



What Moves You Arizona

Transportation in Arizona

January 2016



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1. THE STATEWIDE PLANNING CONTEXT

1.1 Introduction

The Arizona Department of Transportation (ADOT) is updating its long-range transportation plan (LRTP) entitled What Moves You Arizona (WMYA), which was adopted by the Arizona State Transportation Board in November 2011. WMYA was a groundbreaking plan that integrated the comprehensive land use and 2050 vision developed in Building a Quality Arizona (bqAZ) to define both a Recommended Investment Choice (RIC) and State transportation system goals, objectives, and performance measures that have guided ADOT's investment decision since plan adoption. Moreover, the Plan laid the groundwork for ADOT to better integrate planning and project selection through an initiative entitled "P2P Link."

The Plan update, conducted every five years, will cover a 25-year horizon (2016-2040) and is intended to build from the policy direction established by WMYA to update the vision for the State's transportation system and provide guidance for ongoing plan implementation. The update will incorporate an extensive public and stakeholder outreach effort throughout the planning process and include the following specific tasks:

- **Task 1A: Develop Work Plan** – Defines the process, protocols, and tasks that dictate how the plan will be developed;
- **Task 1B: Develop Transportation In Arizona Document (this document)** – Provides important background information and context for the plan update process;
- **Task 2A: Define the Vision Guiding Development of the Plan Goals and Objectives** – Updates the strategic framework for the plan and future ADOT decision making;
- **Task 2B: Performance Measurement Update** – Refines ADOT's current measures to support the plan update, enable tracking and reporting of plan implementation, and address state and federal implementation requirements;
- **Task 3: Multimodal Needs and Deficiencies Assessment** – Defines and documents the investments needed to achieve and maintain desired system performance;
- **Task 4: Baseline & Projected Multimodal Transportation System Revenues** – Establishes and evaluates "Alternative Investment Choices" at different potential revenue levels to support development and selection of the plan RIC;
- **Task 5: Planning to Programming Evaluation Criteria Calibration** – Advances the implementation of P2P Link through the refinement and evaluation criteria weighting; and
- **Task 6: Development of Final Products** – Documents the planning process and communicates Plan findings and guidance to ADOT, its partners and stakeholders, and the public.

The purpose of this report – "Transportation in Arizona" or "TIA" – is to provide initial information and context to educate ADOT staff and stakeholders that will participate in the planning process about issues and trends that could or should be considered as the various plan elements are developed and decisions are made. It includes the following sections:

- **Chapter 1: Statewide Planning Context** (this section) – Describes planning requirements and processes;
- **Chapter 2: Who We Are Today** – Information on demographic, socioeconomic, and transportation trends that helps define who we are, where we live and work, and how we move;
- **Chapter 3: Arizona’s Economy** – Data on economic considerations that influence transportation investment needs such as key industries, economic output, and freight movement;
- **Chapter 4: What Moves Us** – A brief description of the modal components that make up Arizona’s transportation system today;
- **Chapter 5: Delivering Arizona’s Transportation Program** – An overview of ADOT’s revenues, discussion of the anticipated performance target setting process, an introduction to the P2P Link process, and a discussion of how ADOT coordinates planning and programming with MPOs, COGs, and local governments;
- **Chapter 6: Challenges and Questions** – Observations about the potential implications of TIA for the planning process and identification of key questions that will need to be addressed as the plan update is developed.

1.2 How the LRTP relates to the Statewide Framework Plans

Building a Quality Arizona (BqAZ) is a series of statewide transportation framework studies built around five core principles: *Improve Mobility and Accessibility, Support Economic Growth, Promote a Sustainable Development Pattern that Links Land Use and Transportation, Protect Arizona’s Environment and Natural Resources, and Ensure Safety and Security*. Together, the studies are designed to facilitate a common understanding of State long-range growth projections and communicate a uniform direction forward to accommodate that growth. Using the BqAZ process, COGs and MPOs from around the state worked with ADOT, the Arizona State Legislature, the Governor’s office, and the business community to discuss state infrastructure needs.

As part of the statewide framework process, regional transportation agencies are conducting their own transportation framework studies. The studies include evaluating the needs and improvements along critical statewide corridors; regional and urban plans that identify solutions and financial strategies to improve multimodal transportation connectivity, accessibility, and mobility; state and regional freight plans to improve freight efficiency and economic competitiveness; a passenger rail corridor study to identify feasible corridors to implement passenger rail; and studies that highlight the potential to move urban regions toward greater use of sustainable transportation modes – transit, walking and bicycling.

The statewide framework provided an important foundation for the development of WMYA by defining a 50-year transportation vision for Arizona and associated multimodal investment needs. This served as the basis for establishing the goals and objectives in WMYA and informed development of the RIC. For the WMYA update, the bqAZ principles and needs will again serve as critical inputs to the development of plan elements.

1.3 State and Federal Planning Requirements

As with past LRTPs, development of the WMYA update will be heavily influence by federal laws and regulations, as well as State Statutory mandates. At the Federal level, the Intermodal Surface

Transportation Efficiency Act of 1991 (ISTEA), subsequent laws, and associated regulations and guidance define federal requirements for long range transportation planning. In addition to various requirements for plan components and public engagement, these requirements include eight prescribed “planning factors” that each state planning process should consider:

1. Support the economic vitality of the United States, the states, metropolitan areas, and non-metropolitan areas, especially by enabling global competitiveness, productivity, and efficiency;
2. Increase the safety of the transportation system for motorized and non-motorized users;
3. Increase the security of the transportation system for motorized and non-motorized users;
4. Increase accessibility and mobility of people and freight;
5. Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and state and local planned growth and economic development patterns;
6. Enhance the integration and connectivity of the transportation system, across and between modes throughout the state, for people and freight;
7. Promote efficient system management and operation; and
8. Emphasize the preservation of the existing transportation system.

Under the current federal transportation authorization law, Moving Ahead for Progress in the 21st Century Act (P.L. 112-141) (MAP-21), metropolitan and statewide transportation planning processes are continued and enhanced to incorporate national performance goals, measures, and targets into the process of identifying needed transportation improvements and project selection. The federal rules and associated guidance to implement these requirements are currently still under development, but will likely be completed (at least in part) during the WMYA update effort (see below for more details).

Arizona’s statutory requirements focus largely on development of the state LRTP and the statewide Five-Year Transportation Facilities Construction Program. The LRTP and five-year program are developed including the regional and metropolitan project priorities resulting from federally mandated transportation planning processes. All plans and programs developed by COGs and MPOs, including TMAs, must be consistent with Arizona statutes and ADOT planning documents. Specific state statutes that either directly establish LRTP requirements or influence the process and contents of the plan include the following:

- **Statewide Transportation Policy Statement (A.R.S. § 28-306) and Long Range Statewide Transportation Plan; Board Duties (A.R.S. § 28-307)** – Requires the State Transportation Board (the Board) to adopt a “statewide transportation policy statement” that includes performance expectations for the statewide transportation system over the next 20 years using the performance measures developed pursuant to section 28-504 (see below). The statement should consider local, regional and tribal transportation goals and facilitate rather than direct development.
- **Performance Based Planning and Programming (A.R.S. § 28-503)** – Require the ADOT Multimodal Planning Division (MPD) to develop performance-based planning and programming processes, in consultation with local, regional, and tribal transportation agencies, that provide a means of evaluating the current performance of the LRTP, conducting performance-based programming through weighted performance factors, influencing the allocation of funding among major program categories, and reporting performance.

- **Transportation System Performance Measures; Data Collection and Reporting (A.R.S. § 28-504)** – Requires MPD to develop standardized transportation system performance measures, and a process for reporting them, that assess how well the system is moving people, goods, and services in relation to the cost of system preservation, maintenance and expansion. This set of measures will serve as the basis for monitoring and reporting highway system performance and must include:
 - The estimated number of individuals transported.
 - The estimated amount, by weight or volume, of freight transported.
 - The number of miles traveled.
 - The number of vehicles and the estimated capacity of those vehicles.
 - The estimated cost per individual moved per mile.
- **Transportation System Performance Factors; Weights (A.R.S. § 28-505)** – Requires MPD to develop weighted system performance factors that address system preservation, congestion relief, accessibility, integration and connectivity with other modes, economic benefits, safety, air quality and other environmental impacts, cost-effectiveness of a project or service, operational efficiency, and project readiness. These factors are to be used to select projects and services in the five year transportation facilities construction program and the LRTP, and to allocate resources among the department's major program categories.
- **Long-range Statewide Transportation Plan; Division Duties (A.R.S. § 28-506)** – Requires MPD to develop an LRTP every five years through a performance-based process that includes anticipated critical statewide highway system needs for the next twenty years, reflects local general land use plans and county comprehensive land use plans, and considers information developed as a result of federally mandated planning processes. The plan must also identify anticipated revenues and a description of the system performance expected to be achieved by full plan implementation.

1.4 Performance-Based Planning Requirements

A key feature of MAP-21 is the establishment of a performance- and outcome-based national surface transportation program. The objective of this program is to help ensure states invest federal resources in projects and programs that collectively will make progress toward the achievement of seven national goals areas:

- **Safety** – To achieve a significant reduction in traffic fatalities and serious injuries on all public roads;
- **Infrastructure Condition** – To maintain the highway infrastructure asset system in a state of good repair;
- **Congestion Reduction** – To achieve a significant reduction in congestion on the National Highway System (NHS);
- **System Reliability** – To improve the efficiency of the surface transportation system;
- **Freight Movement and Economic Vitality** – To improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development;
- **Environmental Sustainability** – To enhance the performance of the transportation system while protecting and enhancing the natural environment; and

- **Reduced Project Delivery Delays** – To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies’ work practices.

To support implementation of the MAP-21 performance management provisions, the Federal Highway Administration (FHWA) is required to establish measures through a rulemaking to assess safety, infrastructure preservation, congestion, air quality, freight movement, and mobility performance. **Table 1-1** provides the national performance measures required under MAP-21, the funding program, and a timeline for states and MPOs to establish targets. As of November 2015, FHWA issued Notice of Proposed Rule Makings (NPRM) proposing performance measures for safety and infrastructure (pavement and bridge) conditions. FHWA will issue an additional NPRM later this year that will propose performance measures for traffic congestion, on-road mobile source emissions, freight movement on the interstate, and performance of the interstate and non-interstate NHS.

Table 1-1: National Performance Measures Required under MAP-21

PROGRAM	MEASURE CATEGORY	STATES TO ESTABLISH TARGETS:
National Highway Performance Program (NHPP)	Interstate Pavement Condition	Within 1 year of final rule on national performance measures
	Non-interstate NHS Pavement Condition	
	Bridge Condition on NHS (focus on structurally deficient (SD))	
	Performance of Interstate System	
	Performance of Non-Interstate NHS	
Highway Safety Improvement Program (HSIP)	Serious Injuries per 100 million vehicle miles traveled (HVMVT)	Within 1 year of final rule on national performance measures
	Fatalities per HVMVT	
	Number of Serious Injuries	
	Number of Fatalities	
Congestion Mitigation and Air Quality (CMAQ)	Traffic Congestion	Within 1 year of final rule on national performance measures
	On-road Mobile Source Emissions	
Freight Policy	Freight Movement on the Interstate	Periodically

While FHWA is not expected to issue guidance on target setting until they have completed the final rules that establish national performance measures, with targets required one year later, the draft rules for safety and infrastructure condition indicate that states will have the option to set one aggregate urbanized area target and one aggregate non-urbanized area target for any or all of the measures. MPOs will need to set targets for the same measures for all public roads in the MPO within 180 days after

states set their targets. To do so, MPOs will need to work in close coordination with their respective state DOTs, and can either agree to support state targets or set a numerical target specific to their MPO planning area.

Under the draft rule for Infrastructure Condition, states will establish statewide targets for pavement and bridge condition measures for a 4-year performance period. State DOTs must coordinate with their MPOs and COGs to establish targets for interstate pavement within one year of the effective final rule (date unknown at this time). As with safety, an MPO or COG could either agree to support its state's target or establish a target specific to its planning area. If an MPO or COG wishes to establish targets, it must be within 180 days after the state establishes its target.

To date, FHWA has not released the NPRM for traffic congestion, on-road mobile source emissions, freight movement on the Interstate, and performance on the interstate system and non-interstate NHS. However, MAP-21 notes that ADOT must coordinate, to the maximum extent practical, with relevant MPOs in selecting a target to ensure consistency. MPOs must also coordinate, to the maximum extent practical, with ADOT in selecting a target to ensure consistency. As ADOT and the MPOs develop the targets, coordination is required with public transportation providers.

1.5 Vision, Goals, Objectives Update Process

Updating the strategic direction that drives system investment decisions is a critical part of the WMYA update. The existing WMYA vision, goals, and objectives are still relevant but each will be reviewed by ADOT and its planning partners to ensure investment priorities and policies address recent and future trends and new planning requirements.

WMYA is a performance-based plan that will update a strategic direction for Arizona's future multimodal and intermodal transportation system. WMYA's strategic direction must address diverse system user priorities, recent and future trends, and the new MAP-21 planning requirements, which include state and MPO alignment with the national goals listed in section 1.4.

Since FHWA requires that all states and MPOs show progress in achieving the national goals, the existing WMYA strategic direction will be reviewed and updated to address each national goal area during the update process. **Table 1-2** provides an initial review of how the WMYA goals address the MAP-21 national goal areas. Based upon the initial review, the existing goals address the MAP-21 goal areas. However, to ensure recent state and national trends and requirements are addressed, updating the WMYA strategic direction will include conducting a visioning workshop with ADOT and its planning partners, and a series of interactive workshops with MPOs and COGs that will identify, discuss, and refine Arizona's multimodal transportation priorities. Updating the WMYA vision, goals, and objectives will also be influenced by recent and on-going plans and ADOT policies to ensure consistency in strategic direction.

Table 1-2: Existing WMYA Goals Comparison to MAP-21 National Goal Areas

WMYA Goals	MAP-21 NATIONAL GOAL AREAS						
	Congestion Reduction	System Reliability	Safety	Infrastructure Condition	Freight and Economic Vitality	Environmental Sustainability	Project Delivery
Improve mobility and accessibility	✓	✓	✓		✓		
Preserve and maintain the state transportation system		✓	✓	✓	✓		
Support economic growth	✓	✓			✓		
Link transportation and land use	✓	✓			✓	✓	
Consider natural, cultural, and environmental resources						✓	✓
Enhance safety and security	✓	✓	✓		✓		
Strengthen partnerships						✓	✓
Promote fiscal stewardship							✓

2. WHO WE ARE TODAY

Analyzing demographic and socioeconomic information about a state is important in setting the stage for long range transportation planning. Having an understanding of:

- Who We Are - the current and projected population characteristics,
- Where We Live - land use and commuting patterns, and
- How We Move – chosen modes of travel and transportation technology trends

is critical in identifying the transportation needs now and in the future. Understanding the users of and demand on the transportation system helps inform public policy, aids in the decision-making process, and improves the ability to identify and implement sustainable projects. Fortifying the transportation decision-making process with a foundation of socioeconomic information serves to enhance the selection of transportation projects.

2.1 Population – Who We Are

The State's population increased dramatically through the past several decades. The growth pattern continued into the 21st Century, but received a shock during the Great Recession, resulting from a deep economic downturn beginning in 2007 and extending into 2009. Post-recession, the population growth rate in Arizona has increased but never fully recovered to the swift pace Arizona realized from 1970 to 2000. In addition, the population in Arizona, similar to the national trend, is aging. Understanding not only the growth of the State's population but also the composition in regards to age helps to inform the long range transportation plan by identifying the users of the system. This section provides information regarding the population growth trend, the composition of the State's population, and key characteristics defining the population.

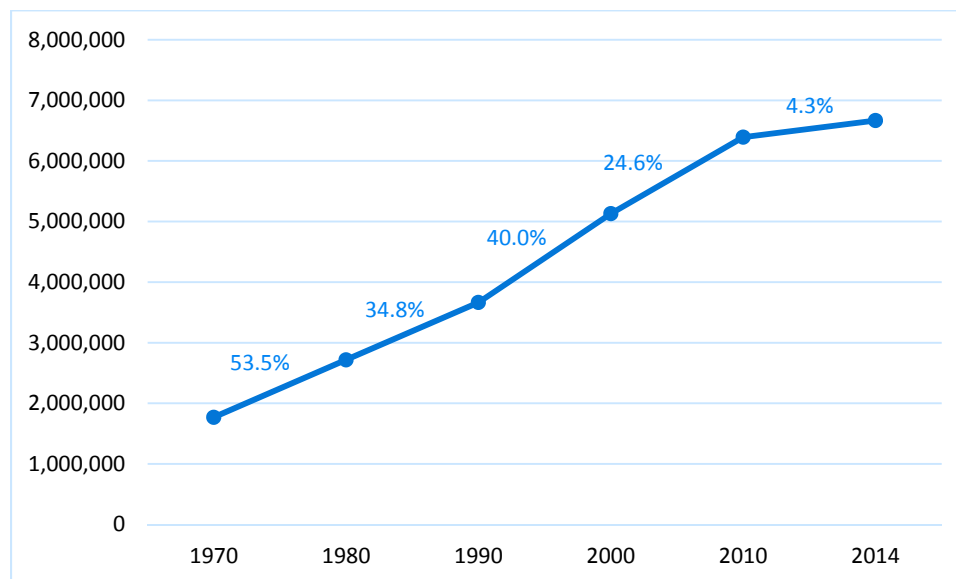
2.1.1 Historical Population

The population of Arizona grew at a strong, steady rate during the last three decades of the 20th Century, with an average decade-over-decade growth rate of nearly 43 percent, while the overall average decade-over-decade growth rate of the national population for the same time period was less than 12 percent. From 1970 to 2000, the population of Arizona nearly tripled from 1.77 million to 5.13 million. Expansive population growth continued into the 21st Century with the State adding more than 800,000 new residents by 2005. From 2005 to 2010, the impact of the Great Recession on Arizona's population growth is evident. With widespread failures in the housing market and impacts to the economy, Arizona's population continued to grow, but at a much slower rate.

Post-recession, the population of Arizona continues to grow at a slightly increased rate, but has not recovered to the swift growth it had seen pre-recession. The State experienced population growth of less than 16 percent from 2000 to 2005 and growth of only 7.6 percent from 2005 to 2010. Although continuing to grow, the latest State population estimate by the Arizona Department of Administration

(ADOA) puts recent growth from 2010 to 2014 at only 4.3 percent, significantly less than the growth experienced in the last three decades of the 20th Century. **Figure 2-1** illustrates the population changes in Arizona from 1970 to 2014.

Figure 2-1: Arizona's Population Change



Source: 1970-2010 U.S. Census, 2014 Arizona Department of Administration

During the decade from 2000 to 2010, only three counties in the State – Mohave, Pinal, and Yavapai – experienced greater than 25 percent growth in population: (**Table 2-1**). Greenlee County is the only county to have a loss in population during this time. Largely, the rural and outlying counties had slower population growth over the 10-year period. Being located between Maricopa and Pima Counties, within close proximity to both Phoenix and Tucson, Pinal County's population grew the most of any Arizona county between 2000 and 2010, more than doubling the population.

Table 2-1: Population Growth by County

County	2000	2010	2000-2010 Population Growth	2000-2010 Percent Change	2050	2010-2050 Population Growth	2010-2050 Percent Change
Apache	69,423	71,518	2,095	3.0%	63,710	-7,808	-10.9%
Cochise	117,755	131,346	13,591	11.5%	192,301	60,955	46.4%
Coconino	116,320	134,421	18,101	15.6%	167,026	32,605	24.3%
Gila	51,335	53,597	2,262	4.4%	60,936	7,339	13.7%
Graham	33,489	37,220	3,731	11.1%	57,196	19,976	53.7%
Greenlee	8,547	8,437	-110	-1.3%	8,447	10	0.1%
La Paz	19,715	20,489	774	3.9%	24,727	4,238	20.7%
Maricopa	3,072,149	3,817,117	744,968	24.2%	6,925,297	3,108,180	81.4%
Mohave	155,032	200,186	45,154	29.1%	352,189	152,003	75.9%
Navajo	97,470	107,449	9,979	10.2%	136,922	29,473	27.4%
Pima	843,746	980,263	136,517	16.2%	1,518,154	537,891	54.9%
Pinal	179,727	375,770	196,043	109.1%	1,240,165	864,395	230.0%
Santa Cruz	38,381	47,420	9,039	23.6%	77,838	30,418	64.1%
Yavapai	167,517	211,033	43,516	26.0%	346,557	135,524	64.2%
Yuma	160,026	195,751	35,725	22.3%	391,121	195,370	99.8%
State	5,130,632	6,392,017	1,261,385	24.6%	11,562,584	5,170,567	80.9%

Source: 2000 and 2010, U.S. Census; 2050, Population Projections, Arizona Department of Administration (ADOA).

2.1.2 Projected Population

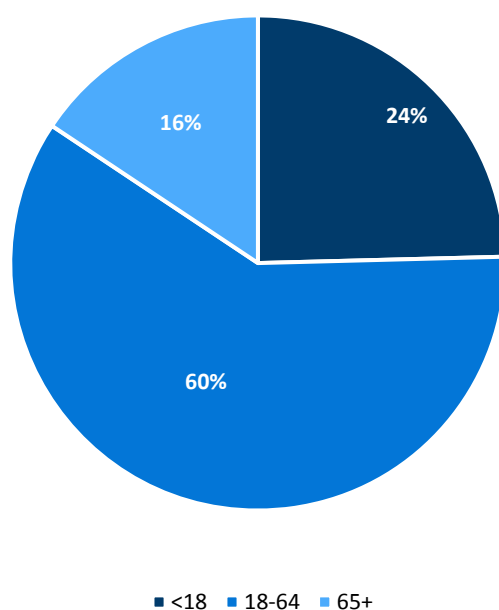
Based on projections prepared by the Arizona Department of Administration (ADOA), Pinal County will continue to be the fastest growing county in the State through 2050 with an expected growth of close to 865,000 persons, representing a 230.0 percent increase (refer to **Table 2-1**). Yuma County will experience a rate of growth almost doubling the County's population by 2050 (plus 99.8%), and two counties – Maricopa and Mohave – will experience population growth exceeding 75 percent. Overall, the ADOA projects the State population to increase by more than five million person by 2050, representing an expected increase of almost 81 percent. Apache County is projected to experience a decrease in population between 2010 and 2050, losing almost 8,000 persons, representing a loss of more than 10 percent of the County's population.

Figure 2-2: Changing Statewide Land Use Pattern in Arizona: 2005 through 2050



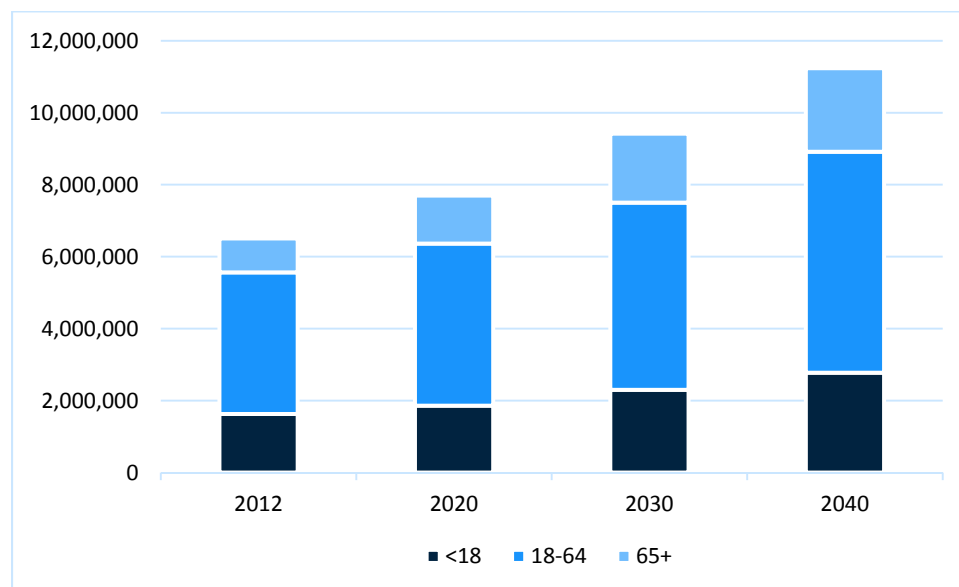
Based on projections by the ADOA, Arizona’s population will be comprised of a majority in the age group of 18 to 64, representing the working age group (**Figure 2-3**). As illustrated in **Figure 2-4**, this trend is expected to carry through 2040.

Figure 2-3: Percent of Arizona’s Population by Age (2015)



Source: ADOA, Office of Employment & Population Statistics, 12/07/2012

Figure 2-4: Arizona’s Population by Age 2012-2040



Source: ADOA, Office of Employment & Population Statistics, 12/07/2012

2.2 Land Use & Development – Where We Live

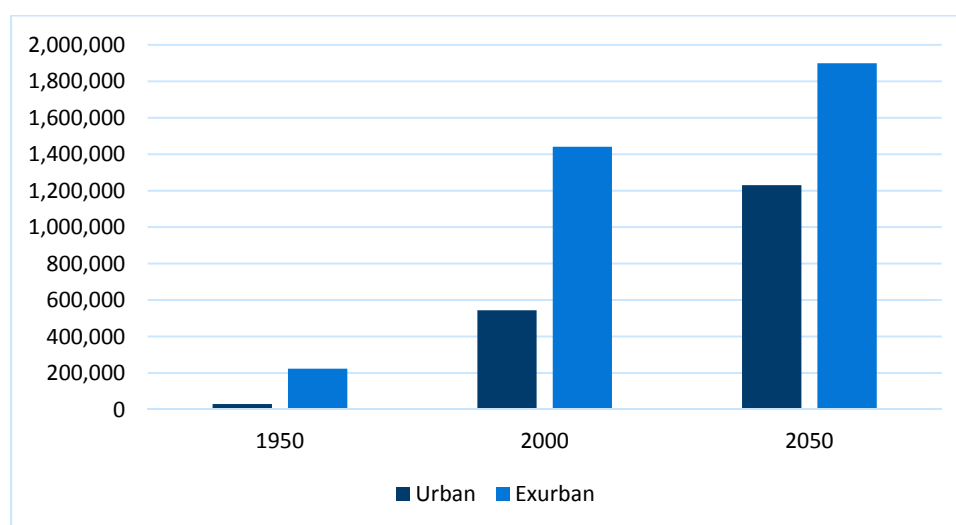
Intense population growth in Arizona, particularly within the Sun Corridor continues to exert increasing pressure on the State’s land resources. Communities along the Sun Corridor, in particular, added nearly 2.4 million new residents between 1990 and 2007. Home to 5.8 million residents in 2014, the Sun Corridor region’s population accounts for 87 percent of Arizona’s total population. Based on projections

from the Eller College of Management’s Economic and Business Research Center (EBRC), the Sun Corridor is predicted to have a population ranging from 8.2 to 9.0 million after 2040. As the population continues to grow, development continues to spread to more rural areas and closer to public lands. Expected population increases not only will require housing and associated infrastructure to provide goods and services, but the continuing growth also will influence demand for recreational activities and increase the demands and challenges for public recreational lands.

2.2.1 Statewide Land Use Allocation

Land development will continue to occur in response to population and economic growth. One estimate of the amount of land developed in the State is included in a report prepared by the Southwest Climate Alliance. **Figure 2-5** shows estimates of total land utilization in Arizona in terms of urban and exurban development. Urban land development is defined as having a housing density greater than one unit per 2.5 acres. Exurban land development is defined as having one unit per 2.51-40 acres. The land area values in the table indicate the amount of land developed at urban densities will more than double between 2000 and 2050. Land developed at exurban densities is expected to increase by only 31 percent.

Figure 2-5: Population in Urban and Exurban Areas of Arizona



Source: Chapter 3, “The Changing Southwest,” Theobald (National Park Service), et al., in *Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment*, G. Garfin, et al., Southwest Climate Alliance, Washington, DC, Island Press, 2010. Note: 2050 Projections are based on averages of four scenarios presented in the source.

2.3 Travel and Transportation Patterns – How WE Move

Reliance on personal vehicles for travel in Arizona has not diminished. Nevertheless, many of the State’s communities have been actively developing multimodal transportation systems. Multimodal plans now give greater attention to the provision of alternative modes of travel to assure all citizens have an opportunity to travel regardless of age or ability. The automobile will continue to dominate as the principal means of transport for individuals taking trips for work, shopping, or recreation. However, public transportation, bicycling, and walking are now viewed as viable, even necessary, modes of travel, particularly in higher density urbanized settings. Thus, while vehicle ownership continues to increase,

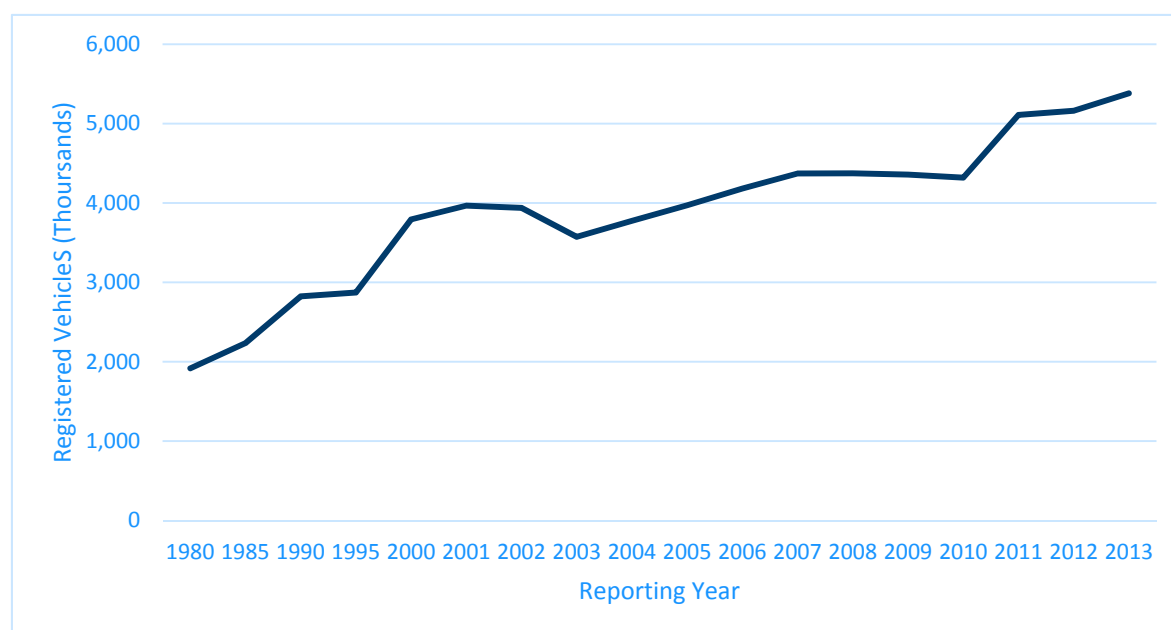
travel patterns are beginning to exhibit more selection as alternative modes become more available, more accessible, safer, and more secure.

2.3.1 Vehicle Ownership

The demand for transportation facilities, especially roads and highways, is partly a function of vehicle ownership. This, unfortunately, is not closely monitored or reported information. A report of motor vehicle registrations by state is available through the Statistical Abstract of the United States: 2012, the most recent date for the U.S. Census Bureau publication. The Abstract provides information on vehicle registrations by state at five-year intervals from 1980 to 2000, then each year after 2000 to 2009. Figure 2-6 shows vehicle registrations (cars, trucks, and buses) have steadily increased in the State since 1980.

A notable dip in registrations occurred in 2003 and 2004. Registrations rebounded and increased through 2007, when registrations leveled out and even decreased slightly. A strong increase started in 2010, similar to the one that occurred in 1995. Registrations since 2009 have steadily increased through 2013 from 4,496,109 to 5,381,050. The automobile share of total 2013 registrations was 2,257,249 (including taxis), representing 41.9 percent of all vehicle registrations compared to 49.6 percent in 2009. Vehicle registrations in 2013 included 188,360 motorcycles, representing 3.5 percent of all vehicle registrations compared to 3.1 percent in 2009. The State reported 4,791,450 licensed drivers in 2013 compared to 4,403,000 in 2009, representing an increase of 8.8 percent. Vehicles registrations increased more dramatically between 2009 and 2013 by 884,941, representing an increase of 19.7 percent.

Figure 2-6: Arizona Vehicle Registration Trend



Source: 1980-2009: Table 1098. State Motor Vehicle Registrations, 1990 to 2009, Motorcycle Registrations and Licensed Drivers by State: 2009, in Statistical Abstract of the United States: 2012, Transportation 667. 2010-2013: State Motor-Vehicle Registrations at Highway Statistics Series Publications for each Year under Highway Statistics Series, Office of Highway Policy Information, Policy and Governmental Affairs, Federal

Highway Administration (FHWA) retrieved October, 2015,
<http://www.fhwa.dot.gov/policyinformation/statistics.cfm>.

The American Community Survey (ACS) provides information regarding many population, social, and economic characteristics for the U.S., states, counties, and cities. The ACS is a mandatory, ongoing statistical survey conducted by the U.S. Census Bureau that samples a small percentage of the population every year. The results of the sampling, reflected in 5-year moving averages updated annually, provide vital information on a yearly basis about our nation and its people. ACS estimates indicate there were more than 3.9 vehicles (automobile, vans, and trucks of 1-ton capacity or less) available to households in Arizona in 2009. This number increased to over four million in 2013. These numbers translate into 1.74 vehicles per household in 2009 and 1.71 vehicles per household in 2013.

2.3.2 Commuting Patterns

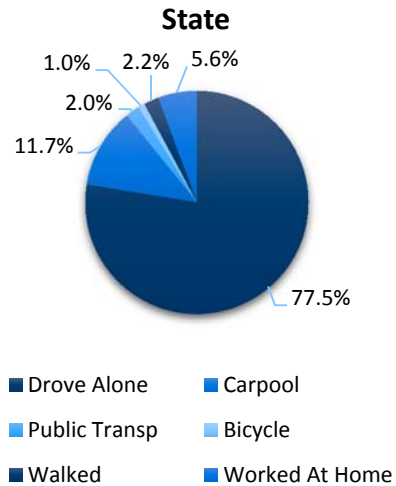
Information available from the American Community Survey (ACS) for 5-year period 2009-2013, which was conducted by the U.S. Census Bureau, indicates there were approximately 2,800,000 Arizonans commute to work on a daily basis throughout the year (**Table 2-2**). The majority of the commuters stay within their county of residence. Pinal County has a notably high out-commute pattern with 49.4 percent of the commuter traveling out of the county to work. By and large, the private vehicle is the mode of choice for commuting with over two million Arizonans driving alone to work and close to 306,000 choosing to carpool. Fewer than 54,000 Arizonans accessed public transportation for their commute to work, which is significantly less than those who used some other mode of travel (e.g., walk and bicycle, motorcycle, or other mode).

Table 2-2: Commuting Activity in Arizona by County

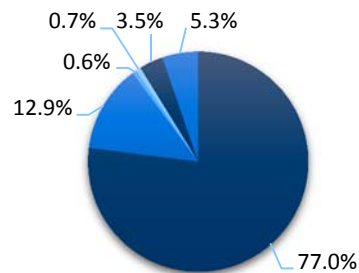
County of Residence	Commute-to-Work ¹		Commute Mode ²			
	Total	In-County	Car, Truck, or Van		Public Transportation	Other Travel Mode ³
			Drove Alone	Carpooled		
Apache	18,225	14,514	13,770	1,946	129	2,191
Cochise	49,581	47,145	37,948	5,324	228	5,687
Coconino	63,296	58,573	42,752	8,097	1,112	10,743
Gila	17,863	15,737	13,671	1,844	80	2,060
Graham	11,895	9,540	8,674	1,804	162	1,152
Greenlee	3,057	2,824	2,386	385	26	201
La Paz	6,541	5,884	4,933	648	13	894
Maricopa	1,705,638	1,665,369	1,297,935	194,184	40,068	168,112
Mohave	66,713	53,359	50,821	9,610	260	5,273
Navajo	31,560	28,885	22,662	4,111	394	4,128
Pima	411,436	398,596	313,261	40,710	10,215	45,085
Pinal	130,542	64,496	101,535	15,819	143	11,543
Santa Cruz	17,112	14,717	13,513	1,736	48	1,679
Yavapai	80,247	73,343	58,870	10,630	133	9,878
Yuma	70,702	67,183	54,547	9,138	663	5,822
Totals	2,684,408	2,520,165	2,037,278	305,986	53,674	274,448
Sources:						
1/ Table 3. Residence MCD/County to Workplace MCD/County Commuting Flows for the United States and Puerto Rico Sorted by Residence Geography: 5-Year ACS, 2009-2013 from Commuting (Journey to Work) Main, U.S. Census Bureau at http://www.census.gov/hhes/commuting/ .						
2/ Table 4. County and Minor Civil Division Commuting Flows by Travel Mode for the United States and Puerto Rico Sorted by Residence Geography: 5-Year ACS, 2009-2013 from Commuting (Journey to Work) Main, U.S. Census Bureau at http://www.census.gov/hhes/commuting/ .						
3/ "Other Travel Mode" category includes the following modes: Taxicab, Worked at home, Bicycle, Walked, Motorcycle, Other method.						

Figure 2-7: Commute Mode Choice

Percent Commute To Work Mode:



Percent Commute To Work Mode:
Remainder of State*



Percent Commute To Work:
Maricopa and Pima counties

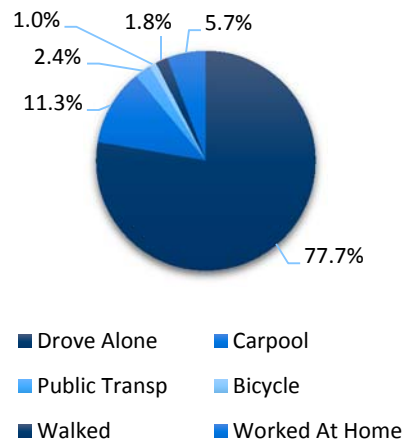


Figure 2-7 provides three graphic illustrations of the distribution of commute trips among different modes of travel for three distinct geographic areas: State of Arizona, the highly urbanized Maricopa and Pima counties, and more rural remainder of the State. The distribution is very similar for these three areas, although there are important variances. A larger share of commute trips are accomplished by walking in the more rural counties outside Maricopa and Pima counties (3.5% compared to 1.8%). In contrast, the share of trips accommodated by public transportation in these counties is much smaller (0.6%) than in the State's two urban counties (2.4%). Counties outside Maricopa and Pima counties account for a larger share of commute trips by carpooling (12.9% v. 11.3%). One potential reason for this pattern may be the lower density of rural residential conditions, resulting in efforts to economize on longer trips between the place of residence and place of work by sharing the ride. There appears to be little difference between the three geographic areas relative to the preference for driving alone for commute trips: 77.5 percent of all commute trips in the State are in single occupancy vehicles (SOVs). There also is little difference relative to the use of bicycles for commute trips.

3. ARIZONA'S ECONOMY

Historically, Arizona has depended on population growth and tourism as its primary economic drivers. However, the impacts of the Great Recession reduced Arizona's population growth and tourism. This had a rippling impact that severely affected Arizona's housing market, reduced state revenues, and increased unemployment. Since the Great Recession in 2009, the average population growth has been 1.4 percent in Arizona and 1.9 percent nationally. Diversifying Arizona's economy is a state priority and transportation plays a critical role in meeting this goal. When transportation infrastructure is efficiently planned, constructed, and maintained it lowers transport costs and improves travel time reliability, which are vital to improving Arizona's economic competitiveness and sustaining future growth. This chapter discusses recent changes to the Arizona economy and highlights a few existing and emerging industries that rely on an efficient and resilient intermodal transportation system.

3.1 State Economic Output

A healthy economy exists when inflation-adjusted gains in Gross Domestic Product (GDP) is greater than two percent per year. GDP or Gross State Product (GSP) is the market value of all officially recognized final goods and services produced within an area in a given period of time. According to the U.S. Department of Commerce, Bureau of Economic Analysis (BEA), in 2014, Arizona current-dollar GDP was \$284.2 billion and ranking 22nd in the U.S. In 2004, Arizona GDP was \$204.7 billion and again ranking 22nd in the U.S. Between 2013 and 2014, Arizona real GDP grew 1.4 percent compared to 2.2 percent nationally. Between 2004 and 2014, the compound annual growth rate for Arizona real GDP was 1.2 percent compared to 1.4 percent nationally.

Based on BEA statistics, the largest industry in Arizona was finance, insurance, real estate, rental, and leasing in 2014. This industry accounted for 21.9 percent of Arizona GDP and had 1.0 percent real growth. The second largest industry was government, which accounted for 13.8 percent of Arizona GDP and had a 0.6 percent real decline.

The largest contributor to real GDP growth in Arizona was professional and business services. This industry accounted for 0.45 percent of the total growth in real GDP. The second largest contributor was retail trade. This industry accounted for 0.44 percent of the total growth in real GDP. Construction, mining, and computer electronics products are also significant contributors to Arizona's GDP. Transportation equipment, computers and electronics, machinery, energy and agricultural products make up the largest sectors in terms of value of Arizona exports.

3.2 Historic and Current Unemployment

Employment is a commonly used measure of economic activity, primarily because of its timely availability through regular reports from government agencies but, also, because of its simplicity. Although several measures of employment are available, the primary source of employment information is from the Bureau of Labor Statistics (BLS) within the U.S. Department of Labor. Arizona

Indicators, a project of the Morrison Institute for Public Policy, accesses the BLS's data base to create numerous graphs providing a picture of the Arizona economy.

The year over year percent change in employment in Arizona was considerably higher than the national average immediately prior to the Great Recession that occurred between 2007 and 2009. Recessionary times often are times of adjustment in the economy, meaning resources (e.g., physical assets and wealth) are redirected or redistributed to reflect changes in markets and market demand. As a result of the adjustments in the State and the nation, the year over year changes in employment in Arizona are now more closely aligned with the national average. After experiencing a drop in employment of close to 9 percent at the beginning of the Great Recession, Arizona's fluctuations in employment have leveled out as shown in **Figure 3-1**. Over the past several years, changes in employment have hovered around 2 percent, tracking relatively closely with the national average. At this time, Arizona's employment growth is stable and slow.

Figure 3-1: Changes in Non-Farm Employment in Arizona: 2000-2015



Recovery from the Great Recession is continuing with some states faring better than others. Arizona, which was hit particularly hard by a collapse of the housing sector, is rebounding and the economy is picking up steam. Generally, employment levels and employment growth need to correspond to population growth, otherwise an economic system can experience high unemployment. Unfortunately, employment levels are highly cyclical. That is to say, increases in employment typically exceed population growth during economic expansions, but changes in employment typically are less than population growth during recessions. This was the case in Arizona over the past decade. **Figure 3-2** displays the pattern of unemployment claims in the State for the past 15 years. During the a period of modest economic expansion prior to the Great Recession, 2002-2006, the graph shows a steady decline in unemployment claims. This trend is sharply interrupted during the next four years, with unemployment claims spiking at almost 9,000. Subsequent to the onset of recovery, the unemployment claims trend exhibits a steady decline.

Figure 3-2: Unemployment Claims: 2000-2015



3.3 Per Capita Income

Per capita personal income is the broadest measure of individual economic well-being. According to BEA, Arizona had a per capita personal income of \$37,895 compared to the U.S. at \$46,049. This ranked Arizona 41st in the U.S. and was 82 percent of the national average. Between 2013 and 2014 per capita personal income increased 3.2 percent in Arizona compared to a 3.6 percent increase nationally. Over the last decade Arizona per capita personal income has increased but it has increased at a slower rate compared to other states and the U.S. In 2004, per capita personal income in Arizona was \$30,222 which ranked Arizona 37th in the U.S. Between 2004 and 2014, the Arizona per capita personal income compound annual growth rate was 2.3 percent compared to 3.0 percent nationally.

3.4 Total Personal Income

Total personal income includes net earnings by place of residence; dividends, interest, and rent; and personal current transfer receipts received by the residents of Arizona. According to BEA, in 2014, Arizona had a total personal income of \$255 billion which ranked Arizona 20th in the U.S. In 2004, Arizona has a total personal income of \$213 billion (adjusted for inflation) which ranked Arizona 21st in the U.S. Over this ten year period, personal income grew 19.7 percent.

3.5 Projected Employment

The Office of Employment and Population Statistics (EPS) within the ADOA is required to develop a 10 year forecast of nonfarm employment across various industries. Between 2012 and 2022, EPS projects total nonfarm employment in Arizona to increase by 22.7 percent, or 559,700 jobs. Most of the employment growth is projected to be in the service providing industries. Within these industries, the construction sector is projected to grow at a fast pace, while professional and business services and educational and health services sectors are expected to gain the largest number of jobs.

By 2022, Phoenix area (Maricopa and Pinal counties) employment is expected to grow by 355,500 (25.4 percent) compared to the projected growth for Tucson (Pima County) of 47,300 (15.1 percent) and the remaining portions of the State of 51, 800 (16.7 percent).

3.6 Major Employment Sectors and Industries

As noted earlier, Arizona's economy was dependent on population growth and tourism as its primary economic drivers. However, since the Great Recession Arizona's economy has become more diverse and transportation infrastructure needs to be responsive to ongoing changes in how people and goods move across the transportation system. Advanced, high tech, and aerospace manufacturing, as well as energy, mining, and tourism industries are critical to Arizona's economy. Each industry has unique transportation requirements and the following provides general information and future projections for each industry.

3.6.1 Advanced Manufacturing

Arizona companies continue to adopt process innovations and new technologies, including automation and additive manufacturing. There are thousands of manufacturing companies contributing to Arizona's economy. The following notes the importance manufacturing plays in the Arizona economy:

- Total manufacturing employment exceeded 154,000 in 2012.
- One manufacturing job in Arizona supports an additional 1.29 jobs, which means that there are 198,660 additional jobs in Arizona that are supported by manufacturing.
- Over 80 percent of Arizona's \$18.4 billion in exports for 2012 were manufactured goods. The largest sectors for manufactured goods were: electrical machinery, aircraft, spacecraft, machinery, and optics.
- There were a total of 4,666 establishments that manufactured in Arizona in 2012.
- The average annual wage for a manufacturing position in 2012 was \$68,964. This is more than 50 percent higher than the average wage for all positions in Arizona.
- Arizona's total manufacturing output (contribution to GSP) in 2012 was \$23.66 billion, which accounts for over 10 percent of Arizona's Real GSP.

3.6.2 High Tech Manufacturing

Many high technology manufacturing companies reside in Arizona. According to Moody's Analytics, Arizona is expected to have the nation's fastest high tech job growth at 3 percent annually from 2012-2017. TechAmerica Foundation's 2013 Cyberstates Report notes that 55 of every 1,000 private sector workers in Arizona are employed by high-tech firms. In February 2015, Apple announced it will invest \$2 billion over the next ten years in a global command center in Mesa. Automaker GM will hire up to 1,000 employees for their IT innovation Center in Chandler.

According to the Arizona Commerce Authority, the State's high-tech industry is a primary driver of job growth within the State, with each job creating an additional 5.8 jobs in the economy. The average high-tech wage is nearly 2.5 times greater than the average wage in Arizona. The high-tech boom in Arizona has also helped add nearly 64,000 jobs in other areas.

3.6.3 Aerospace and Defense

More than 1,200 Arizona-based companies make Arizona the third-largest supply chain contributor for aerospace and defense. According to a 2015 study conducted by the International Trade Administration, Arizona's exports from the aerospace and defense industry increased by nearly 22 percent between 2011 and 2014, totaling \$3.47 billion. According to a 2012 Deloitte study, Arizona ranks 4th nationally in aerospace industry payroll and 4th in aerospace revenue at nearly \$15 billion. The Arizona Commerce Department noted that the following advantages attract and retain aerospace and defense industries to Arizona:

- Located west of Phoenix in central Arizona, Luke Air Force Base is home to the 56th Fighter Wing, the largest fighter wing in the world and the only active-duty Air Force F-16 training wing, and also operates as the sole pilot training center for the F-35A Lightning II.
- Fort Huachuca in southern Arizona is the largest unmanned aerial systems (UAS) training facility in the world. The \$10 million facility contains 25,000 square feet of space and 10 simulators.
- The Yuma Proving Ground in western Arizona is the second-largest military installation in the world, spread over 838,000 acres, roughly the size of Rhode Island.

3.6.4 Renewable Energy

The Renewable Energy tax credit (A.R.S. §41-1511) was established by the Arizona legislature in 2009 to promote the renewable energy industry in the State. The goal is to encourage business investment to produce high quality employment opportunities and enhance Arizona's position as a center for production and use of renewable energy products. Today, there are more than 100 significant solar energy businesses in Arizona, ranging from rooftop panel makers to major power generators, which makes Arizona a prominent renewable energy industry location.

In 2012, the Solar Energy Industries Association (SEIA) ranked Arizona #1 nationwide in solar employment per capita and Arizona accounts for approximately 8.2 percent of the nation's total employment in the solar industry.

3.6.5 Mining

Arizona is home to an abundance of critical and strategic minerals capable of meeting our nation's manufacturing and national security needs. Arizona has led copper production in the U.S. since 1910 and the Arizona Mining Association estimates that approximately 65 percent of the nation's copper is mined in Arizona. In 2013, Arizona's mining industry contributed approximately \$4.8 billion to Arizona's economy and provided an estimated 52,300 direct and indirect jobs to Arizona residents.

3.6.6 Tourism

The Arizona Office of Tourism completed the report Arizona Travel Impacts in September 2015. According to this report, the Arizona travel industry had its strongest year of growth in 2014 in almost a decade. All measures of the industry – spending, employment and visitation were up sharply in 2014. The only decline was in state sales tax revenue, due to the expiration of the temporary 1 percent tax in May 2013. The following provides a summary from this report:

- **Spending.** Total direct travel spending in Arizona was \$20.9 billion in 2014. This represents a 5.4 percent increase over the preceding year in current dollars. In real dollars (adjusted for inflation) Arizona travel spending increased by 4.9 percent. These spending increases are the strongest since the period immediately preceding the recession.
- **Travel Activity.** Visitor air travel on domestic flights to Arizona destinations increased by 3.9 percent in 2014 – also the strongest growth since the years before the recession. Room demand increased by 4.5 percent for the year.
- **Employment.** Direct travel-generated employment was 171,500 in 2014. This represents the addition of 6,200 jobs, an increase of 3.8 percent. Jobs were added in all major sectors of the travel industry.
- **Secondary Impacts.** The re-spending of travel-related revenues by businesses and employees creates secondary impacts. In 2014, the secondary impacts were 147,000 jobs with \$6.2 billion in earnings.
- **GDP.** The GDP of the travel industry was \$8.3 billion in 2014. The travel industry and the microelectronics industry have been the top two export-oriented industries in the state in recent years.

3.7 Economic Outlook and Impacts

Based upon research at the Economic and Business Research Center (EBRC) at the University of Arizona's Eller College of Management, the 30-year outlook (2015-2045) suggests Arizona will continue to outpace the U.S. in terms of job, population, and real income growth. Based on these projections, Arizona will have millions more jobs and residents in 2045 than it does today. Further, even after adjusting for inflation, Arizonans can expect to experience a higher level of per capita personal income than ever before.

Arizona's projected growth will have major impacts on the multimodal transportation system. The majority of the population and employment growth will be within the Sun Corridor. This growth will impact numerous highways including, I-8, I-10, I-17 and I-19, US 60, SR 87, and SR 77. The growth also provides an opportunity to potentially invest in intercity passenger rail service between Phoenix and Tucson. ADOT has been working closely with the Federal Railroad Administration (FRA) and other federal agencies, as well as local governments and planning organizations in Maricopa, Pinal, and Pima counties to determine which passenger rail routes will move forward for further study. To support that effort, a Draft Tier 1 Environmental Impact Statement (EIS) has been prepared and ADOT is currently obtaining comments from the public pertaining to the draft EIS recommendations.

4. WHAT MOVES US – ARIZONA’S TRANSPORTATION SYSTEM TODAY

4.1 Highway and Bridge

4.1.1 Highways

The State of Arizona has 141,483 total lane miles of roadway with 37,811 of those eligible for federal aid. Just over half (19,536) of the federal aid lane miles are located in rural areas while nearly two thirds (67,160 of 103,672) of the non-federal aid lane miles are rurally located.¹

ADOT owns and maintains more than 10 percent (18,488) of the state’s total lane miles with the majority of those (11,117) on the NHS including more than 5,000 lane miles of Interstate. **Table 4-1** below tallies ADOT highways and NHS highways by lane mile. Another 1,627 NHS lane miles in Arizona are owned by jurisdictions other than ADOT (counties, cities, municipalities, and federal agencies), though under MAP-21, ADOT will be responsible for reporting the condition of all 12,744 NHS lane miles within the State to FHWA.

Table 4-1: Lane Miles on the ADOT System and on the NHS

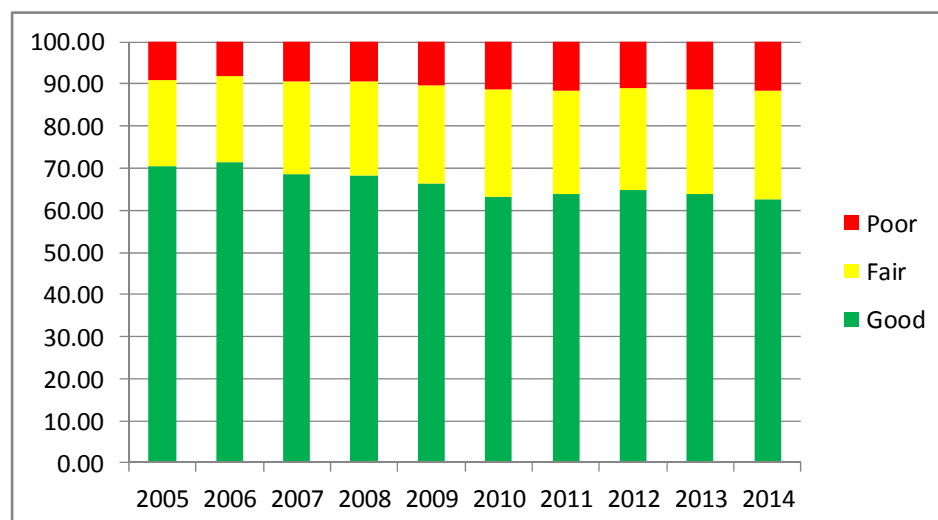
Asset Type	Lane Miles of ADOT Owned and Maintained			Lane Miles of Non-ADOT NHS
	Interstate	Non-Interstate NHS	Non-NHS	
Highways	5,182	5,935	7,371	1,627

Source: ADOT staff, October 2015

ADOT reports the condition of its roadways based on the percentage of the centerline miles achieving the desired International Roughness Index (IRI), rutting, and cracking levels. IRI, reported nationally by all states through FHWA’s Highway Performance Management System (HPMS), has been slowly but steadily worsening over the past decade, as demonstrated in **Figure 4-1**.

¹ Federal Aid Highway Lane Mile Length 2011, Highway Performance Management System

Figure 4-1: Percent of Lane Miles in Good, Fair, Poor Condition Based on IRI



Source: ADOT Staff, October 2015

Based on 2011 HPMS data, 86 percent of Arizona's rural interstate reports an IRI of 95 or better, ranking 17th nationally. Similarly 86 percent of Arizona's urban interstate lane miles carry an IRI of 95 or better, placing 10th among state departments of transportation including Puerto Rico and the District of Columbia.² **Figure 4-2** shows the distribution of ADOT's highway condition using 2012 centerline miles and its own pavement condition rating. ADOT staff reports that the Department currently dedicates approximately \$220 million annually for preservation and reconstruction activities, an amount barely adequate to maintain current conditions.

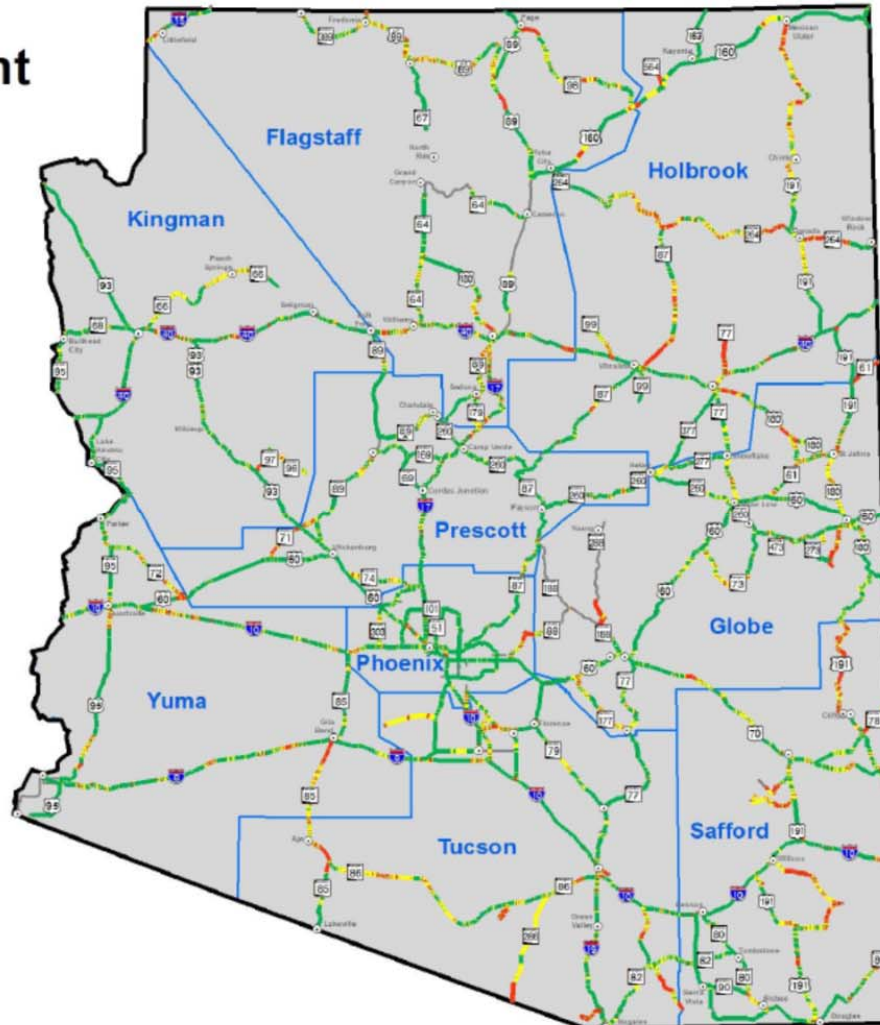
² Function System Length 2011, miles measured by pavement roughness, HPMS.

Figure 4-2: Statewide Pavement Condition

Statewide Pavement Condition 2012



Condition	Miles	Percentage
Good	3617	62%
Fair	1410	24%
Poor	778	13%
Total:	5805	



Source: *Linking Planning and Programming: New Direction for Investment Decisions*, April 17, 2014. [http://azdot.gov/docs/default-source/planning/p2p-r-s-\(04-17-14\).pdf?sfvrsn=2](http://azdot.gov/docs/default-source/planning/p2p-r-s-(04-17-14).pdf?sfvrsn=2) . Retrieved October 14, 2015.

4.1.2 Bridges

According to National Bridge Inventory (NBI) data³, there are 8,035 bridges (including culverts greater than 20 feet in length) in the State of Arizona with a total deck area of just less than 5 million square feet. ADOT owns 4,741 (59 percent) of those bridges totaling approximately 3.4 million square feet (69 percent). More than half of those are large culverts. Other bridges and culverts are owned by cities, counties, railroads, and other jurisdictions.

Based on the same NBI data, Arizona ranks well within the top half of the nation for fewest structurally deficient (SD) bridges. **Table 4-2** summarizes 2014 NBI data for structural deficiency for (1) all bridges in Arizona, (2) ADOT-owned bridges, and (3) all NHS bridges in Arizona. This data is provided by both bridge count and total deck area, and national rankings are among 52 jurisdictions that include District of Columbia and Puerto Rico.

Table 4-2: Structurally Deficient Bridges in Arizona

Owner or System	Bridge Count				Bridge Deck Area			
	Total	SD	% SD	Nat'l Rank	Total	SD	% SD	Nat'l Rank
Total	8,035	256	3.2%	4	4,965,164	210,350	4.2%	9
ADOT	4,741	109	2.3%	9	3,416,957	150,410	4.4%	20
NHS	3,548	78	2.2%	11	3,073,938	143,318	4.7%	23

Source: <https://www.fhwa.dot.gov/bridge/britab.cfm> . Retrieved October 9, 2015.

ADOT periodically reports its own Bridge Condition Rating Index for ADOT-owned bridges, with a 93.1 index reported in November 2013⁴. **Figure 4-3** maps the distribution of good, fair, and poor bridges using this index. This primary bridge measure, a composite of ratings for deck, substructure, superstructure, and structural evaluation, has slowly been declining through 2013, as demonstrated in **Figure 4-4**. Secondary measures for bridges include Sufficiency Rating, Percent of Deck on Functionally Obsolete Bridges, and Structurally Deficient Bridges⁵.

ADOT staff reports that the Department currently dedicates approximately \$40 million annually to inspection, preservation, and replacement of its nearly 5,000 ADOT-owned bridges and culverts, a funding level incapable of maintaining existing bridge conditions. Staff estimates that nearly \$60 million annually is required to maintain current conditions.

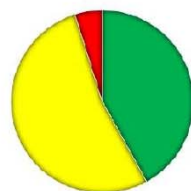
³ <https://www.fhwa.dot.gov/bridge/owner.cfm> . Retrieved October 9, 2015.

⁴ Framework for ADOT Asset Management System Jean A. Nehme, PhD, PE Arizona Department of Transportation November 14, 2013 Arizona Pavements/Materials Conference.

⁵ ADOT Corridor Profile Studies, September 16, 2014.

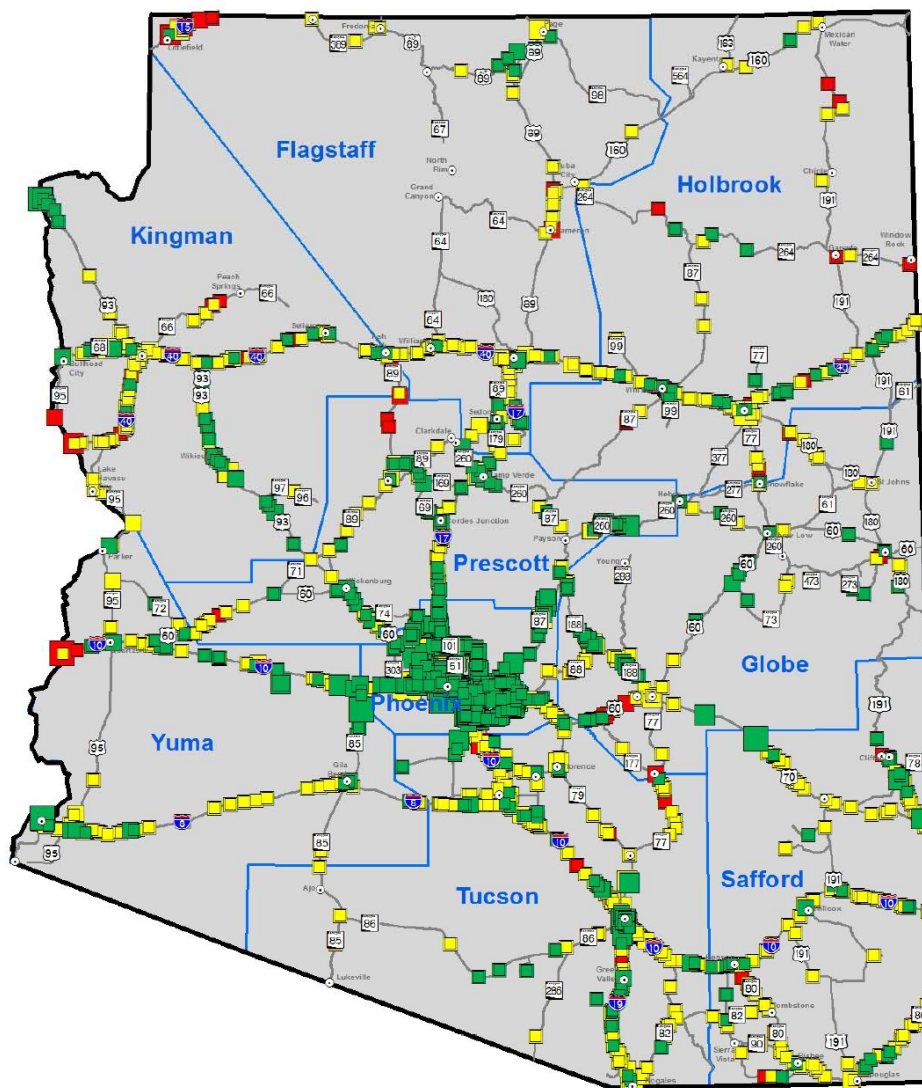
Figure 4-3: Statewide Bridge Condition

Statewide Bridge Condition 2013



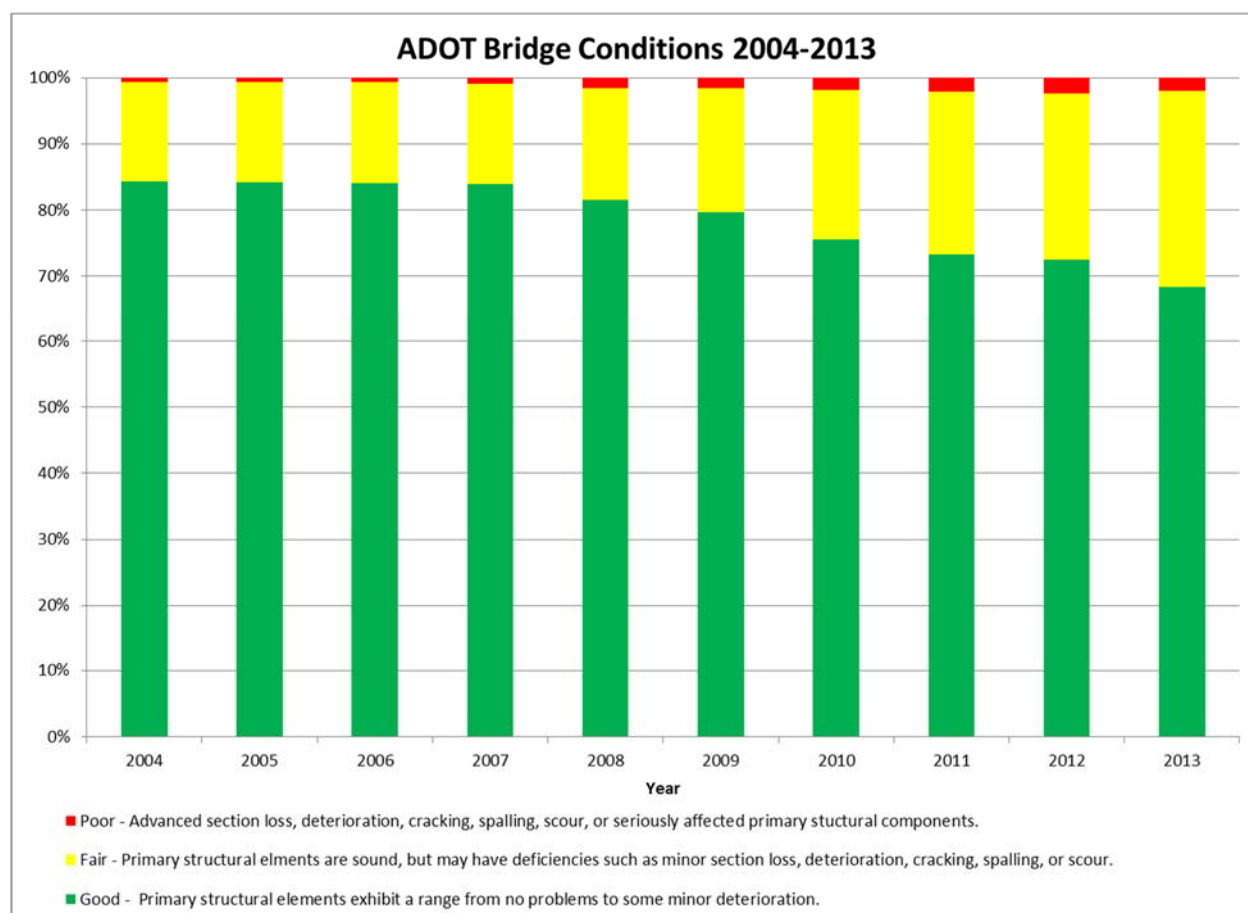
Condition	Count	Percentage
Good	910	42%
Fair	1153	53%
Poor	106	5%

Total: 2169



Source: *Linking Planning and Programming: New Direction for Investment Decisions*, April 17, 2014. [http://azdot.gov/docs/default-source/planning/p2p-r-s-\(04-17-14\).pdf?sfvrsn=2](http://azdot.gov/docs/default-source/planning/p2p-r-s-(04-17-14).pdf?sfvrsn=2) . Retrieved October 14, 2015.

Figure 4-4: ADOT Bridge Condition Rating by Deck Area, 2004-2013



Source: ADOT Staff, October 2015

4.2 Transit

Arizona's transit systems continue to grow, with new and expanding systems now operating in 13 of the State's 15 counties. In all, there are now 38 active transit systems providing fixed route and demand response bus service. Fixed route bus service is defined as operating along a prescribed route according to a fixed schedule. There are 12 systems providing this type of service. Demand response bus service generally does not operate on a fixed route, but responds to calls initiated by passengers or their agents to the transit operator, who then schedule service. There are 26 systems providing this type of service, many of these systems operate where fixed route bus service is provided, augmenting transit services by providing accessible specialized travel opportunities.

In 2005, fixed route transit systems were serving four communities in the State. These systems accounted for approximately 15.1 million passenger trips in the first quarter of 2005. As of 2015, there were 12 fixed route transit systems operating, which accounted for more than 25 million passenger trips in the first quarter of 2015. This increase includes not only more persons using existing services, but new ridership on new and expanded services. The new services include new fixed route systems and

additional routes or modified routes within existing fixed route systems, as well as new demand response services, particularly in the rural communities of the State. The largest transit system in the State is operated by Valley Metro/Regional Public Transportation Authority (RPTA) throughout the Phoenix metropolitan area. Valley Metro provides direct transit services to several communities in the metropolitan area and contract services (e.g., van pool, express bus) to other communities in the outskirts of the metropolitan area. Demand response services support travel within 23 communities outside the major metropolitan areas of the State and provide critical connections to certain designated destinations, such as regional hospitals and colleges.

In addition to fixed route and demand response bus services, urban rail passenger systems continue to be constructed, expanded, and planned. The light rail transit (LRT) system serving the Phoenix metropolitan area (specifically Phoenix, Tempe, and Mesa) – Valley Metro Rail – is completing extensions into Mesa and north Phoenix. Tucson recently completed a 3.9 mile Modern Streetcar (Sun Link) line connecting the downtown area with the University of Arizona (U of A) campus. Also, Tempe is moving toward establishing a 2.7 mile modern streetcar line that will connect its downtown area and the Arizona State University (ASU) campus with core residential and commercial areas to the south.

Historically, Maricopa County, which is served by Valley Metro, has had low levels of bus ridership per capita. Population growth and increasing congestion have led to an increase in ridership and more demand for public transit options. Programs developed to inform residents of the benefits of public transportation, both to themselves and to the environment, are making a positive difference. Valley Metro Rail ridership has been strong since its inception and support is gaining for the urban streetcar systems providing ready access to concentrated downtown areas and major education institutions. The increased demand demonstrates that communities are more receptive to alternate forms of transportation. Most exurban areas, however, lack access to public transportation.

Federal support facilitates continuing growth and expansion of the State's transit systems. Grants from the Federal Transit Administration (FTA) are available to Urbanized Areas (UZA) for capital projects (i.e., facility construction and vehicle acquisition), planning, job access and reverse commute projects, as well as operating expenses in certain circumstances. The FTA also provides funding aimed at supporting transit-oriented development (TOD) associated with new fixed guideway and core capacity improvement projects. In addition, FTA provides other formula grants to aid in the enhancement of transit services, improved mobility, improved accessibility, and rural operations. ADOT is instrumental in administering transit grants for a number of transit programs, including rural transit systems and services for the elderly and the disabled. These programs provide access to health care, shopping, education, employment public services and recreation.

4.3 Intercity Bus Transit

Beyond important transit services oriented to supporting mobility and accessibility within communities of the State, there are a number of intercity and interstate services available in Arizona. Amtrak, the nation's transcontinental passenger rail service has eight stations in Arizona with surface transportation access provided to these stations from nine other localities. Greyhound Lines, and its subsidiary Americanos USA, also provides intercity and interstate transportation services throughout the State with international travel opportunities to Mexico. Intrastate transportation companies include Arizona Shuttle Service, which supports intrastate travel between eight cities as well as the Grand Canyon with

direct service to Sky Harbor International Airport (Sky Harbor), and Sedona Phoenix Shuttle, which provides transportation services among Sedona, Village of Oak Creek, Cottonwood, Mayer, and Camp Verde with service to Phoenix Sky Harbor. Shuttle services of Prescott Transit and Shuttle “U,” another Prescott oriented company, recently were folded into Arizona Shuttle creating enhanced linkages for the “Quad Cities” area, which includes: Prescott, Prescott Valley, Chino Valley and Dewey/Humboldt.

4.4 Passenger Rail

Passenger rail systems have received increasing attention, because capacity increases to national and state highway systems have inherent limitations, not only in terms of physical space required for new roadway facilities but also in terms of social and environmental impacts. Even the nation’s airports are increasingly congested and the costs and impacts of expansion are beyond the reach of current budgetary programs. Passenger trains, on the other hand, offer the ability to move a large number of people at a lower per passenger cost than other commonly used modes of travel, namely air and highways. A single rail corridor can support the transportation of hundreds of passengers with minimal impacts. In addition, many existing railroad corridors, which in the past supported passenger train travel, can be adapted for the newer forms of passenger rail envisioned to accommodate intercity travel demand.



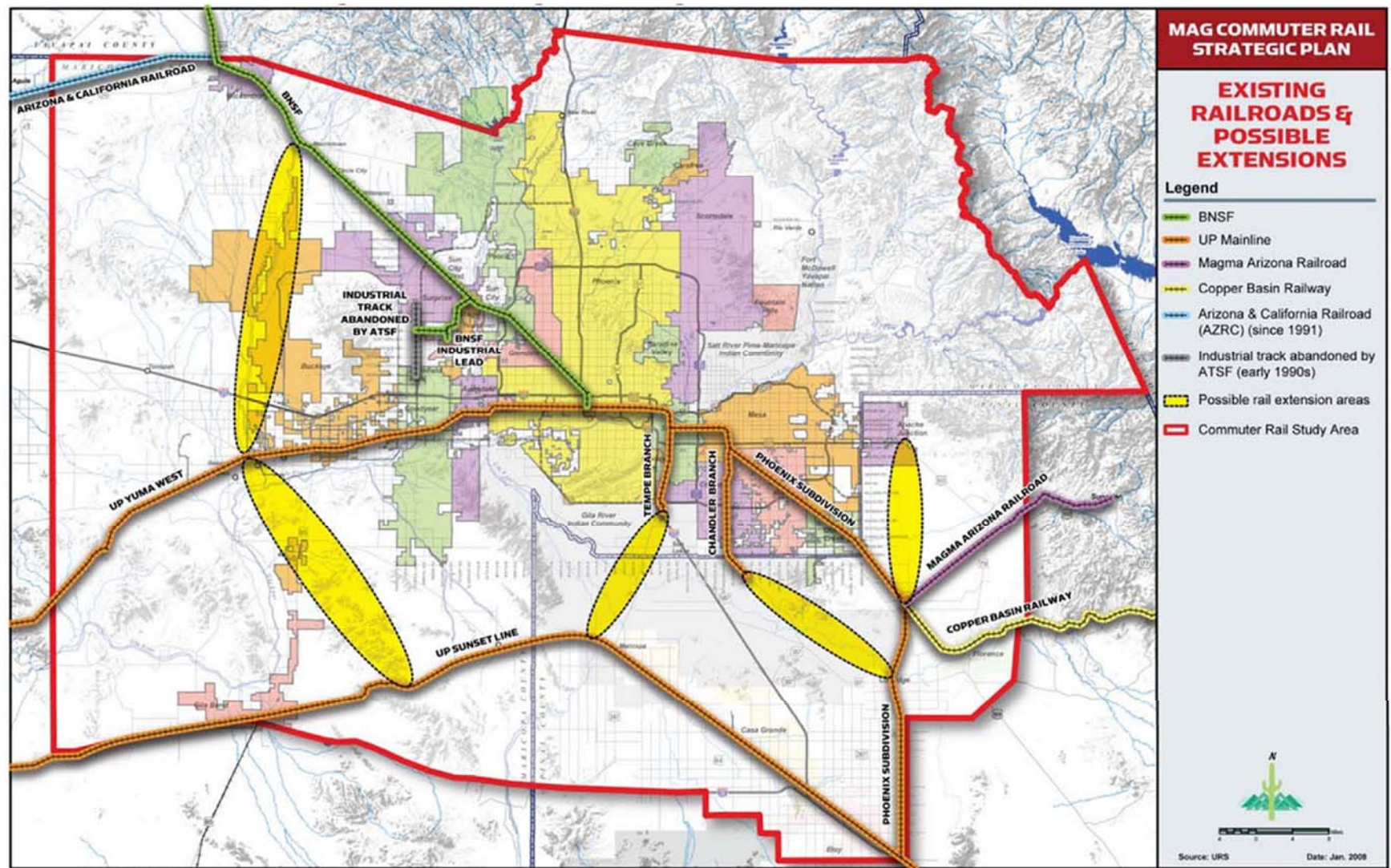
4.4.1 Transcontinental/Interstate Rail

Significant resources are being devoted to evaluating potential rail transportation options in Arizona. Today, passenger rail service is limited to Amtrak and two geographically limited tourist or scenic railway operations. Amtrak, as previously noted, has eight stations in Arizona and additional sites facilitating surface access to the Amtrak stations. Amtrak operates three routes through the State: Sunset Limited, Texas Eagle, and Southwest Chief. The Sunset Limited provides service from Los Angeles, California, to El Paso, Texas, then on to New Orleans, Louisiana. The Texas Eagle also provides service from Los Angeles, but this service continues northeast through Texas to Chicago, Illinois. These two routes are operated on the Union Pacific Railroad (UP) Sunset Route through the southern portion of the State with stations in Yuma, Maricopa, Tucson, and Benson. Amtrak’s Southwest Chief runs daily between Chicago and Los Angeles through northern Arizona. The Southwest Chief operates on the BNSF Railway Mainline with stations in Kingman, Williams, Flagstaff, and Winslow.

4.4.2 Commuter Rail

Commuter rail primarily operates during the peak commute periods in the peak commute direction. This service is designed to link residential communities with urbanized work centers, most prominently downtown areas. Agencies that operate passenger rail have the ability to purchase rights of way for passenger rail operations or lease access rights from freight railroads including UP or BNSF. Maricopa Association of Governments (MAG) has been investigating the feasibility of commuter rail service as a potential solution to alleviate peak congestion in the Phoenix metropolitan area. Subsequent to completion of the Commuter Rail Strategic Plan in 2008, MAG embarked on the Commuter Rail System Study, which was completed in 2010. This latter study confirmed the potential for commuter rail service in five corridors. Potential extensions of service in these corridors ultimately would provide a comprehensive commuter rail system linking central, western, and southwestern portions of Maricopa County with western, central, and northern portions of Pinal County, as shown in **Figure 4-5**.

Figure 4-5: Potential Rail Service Corridors in Central Arizona

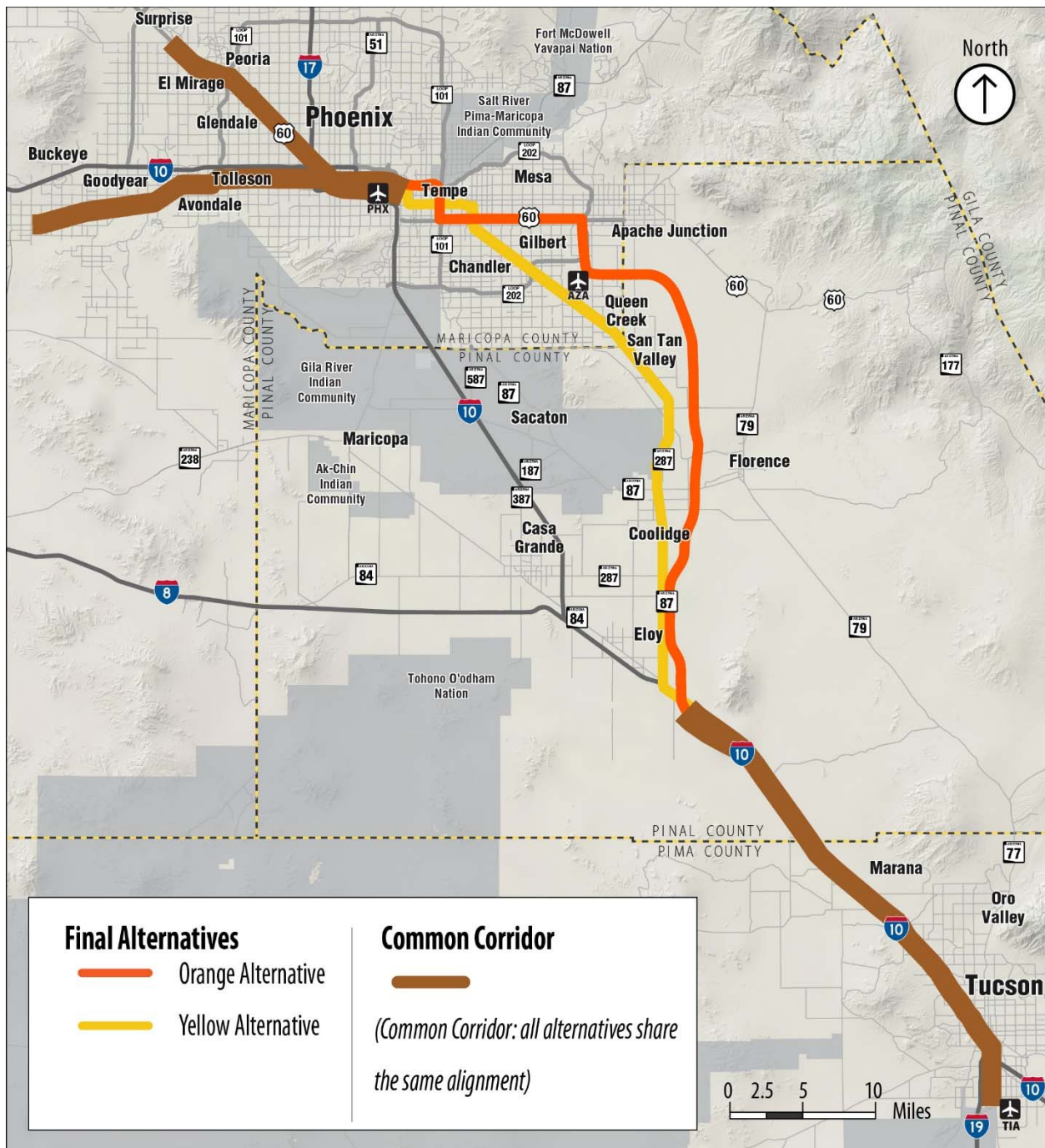


4.4.3 Passenger Rail

One of the main products from bqAZ was the development of a State Rail Plan that includes a vision for passenger rail. Adopted by the State Transportation Board in 2011, the State Rail Plan is a comprehensive assessment of the state's rail needs to improve regional and statewide safety and mobility.

The first Implementation of this Plan is the Passenger Rail Corridor Study: Tucson to Phoenix. In 2011, the Federal Railroad Administration (FRA) along with ADOT initiated this study to continue building on statewide and regional planning efforts to identify passenger rail alternatives between Arizona's two largest cities, Tucson and Phoenix. Over 10,000 public surveys have been submitted as part of this study. Currently two build alternatives and the no-build alternatives are being considered (**Figure 4-6: Passenger Rail Alternatives**).

Figure 4-6: Passenger Rail Alternatives



Total one-way trip time along the potential 121 mile route with potentially 13 stations between Tucson and Phoenix would be less than two hours, assuming train speeds of up to 125 mph for conventional intercity rail operations. This is reasonably comparable with travel time in an automobile via I-10. ADOT planning estimates indicate a potential between 3 to 3.5 million passengers (an average of 12,700 riders per day), if the passenger rail service existed today. The year 2035 passenger forecast is between 5 to 5.5 million (20,000 riders per day).

The capital cost estimates for implementing a passenger rail system between Tucson and Phoenix (120-miles) are between \$3.8 billion and \$4.5 billion for a passenger rail system within the Yellow Corridor Alternative and between \$6.5 billion and \$7.6 billion for a passenger rail system within the Orange Corridor Alternative. The capital cost estimates include right of way, equipment, infrastructure and facilities. Annual operating costs have been estimated at approximately \$64 million for the yellow corridor alternative and \$86 million for the orange corridor.

The ADOT Passenger Rail Corridor Study is anticipated to be complete in the Spring 2016 with a record of decision from the FRA. While the proposed passenger rail project has no identified funding, the environmental impact statement is a step in identifying the cost, impacts and benefits from a rail system serving passengers in Arizona.

4.5 Freight Systems, Facilities, and Services

The current freight infrastructure of the State is comprised of the State Highway System (SHS) and urban arterials moving goods via truck throughout the State, two Class I railroads and a number of short lines, and 2 public airports providing the majority of air cargo service. Supporting these avenues for the movement of goods is a freight infrastructure that includes warehouses, terminals, and intermodal facilities. Freight terminals facilitate the transfer of goods between producers and buyers, and warehouses provide temporary storage of goods. Intermodal facilities in Arizona provide important connections for the movement of freight between modes and are particularly important because of the State's proximity to Mexico. ADOT is also concurrently completing Arizona's State Freight Plan which will identify short- and long-term investment priorities to generate the greatest return for the State's economy, while advancing key transportation system goals particularly related to freight. Coordination between the State Freight Plan and the long range plan will continue throughout the planning process to ensure the long range transportation plan supports the State Freight Plan.

4.5.1 Trucking

Virtually every business and household in the State depends to some extent on the mobility of trucks for shipping and receiving of consumer goods and materials for the manufacturing and assembly of products. The majority of truck freight movements through Arizona utilize interstate highways which account for two percent of total highway miles in the State. Arizona highways provide an important through connection from the ports in California to the rest of the U.S. and this is apparent from the large share (39 percent by volume and 64 percent by value) of truck flows traveling through the State. Specifically, I-10 and I-40 provide an important connection from the Ports of Los Angeles and Long Beach to inland markets. Similarly, I-8 connects the Port of San Diego with I-10 in Arizona then onward to points east. The interstate highway connections in the State also provide direct access to national markets from the State's two largest metropolitan areas: Phoenix and Tucson.

Freight corridors within Arizona include those on the draft Primary Freight Network (PFN) developed by FHWA, the Critical Rural Freight Corridors (CRFC) which will be developed at the state level based on criteria in the National Freight Policy, and Congressional Freight Corridors. The State Freight Plan identifies both the PFN and routes that likely meet the criteria of the CRFC. The Congressional High-Priority Corridors are established by USDOT under provisions of SAFETEA-LU and include four corridors in Arizona (FHWA 2008).

- Economic Lifeline Corridor along I-15 and I-40 in California, Arizona, and Nevada.
- CANAMEX Corridor generally following I-19 from Nogales to Tucson, I-10 from Tucson to Phoenix, US 93 from near Phoenix to the Nevada border (future I-11), and the Economic Lifeline Corridor mentioned above.
- Alameda Corridor (I-10 between California and Phoenix and between Tucson and New Mexico).

These corridors and highways are of particular importance to the movement of goods within and through Arizona.

4.5.2 Rail Freight

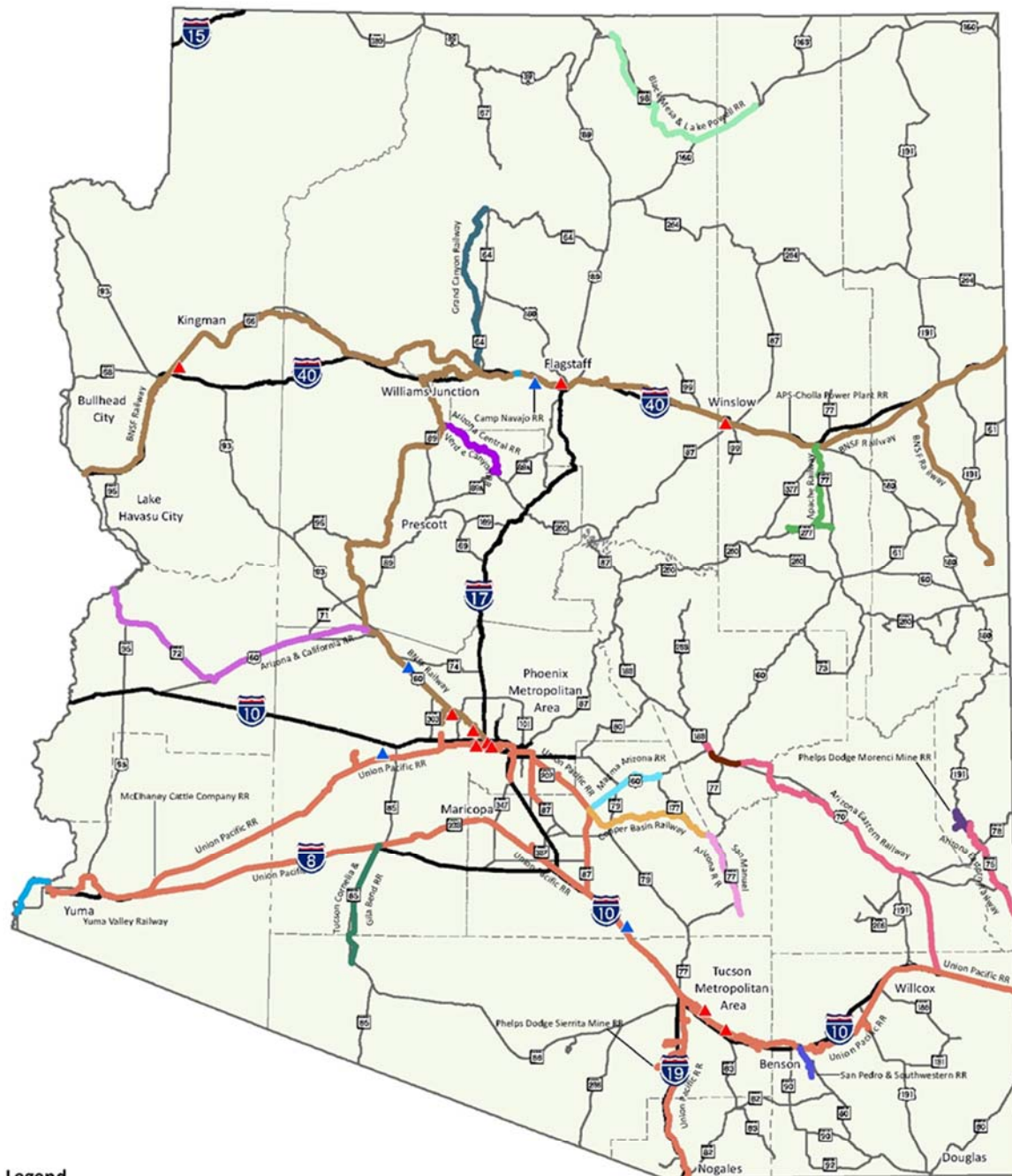
Rail freight provides shippers with a cost effective transportation solution, particularly shippers of heavy, bulk commodities (e.g., coal, oil, automobiles, etc.). Timely and efficient rail freight service can be a critical factor in attracting and retaining industry and commerce often central to regional economies. If all rail shipments were shifted to trucks (which, clearly is not practical), there would be significant changes in the cost of goods at market. In addition, the number of trucks on the roadways of the State would increase dramatically, requiring large investments in new highways and bridges. Efficient and effective integration of rail and truck modes, therefore, is an important transportation concern and desirable objective.

Two Class I railroads provide interstate general freight services in Arizona: BNSF and UP. There also are eight Class III short-line (i.e., local service) railroads engaged in the transport of specialized freight operations: Arizona Eastern Railway (AZER), San Manuel Arizona Railroad Company (SMARRCO), Copper Basin Railway (CBR), Apache Railway (APA), Arizona and California Railroad (ARZC), Black Mesa and Lake Powell Railroad (BLKM), Magma Arizona Railroad (MAA), and San Pedro and Southwestern Railroad (SPSR). Additionally, there are several company owned rail lines serving copper mining operations and a Port of Tucson branch, which supports operations of the free trade zone in that community, as well as tourist lines with localized service areas and on connections.

The BNSF mainline parallels I-40 for most of its length. A BNSF branch line, referred to as the “Peavine” runs from Williams south to Phoenix with an intermodal terminal in Glendale. The UP mainline parallels I-8 from Yuma to Tucson and I-10 east of Tucson. The UP Phoenix Subdivision branches from the Sunset Route in Eloy, running north through Coolidge, Queen Creek, Gilbert, Mesa, and Tempe to Phoenix. The UP Phoenix Subdivision connects with the CBR at Magma Junction, providing critical rail freight service to Eastern Arizona. UP has intermodal facilities in Phoenix and Tucson and a branch line from Tucson to Nogales, where it connects to the Ferromex Railroad (FXE) for service to Mexico.

The UP recently completed double tracking its Sunset Mainline through Arizona and is in the planning stages of a major new regional classification yard in the Red Rock area, approximately 18 miles southeast of Eloy. The proposed Red Rock facility would provide the State with needed intermodal capabilities. **Figure 4-7** shows all the railroad lines serving the State. This figure also shows the locations of three other proposed rail facilities: one of the UP Phoenix Subdivision west of Phoenix, a second on the BNSF line northwest of Phoenix, and the third on the BNSF Mainline west of Flagstaff.

Figure 4-7: Arizona's Railroad Lines



Legend

Railroads

- | | |
|-----------------------------|--------------------------------|
| Apache Railway | Copper Spike RR |
| Arizona & California RR | Grand Canyon Railway |
| Arizona Central RR | Magma Arizona RR |
| Arizona Eastern Railway | Phelps Dodge Morenci RR |
| Black Mesa & Lake Powell RR | San Manuel Arizona RR |
| BNSF Railway | San Pedro & Southwestern RR |
| Copper Basin Railway | Tucson Cornelia & Gila Bend RR |

Freight Railroad Facilities (Classification Yards, etc.)

- ▲ Existing Railroad Facilities
- ▲ Proposed Railroad Facilities

4.5.3 Air Cargo

The total air cargo originating in Arizona in 2013 was approximately 300 million pounds, which has remained relatively steady since 2004⁶. The air cargo entering Arizona has declined by about 24 percent from 2004 to 2013, from over 350 million pounds to under 300 million pounds⁶. Phoenix Sky Harbor International Airport (PHX) handles approximately 90 percent of air cargo originating or terminating in Arizona, while Tucson International Airport (TUS) handles nearly 10 percent of Arizona's air cargo. Carriers like FedEx and UPS are continuing to expand their share of cargo movement and only 13 percent of air cargo in Arizona was moved on passenger aircraft.

4.6 Non-motorized Transportation

The update of the State's Bicycle and Pedestrian Plan was completed in June, 2013. This Plan presents a long term vision for a statewide, interconnected transportation system that includes shared roadways, bicycle facilities, and pedestrian accommodations. Although the updated Plan focuses on the SHS, programmatic recommendations are viewed as benefiting local efforts to more fully integrate bicycle and pedestrian travel within the motorized transportation system. As stated in the Plan, ADOT's goals for achieving the State's bicycle and pedestrian vision are:

1. Increase bicycle and pedestrian trips;
2. Improve bicyclist and pedestrian safety;
3. Improve pedestrian and bicycle infrastructure

For more than 50% of rural cross-section highways and most urban cross-section highways, bicyclists are using the roadway, as very few segments of the SHS have designated bicycle and pedestrian facilities. In selected segments, however, bicyclists and pedestrians use infrastructure consisting of paved shoulders, designated bicycle lanes, buffer treatments, sidewalks, shared use paths, and grade-separated bicycle and pedestrian facilities. Safety data reported in the 2013 Plan reveal an average of 24.8 bicycle fatalities occurred during the period 1994-2010, but three of the last four years for this period were below this average (21, 19, and 19). During the same period, an average of 147.1 pedestrian fatalities occurred, but two of the last four years for this period were notably below this average (121 and 120).

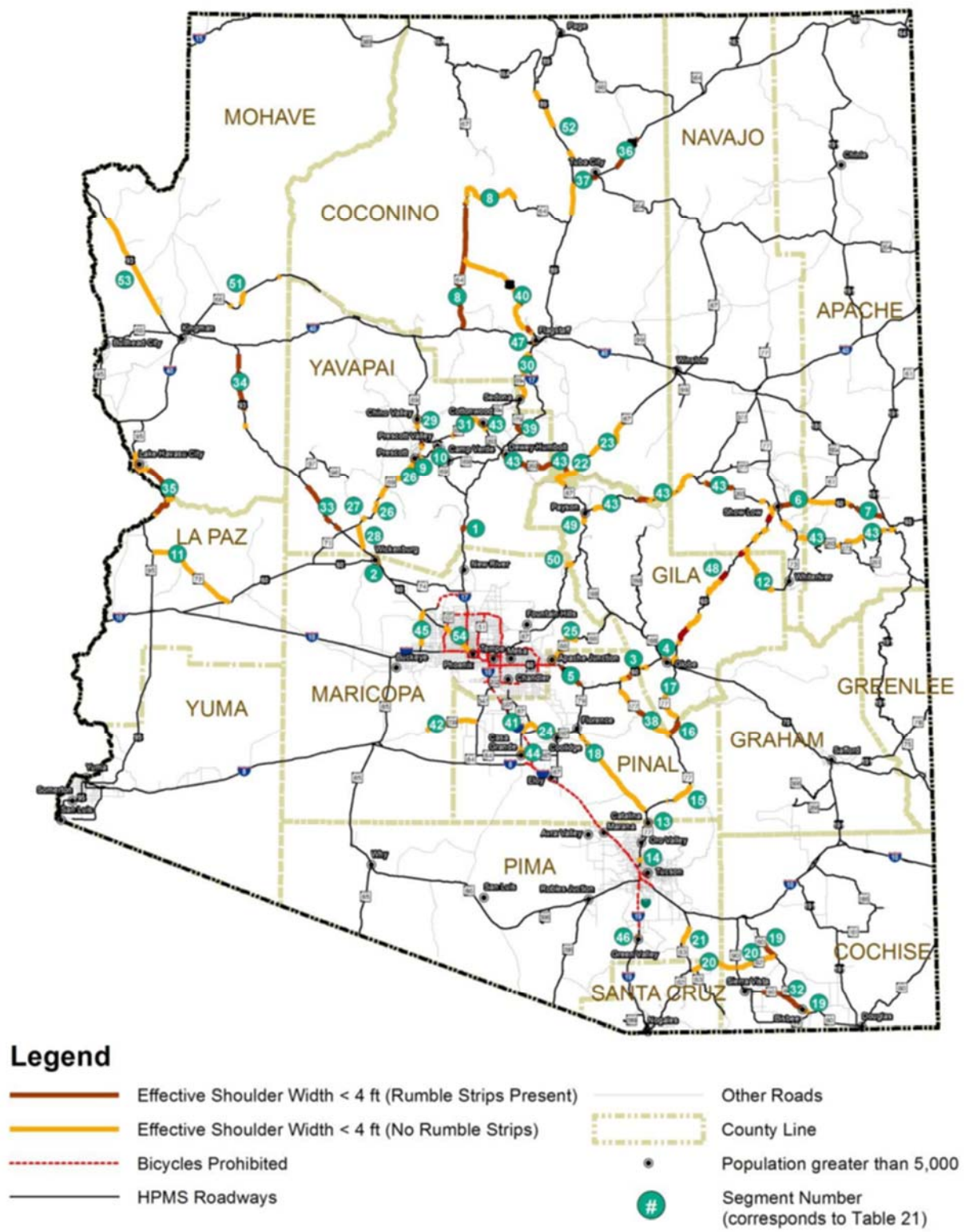
The strategies identified in the plan take into account the understanding that actions to improve the accommodation and safety of bicycle and pedestrian travel cannot be defined with a "one size fits all" approach, but need to be responsive to the preferences of different user groups and trip types. In addition, specific locational opportunities for improving the SHS were identified. **Figure 4-8** and **Figure 4-9** show priorities for improvement of the bicycling and pedestrian environment on the SHS.

ADOT and the State of Arizona is actively involved in the development of a U.S. Bicycle Route System. State, regional, and local transportation agencies and nonprofits, such as the Adventure Cycling Association (ACA), are working to map and sign U.S. Bicycle Routes or USBRs across the nation. A centralized source of information regarding USBRs is maintained by the ACA. There is one USBR designated within Arizona;

⁶ Bureau of Transportation Statistics (2014).

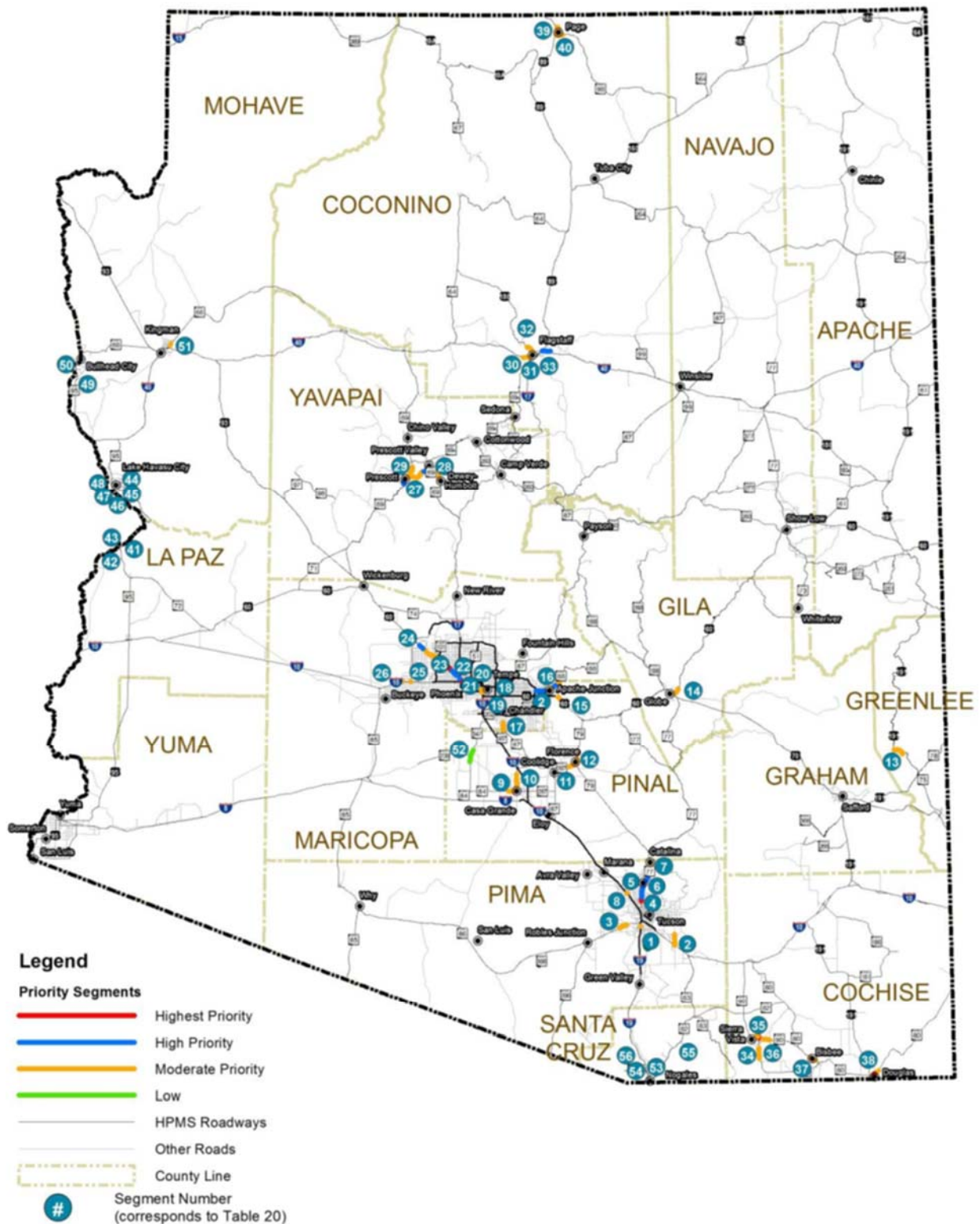
US Bicycle Route 90: The route stretches 573 miles across Arizona from the California border to the New Mexico border, utilizing existing highways, urban streets and paths. To develop the route, approved by AASHTO, local and state officials worked with the Adventure Cycling Association and other bicycle advocacy groups. The route designation did not involve any new infrastructure. The roads were chosen to provide route users with directional information.

Figure 4-8: Opportunity Locations for Improving Paved Shoulders on State Highways in Arizona



Source: Figure 21, State Highway Paved Shoulder Opportunities – Statewide, *ADOT Statewide Bicycle and Pedestrian Plan*, Updated, Final Report, Arizona Department of Transportation, June, 2013.

Figure 4-9: Opportunity Locations for Sidewalks on State Highways in Arizona



Source: Figure 13, State Highway Sidewalk Opportunities, *ADOT Statewide Bicycle and Pedestrian Plan*, Updated, Final Report, Arizona Department of Transportation. June. 2013.

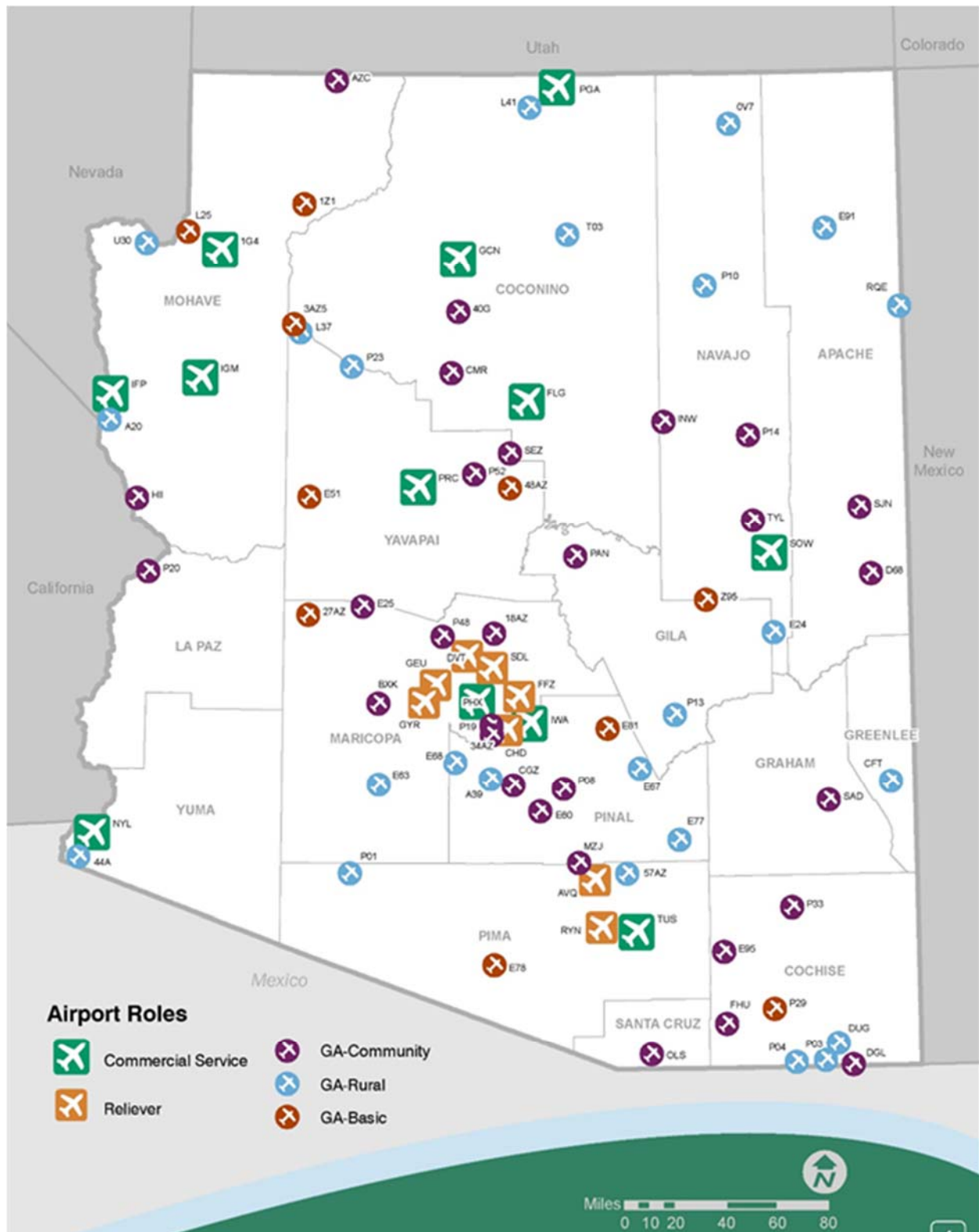
4.7 Aviation

Arizona has 12 public airports that offer commercial, air carrier service on a scheduled basis and a multitude of smaller airports designated as Relievers or oriented to General Aviation (GA) activity, as illustrated in **Figure 4-10**. The National Plan of Integrated Airport Systems (NPIAS) identifies airports that are significant to national air transportation and thus eligible to receive federal grants under the Airport Improvement Program (AIP). Fifty-eight of the 83 public-use airports in Arizona are included in the NPIAS. Data available through the 2013-2017 NPIAS reports total enplanements in Arizona as approximately 23.4 million in 2014. Most of the enplanements (21.9 million) occurred at Phoenix and Tucson International Airports. NPIAS reported 22.8 million enplanements in 2012. Although this may appear to be in conflict with the enplanement forecast for 2012 shown in the previous graphic from the Arizona SASP, the NPIAS classifies “air tours” as GA activity and, therefore, the 2012 enplanement number under counts the actual number of persons utilizing the airports as passengers.

Between 2016 and 2020 planned airport projects for Sky Harbor International Airport will total more than \$175 million. Major facility improvements focus on increasing capacity and rehabilitating runways, taxiways, and aprons. Capacity improvement projects, involving construction of new taxiways and increasing apron space, are anticipated to require more than \$63 million in funding with 75 percent coming from the Federal government and the State contributing 12.5 percent. Other major improvements involve reconstruction/ rehabilitation of existing surfaces over which airplanes operate. Taxiway and apron infrastructure-related improvements are estimated to cost more than \$55 million divided in the same manner among the Federal, State, and local jurisdictions.

Phoenix-Mesa Gateway Airport, which is the primary reliever airport for Sky Harbor International Airport, will be implementing major expansion projects during the 2016-2020 period of the State’s Airport Capital Improvement Program (ACIP). Planned improvements total more than \$274 million over the 5-year period of the current ACIP. A total of \$208 million is planned for expansion of the terminal building. More than \$37 million will be expended to increase the capacity of the airport by constructing new taxiways and apron areas. Also, more than \$14 million will be required to reconstruct/rehabilitate existing taxiways and apron areas. These planned expenditures will be divided in the same manner among the Federal, State, and local jurisdictions as described above for Sky Harbor International Airport.

Figure 4-10: General Location of Arizona's 83 Public-Use Airports



Source: 2008 Arizona State Airports System Plan, *Arizona Airports: Connecting, Moving, and Supporting Our State*, Arizona Department of Transportation.

4.8 Border Crossings/Ports of Entry

Ports of Entry (POE) are maintained at major entrance portals to Arizona to monitor and control all entry, including people and goods. There are eight international POEs located on the Arizona/Sonora International Border. There are 14 non international POEs located on roadways associated with entry from bordering states: California, Nevada, Utah, Colorado, and New Mexico.

4.8.1 Non-international POEs

The non-international POEs are employed to monitor all commercial traffic entering Arizona, which involves checking and verifying: vehicle registration; compliance with tax laws and regulations; compliance with size and weight restrictions associated with the SHS; compliance with commercial driver license (CDL), insurance, and equipment safety requirements; as well as, issuance of permits, as required. Based on a “Concept of Operations” classification, there are three distinct types of non-international POEs serving the State:

- Staffed – a facility designed to process and inspect, as necessary, moderate to high traffic volumes, including 1,500 to 15,000 trucks per day, with an “on site” support staff;
- Virtually Supported – a facility with automated, interactive kiosks, designed for sites with less than 1,500 trucks daily and staffed “off-site” with capabilities to communicate with drivers using high definition (HD) displays, speakers, and microphones; located on the outbound side of major trade corridors and Interstate routes ; and
- Virtually Unsupported – a facility with little or no infrastructure located in low volume areas in remote locations with less than 300 trucks per day, which is supported, as needed, by mobile enforcement teams with portable scales and wireless Internet connections.

The general locations of the International POEs serving the State are shown in **Figure 4-11: Locations of Arizona Ports of Entry**.

Figure 4-11: Locations of Arizona Ports of Entry



Source: "Arizona Ports of Entry," Transportation and Trade Corridor Alliance, amended with information from "Port and Commercial Permit Locations," Arizona Department of Transportation, retrieved September 2, 2015.

Arizona's POE system clearly is diverse in many aspects, including location/geography, size, age, and (to a degree) function. According to the recent study of the State's non international POEs, Arizona Ports of Entry Study (July, 2013), six POEs are located on the interstate system – I-8, I-10, and I-40. The remaining eight POEs are located on various U.S. and state highways and key arterial roadways. The primary focus of the State's POE system currently is on vehicles entering the State via the interstate system. The study suggests, there may be a need to consider shifting some of this enforcement focus to intrastate vehicles. Future growth of truck traffic operating within and through the State is expected to place increasing demands on the current POE system; therefore, a new paradigm will need to be implemented to efficiently connect technology, infrastructure, and staff to allow the system to meet the challenges of the near and long term future. This paradigm could include increasing the level of enforcement through implementation of the Performance and Registration Information System Management (PRISM)

program as a means of improving enforcement and adding the ability to cite illegal vehicle operations electronically without direct officer involvement/enforcement.

The Arizona Commerce Authority recently released “Arizona’s Key Commerce Corridors: Local Jobs, Global Market,” which identifies six corridors “...where improvements to the transportation infrastructure supports the greatest potential commercial and economic benefits.” Five of the six corridors are associated with the POEs. Infrastructure improvements in these corridors needed over the next 20 years have an estimated total cost of \$18.8 billion. With additional improvements required at the POEs (\$0.8 million) and needed replacement of critical bridges (\$0.4 billion), the total expected cost is \$20 billion. **Table 4-3** shows in which corridors the proposed infrastructure investments would be made. The proposed investments are anticipated to sustain 23,000 full-time jobs per year. The report notes that enhancement of the Key Commerce Corridors potentially would result in significant enhancement of Arizona’s economy “...by supporting the creation of high-value, export-focused jobs.” The job creation and stimulation effect of these infrastructure investments would increase revenues for both State and local jurisdictions. Proposed improvement would promote safety and compliance and enhance the investment potential in the most heavily traveled commerce corridors. These improvements include mainline screening technologies, port technology, and physical facility enhancements for both inbound and outbound functions.

Table 4-3: Estimated Cost of Key Commerce Corridor Infrastructure Improvements

Infrastructure Improvements	Capital Costs & 20– Year O&M (Billions)	Total Jobs for 20 Years
Arizona Corridors	\$ 18.8	21,700
I-19 Nogales to Tucson	\$ 2.4	2,700
I-10/I-8 Tucson to Phoenix	\$ 6.4	7,400
I-11 (US 93) Phoenix to Las Vegas	\$ 2.5	2,900
I-17 Phoenix to Flagstaff	\$ 3.0	3,500
I-10 California to Phoenix	\$ 2.3	2,600
I-10 Tucson to New Mexico	\$ 2.2	2,600
Arizona Borders	\$ 0.8	900
Arizona Bridges	\$ 0.4	400
Total Improvements and Jobs	\$ 20.0	23,000

Source: *Arizona’s Key Commerce Corridors: Local Jobs, Global Markets, Multimodal Planning Division, Arizona Department of Transportation (ADOT) March 2014.*

4.8.2 International POEs

Six POEs accommodate the monitoring and control of international people and goods movements across the Arizona/Sonora International Border. The recently completed *Arizona-Sonora Border Master Plan* (2013) indicates in 2010 more than 23 million people crossed through LPOEs at the Arizona-Sonora border on foot or in various personal or commercial (e.g., bus, freight) vehicles. The *Arizona-Sonora Border Master Plan*, prepared jointly by ADOT and FHWA, is directed toward improving the capacity and operational efficiency of the Arizona/Sonora POEs. The Plan lays out strategies and projects for supporting improvements of the transportation infrastructure of the Arizona/Sonora border region essential to: relieving traffic congestion, reducing delays, enhancing safety and security, promoting international trade, and improving the quality of life for residents. The primary objectives, as stated in the Plan are:

- Develop and implement a plan for identifying, prioritizing, and promoting POE and related transportation projects and services;
- Design a process to ensure relevant international stakeholders participate in the planning of POE projects and related transportation infrastructure improvements in the border region;
- Increase understanding of the POE and transportation planning processes on both sides of the border; and
- Establish a process for continued dialogue among relevant international stakeholders that will promote coordination on current and future projects, especially through coordination of planning and programming processes adopted and pursued by study participants/partners.

Using data collected for various projects planned and proposed for the border area (more than 160 in all), the *Arizona-Sonora Border Master Plan* presents a listing of independently scored projects classified into three project types: POE-oriented improvements; multimodal infrastructure/facilities (e.g., roadways, bridges, highway interchanges, transit, pedestrians, and bicyclists); and railroad projects. A key recommendation of the *Arizona-Sonora Border Master Plan* is establishment of an Implementation Monitoring Committee to: (1) provide leadership and guide resources toward effecting improvement projects; and (2) assure continued coordination with the Secretaría de Comunicaciones y Transportes (SCT) and General Services Administration (GSA) as improvement of the border area crossing moves forward.

Data available through the U.S. Department of Transportation (USDOT), Research and Innovative Technology Administration (RITA), indicates the magnitude of border crossings in 2010, as referenced above, is significantly lower than the peak number of border crossings – approximately 36 million – that occurred in 2002. Information available through The Arizona-Mexico Commission (AMC) and the USDOT indicates commerce in the form of trucks, trains, and containers is increasing. According to the AMC and USDOT information, truck/container crossings increased from 754,000 in 2012 to 763,000 in 2013, representing a notable increase over slightly more than a low of 600,000 in 2002 and 2003. Train/container crossings increased from 1,300 in 2012 to 1,730 in 2013. The number of containers traveling by train reached 60,000 in 2006, then dropped to approximately 55,000 in 2010, but this level of movement is far greater than the approximately 25,000 crossing in 1996. The AMC also reports nearly \$55 million in bi-national trade and \$7.3 million in tourism expenditures are conducted daily through the eight Arizona-Sonora POEs.

The recently completed Arizona State Freight Plan provides information relating to trade activity in 2014 **Table 4-4.** Total international trade between Arizona and Mexico exceed \$30 billion, representing seven percent of the total value of goods transported between the U.S. and Mexico via land transportation modes. The majority of the Arizona trade was accomplished via the State’s trucking industry.

Table 4-4: Total Land-Based Arizona-Mexico Border Trade: 2014

Freight Mode	Total Value of Trade (Thousands)	Modal Distribution
Truck	\$20,034,830	66%
Rail	\$10,043,347	33%
Pipeline	\$234,158	1%
Total	\$30,312,335	100%

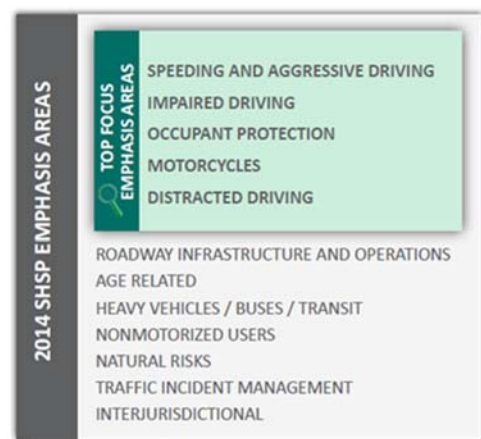
Source: Chapter 6, *Border Infrastructure and International Trade Gateways, Working Paper | Inventory of State Freight Transportation System Assets, Arizona State Freight Plan, April 2014.*

The Transportation and Trade Corridor Alliance (TTCA), a collaborative organization formed of ADOT, AMC, Arizona Commerce Authority, and Arizona Office of Tourism, has created a *Roadmap Action Plan* for Arizona POEs to ensure each is developed to offer appropriate services associated with multidirectional and multimodal logistics hubs. The TTCA identifies a need to double Arizona’s exports to Mexico by 2025, an action that includes identifying ways to expedite the processing and value-added potential of fresh produce and other perishable commodities at POEs at the Arizona/Sonora Border. The *Roadmap Action Plan* calls for developing a strategy to attract private capital to invest in and develop facilities, such as inland ports, which could serve as POEs.

4.9 Safety and Security

ADOT’s safety and security focus is not just on highways. The Department seeks to provide a comprehensive transportation system that is safe for travel and to provide travelers with a reasonable level of security.

Federal regulations, guiding implementation of MAP-21, require all states to have a Strategic Highway Safety Plan (SHSP), an overarching strategic statewide safety document for reducing fatalities and serious injuries on public roadways. Preparation of the SHSP is developed through a data-driven, collaborative approach that engages a broad spectrum of Arizona’s safety stakeholders representing each of the 4 E’s of safety: Engineering, Education, Enforcement and Emergency Medical Services. The current Arizona 2014 Strategic Highway Safety Plan (SHSP) establishes safety goal statements and identifies Emphasis Areas that provide a basis for focusing resources to achieve stated goals. The processes adopted guide and support implementation of recommended safety strategies and action



steps or countermeasures through our various transportation and safety plans and programs. The SHSP gives much needed attention to the travel conditions and challenges faced by non-motorized users of the State's transportation system, i.e., pedestrians and bicyclists, as well as public transportation operations and services.

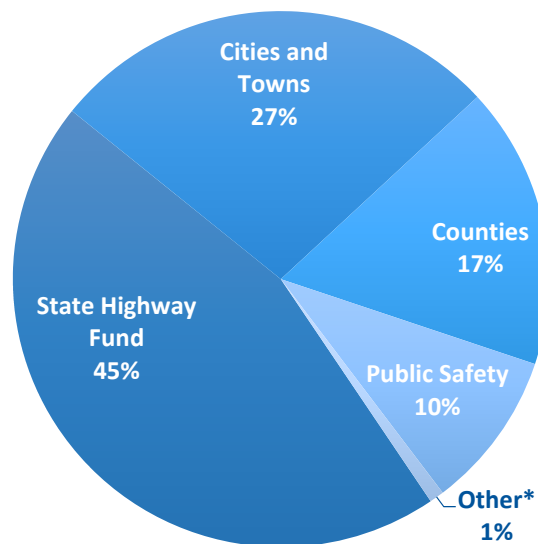
5. DELIVERY OF ARIZONA'S TRANSPORTATION PROGRAM

While there are many aspects associated with how ADOT delivers projects and programs, four areas in particular are import considerations for the WMYA update – finance, performance target setting, programming, and intergovernmental coordination. The following section provides an overview of transportation funding and spending in Arizona, discusses the anticipated approach to target setting, describes the P2P Link initiative and its current state of implementation, and identifies how ADOT works with MPOs, COGs, and local governments to develop the LRTP and select projects.

5.1 Transportation Funding and Spending Overview

Transportation investments in Arizona are paid for with a combination of federal, state, and local funding sources. State revenues are generated from a variety of taxes and fees such as fuel taxes, vehicle registration fees, motor carrier taxes, and licensing fees. Funding from these sources is deposited into the Highway User Revenue Fund (HURF) and then distributed to the State Highway Fund, local governments, and other uses as shown in **Figure 5-1**.

Figure 5-1: Distribution of HURF Collections (\$1.2B, FY2014)⁷



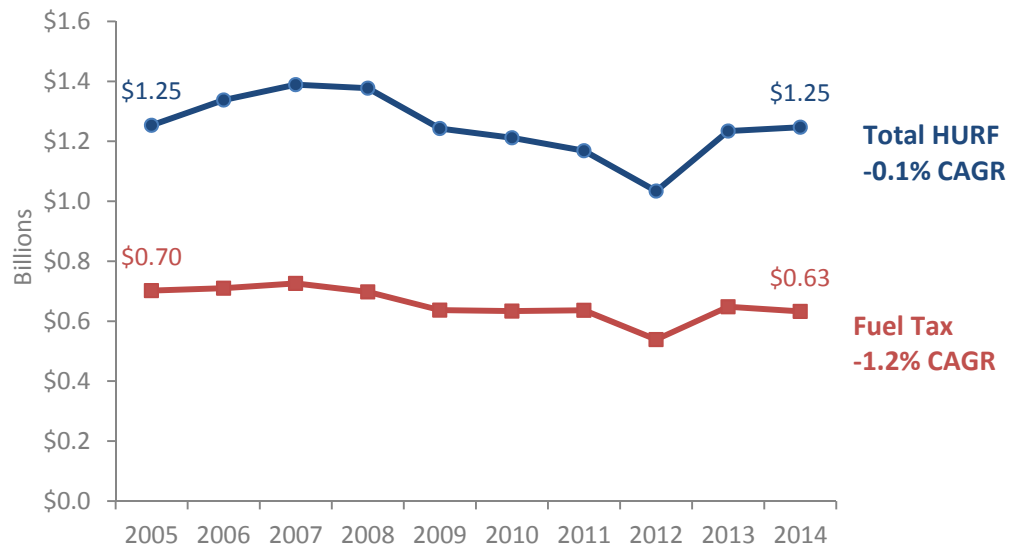
* Other includes Arizona State Parks, Economic Strength Project Fund. Vehicle Registration Enforcement, Other State Agencies, and New Third Party Funding

As shown in **Figure 5-2**, since FY2005, total HURF revenue collections have ranged from a high of almost \$1.4 billion in FY2007 to a low of just over \$1.0 billion in FY2012. Total revenues have recovered in recent years to historic levels, but between FY2007 and FY2012 trended downward. Fuel tax revenues are the most significant single component of total revenues, comprising approximately \$0.6 billion in FY2014. Fuel

⁷ ADOT Receipts and Expenditures, 2013-2014 Annual Report. Submitted to Arizona Secretary of State

tax revenues are trending down due to increased vehicle fuel efficiency and other factors resulting in a compound annual growth rate (CAGR) between FY2005 and FY2014 of -1.2 percent.

Figure 5-2: Highway User Revenue Fund Collection
FY2005-FY2014⁸



5.1.1 State Highway Fund

The State Highway Fund receives not only the HURF distribution shown above, but also federal funding and a small amount of other miscellaneous revenues. As shown in **Figure 5-3**, in FY2014, the State Highway Fund's receipts included 57 percent from HURF, 41 percent from federal funds, and 2 percent from other sources.

⁸ FY2014 ADOT CAFR

Figure 5-3: State Highway Fund Receipts (\$984 million, FY2014)⁹

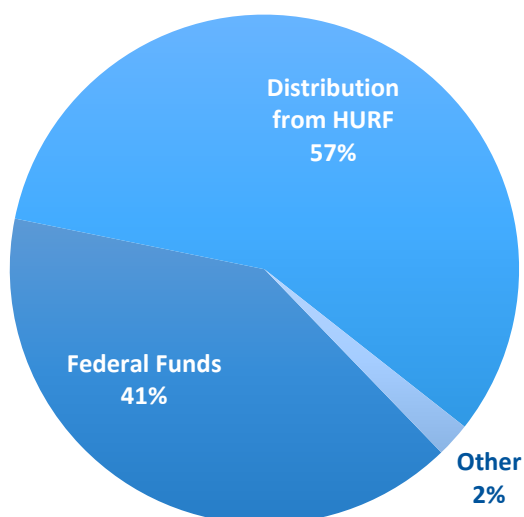
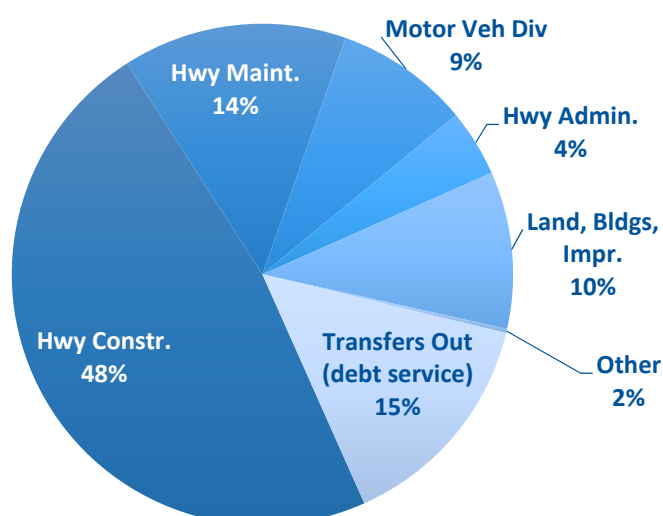


Figure 5-4 breaks down the expenditures from the State Highway Fund. The largest share of expenditures from the State Highway Fund are for highway preservation, modernization, and expansion construction (48 percent), with the remainder going to debt service (15 percent), and highway maintenance (14 percent). Revenues from the State Highway Fund are also used to pay for land, buildings, and improvements (10 percent), operations of the Motor Vehicle Division (9 percent), and highway administration (4 percent).

Figure 5-4: State Highway Fund Expenditures (\$895 million, FY2014)¹⁰



⁹ ADOT Receipts and Expenditures, 2013-2014 Annual Report. Submitted to Arizona Secretary of State

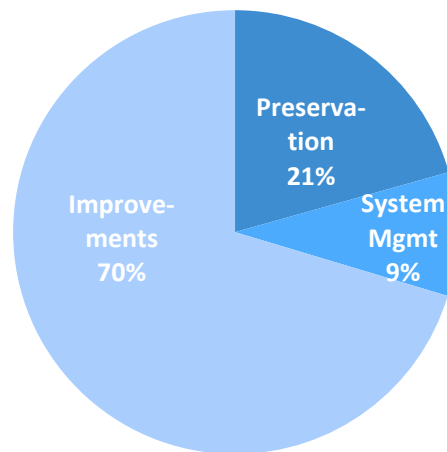
¹⁰ ADOT Receipts and Expenditures, 2013-2014 Annual Report. Submitted to Arizona Secretary of State

5.1.2 State Transportation Improvement Program (STIP) Expenditure Trends

An analysis of the State’s historical and current programming provides a view of expenditure trends with respect to the allocation of resources to different types of investments. As shown in **Figure 5-5**, between FY2001 and the end of the current State Transportation Improvement Program (STIP) in FY2020, Arizona will have invested \$79.7 billion in the preservation, management, and improvement of the State’s transportation system.¹¹ Each of these categories of investments is described below:

- **Improvements** – major and minor capacity projects, operational improvements, and spot improvements.
- **Preservation** – maintenance of the existing system including pavement, bridges, safety features, public transit, roadside facilities, and operational facilities such as signal warehouse and RPMs, ports of entry, collection of overweight fees, and sign rehabilitation.
- **System Management** – development support including design, engineering, utilities, right of way, environmental, storm water, system management, and planning as well as operating support such as the civil rights office, ITD Technical and NHI training, privatization, risk management, professional and outside services, partnering, contingencies, and emergency projects.

Figure 5-5: Arizona Programmed Transportation Investments
FY 2001 through FY2020 (\$79.7 billion)



As shown in **Figure 5-6** and **Figure 5-7**, ADOT’s resource allocation mix has changed since the adoption of WMYA in 2011. In particular, the Department shifted spending on improvements to preservation. Moreover, as shown in **Figure 5-8** and **Figure 5-9**, ADOT’s allocation of preservation spending has changed since 2011, with a smaller portion spent on pavement and more spent on preservation of bridge, safety, and operational facility assets.

¹¹ <http://www.azdot.gov/planning/transportation-programming/current-program> and History Excel Spreadsheet (From Program Fiscal Years 2001 to 2016, updated annually).

Figure 5-6: Arizona Programmed Transportation Investments FY2001-FY2011 (\$44.8 billion)

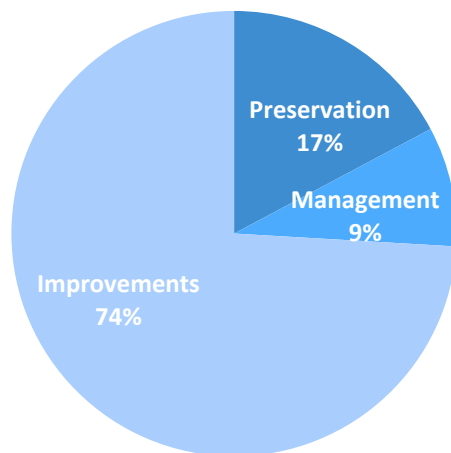


Figure 5-7: Arizona Programmed Transportation Investments FY2012-FY2020 (\$34.8 billion)

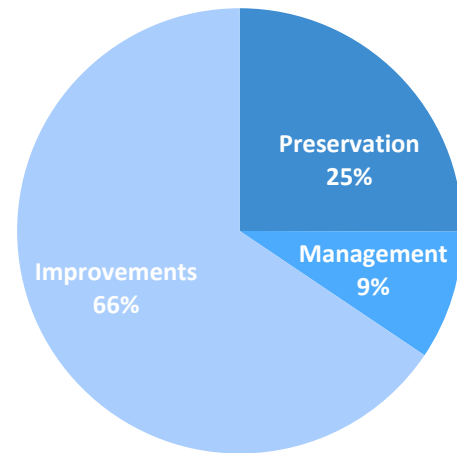


Figure 5--8: Preservation Detail FY2001-FY2011

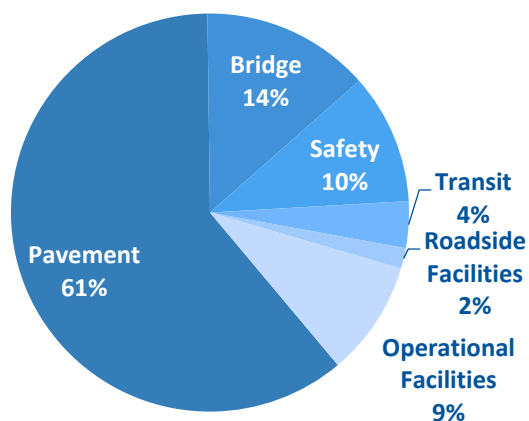
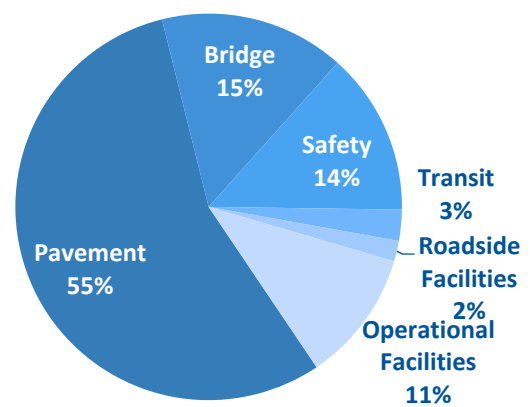


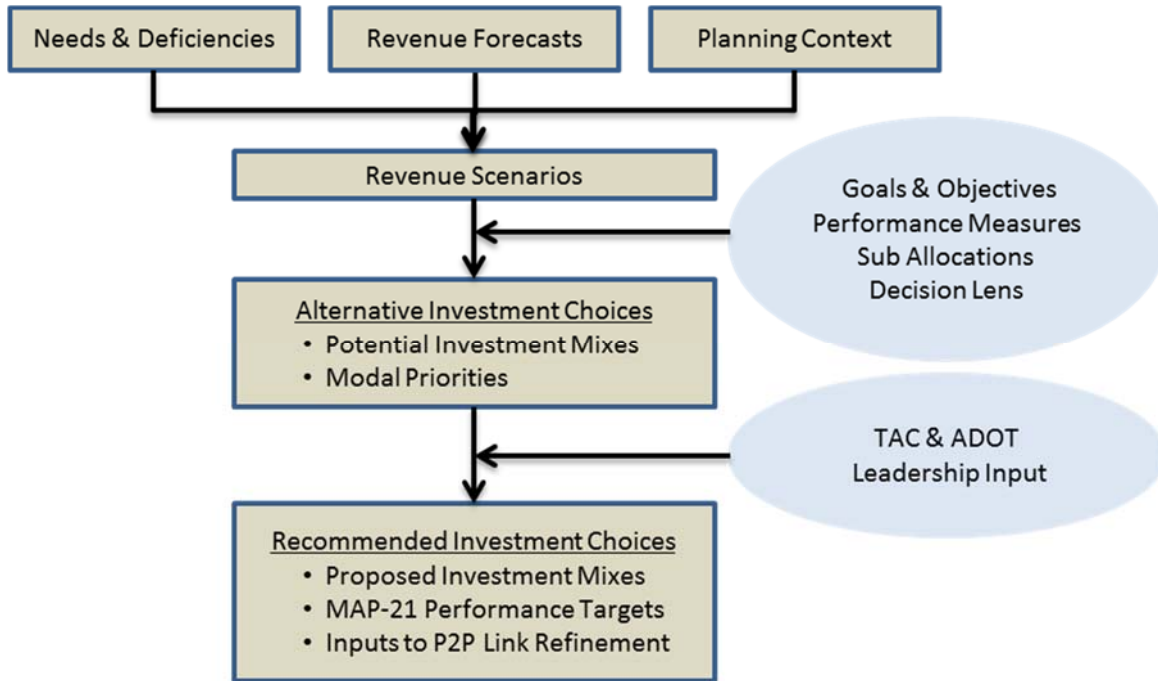
Figure 5-9: Preservation Detail FY2012-FY2020



5.2 Performance Target Setting

As noted in Section 1.4, Federal guidance for implementing the target setting provisions of MAP-21's performance management requirements is still forthcoming and it is unclear when this guidance will be provided. Nonetheless, ADOT is committed to establishing and implementing a performance target-setting process as part of the WMYA update. As illustrated in **Figure 5-10**, this will be accomplished through the scenario development effort conducted in Task 4 of the planning effort.

Figure 5-10: Scenario Development Process



The process for setting WMYA (i.e., 25-year horizon) and shorter term (i.e., 2- to 4-year horizon) performance targets will likely need to be fluid and adapt as more information and guidance on MAP-21 implementation becomes available. In particular, little if anything is known about how existing state/MPO STIPs/TIPs should be reconciled with the 2-year and 4-year performance targets that will need to be set for some or all national goal areas. The anticipated approach for WMYA is to establish long term performance targets that are consistent with the national goal areas and then work to establish sort term targets through the following tentative approach:

- Alternative Investment Choices (AICs) will show the long-term performance that can be achieved for various goal areas with different resource allocations across the major investment categories (i.e., preservation, modernization, expansion, and other areas as appropriate).
- The application of Decision Lens during the scenario planning workshop will enable participants to see the long-term performance implications of different resource allocation approaches and make refinements to either the allocations directly or to the relative priorities among goals that drive allocation modeling.

- A combination of management system outputs, independent analyses, and qualitative assessments will be used to define and articulate the anticipated long-term performance for AICs.
- The development of the RIC will be achieved through iterative refinement of the AICs that considers both alignment with the revised WMYA goals and any current/emerging guidance from FHWA on MAP-21 implementation. The anticipated long-term performance under the final Recommended Investment Choice (RIC) will thus effectively establish ADOT's long-term performance targets.
- Based on the notice of proposed rulemakings (NPRMs) FHWA has released to date, states will be required to set targets for national performance measurement goal areas for a 2-4 year horizon. As a starting point for setting these short term targets in Arizona, the consultant team will work with ADOT staff to apply performance measures to assess the short term performance that will likely be achieved through implementation of the current ADOT STIP (and potentially MPO TIPs). These performance forecasts will then be compared to the targets associated with the RIC to assess their compatibility. If a high-level of compatibility is found, the 2-4 year, STIP/TIP-based performance forecast will essentially become ADOT's short-term targets, although some of the targets may be more directional than hard targets. If significant inconsistency is determined, the consultant team and ADOT staff will explore the need to revise the current ADOT STIP and/or make adjustments to the RIC and its associated long-term performance targets.

5.3 P2P Link: ADOT's New Programming Process

"P2P Link" is the name given to ADOT's ongoing effort to revamp its project selection process to better link planning and programming and integrate system performance measurement into decision-making and support ADOT's compliance with MAP-21 performance management requirements. The effort was conceived as part of the development of the original WMYA plan. It has included significant work over the last few years to define a programming framework and associated activities such as resource allocation and performance measurement that implement the LRTP RIC and will lead to a process that is transparent, defensible, logical, and reproducible.

5.3.1 P2P Link Implementation Progress

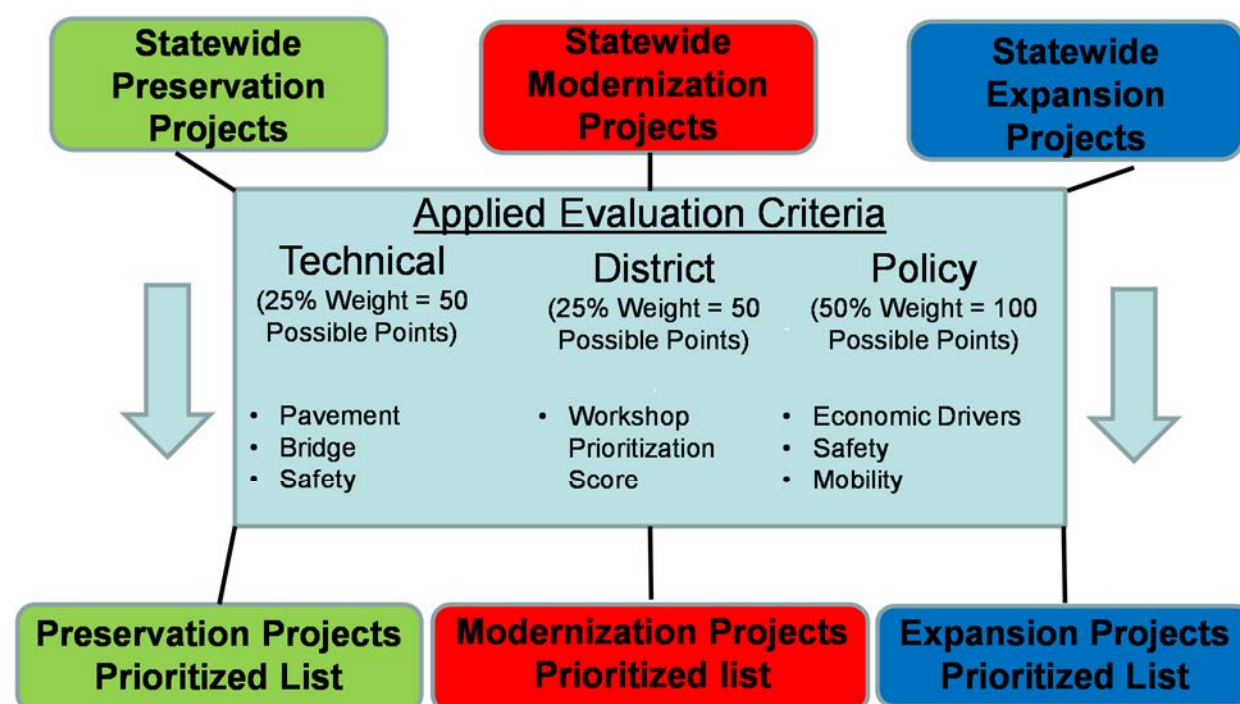
The development of P2P Link began in earnest with the adoption WMYA. Between 2012 and 2014, ADOT focused on developing the framework for P2P Link. Since 2014, the agency has been preparing for implementation of P2P Link through actions such as the following:

- Streamlining ADOT's funding program structure and aligning them with the three major performance categories/investment areas identified in WMYA – Preservation, Modernization, and Expansion;
- Creating a "development program" that covers years 6-10 in the 10-year work program and addresses plans for the initial development of expansion, modernization, and non-highway projects;
- Refinement of ADOT's 5-Year Program to create a fiscally constrained plan that documents the projects ADOT has committed to deliver to address all program performance measures over the next five years;

- Development of an annual process that evaluates, tracks, and reports system performance against the metrics established in WMYA;
- Refinement of ADOT’s annual resource allocation process to establish yearly funding for major performance categories that begins to consider target allocations as defined by the WMYA RIC ;
- Establishment of a an initial criteria weighting scheme; and
- Identification of an approach to identifying a statewide pool of candidate projects.

ADOT is currently in the process of piloting the P2P Link process in its Northwest and Southeast Districts through an effort that uses the system performance report and increased coordination with district, technical, and COG/MPO staff to identify and nominate best performing projects. This effort has included the development of a project nomination and scoping process (illustrated in Figure 5-11) that balances consideration of technical, district, and policy considerations to develop prioritized lists of highway projects for preservation, modernization, and expansion.

Figure 5-11: P2P Project Prioritization Process



5.3.2 Future P2P Refinements

The next steps for P2P Link development will focus on refining the process based on: 1) experience to date; 2) emerging federal MAP-21 implementation requirements; and 3) findings and outputs from the WMYA update efforts. Specific items that will be addressed include:

- Refining project evaluation criteria and calibrating weights;
- Establishing an updated WMYA RIC with a new target for resource allocation across different investment types;

- Aligning (with refinement as necessary) P2P Link evaluation criteria, processes, performance measures, and target setting based on emerging FHWA MAP-21 performance measures rules and associated implementation guidance;
- Better integrating other plans (e.g., Strategic Highway Safety Plan, Corridor Profile Studies, and the Asset Management Plan) into the project nomination and evaluation process;
- Rolling out the P2P Link project prioritization in all districts in 2015-2016; and
- Modifying ADOT subprograms to better align with the preservation, modernization, and expansion investment categories, and create minimum investment thresholds based on performance in 2019.

5.4 Institutional Coordination

Arizona has three types of regional transportation planning agencies to conduct and coordinate transportation planning activities:

- Transportation Management Areas (TMAs)
- Metropolitan Planning Organizations (MPOs)
- Council of Governments (COGs)

Every community within Arizona is represented by at least one of these planning agencies. The two MPOs that are classified as TMAs include Phoenix - Maricopa Association of Governments (MAG) and Tucson - Pima Association of Governments (PAG). Beyond the two MPOs certified as TMAs, Arizona has six other MPOs: Central Yavapai Metropolitan Planning Organization (CYMPO), Flagstaff Metropolitan Planning Organization (FMPO), Yuma Metropolitan Planning Organization (YMPO), and three new MPOs formed in 2013 as a result of the 2010 Census, serving the Casa Grande area (SCMPO), Lake Havasu City area (LHMPO), and Sierra Vista area (SVMPO). Each MPO is charged with providing a comprehensive regional transportation planning process for the designated planning area. MPOs work with ADOT and other partner agencies to develop federal- and state-required transportation plans and programs for their regions. An MPO ensures federal spending on transportation occurs through a comprehensive, continuous, and cooperative (3-C) planning process.

ADOT is the primary decision maker for federal-aid transportation plans and investments in non-metropolitan areas with populations less than 50,000 (COG areas). However, ADOT understands the importance of consulting with local governments before, during, and after the decision-making process to ensure that participation results in improved transportation system planning, performance and project development decisions.

Native nations and tribal governments have sovereign status and jurisdiction over lands within reservation boundaries, but ADOT has exclusive control and jurisdiction over state highways within reservation boundaries, as defined in A.R.S. §28-332(A). Approximately 1,219 miles or 19.8 percent of Arizona's state highway system crosses tribal lands. To facilitate needed state-tribal discussion, coordination, and consultation, ADOT's Tribal Transportation Program focuses on transportation-related partnerships, projects, and activities. ADOT has a tribal planning coordinator assigned to work with each Arizona tribal entity.

Throughout the WMYA Update, ADOT will coordinate and consult directly with each of these and other state and federal planning entities to gather input and guidance.

6. OBSERVATIONS AND QUESTIONS

6.1 Observations

The first five chapters of this report summarize a broad range of topics, issues, and considerations that are highly relevant to Arizona's transportation future. While much of the information provided is general and/or preliminary, a handful of important observations can be made that should influence the WMYA update:

- Long range transportation planning is complex – It brings together a combination of technical, policy, process and political requirements and considerations, some of which are at odds and tend to make consensus-building difficult.
- Tough decisions will need to be made – Even through just a preliminary look at future highway investment needs and anticipated revenues, it is clear that Arizona will likely not have the funding needed to fully achieve the bqAZ vision. This places importance on establishing and maintaining clear and meaningful processes for prioritizing goals/objectives and making trade-off decisions.
- The transportation landscape is changing – Emerging forces and trends associated with demographics, the political climate, culture and attitudes, technology, energy, the environment, and the workforce will change the way people and goods move, the challenges transportation agencies face, and the way programs and projects need to be delivered.
- The Great recession had a profound impact on Arizona – While population and economic growth is returning to Arizona, the State was one of the hardest hit by the economic downturn. For transportation, this created the dual challenge of lagging revenues for spending, but increased demand for investment to spur economic growth and help diversify the State's economy.
- The asset management challenge – From a national perspective, Arizona's transportation assets are generally in good condition, but due to both financial constraints and the age of the system, ADOT and its stakeholders will face increasing investment demands to maintain existing asset conditions.

6.2 Planning Process Questions

To ensure the WMYA update successfully considers the observations listed above and provides a meaningful foundation for future Arizona transportation decision making, several key questions about the planning process will need to be addressed. These include the following:

- **Strategic Planning** – The following are questions that should be discussed to inform preparations for the Plan's vision, goals, and objectives workshop:
 - **Evolving Vision** – Has the vision for Arizona's transportation system changed?
 - **Key Factors** – What potential future trends are most relevant to how ADOT allocates its resources and prioritizes its projects? How should these decisions be affected by them?
 - **Shifting Values** – What, if anything, has changed about ADOT's stakeholders since WMYA was adopted? What does this mean for WMYA's strategic direction?
 - **Federal Requirements** – How do the WMYA goals, objectives and performance measures align with MAP-21 national level goals?

- **Funding Issues** – How do financial realities and opportunities translate to the need for refinements to WMYA’s strategic direction?
- **Scenario Planning Task** – The following are questions that should be discussed in advance of the effort to develop and evaluate the Alternative Investment Choices and select the RIC:
 - **Strategic Alignment** – What WMYA goals are relevant to scenario planning?
 - **Revenue Estimates** – What assumptions do we need to make for the “Reduced Revenue” scenario? What do we use as a starting point for the Baseline Revenue scenario? How do we gain consensus on the right levels?
 - **Full State Needs** – What assumptions should be made in developing the modern and expansion costs for the Full State Needs Scenario?
 - **Multi-modal Needs** – What assumptions and existing information should be used in developing the non-highway needs for inclusion in the scenarios?
 - **Performance Considerations** – What outcomes need to be quantified and/or qualified to enable adequate analysis of scenarios?
 - **Target Setting** – Should performance targets be set for the entire system, or independently for urban and rural areas? Will MPOs set their own targets for their respective areas, or adopt those established by ADOT?
 - **Scenario Details** – What line items do we want in the Scenarios (e.g., just preservation, modernization, and expansion, or more granular)?
 - **Scenario Themes** – What do we want the investment focus of the spending scenarios to be (e.g., preservation, economic development, multimodal, other)?
- **Criteria Weighting** – The following are factors that will need to be considered in advance of the workshop and activities associated with calibrating the P2P Link evaluation criteria:
 - **Strategic Alignment** – Which are relevant to criteria weighting?
 - **Current Issues** – What are current concerns about the evaluation criteria in P2P Link?
 - **Performance** – What key performance considerations are missing?
 - **Approach** – How segregated is the project evaluation; are we doing full cross asset optimization, grouped by major investment area (i.e., preservation, modernization, and expansion), or by specific funding programs?
 - **Scope of Options** – Are changes to the current program structure on the table for consideration?