." The permitting process is based on a set of application requirements, a formal submittal, review by the permitting agency, and action by the agency to issue or deny the access.

Typically, developments would be required to submit a site plan and an associated traffic impact study. Traffic study reporting requirements vary by permitting agency, but generally describe the driveway location, number of driveways, size and profile, and examine circulation patterns, safety, roadway capacity, intersection traffic control and projected traffic operating conditions. ADOT provides standard criteria for traffic impact study requirements. Appendix A includes the Traffic Impact Study guidelines from ADOT. Navajo Boulevard, located within the City of Holbrook, has operational and systemic issues relating to traffic flow and multi-modal mobility. Requiring traffic impact studies would allow decision makers to be fully informed about the land use decisions being made so that new development not only provides the economic development opportunities, but does it in a responsible manner.

C. Design-Based Access Management

A design-based access management approach applies engineering standards that are to be met by all new developments and improvements. Examples include:

- Developing a roadway design manual that has engineering standards that address roadway geometry and access geometry standards;
- Integrating traffic impact studies as part of the design process (outlined in Appendix A);
- Developing design standards for turning lane geometry; and
- Developing design standards for median treatments.

Navajo County and its member cities are strongly encouraged to expand upon the four bullets above and integrate cross access requirements on any non-local roadway. Cross Access agreements allow driveways to be shared between property owners. The property owners benefit because they can provide additional parking where a private drive may typically occur. The local agency benefits because there is one fewer access located on a collector or higher class roadway facility. Additionally, pedestrians and cyclists benefit as there are fewer conflict points where pedestrians/cyclists interact with driveway traffic.

There are nine key design criteria identified in the TRB *Access Control Manual*, including:

- Preserve the functional intent of the roadway to which access is to be provided;
- Minimize the difference in speed between turning vehicles and through traffic to produce a safe traffic environment;
- Eliminate encroachment of turning vehicles on adjacent lanes;
- Use a combination of throat width and return radii that will accommodate the intended exit and entry operations of the selected design vehicle;
- Provide adequate sight distance for drivers exiting a site;
- Provide sufficient storage within the driveway for traffic entering the site to prevent spill-back onto the abutting road;
- Provide sufficient queuing within the driveway to produce efficient traffic flow for vehicles leaving the site;
- Minimize the number of conflict points at the junction of the access connection with the abutting road; and
- Provide adequate storage for turn lanes and within access connections to accommodate peak traffic demand.

A successful Access Management strategy for Navajo County, the City of Holbrook and the City of Winslow should include Planning-, Regulatory- and Design-based strategies to fully protect the transportation infrastructure investments made on the system. It is highly recommended that a study be conducted to identify and develop the best components of an Access Management Program for Navajo County.

8.2 SAFETY IMPROVEMENT PROGRAM

An annual Safety Improvement Program should be established to develop a systematic approach for crash mitigation based on reported crash data. A program that allows ADOT, Navajo County and the member cities within Navajo County to access crash records would allow agencies fully understand safety issues.

The Safety Improvement Program should be based on two categories of safety analysis, including the calculated crash rate and the raw number of crashes based on three years of historic crash data. Projects that would be evaluated in the Safety Improvement Program would include those segments and spot locations/intersections that exhibit a higher than average number of crashes compared to similar types of facilities or throughout Navajo County. This Long-Range Transportation Study identified several issues relating to cyclists on SR-260 in Pinetop-Lakeside, extensive wild animal crashes on SR-260 between Heber-Overgaard and Show Low, and left-turn/access crash issues in Holbrook and Winslow.

Each crash location or segment within the Safety Improvement Program would be evaluated based on three years of historic crash data and a field review would be required. The crash data should be summarized in a crash diagram to identify travel direction, crash type, time of day, and severity. The crash diagram will help to identify trends. The field review would examine geometric issues such as pavement width, shoulder width, roadway curvature, lighting condition, roadway stripes (paint), speeds,

traffic counts, signs and markers. Additionally, other factors such as pedestrian and/or bicycle use, and driveways should be noted.

The Safety Improvement Program would provide ADOT, Navajo County and member cities a tool to help prioritize capital investments from as small as roadway regulatory signs to geometric improvements.

However; any Access Management or Safety Improvement strategies should include provisions and analysis related to transportation improvements in historic downtown areas. Specifically, how to achieve access management and safety improvement goals on existing roads without destroying the historic character of the roadways, intersections and access drives in high-density historic urban core areas.

9.0 IMPLEMENTATION PLAN

The extent of the transportation issues presented in Chapters 4, 5, 6 and 7 for the Central Navajo County region far exceed the revenues anticipated for the region. The anticipated revenues, through Year 2030 are summarized below. Following that summary is a short-, mid- and long-range improvement plan.

Many of the improvements are based on the socioeconomic assumptions developed for the region from stakeholder and agency input. Understanding that the economy is in turmoil, growth has essentially halted, traffic demands have generally stagnated and local sales tax receipts have diminished, it is important that this plan be implemented according to the needs as they occur. Additionally, this plan should be revisited in year 2015, and updated to reflect the state of the economy at that time.

A financial overview was conducted to examine ADOT, Navajo County and the cities of Holbrook and Winslow. This section identifies existing and projected Year 2030 forecasted revenues, and describes additional funding options that could be implemented either locally or regionally.

9.1 TRANSPORTATION REVENUES

For the study area, the four jurisdictions had approximately $11.2 million in transportation revenue for FY 2008-09. Most all of the transportation revenue provides funds for maintenance efforts, not expansion or major capital projects.

As the previous section demonstrates, state shared revenue is the primary “reasonably expected revenue funding stream” for the study area. The study team acknowledges that federal revenue is a major source, but believes that projecting federal revenues is too uncertain and the future of federal transportation funding will be decided in the reauthorization of the federal transportation program.

Table 9.1 presents a projection of state shared transportation revenue available to the study area jurisdictions for FY 2009 to 2030. Total revenue is projected to be $284.6 million, with ADOT at $102.9 million, Navajo County at $105.5 million, Holbrook at $27.1 million, and Winslow at $49.1 million. This revenue should be viewed as primarily available for annual operations and maintenance expenditures, and not for any major capacity expansions of the existing roadway systems in the study area.

TABLE 9.1 PROJECTION OF STATE SHARED TRANSPORTATION REVENUE IN STUDY AREA, FY 2009 – 2030 (CURRENT $ MILLIONS)

Fiscal Years	ADOT (Holbrook and Winslow Sections)	Navajo County (Holbrook Yard)	Holbrook	Winslow	Total
FY 2009 - 2010	$5.42	$5.41	$1.43	$2.59	$14.84
FY 2011 - 2020	$37.32	$38.11	$9.84	$17.82	$103.09
FY 2021 - 2030	$60.16	$61.97	$15.86	$28.72	$166.71
Total	$102.90	$105.49	$27.13	$49.13	$284.64

Source: CLA Associates, 2009

9.2 POTENTIAL NEW TRANSPORTATION REVENUE SOURCES

Understanding that the revenues that are anticipated for the region will primarily go towards maintenance, the study team identified potential revenue sources for four jurisdictions, but does not attempt to prioritize source or quantify their revenue capabilities. The sources identified in this section are generic to all jurisdiction and transportation agencies. The section concentrates exclusively on non-federal revenue sources. The potential sources are not mutually exclusive, so the state legislature could authorize multiple revenue sources for ADOT or the local jurisdictions; or ADOT and local jurisdictions could independently initiate new sources. Any new ADOT revenue source or sources would increase local revenue if the new revenues were distributed through the existing Highway-User Revenue Fund (HURF).

9.2.1 ADOT CANDIDATE REVENUE SOURCES

In rural Arizona, ADOT primarily relies upon HURF revenue (and secondarily on, federal revenue) for its annual funding. The State HURF draws from a wider collection of sources, as shown in Table 9.2, with the Vehicle License Tax and vehicle use excise taxes (gasoline and use fuel). Additionally, the composition of HURF revenue sources has changed, with gasoline taxes declining as a percent of HURF and vehicle license taxes increasing as a percent of total revenue.

The State does not currently dedicate State sales tax revenues for transportation and the legislature would likely be unwilling to divert already tight State general revenues to other purposes such as transportation. There was an attempt by the TIME Coalition (Transportation & Infrastructure Moving Arizona's Economy) to put an initiative on the ballot to levy and collect a new statewide sales tax for transportation, but the Secretary of State ruled there were not sufficient number of signatures to place the initiative on the ballot.

On tolling options, the Arizona legislature in the 2009 regular session approved major public-private-partnership (P3) enabling legislation. The P3 legislation created innovative ways to build and operate transportation facilities. Many states use this funding mechanism to build new capacity, and sometimes generating new funds by selling public assets to private investors who then operate them on a pay-for-use basis. Arizona had numerous toll facilities during territorial days, including roads and bridges, although their use ended long ago.

Until recently, our state laws did not encourage the formation of P3 investments. The state legislature recently reopened the door for viable P3 investments by adopting new enabling legislation. This landmark legislation codifies best practices from around the country into a single statute. The legislation is innovative and flexible, and can be used for transit as well as roads. This flexibility will encourage planners and investors to consider all modes of travel, more so than in the past. "Eligible projects" are very broadly defined as "any enhanced, upgraded or new facility" using "one or more modes," including highways, alternate modes (transit, bus systems, guided rapid transit), "intermodal or multimodal systems," other modes (ferries, boats, and vessels), as well as support facilities, equipment and property.

TABLE 9.2 ADOT CANDIDATE REVENUE SOURCES

Candidate Source	Currently Authorized	Potential Action
Fuel Taxes		
Motor fuel taxes	Yes	Amend ARS to increase tax rate/gallon
Indexing fuel taxes	No	Amend ARS to index fuel taxes
Sales tax on sale of gasoline	No	Amend state constitution and amend ARS
Vehicle registration and related fees		
Vehicle registration and license fees	Yes	Amend ARS to increase fees
Vehicle personal property taxes	No	Increase in lieu property tax rate or add new tax category
Excise tax on vehicle sales dedicated to transportation	No	Amend ARS to authorize this excise tax
Tolling, pricing and other user fees		
Tolling existing roads	Yes	See comments below
HOT lanes, express toll lanes, truck toll lanes	Yes	See comments below
VMT fees	No	Follow VMT demonstration programs
Container fees, custom duties, etc	No	Not applicable
Other dedicated taxes		
Dedicate portion of state sales tax	No	Amend ARS to impose statewide sales tax for transportation

Source: CLA Associates, 2009

9.2.2 LOCAL JURISDICTION CANDIDATE REVENUE SOURCES

It is anticipated that the population and county origin of fuel sales factors that control the distribution of HURF revenue will progressively reduce the percentage shares of HURF revenue that Navajo County, Holbrook and Winslow will realize in the future, as growth elsewhere in the state outstrips that which will be encountered in Navajo County. Unless or until the legislature increase and/or indexes fuel taxes, these jurisdictions will receive progressively smaller shares of a smaller HURF pie. HURF funds can only be used for highway purposes, and impact fees can only be used to mitigate development related capacity needs. Neither source can be used for public transit, under current legislation, although transit can have a positive affect or capacity.

Table 9.3 identifies candidate sources that the three local jurisdictions are already authorized to use and that could be allocated, in whole or in part, to transportation purposes. These sources include property-related taxes and sales taxes. All three jurisdictions are authorized to levy general property taxes (general fund) and secondary property taxes (debt service), but they do not allocate general fund to transportation nor have they obtained voter approval for transportation general revenue bonds. (Navajo County, Holbrook and Winslow have issued revenue bonds, but these do not include transportation purposes and do not use the jurisdiction's HURF revenues as the debt service source).

TABLE 9.3 CURRENTLY AUTHORIZED REVENUE SOURCES AVAILABLE FOR TRANSPORTATION

Type	Source	Navajo County	Holbrook	Winslow
Property Related Taxes	Primary Property Tax	■	■	■
	Secondary Property Tax	■	■	■
	Improvement District/Community Facility District	X	■	■
Sales Taxes	General Sales Tax	■	■	■
	Transportation Sales Tax	#	■	■
	Construction Sales Tax	#	■	■

Legend

X	Authorized/Currently Used
■	Authorized/Currently Not Used
#	Not Authorized

Source: CLA Associates, 2009

Only Navajo County currently utilizes improvement districts for transportation purposes, but does not consider the districts as true revenues sources and these revenues have not been included in this analysis. All three jurisdictions levy general sales taxes, but do not dedicate any of these revenues for transportation purposes. Navajo County is not currently authorized to levy a transportation sales tax or a construction sales tax. The two incorporated jurisdictions are authorized to do, but are not currently doing so.

9.2.3 PLANNING ASSISTANCE FOR RURAL AREAS

During 2009, ADOT implemented the Planning Assistance for Rural Areas (PARA) program that allows local jurisdictions to complete planning studies that allow communities to effectively complete transportation planning. The PARA program provides federal funds to non-metropolitan communities for the purpose of conducting transportation planning studies. Eligible applicants include counties, cities and towns located outside the planning boundaries of Transportation Management Areas, as well as all tribes.

PARA funds are limited to planning applications, and may not be used for the design or construction of transportation facilities. PARA funds may be applied to address a broad range of planning issues related to roadway and non-motorized transportation modes. Funds may be also be applied to studies dedicated solely to the planning of public transportation services

Partnerships between communities are encouraged. PARA funds may be used for planning studies that address the needs of multiple jurisdictions, as well as for needs that are limited to neighborhoods within jurisdictions. Applicants are encouraged to focus their requests for funding on the most critical transportation planning needs identified in their communities. The City of Winslow has been awarded new PARA study funds to examine the potential for a new BNSF railroad crossing study.

9.3 IMPLEMENTATION STRATEGY

The transportation needs in this study far outpace the available funds required for proper planning/study, engineering design and implementation. The implementation strategy outlined below provides a systematic method towards project completion. Many of the needs identified herein are stemmed from regional and/or localized growth. The City of Holbrook, for example, will see the impacts of growth in Southern Navajo County and the Aztec Land and Cattle Company holdings once they develop. These impacts, due to the limited transportation network, will require coordination between the agencies so to provide a proactive approach of how to manage the anticipated growth. Tables 9.4 through 9.7 summarizes the short-, mid- and long-range transportation plan implementation strategies for the Study Area, the community of Heber-Overgaard, the City of Holbrook and the City of Winslow, respectively.

TABLE 9.4 STUDY AREA IMPLEMENTATION STRATEGY

Study Area Recommendations			
Recommendation	**CIP Years 2010 - 2014**	**Years 2015-2020**	**Years 2020-2030**
SR-77 Corridor between Snowflake and Holbrook - Passing Lanes - Shoulder Improvements	Conduct Corridor Evaluation	Conduct DCR Implementation	Implementation
SR-87 Corridor between Payson and Winslow - Passing Lanes - Additional BNSF Crossing - Shoulder Improvements	Conduct Corridor Evaluation	Conduct DCR Implementation	Implementation
SR-377 Corridor between Heber Overgaard and Holbrook - Geometric Improvements - Horizontal/Vertical Curves - Shoulder Improvements	Conduct Corridor Evaluation	Conduct DCR Implementation	Implementation
SR-277 Corridor Between Heber-Overgaard and SR-377	Conduct Corridor Evaluation in conjunction with Heber-Overgaard North Side Alternative Route Study		
SR-277 Corridor Between Heber-Overgaard and SR-377		Evaluate Turn Lanes at major intersections	
SR-260 Corridor between Heber-Overgaard and Show Low	Conduct Corridor Evaluations	Implementation	Implementation
SR-77/SR-377 Intersection Evaluation	Monitor for Signal Warrant	Conduct Intersection Upgrade Evaluation	
SR-277/SR-377 Intersection Evaluation		Monitor for Signal Warrant	Conduct Intersection Upgrade Evaluation
Heber-Overgaard to Show Low Transit Service	Conduct Transit Needs/Connectivity Assessment	Conduct Transit Needs/Connectivity Assessment	Conduct Transit Needs/Connectivity Assessment
Southern Navajo County Rails to Trails Corridor	Conduct Preliminary Study and Identify funding partners	Implementation	
Transportation Plan		Conduct Update (PARA)	Conduct Update (PARA)
Require Traffic Impact Assessments for all major developments with traffic generation greater than 100 trips during the day	Implementation		

Source: Wilson & Company, Inc.

Table 9.5 Heber Overgaard Implementation Strategy

Heber-Overgaard Area Recommendations			
Recommendation	**CIP Years 2010 - 2014**	**Years 2015-2020**	**Years 2020-2030**
Conduct North Side Alternative Route Study	Conduct Corridor Routes Evaluation (PARA)	Conduct DCR	Implementation
Heber-Overgaard to Show Low Transit Service	Conduct Transit Needs/Connectivity Assessment	Conduct Transit Needs/Connectivity Assessment	Conduct Transit Needs/Connectivity Assessment
Conduct Walkability Assessments	As Needed	As Needed	As Needed
SR-260/SR-277 Intersection	Monitor for Signal Warrants	Monitor for Signal Warrants	Monitor for Signal Warrants
Require Traffic Impact Assessments for all major developments with traffic generation greater than 100 trips during the day	Implementation*		

Source: Wilson & Company, Inc.

If a northern alternative route is not pursued, then the following improvements are recommended

Recommendation	**CIP Years 2010 - 2014**	**Years 2015-2020**	**Years 2020-2030**
SR-277 Corridor Between Heber-Overgaard and SR-377	Evaluate Turn Lanes at major intersections		
SR-277 Corridor Between Heber-Overgaard and SR-377	Conduct Corridor Evaluation - potential 5-lane corridor	Conduct DCR	Implementation
SR-260/SR-277 Intersection Evaluation	Monitor for Signal Warrant	Conduct Intersection Upgrade Evaluation	
SR-277/SR-377 Intersection Evaluation		Monitor for Signal Warrant	Conduct Intersection Upgrade Evaluation

Source: Wilson & Company, Inc.

TABLE 9.6 CITY OF HOLBROOK AREA IMPLEMENTATION STRATEGY

City of Holbrook Area Recommendations			
Recommendation	**CIP Years 2010 - 2014**	**Years 2015-2020**	**Years 2020-2030**
Navajo Boulevard Corridor Assessment	Conduct Corridor Evaluation (PARA) Implementation	Implementation	
Navajo Boulevard Corridor Traffic Counts	Monitor for improvement triggers	Monitor for improvement triggers	Monitor for improvement triggers
Hopi Drive Corridor Assessment	Conduct Corridor Evaluation (PARA) Implementation	Implementation	
ADA Walkability Assessment	Conduct Corridor Evaluation (PARA) Implementation	Implementation	
Bicycle Guide Signing Program	Conduct Assessment Implementation		
Holbrook Amtrak Station/Multi-Modal Hub	Conduct Assessment (PARA)	Develop Holbrook Station	
SR-77/SR-377 Intersection	Monitor for Signal Warrant	Monitor for Signal Warrant Conduct Intersection Upgrade Evaluation	
SR-77/US-180 Intersection	Monitor for Signal Warrant		
Alternative Route/Rail/River Crossing	Conduct Assessment (PARA)	Conduct DCR	Implementation Shift trucks to new route
Require Traffic Impact Assessments for all major developments with traffic generation greater than 100 trips during the day	Implementation*		

Source: Wilson & Company, Inc.

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If traffic volumes increase beyond 14,000 vehicles per day on Navajo Boulevard, and no alternative routes are in place and will not be in place within 5 years, the following recommendations should be considered:

1) Complete an Access Control Plan for Navajo Boulevard to include:
   a. Access closure/consolidation
   b. Install median treatments
   c. Prohibit left-turns from Navajo Boulevard except at existing signalized intersections
   d. Extend northbound SR-77 left-turn lane to Hopi Drive
   e. Conduct corridor traffic signal synchronization
   f. Do not install additional traffic signals on Navajo Boulevard Corridor as traffic operations will degrade.

TABLE 9.7 CITY OF WINSLOW IMPLEMENTATION STRATEGY

Winslow Area Recommendations			
Recommendation	**CIP Years 2010 - 2014**	**Years 2015-2020**	**Years 2020-2030**
North/South Movement Study (rail crossing)	Conduct Study (2010 PARA)	Conduct DCR	Implementation Shift trucks to new route
Conduct 2nd/3rd Streets Corridor Assessment	Conduct Corridor Evaluation	Implementation	Implementation
Transcon Lane and Truck Stop access Improvements	Conduct Evaluation Implementation		
Bicycle Guide-Signing	Determination and Implementation		
Williamson Avenue Undercrossing	Conduct Preliminary Engineering Study	Conduct DCR	Implementation
Hipkoe Drive Interchange	Conduct focused circulation assessment	Conduct Preliminary Engineering Study	Implementation
Coopertown Road Improvements	Conduct Preliminary Engineering Study Implementation	Implementation	
Require Traffic Impact Assessments for all major developments with traffic generation greater than 100 trips during the day	Implementation*		
Examine feasibility for Winslow to Holbrook and Winslow to Flagstaff transit service through White Mountain Connection and Mountain Lion transit service providers, respectively.	Conduct Evaluations Implementation		

Source: Wilson & Company, Inc.

Appendix A

ADOT Traffic Engineering Policies, Guidelines and Procedures

ADOT Traffic Impact Analysis

TM 240

240 TRAFFIC IMPACT ANALYSES

The purpose of this document is to establish uniform guidelines for conducting traffic impact analyses for a proposed new or an expansion of an existing development requesting access, direct or indirect, or modification of access to the State highway system.

A package which includes these guidelines, a Traffic Impact Analysis Study and Report Format Procedural Guidelines, and an Example Traffic Impact Analysis is available from Engineering Records (publication # 35-209).

240.1 IMPLEMENTING STATEMENT

ADOT desires to operate a safe and efficient State highway system. The management of access to the system in an effective manner is vital to maintain the overall safety and efficiency of this system. Access to the State highway system is managed through the encroachment permit process. This permit process requires those desiring access to the State highway system to apply for an encroachment permit. Since access to a State highway for a development may impact traffic on the highway, a Traffic Impact Analysis **shall** be prepared for developments which desire a permit and meet the specific requirement stated below.

The purposes of the Traffic Impact Analysis procedures presented herein are to:

- Provide information to the permit applicant and/or his representatives on specific requirements of the analysis, and

- Ensure consistency in the preparation and review of Traffic Impact Analyses.

The procedures outlined herein present the minimum information required when conducting a Traffic Impact Analysis. The preparer of the Traffic Impact Analysis **shall** contact the appropriate ADOT Regional Traffic Engineer to discuss the scope of the analysis, methodology, and level of detail required for his specific project prior to beginning the analysis.

240.2 REFERENCES

ADOT: Traffic Manual section on Traffic Signal Needs Study
Roadway Engineering Group's "Roadway Design Guidelines", May 1996

Institute of Transportation Engineers:
Draft. Recommended Practice. Traffic Access and Impact Studies for Site Development, September 1989
Manual of Transportation Engineering Studies, 1st Edition, 1994
Trip Generation, 6th Edition, 1997
Transportation and Land Development, 1988

Transportation Research Board, Special Report 209, Third Edition: Highway Capacity Manual, 1994

240.3 DEFINITIONS

Traffic Impact - The effect of site traffic on highway operations and safety.

Traffic Impact Analysis - A traffic engineering study which determines the potential traffic impacts of a proposed traffic generator. A complete analysis includes an estimation of future traffic with and without the proposed generator, analysis of the traffic impacts, and recommended roadway improvements which may be necessary to accommodate the expected traffic.

Traffic Generator - A designated land use (residential, commercial, office, industrial, etc.) or change in land use that generates vehicular and/or pedestrian traffic to and from the site.

Traffic Mitigation - The reduction of traffic impacts on roadways and/or intersections to an acceptable level of service by way of roadway construction improvements, the upgrade of existing traffic control devices, or the modification of the site plan.

Traffic Generation - The estimation of the number of origins from and destinations to a site resulting from the land use activity on that site.

Mode Split - The estimation of the number of trips made by each mode (automobiles, pedestrian, transit, etc.)

Trip Distribution - The allocation of the site-generated traffic among all possible approach and departure routes.

Trip Assignment - The assignment of site plus non-site traffic to specific streets and highways.

Influence Area - The geographic area surrounding the site from which the development is likely to draw a high percentage (80% or more) of the total site traffic.

Area of Significant Traffic Impact - The geographic area which includes the facilities significantly impacted by the site traffic.

Peak Hour - The single hour of a representative day when the traffic volume on the highway represents the most critical period for operation and the highest typical capacity requirements.

Peak Hour of Generator - The single hour of highest volume of traffic entering and exiting a site.

240.4 REQUIREMENT

A traffic impact analysis **shall** be required for all new developments or additions to existing developments which generate 100 or more trips during any one hour of a day. The specific analysis requirements and level of detail are determined by the following categories:

(1) Category I - Developments which generate 100 or more peak hour trips but less than 500 trips during the morning or afternoon peak hour of the highway or during the peak hour of the generator.

A Category I Traffic Impact Analysis may also be required for any of the following reasons:

a. The existence of any current traffic problems or concerns in the local area such as an offset intersection, a high number of traffic accidents, etc., or

b. The sensitivity of the adjacent neighborhoods or other areas where the public may perceive an adverse impact, or

c. The proximity of proposed site driveways to existing driveways or intersections, or

d. Other specific problems or safety concerns that may be aggravated by the proposed development.

(2) Category II - Developments which generate more than 500 trips during the morning or afternoon peak hour of the highway or during the peak hour of the generator.

The Regional Traffic Engineer makes the final decision on requiring a Traffic Impact Analysis and determining whether the Analysis falls within Category I or II. A developer **shall** first estimate the number of vehicle trips generated by the development to determine if a Traffic Impact Analysis is required and the applicable category. The developer **shall** obtain concurrence from the Regional Traffic

Engineer on the number of trips generated by the development. The developer may request that the Regional Traffic Engineer assist him in estimating the number of trips for the purpose of determining whether a Traffic Impact Analysis is required for the proposed development.

If a developer agrees to perform mitigation improvements as outlined by the Regional Traffic Engineer, preparation of a Traffic Impact Analysis may be waived.

240.5 ANALYSIS APPROACH AND METHODS

The following diagrams shall illustrate the roadway network accurately and shall be included in each Traffic Impact Analysis report:

a. Site location
b. Site plan
c. Existing peak hour turning volumes
d. Estimated site traffic generation (a table may be substituted)
e. Directional distribution of site traffic
f. Site traffic assignment (For each horizon year/Build out)
g. Future traffic assignment without development for each horizon year
h. LOS for future traffic without development for each horizon year
i. Total future traffic, i.e. future traffic with development, for each horizon year
j. LOS for total future traffic for each horizon year

The following items should be documented:

a. Existing transportation system
b. Anticipated transportation system
c. Collision diagram(s)
d. Recommended improvements

For Category I, many of the items may be documented within the text. For Category II, the items should be included in figures and/or tables. All figures and tables **shall** be legible.

Additional diagrams may be required to illustrate development construction phases and proposed alternatives when applicable.

When transportation planning models are used to generate present and/or future traffic conditions, it is the responsibility of the submitter to illustrate the diagrams above to provide a clear, step-by-step analysis.

The traffic analysis approach and methods are presented below.

(1) Study Area

The minimum study area **shall** be determined by project type and size in accordance with the criteria in Table 240-1. The extent of the study area may be enlarged or decreased depending on special conditions as determined by the Regional Traffic Engineer.

(2) Study Horizon Years

The study horizon years **shall** be determined by project type and size in accordance with the criteria in Table 240-1.

TABLE 240-1

CRITERIA FOR DETERMINING STUDY REQUIREMENTS

Analysis Category	Development Characteristic (d)	Study Horizons (a)	Minimum Study Area On the State Highway(s) (c)
I	Small Development < 500 peak hour trips	1. Opening year	1. Site access driveways 2. Adjacent signalized intersections and/or major unsignalized street intersections
II a	Moderate, single phase 500 - 1000 peak hour trips	1. Opening year 2. 5 years after opening	1. Site access driveways 2. All State highways, signalized intersections, and/or major unsignalized street intersections within 1/2 mile
II b	Large, single phase > 1000 peak hour trips	1. Opening year 2. 5 years after opening (b) 3. 10 years after opening	1. Site access driveways 2. All State highways, signalized intersections, and/or major unsignalized street intersections within 1 mile
II c	Moderate or large, multi-phase	1. Opening year of each phase	1. Site access driveways

		2. 5 years after opening (b) 3. 15 years after opening	2. All State highways, signalized intersections, and major unsignalized street intersections within 1 mile

(a) Assume full occupancy and build-out.

(b) Not required if the traffic impacts of the project are fully mitigated 10 or 15 years after opening with existing conditions plus 5-year programmed improvements.

(c) An enlarged study area may be required by the Region for certain projects.

(d) The number of trips shall include all trips made to the site, i.e. pass-by and diverted link trips.

(3) Analysis Time Period

Both the morning and afternoon weekday peak hours **shall** be analyzed except:

a. If the proposed project is expected to generate no trips or a very low number of trips during either the morning or evening peak periods, then the requirement to analyze one or both of these periods may be waived by the Regional Traffic Engineer, or

b. Where the peak traffic hour in the study area occurs during a different time period than the normal morning or afternoon peak travel periods (for example midday), or occurs on a weekend, or if the proposed project has unusual peaking characteristics, these additional peak hours **shall** also be analyzed.

The peak hour of generator also shall be analyzed where its value exceeds the number of trips generated by the development during the peak hour of the adjacent highway.

(4) Seasonal Adjustments

The traffic volumes for the analysis hours **shall** be adjusted for the peak season, if appropriate, in cases where seasonal traffic data are available and approved by the Regional Traffic Engineer.

(5) Data Collection Requirements

All data **shall** be collected in accordance with the latest edition of the Institute of Transportation Engineers **"**Manual of Transportation Engineering Studies" or as directed by the Regional Traffic Engineer.

a. Turning Movement Counts

Turning movement counts **shall** be obtained for all existing cross-street intersections to be analyzed during the morning and afternoon peak periods and the peak hour of the generator. Turning movement counts may be required during other periods as directed by the Regional Traffic Engineer.

Available turning movement counts may be extrapolated a maximum of two years with the concurrence of the Regional Traffic Engineer.

b. Daily Traffic Volumes

The current and projected daily traffic volumes **shall** be presented in the report. Available daily count data may be obtained from ADOT and extrapolated a maximum of two years with the concurrence of the Regional Traffic Engineer.

Traffic volume estimates from other approved developments within the study area which are expected to occur during the study horizon years should be obtained from ADOT and presented in the report.

Where daily count data are not available, mechanical counts may be required at the Regional Traffic Engineer's discretion for rural highways where the closest intersection is 1/2 mile or further from the site.

c. Accident Data

Traffic accident data **shall** be obtained from ADOT for the most current three-year period available.

d. Roadway and Intersection Geometrics

Roadway geometric information **shall** be obtained including roadway width, number of lanes, turning lanes, vertical grade, location of nearby driveways, and lane configuration at intersections.

e. Traffic Control Devices

The location and type of traffic controls **shall** be identified.

(6) Trip Generation

a. The latest edition of the Institute of Transportation Engineers' "Trip Generation" **shall** be used for selecting trip generation rates.

b. Other rates may be used with the prior approval of the Regional Traffic Engineer in cases where "Trip Generation" does not include trip rates for a specific land use category, or includes only limited data, or where local trip rates have shown to differ from the "Trip Generation" rates.

(7) Trip Distribution and Assignment

a. Projected trips **shall** be distributed and added to the projected non-site traffic on the State highway(s).

b. The specific assumptions and data sources used in deriving trip distribution and assignment **shall** be documented in the report.

(8) Capacity Analysis

a. Level of service **shall** be computed for signalized and unsignalized intersections in accordance with the latest edition of the "Highway Capacity Manual".

b. For signalized intersections, operational analyses **shall** be performed for time horizons up to five years. The planning method will be acceptable for time horizons beyond five years. Analyses may include modifications to the existing signal timing if the study area is within a coordinated signal system; Highway Capacity Manual signal timing methods should not be used for generating signal timing.

c. Analyses may include an arterial analysis in accordance with the latest edition of the "Highway Capacity Manual".

d. Peak hour factors used for future conditions shall not exceed 0.90. The following peak hour factors shall be used unless otherwise directed by the Regional Traffic Engineer:

PHF = 0.80 for < 75 vph per lane
PHF = 0.85 for 75 - 300 vph per lane
PHF = 0.90 for > 300 vph per lane

(9) Traffic Signal Needs

a. A traffic signal needs study **shall** be conducted for all new proposed signals for the base year. If the warrants are not met for the base year, they should be evaluated for each year in the five-year horizon.

b. Traffic signal needs studies **shall** be conducted per ADOT Traffic Manual section on the Traffic Signal Needs Study.

c. Existing signals adjacent to the development's access to the State highway shall be evaluated for continued signal warrants, phasing, timing, and coordination for each year in the five-year horizon.

(10) Accident Analysis

An analysis of three-years of accident data **shall** be conducted to determine if the level of safety will deteriorate due to the addition of site traffic.

(11) Queuing Analysis (Category II Only)

A queuing analysis **shall** be conducted for all turn lanes and ramp termini under stop or signal control within the study area.

(12) Speed Considerations

Vehicle speed is used to estimate safe stopping and cross corner sight distances. In general, the posted speed limit is representative of the 85th percentile speed on the highway and may be used to estimate safe stopping and cross corner sight distances. However, the 85th percentile speeds for some highways are commonly higher than the posted speed limit. Therefore, a speed of 5 MPH over the posted speed limit or the 85th percentile speed, as directed by the Regional Traffic Engineer, should be used to estimate safe stopping and cross corner sight distances for highways with posted speeds of 55 MPH or greater.

(13) Improvement Analysis

The roadways and intersections within the study area **shall** be analyzed with and without the proposed development to identify any projected impacts in regard to level of service and safety.

a. Where the highway will operate at arterial level of service C or better without the development, the traffic impact of the development on the

highway **shall** be mitigated to arterial level of service C. Mitigation to level of service D may be acceptable in urban areas of over 50,000 population at the discretion of the Regional Traffic Engineer and with the concurrence of the affected municipality.

b. Where the highway will operate below arterial level of service C in the horizon year(s) without the development, the traffic impact of the development **shall** be mitigated to provide the same level of service at the horizon year(s).

(14) Certification

The Traffic Impact Analysis **shall** be prepared under the supervision of a registered Professional Engineer (Civil). For analyses prepared by persons external to ADOT, the report **shall** be sealed and signed.

240.6 STUDY AND REPORT FORMAT

(1) Introduction and Summary

a. Purpose of report and study objectives
b. Executive summary
   - Site location and study area
   - Development description
   - Principal findings
   - Conclusions
   - Recommendations

(2) Proposed Development

a. Site location
b. Land use and intensity
c. Site plan (readable version shall be provided)
   - Access geometrics
d. Development phasing and timing

(3) Study Area Conditions

a. Study area
   - Area of significant traffic impact
   - Influence area

b. Land use
   - Existing land use
   - Anticipated future development

c. Site accessibility
   - Existing and future area roadway system

(4) Analysis of Existing Conditions

a. Physical characteristics
   - Roadway characteristics
   - Traffic control devices
   - Transit service
   - Pedestrian/bicycle facilities
   - Existing transportation demand management

b. Traffic volumes
   - Daily, morning, and afternoon peak periods (two hours), and others as required

c. Level of service
   - Morning peak hour, afternoon peak hour, and other as required

d. Safety

e. Data sources

(5) Projected Traffic

a. Site traffic forecasting (each horizon year)
   - Trip generation
   - Mode split
   - Pass-by traffic (if applicable)
   - Trip distribution
   - Trip assignment

b. Non-site traffic forecasting (each horizon year)
   - Projections of non-site traffic by ADOT may be used. For larger developments and study areas, a more comprehensive method may be required which includes: trip generation, trip distribution, modal split, and trip assignment.

c. Total traffic (each horizon year)

(6) Traffic and Improvement Analysis

a. Site access

b. Level of service analysis
   - Without project including programmed improvements (each horizon year)
   - With project including programmed improvements (each horizon year)
c. Roadway improvements
   - Improvements programmed by ADOT or others to accommodate non-site traffic
   - Additional alternative improvements to accommodate site traffic
d. Traffic safety
   - Sight distance
   - Acceleration/deceleration lanes, left-turn lanes
   - Adequacy of location and design of driveway access
e. Pedestrian considerations
f. Speed considerations
g. Traffic control needs
h. Traffic signal needs (base plus each year in five-year horizon)
i. Transportation demand management

(7) Conclusions

(8) Recommendations

a. Site access
b. Roadway improvements
   - Phasing
c. Transportation demand management actions if appropriate
d. Other

(9) Appendices

a. Traffic counts
b. Capacity analyses worksheets
c. Traffic signal needs studies
d. Accident data and summaries

240.7 APPROVALS

The traffic impact analysis **shall** be submitted to the Regional Traffic Engineer for approval.

The Regional Traffic Engineer or his designated representative **shall** approve or disapprove the Traffic Impact Analysis.

240.8 DESIGN STANDARD REFERENCE

A. Designs **shall** be in accordance with or exceed current ADOT Design, Construction, and Traffic Engineering policies, procedures, and standards.

B. Capacity analyses **shall** be in accordance with the latest edition of the "Highway Capacity Manual".

C. Traffic signal needs studies **shall** be in accordance with the ADOT Traffic Manual section on the Traffic Signal Needs Study.