



# 2050 Long-Range Transportation Plan

**ADOT**

## Multimodal Needs Analysis



*Connecting Arizona. Better Lives Through Better Transportation.*



### Table of Contents

- 1 Introduction ..... 1
  - 1.1 Arizona Transportation System Components ..... 1
  - 1.2 Needs Identification Process..... 1
  - 1.3 LRTP Vision and Goals..... 3
  - 1.4 Time Value of Money..... 5
  - 1.5 National Perspective on Needs Analysis..... 5
- 2 ADOT Infrastructure Needs ..... 6
  - 2.1 State Highway System Needs..... 6
    - 2.1.1 Background..... 6
    - 2.1.2 SHS Needs Categories and Data Sources ..... 10
    - 2.1.3 Pavement Needs..... 11
    - 2.1.4 Bridge Needs..... 17
    - 2.1.5 Mobility Needs..... 21
    - 2.1.6 Safety Needs..... 26
    - 2.1.7 Freight Needs..... 32
  - 2.2 Other Facilities ..... 36
    - 2.2.1 State Ports of Entry ..... 36
    - 2.2.2 Rest Areas/Truck Parking Areas..... 38
    - 2.2.3 Grand Canyon National Park Airport ..... 40
- 3 ADOT Stewardship Needs..... 41
  - 3.1 Public Transit Funding Needs..... 41
  - 3.2 Aviation Infrastructure Funding Needs ..... 44
  - 3.3 Passenger Rail Funding Needs ..... 46
  - 3.4 Non-SHS Bridge Inspections and Funding Needs ..... 46
  - 3.5 Statewide Planning Funding..... 47
  - 3.6 HSIP, CMAQ, and TA Funding..... 48
  - 3.7 EV Charging and CRP Funding ..... 49
  - 3.8 Public At-Grade Highway-Rail Crossings Safety Funding..... 50
- 4 Needs of Complementary Transportation Systems ..... 51
  - 4.1 Transportation Infrastructure – Municipal, County, Federal, Tribal, and Private ..... 51
  - 4.2 Phoenix and Tucson Public Transit Systems ..... 51
  - 4.3 Private Transit Systems..... 52
  - 4.4 Private Rail Facilities..... 52
  - 4.5 Public and Private Airports ..... 52
  - 4.6 Federal Ports of Entry ..... 52
- 5 Summary of Findings ..... 53



### List of Figures

Figure 1: Arizona Transportation System .....2

Figure 2: Generalized LRTP Needs Identification Process .....3

Figure 3: 2050 LRTP Vision and Goals .....4

Figure 4: National Transportation System Goal Areas .....4

Figure 5: ADOT Infrastructure Component .....6

Figure 6: Arizona State Highway System .....7

Figure 7: National Highway System in Arizona .....8

Figure 8: TAMP Interstate Pavement Conditions by Lane-Miles .....15

Figure 9: TAMP Non-Interstate NHS Pavement Conditions by Lane-Miles .....15

Figure 10: Projected Future SHS Pavement Conditions by Lane-Miles .....16

Figure 11: TAMP ADOT-Owned NHS Bridge Conditions by Deck Area .....19

Figure 12: Projected Future SHS Bridge Conditions by Deck Area .....20

Figure 13: Level of Travel Time Reliability (LOTTR) .....24

Figure 14: CPS Mobility Index Needs .....25

Figure 15: 2016-2020 Levels of Service of Safety (LOSS) 3 and 4 Map .....29

Figure 16: CPS Safety Index Needs .....30

Figure 17: Truck Travel Time Reliability (TTTR) .....34

Figure 18: CPS Freight Index Needs .....35

Figure 19: State Domestic Ports of Entry .....37

Figure 20: State Rest Areas/Truck Parking Areas .....39

Figure 21: ADOT Stewardship Component .....41

Figure 22: Arizona 5310 and 5311 Transit Providers .....43

Figure 23: Arizona Airports .....45

Figure 24: Complementary Transportation Systems Component .....51

Figure 25: ADOT Infrastructure Needs .....54

Figure 26: ADOT Stewardship Needs .....55

Figure 27: Arizona Transportation System Detailed Needs .....56

Figure 28: Arizona Transportation System Summary Needs .....57



### List of Tables

Table 1: Centerline Miles of Arizona Roads by Owner .....9

Table 2: Arizona Vehicle Miles Traveled (Millions).....9

Table 3: Centerline Road Miles in Arizona By Region .....10

Table 4: ADOT Infrastructure Needs Data Sources.....11

Table 5: TAMP Pavement Lane-Mile Targets .....14

Table 6: SHS Pavement 2026-2050 Needs .....17

Table 7: TAMP Bridge Deck Area Targets.....18

Table 8: SHS Bridge 2026-2050 Needs .....20

Table 9: SHS Mobility 2026-2050 Needs .....26

Table 10: SHS Safety 2026-2050 Needs .....31

Table 11: Arizona Truck Freight by Tonnage and Value.....32

Table 12: SHS Freight 2026-2050 Needs .....36

Table 13: State POE 2026-2050 Needs.....38

Table 14: Rest Areas/Truck Parking Areas 2026-2050 Needs .....40

Table 15: Grand Canyon National Park Airport 2026-2050 Needs.....40

Table 16: ADOT 5310 and 5311 Public Transit Funding 2026-2050 Needs.....42

Table 17: ADOT Aviation Infrastructure Funding 2026-2050 Needs .....44

Table 18: ADOT Passenger Rail Funding 2026-2050 Needs .....46

Table 19: ADOT Non-SHS Bridge Inspections and Funding 2026-2050 Needs.....47

Table 20: ADOT Statewide Planning Funding 2026-2050 Needs.....47

Table 21: ADOT HSIP, CMAQ, and TA Funding 2026-2050 Needs.....49

Table 22: ADOT EV Charging and CRP Funding 2026-2050 Needs .....49

Table 23: ADOT Public At-Grade Highway-Rail Crossings Safety Funding 2026-2050 Needs .....50

Table 24: ADOT Infrastructure 2026-2050 Needs .....54

Table 25: ADOT Stewardship 2026-2050 Needs.....54

Table 26: Arizona Transportation System 2026-2050 Needs.....56



### List of Acronyms

ACIS	Arizona Crash Information System	NEVI	National Electric Vehicle Infrastructure
ADOT	Arizona Department of Transportation	NHS	National Highway System
AFC	Alternative Fuel Corridors	NPIA	National Plan of Integrated Airport Systems
AIP	Airport Improvement Program	NPMRD	National Performance Management Research Data Set
AMP	Airport Master Plan	O&M	Operations and Maintenance
BIL	Bipartisan Infrastructure Law	PAG	Pima Association of Governments
BIMP	Border Infrastructure Master Plan	POE	Port of Entry
BNSF	BNSF Railway	PRCS	Passenger Rail Corridor Study
BrM	Bridge Management System	PSAP	Pedestrian Safety Action Plan
CMAQ	Congestion Mitigation and Air Quality Improvement	RMAP	Regional Mobility Accessibility Plan
COG	Council of Governments	RMC	Roadway Maintenance Costs Summary Report
CPS	Corridor Profile Studies	RTP	Regional Transportation Plan
CRP	Carbon Reduction Program	SASP	State Aviation System Plan
DPS	Department of Public Safety	SFP	State Freight Plan
DR	Designated Recipient	SHRAP	State Highway-Rail At-Grade Crossing Action Plan
dTIMS	Deighton’s Total Infrastructure Management System	SHS	State Highway System
EV	Electric Vehicle	SOGR	State of Good Repair
EVSE	Electric Vehicle Supply Equipment	SOV	Single-Occupancy Vehicle
FAST	Fixing America’s Surface Transportation	SPF	Safety Performance Function
FHWA	Federal Highway Administration	SPR	State Planning and Research
FRA	Federal Railroad Administration	STBG	Surface Transportation Block Grant
FTA	Federal Transit Administration	STIP	Statewide Transportation Improvement Program
GA	General Aviation	STSP	Strategic Traffic Safety Plan
GCNP	Grand Canyon National Park	TA	Transportation Alternatives
HSIP	Highway Safety Improvement Program	TAMP	Transportation Asset Management Plan
IDP	Infrastructure Deployment Plan	TIM	Traffic Incident Management
IRI	International Roughness Index	TIP	Transportation Improvement Program
ITS	Intelligent Transportation Systems	TOC	Traffic Operations Center
LOS	Level of Service	TSMO	Transportation System Management and Operations
LOSS	Level of Service of Safety	TTTR	Truck Travel Time Reliability
LOTTR	Level of Travel Time Reliability	UPRR	Union Pacific Railroad
L RTP	Long-Range Transportation Plan	USC	United States Code
MAG	Maricopa Association of Governments	v/c	Volume-to-Capacity
MAP-21	Moving Ahead for Progress in the 21st Century Act of 2012	VMT	Vehicle Miles Traveled
MPO	Metropolitan Planning Organization	WVCS	Wildlife-Vehicle Conflict Study
NBI	National Bridge Index		



# 1 Introduction

---

As part of the Arizona Long-Range Transportation Plan (LRTP) 2050 update, the Arizona Department of Transportation (ADOT) has analyzed the long-term needs of Arizona's transportation system.

## 1.1 Arizona Transportation System Components

Arizona's transportation system is composed of facilities, assets, and services related to moving people and goods throughout Arizona. ADOT has varying levels of ownership and oversight of the three major components of the Arizona transportation system:

- ADOT Infrastructure (e.g., the State Highway System)
- ADOT Stewardship (e.g., aviation infrastructure and rural transit funding programs)
- Complementary Transportation Systems (e.g., local roads and railroads)

These three components, along with their major subcomponents, are shown in **Figure 1** and will be discussed in more detail in subsequent sections of this document.

The LRTP needs analysis has a primary focus on ADOT Infrastructure with a secondary focus on the ADOT Stewardship component. Complementary Transportation Systems are incorporated by reference but not included in the quantification of statewide transportation system needs.

## 1.2 Needs Identification Process

For purposes of the LRTP needs analysis, a need is defined as the funding amount required to bring or maintain facilities, assets, or services at a desired level or, in the case of transportation-related programs, the funding amount allocated to, or required to administer, the programs.

Goals develop the framework for needs by determining the overarching priorities. Goals are typically developed based on input from technical and non-technical sources and often are guided by an overall vision statement. Categories of need allow for grouping of needs based on some common characteristic. Performance measures are then developed within the categories of need and in alignment with the identified goals utilizing available data to assess current performance against desired performance. **Figure 2** shows the generalized needs identification process assumed in the LRTP needs analysis for facilities, assets, and services. For transportation-related programs, as mentioned previously, the identification of needs is typically limited to the funding amount allocated to, or required to administer, the programs.

Various goals and performance measures have been developed by different entities at the federal, state, regional, local, and even project-specific levels, which has resulted in needs being identified and defined in different ways. This variation makes it a challenge to identify a single source for overall needs for Arizona's statewide transportation system. For the LRTP needs analysis, the needs identified from different sources have been summed together, with specific effort to remove duplication and fill in missing gaps, although it is recognized the total level of statewide need likely exceeds what has been able to be identified and quantified due to a lack of available data.



Figure 1: Arizona Transportation System

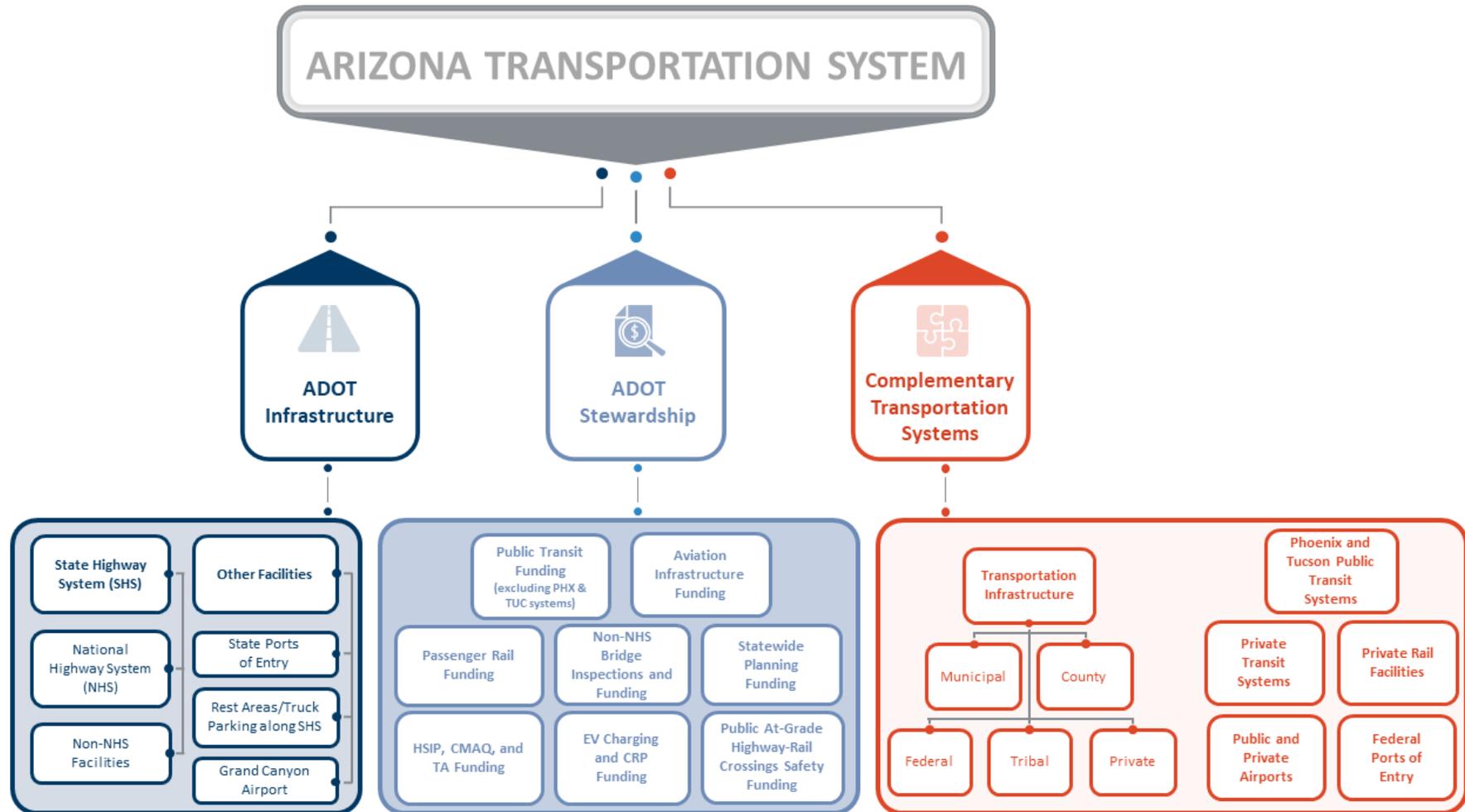




Figure 2: Generalized LRTP Needs Identification Process

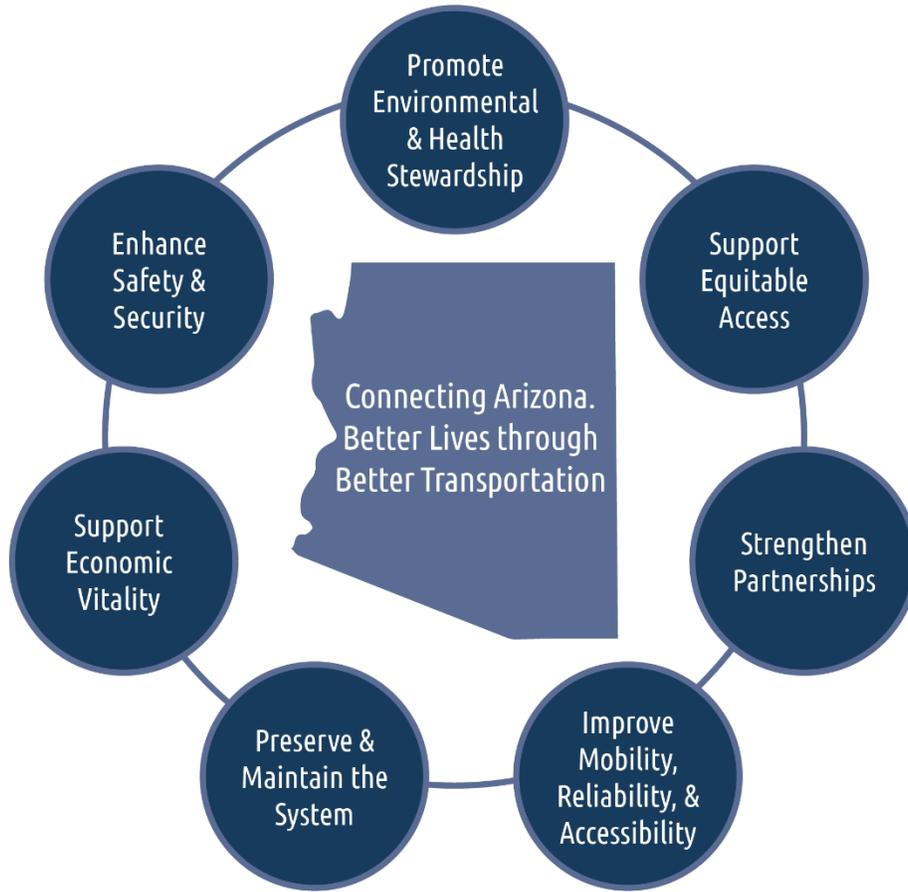


### 1.3 LRTP Vision and Goals

To help guide transportation planning and decision-making in Arizona, ADOT has identified a vision statement and seven priority goals for the LRTP, as shown in **Figure 3**. The LRTP vision and goals generally align with the National Transportation System Goal Areas developed by the Federal Highway Administration (FHWA) that are shown in **Figure 4**. The needs identified in the LRTP needs analysis all correlate to one or more of these goals. For more information on the LRTP vision and goals, see the 2050 LRTP Vision and Goals working paper.

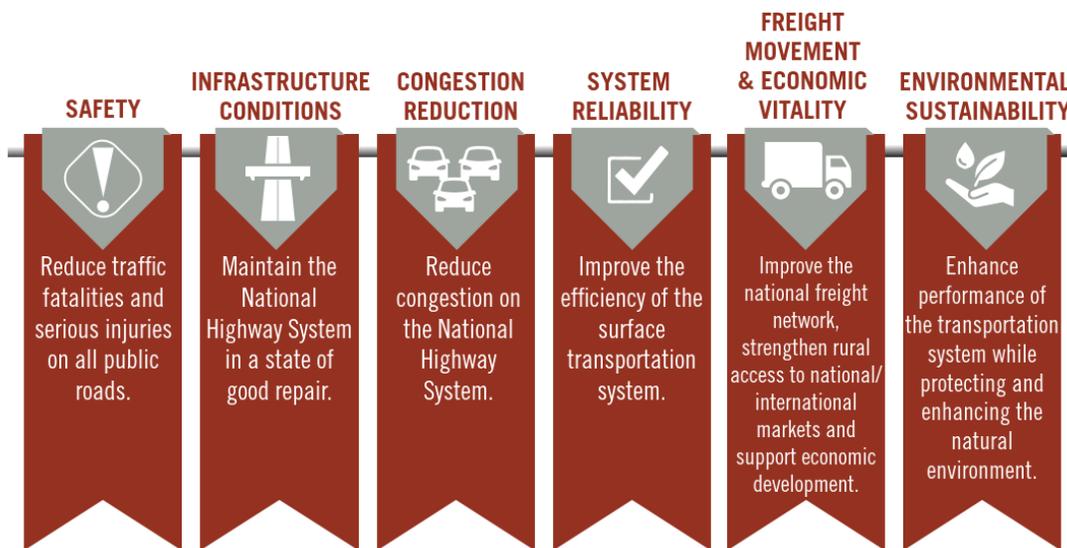


Figure 3: 2050 LRTP Vision and Goals



Source: ADOT 2050 LRTP Vision and Goals

Figure 4: National Transportation System Goal Areas



Source: FHWA and ADOT 2040 LRTP



## 1.4 Time Value of Money

Needs have been identified using historical trends as well as forecasted conditions. These needs have come from a variety of sources completed at different times in the past with forecast horizons at different years. Some needs are one-time occurrences (e.g., construct an improvement) while others are recurring expenditures (e.g., annual funding of federal programs). Recognizing that the value of money changes over time due to factors such as inflation and interest rates, it is critical that the dollar amount of needs from different timeframes all be brought to a common point in time for consistency.

The 2050 LRTP needs analysis covers the years 2026-2050, with the year 2026 being considered the “baseline” year. All needs amounts for years prior to 2026 have been brought up to 2026 dollars while all needs amounts for years after 2026 have been brought back to 2026 dollars.

Per ADOT’s construction cost index from July 2022, construction costs increased 88 percent between 2016 and 2022. This works out to an average annual inflation factor of approximately 11 percent. Needs values previously identified in past reports or studies prior to 2022, have all been grown by this 11 percent annual inflation rate to establish needs values in 2026 dollars. All future needs values beyond 2026 were factored back to 2026 assuming an average annual inflation rate of 7 percent.

## 1.5 National Perspective on Needs Analysis

A peer review of state LRTPs for Ohio, Pennsylvania, and Utah was conducted to consider how other peer states relate their transportation system goals to performance measures and needs. The review examined how these other states identified notable transportation elements and their methodology for identifying transportation needs, including needs not within their jurisdiction.

This limited peer review revealed that the identified performance measures and LRTP goals created by ADOT are closely aligned with those created by the three peer states. However, the process for developing needs and the associated assumptions of what constitutes a need that should be included in the LRTP, vary widely. Each peer state’s general approach is provided below:

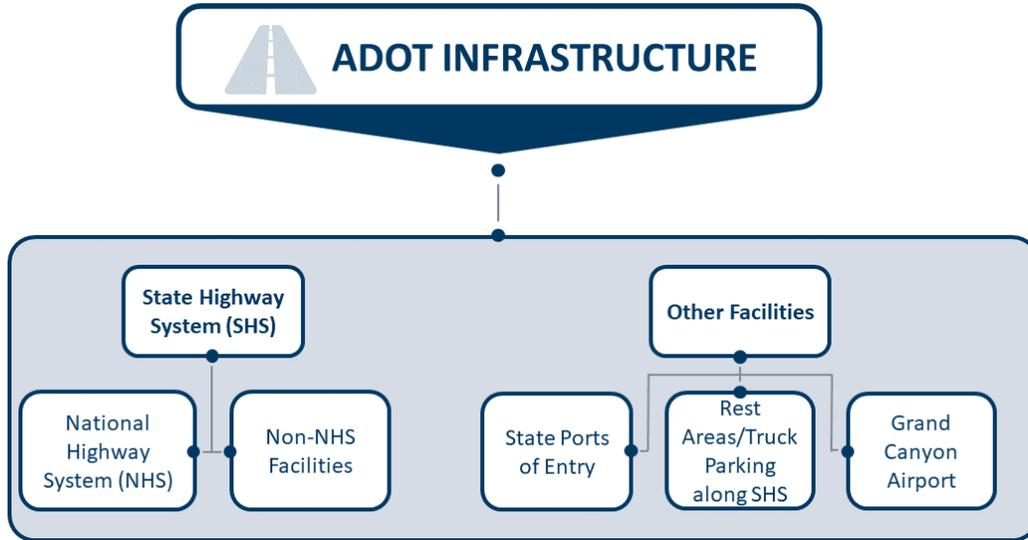
- Ohio’s LRTP is a policy-level LRTP that includes the needs of both State DOT and other “partner” agencies (counties, cities, etc.). Over 60 sources of information were referenced and needs were analyzed within categories keeping ODOT and “partners” separate.
- Pennsylvania’s LRTP is a policy-level LRTP that addresses transit, active transportation, and the non-interstate roadway network. It connects performance measures to objectives and actions to develop an implementation plan.
- Utah utilized a project-based approach with a combination of identified projects between UDOT and their partner agencies. The LRTP provided a breakdown of projects by region and transportation type but did not exhibit strong connections between needs and goals.

ADOT’s 2050 LRTP introduces new groupings for transportation elements to help make it more clear what the needs development process is and what assumptions were made regarding what constitutes a need.

## 2 ADOT Infrastructure Needs

ADOT Infrastructure needs are the primary focus of the LRTP needs analysis. The ADOT Infrastructure component includes the subcomponents shown in **Figure 5**. These are all facilities or assets that are owned by the State of Arizona and that are operated and maintained by ADOT.

**Figure 5: ADOT Infrastructure Component**



The needs for ADOT Infrastructure subcomponents are determined by comparing existing and projected performance against performance targets developed at the federal, state, and project-specific levels. This needs analysis primarily relies on previous efforts performed by others.

### 2.1 State Highway System Needs

#### 2.1.1 Background

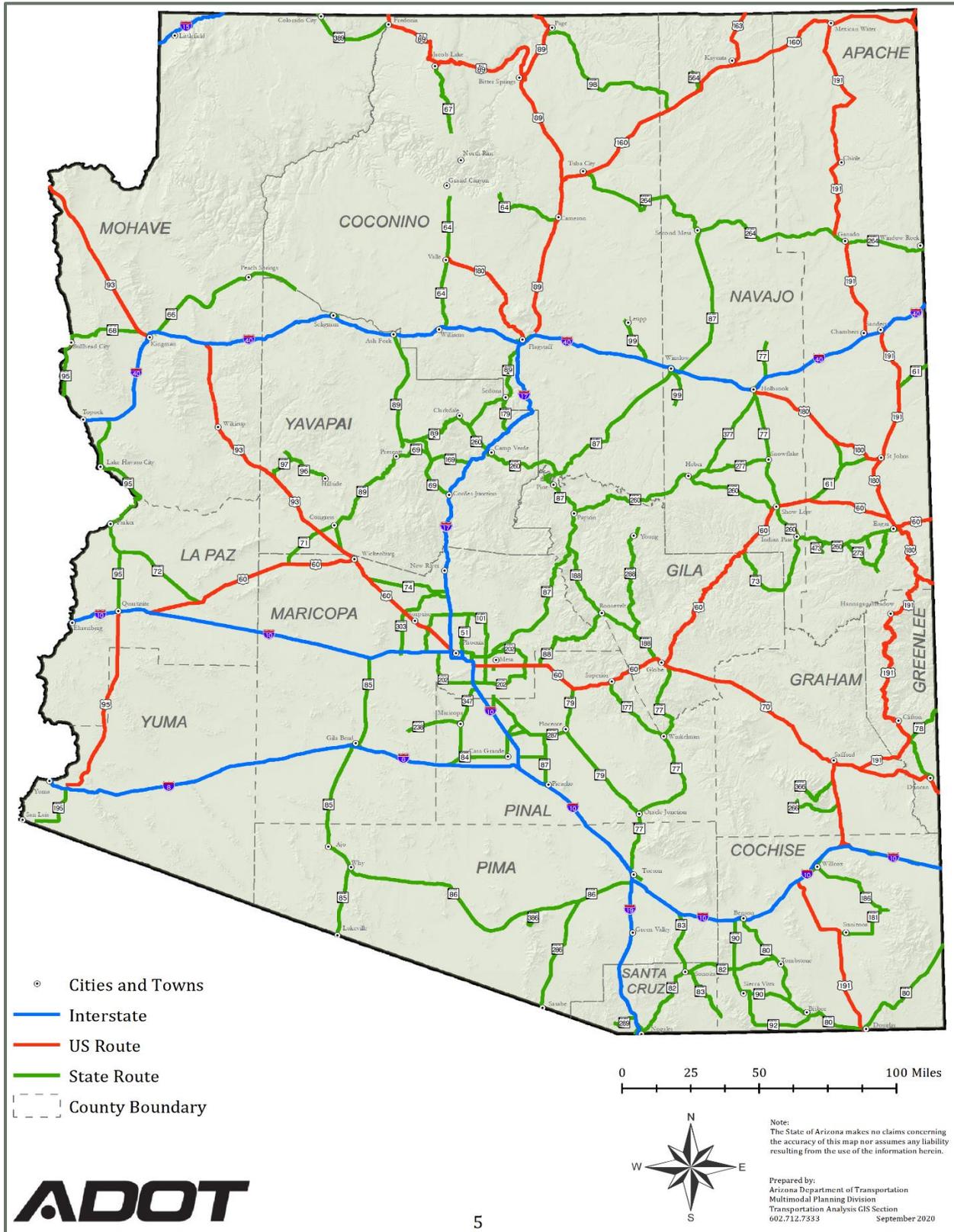
The State Highway System (SHS) is composed of all Interstate, State Highway, and US Route facilities (the roadways themselves and associated infrastructure within roadway right-of-way) in Arizona, as shown in **Figure 6**. The SHS consists of National Highway System (NHS) and non-NHS facilities. NHS facilities, which are shown in **Figure 7**, comprise approximately 60 percent of the SHS and are further broken down into Interstate NHS and Non-Interstate NHS facilities. Locally-owned NHS facilities and other facilities owned by other entities (e.g., local and tribal roads) are not included in the SHS and as such are not included in the identification of ADOT Infrastructure needs.

FHWA classifies roadways based on their function (or position) within the overall transportation network – using a functional classification system. This system defines seven functional classifications for roadways:

1. Interstates
2. Other Freeways and Expressways
3. Other Principal Arterials
4. Minor Arterials
5. Major Collectors
6. Minor Collectors
7. Local



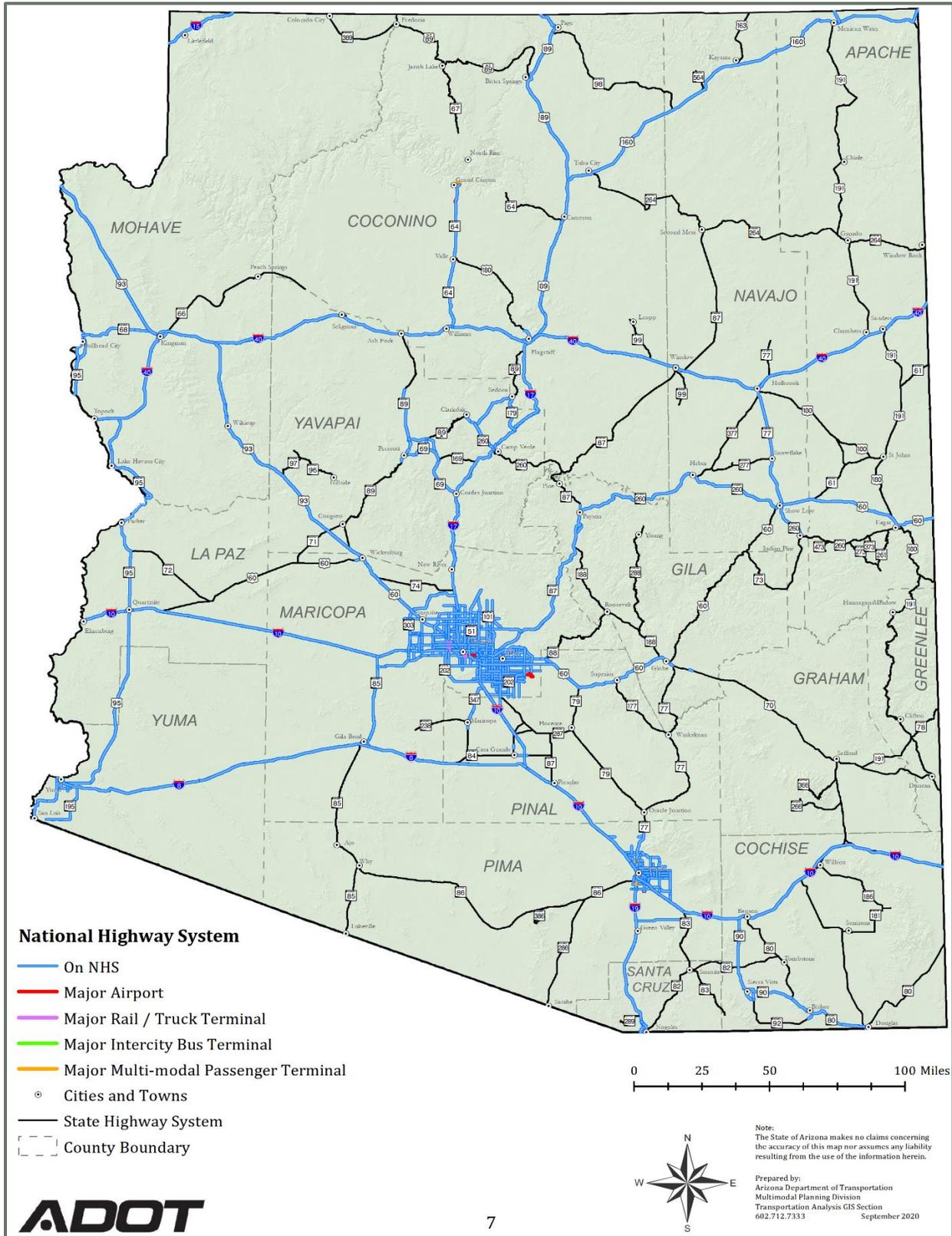
Figure 6: Arizona State Highway System



Source: ADOT Mapbook 2020



Figure 7: National Highway System in Arizona



Source: ADOT Mapbook 2020



As seen in **Table 1**, Arizona has nearly 67,000 centerline miles in its roadway network. The SHS (what ADOT owns and operates) constitutes approximately 10 percent of total roadway centerline miles in Arizona (6,844 miles), including 100 percent of all Interstate miles and 84 percent of all Principal Arterial Roads miles (Interstates + Other Freeways and Expressways + Other Principal Arterials). These higher functional classification roadways serve as the primary corridors within and between urban areas.

**Table 1: Centerline Miles of Arizona Roads by Owner**

Ownership Breakdown	ADOT	County	Town	City	Tribal	Federally Owned	Other	Total
Interstate	1,169	0	0	0	0	0	0	1,169
Other Freeways/ Expressway	262	4	0	5	0	0	0	271
Other Principal Arterial	1,547	107	53	404	0	7	0	2,117
Minor Arterial	2,101	592	290	1,690	0	45	8	4,725
Major Collector	1,207	2,046	449	1,725	0	674	54	6,155
Minor Collector	308	2,096	416	1601	0	1,019	187	5,628
Local	249	13,072	2,702	13,303	3,772	13,237	568	46,903
<b>Total</b>	<b>6,844</b>	<b>17,916</b>	<b>3,909</b>	<b>18,729</b>	<b>3,772</b>	<b>14,982</b>	<b>817</b>	<b>66,968</b>

Source: ADOT HPMS 2020 Ownership Report

Vehicle Miles Traveled (VMT) within each functional classification reflect the number of miles of roadway and the average daily traffic volume on each mile. While the Principal Arterial Roads make up approximately 5 percent of the system, they carry approximately 50 percent of the VMT, as seen in **Table 2**. It should be noted that VMT data is from 2020 and may represent somewhat atypical conditions due to Covid-related changes in travel patterns.

**Table 2: Arizona Vehicle Miles Traveled (Millions)**

Ownership Breakdown	Urban	Rural	Total	Percent
Interstate	7,211	6,765	13,976	21%
Other Freeways/ Expressways	7,624	100	7,724	12%
Other Principal Arterial	7,323	3,468	10,791	16%
Minor Arterial	14,737	1,983	16,720	25%
Major Collector	5,391	1,649	7,040	11%
Minor Collector	2,430	555	2,985	5%
Local	5,275	1,248	6,523	10%
<b>Total</b>	<b>49,990</b>	<b>15,768</b>	<b>65,758</b>	<b>100%</b>

Source: FHWA Highway Statistic Series 2020 VMT



**Table 3** shows that over 60 percent of all centerline roadway miles in Arizona are located in rural areas – including nearly 80 percent of Interstates. Outside of rural areas, the majority of roadway miles in Arizona are located in the two major metropolitan areas of Phoenix and Tucson.

**Table 3: Centerline Road Miles in Arizona By Region**

Ownership Breakdown	Phoenix Area	Tucson Area	Other Major Urban	Small Urban	Rural	Total
Interstate	71	44	67	70	916	1,169
Other Freeways/ Expressways	221	4	27	0	19	271
Other Principal Arterial	373	190	116	176	1,262	2,117
Minor Arterial	1,597	288	381	274	2,185	4,725
Major Collector	1,301	384	509	620	3,342	6,155
Minor Collector	1,406	348	394	518	2,961	5,628
Local	5,275	2,848	6,230	2,776	29,703	46,903
Total	12,791	4,106	7,724	4,442	40,391	66,968

Source: ADOT Extent and Travel Report 2020

### 2.1.2 SHS Needs Categories and Data Sources

SHS needs are grouped into five categories: pavement, bridge, mobility, safety, and freight. The data for the SHS categories are sourced from various planning efforts, as shown in **Table 4**. The primary ADOT data sources are dTIMS modeling (pavement), BrM modeling (bridge), INRIX travel data (mobility and freight), and ACIS crash data (safety), along with relevant completed plans such as the Transportation Asset Management Plan (TAMP), Corridor Profile Studies (CPS), Five-Year Transportation Facilities Construction Program (5-Year Program), Roadway Maintenance Costs Summary Report (RMC), various statewide safety plans, the State Freight Plan (SFP), and the Arizona-Sonora Border Infrastructure Master Plan (BIMP). Where available, the needs for SHS facilities identified in Regional Transportation Plans (RTPs) of regional entities known as metropolitan planning organizations (MPOs) and Councils of Government (COGs) were also included where not duplicative to ADOT’s planning efforts.



**Table 4: ADOT Infrastructure Needs Data Sources**

SHS Category and Data Sources				
Pavement	Bridge	Mobility	Safety	Freight
dTIMS, CPS, TAMP	BrM, CPS, TAMP, RMC	INRIX, CPS, RTPs, RMC, 5-Year Program	ACIS, CPS, Statewide Safety Plans, RMC, 5-Year Program	INRIX, CPS, SFP, BIMP

**2.1.3 Resilience Considerations**

An additional consideration for ADOT Infrastructure is natural hazard and extreme weather resilience. As outlined in the TAMP, ADOT has implemented a risk policy and procedure, risk management process, and risk mitigation plans for high priority risks for the entire state system (NHS and non-NHS). ADOT uses a risk register to identify, evaluate, and prioritize risks. A risk register was developed during the Asset Management Risk workshop. As a result, several actions were implemented in response to risks that were previously identified, including incorporating risk into the bridge and pavement management system project prioritization processes.

There were several natural hazard related risks identified in the risk register. One of the risk events identified are extreme weather trends, owned by the Environmental Planning Resilience Program, Districts, Transportation System Management & Operations (TSMO). The risk mitigation enacted was implementation of ADOT’s Resilience Program 2021/22 Work Plan, along with implementation of the pump station reliability tool and completion of probabilistic risk modeling development for bridge design. Another asset-level risk event identified is flood damage including scour, owned by the Bridge Group, TSMO, Environmental Planning Resilience Program. The risk mitigation enacted was statewide scour evaluations and a scour-counter measures program, as well as use of the ADOT Resilience Program Natural Hazard Risk Assessment Process. Additional environmental risks identified include subsidence due to groundwater pumping and rock falls and geohazards. The risk mitigation was to expand the use of the Resilience Program GIS database to map subsidence and geohazard locations of concern.

One of the high priority risks for the agency are those associated with extreme weather trends. The TAMP references findings from both the Preliminary Study of Climate Adaptation for the Statewide Transportation System in Arizona (March 2013) and an Extreme Weather Vulnerability Assessment (January 2015). The TAMP further documents recommendations that came out of these reports, including incorporating extreme weather risks into the TAMP and incorporating cost-effective risk reduction strategies. This was accomplished through the Asset Management, Extreme Weather, and Proxy Indicators Infrastructure Resilience Report updated in March 2020. The TAMP provides a status update on the recommendations from the March 2020 report:

- Roadside Vegetation Management Guidelines (implemented)
- Probabilistic Bridge Design Pilot Project (underway)



- 2019 Pump Station Reliability Tool Pilot Project (implemented)
- Scour Counter Measures Program (implemented)
- Culvert Repair Program (implemented)
- Geo-hazard Plan (plan completed – implementation unfunded)
- Resilience Program 2021/22 Work Plan (under development)
- Resilience Program Natural Hazard Risk Assessment engineering design and project development process (implemented)

The following investment strategies were adopted by ADOT to address risks associated with bridges and pavements:

- Infrastructure resilience. ADOT is taking several steps to invest in infrastructure resilience, including:
  - Improving infrastructure at repeated emergency event locations to better withstand the effects of extreme weather events, such as upgrading the drainage infrastructure on SR 71 at MP 86.
  - Implementing better tools for the management of pump stations, including a Pump Station Reliability Tool.
  - Developing Roadside Vegetation Management Guidelines to help improve drainage and reduce erosion.
  - Developing improved design that accounts for extreme weather, such as the Probabilistic Bridge Design Pilot Project.

The State Freight Plan also prioritizes resilience investments; the System Management and Mobility Objectives include Objective 2.5: increase the resilience of the freight transportation system through ADOT’s Resilience Program by addressing transportation infrastructure vulnerabilities (including those related to stormwater infrastructure) associated with threats from extreme weather, stormwater runoff, flooding, wildfires and other hazards. The Freight Plan further ties the resource allocation policies and strategies to the identified objectives; potential policies and strategies that meet the resilience objective include:

- Prioritize the modernization and preservation of existing freight system infrastructure over the expansion or development of new facilities.
- When prioritizing ADOT freight investments, seek to improve quality of life for Arizona residents and consider ways in which freight system impacts on the natural environment may be minimized, mitigated or reduced. Factors to consider in scoping projects are improvement of storm water quality, reduction of storm water runoff, protection or mitigation of impacts to wildlife habitats, or incorporation of wildlife linkage zones in accordance with Arizona’s Wildlife Linkages.



- Appropriately scope projects to best serve the needs of the freight system by leveraging stakeholder input and data to identify differences between underlying issues and surface-level indicators.
- Regularly evaluate Critical Rural and Urban Freight Corridor (CRFC, CUFC) designations to determine if allocation efficacy and efficiency are optimal or can be improved.
- Develop targets that are meaningful, data-driven, and help ADOT improve the decision-making process through investment impact forecasts.
- Incorporate data-driven scenario planning and robust decision-making frameworks into long-range and freight transportation planning processes to be better prepared for future uncertainties and understand possible impacts to ADOT practices and investments.
- Integrate triggering circumstances into agency strategies to account for future uncertainties and develop an established process for responding to situations outside of the forecasted or projected conditions.
- Ensure prioritization criteria are aligned to strategic goals, objectives, and measures.
- Prepare for emerging technology scenarios, including automation and demand for alternative freight fuel.
- When new data sources become available or strategic initiatives begin, adjust project prioritization processes and scoring criteria accordingly with the aims of improving safety, increasing efficiency, and reducing negative impacts.
- Develop automated tools to regularly evaluate projects' impacts on natural environments, freight emissions, and local communities.

#### **2.1.4 Pavement Needs**

Pavement conditions affect traveler safety and operating costs of moving goods through the state. Pavement needs reflect ADOT's aim to keep the road network in good condition. The needs are addressed by preserving, repairing, rehabilitating, and replacing pavement. The main source of the pavement needs estimates for the needs analysis is the Deighton's Total Infrastructure Management System (dTIMS) model. ADOT's Asset Management Group manages dTIMS using pavement condition ratings and deterioration model data to estimate the investment required to achieve certain pavement system performance levels based on general engineering principles and Arizona-specific design standards and unit costs. Other sources of pavement needs are the CPS and TAMP.

Pavement needs differ depending on the type of roadway as the pavement performance targets have different values and thresholds for different roadway classifications (Interstates, Non-Interstate NHS, Non-NHS Roadways).



### 2.1.4.1 Pavement Performance Measures and Thresholds

The Moving Ahead for Progress in the 21st Century Act of 2012 (MAP-21) established seventeen performance measures, (see 23 USC 150) providing the basis for State-level, performance-based transportation planning and programming for transportation projects. Each State must establish multi-year targets for each measure.

ADOT Federal Pavement Performance Targets (lane-miles) for 2019 are:

- Percent of Interstate pavement in good condition:  $\geq 44$  percent (2021 target – no target existed in 2019)
- Percent of Interstate pavement in poor condition:  $\leq 2$  percent (2021 target – no target existed in 2019)
- Percent of Non-Interstate NHS pavement in good condition:  $\geq 31$  percent
- Percent of Non-Interstate NHS pavement in poor condition:  $\leq 6$  percent

These Federal targets are conservative, meaning ADOT aspires to perform better than these targets to meet the goals of preserving and maintaining infrastructure, enhancing safety, and improving reliability. ADOT has developed other related performance measures and targets as described below to capture existing and projected future needs more fully.

Other performance measures include:

- ADOT’s TAMP established State of Good Repair (SOGR) pavement targets, as shown in **Table 5**, to evaluate the level of service that could be achieved at the expected funding level.

**Table 5: TAMP Pavement Lane-Mile Targets**

Pavement Class	Minimum % Good/Fair	Maximum % Poor
Interstates	98	2
Other NHS – State Maintained	93	7
Non-NHS – High Volume	93	7
Non-NHS – Low Volume	85	15

Source: ADOT Transportation Asset Management Plan 2021

- Both the ADOT Federal pavement targets and TAMP pavement targets, as well as dTIMS, rely on performance measures of good, fair, and poor condition based on a combination of international roughness index (IRI), cracking, and rutting pavement ratings.
- ADOT’s CPS uses this same pavement rating data to develop a primary performance measure called the Pavement Index and then multiple secondary performance measures, with values similarly identified as being in good, fair, and poor condition.

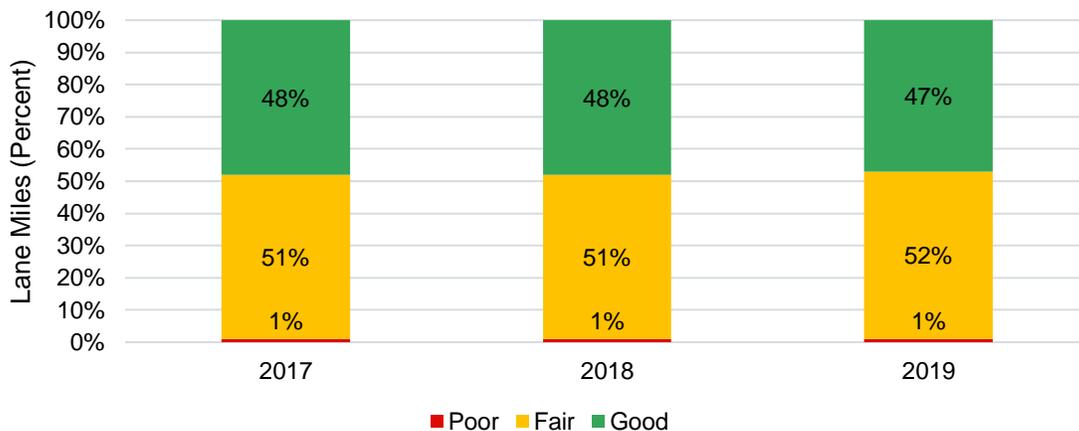
### 2.1.4.2 Pavement Conditions

ADOT’s TAMP indicates approximately 48 percent of all Interstate NHS pavement lane miles were in good condition and one percent were in poor condition in 2019, as shown in **Figure 8**. For Non-



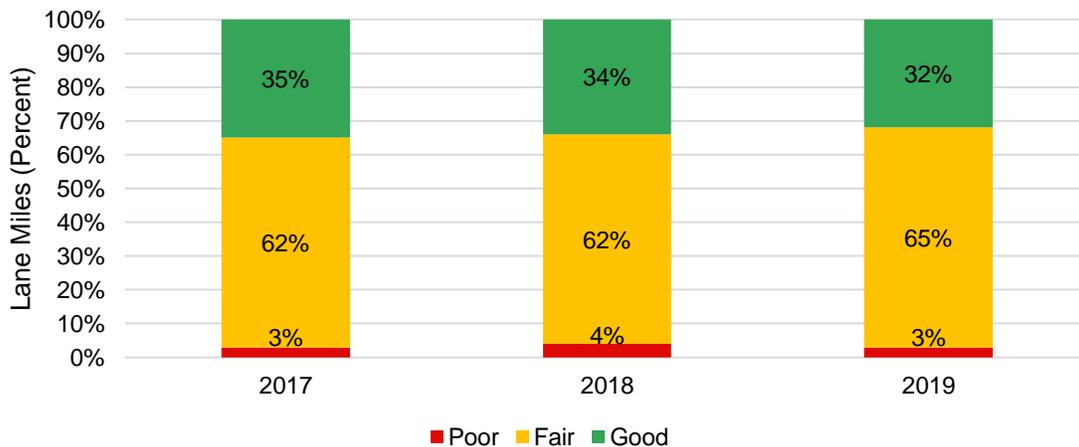
Interstate NHS pavement that is owned by ADOT, approximately 32 percent of lane-miles were in good condition and three percent were in poor condition, as shown in **Figure 9**. As measured, current pavement conditions meet all the Federal performance measures targets, but future investments are needed to maintain this level of performance as pavement conditions naturally deteriorate over time.

**Figure 8: TAMP Interstate Pavement Conditions by Lane-Miles**



Source: ADOT Transportation Asset Management Plan 2021

**Figure 9: TAMP Non-Interstate NHS Pavement Conditions by Lane-Miles**



Source: ADOT Transportation Asset Management Plan 2021

### 2.1.4.3 Identified Pavement Needs

From ADOT’s dTIMS analysis, pavement needs were estimated through the year 2050. A comparison of over 18 scenarios of various preservation approaches, funding amounts, and inflation factors was prepared to determine the impacts to performance measures. The selected scenario that resulted in acceptable long-term performance was a “hybrid” approach that assumed an 11% annual increase in spending. Additional detail on the hybrid need scenario is provided below.



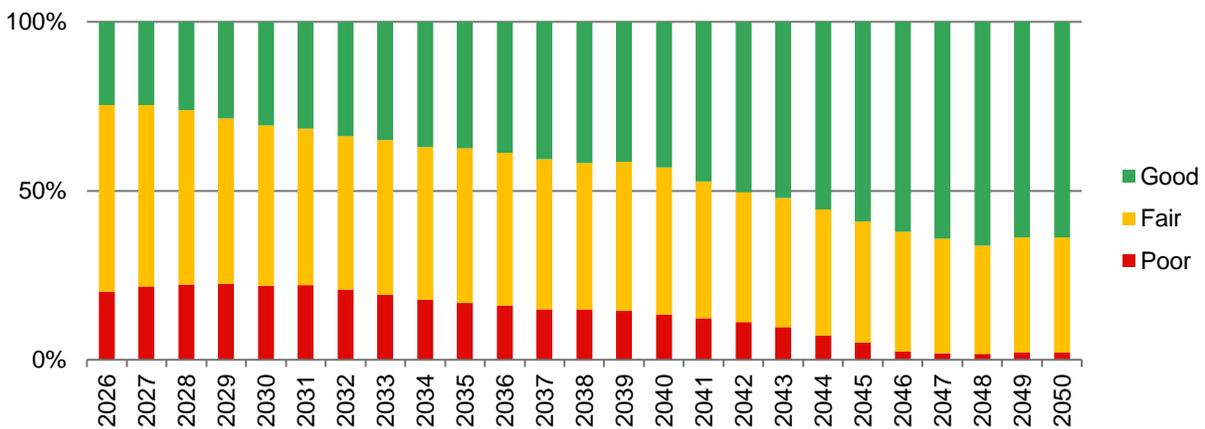
The analysis assumed a budget of \$362 million in 2026 as a baseline for pavement preservation expenditures within the model.

To achieve the performance thresholds with a growing demand for treatment and preservation, the model expenditures were assumed to annually increase by 11 percent.

Informed by global inflation trends from the last few years with projections into the future, an annual inflation rate of 7 percent was assumed in the modeling analysis to reflect anticipated growing prices for resources associated with pavement preservation and rehabilitation into the future. A discount, or interest, rate of 3 percent was assumed in the modeling to reflect anticipated interest rates based on recent and projected trends.

The findings from the scenario modeling analysis, displayed in **Figure 10**, indicate how the hybrid program approach of pavement preservation and reconstruction will impact the performance measures through 2050. This approach reduces poor performance of pavement and increases good performance for pavement over time based on the increased level of treatment and investment, enabling ADOT to meet the goals of preserving and maintaining infrastructure, enhancing safety, and improving reliability.

**Figure 10: Projected Future SHS Pavement Conditions by Lane-Miles**



Source: ADOT: dTIMS Scenario Modeling 2022

To achieve the pavement conditions for NHS/Interstate and non-NHS assets modeled for the needs analysis, the total 2026-2050 investment is estimated (in 2026 dollars) at approximately \$62.2 billion. Of this amount, approximately \$40.1 billion will be required for Interstate and NHS pavement needs and non-NHS needs total approximately \$22.1 billion.

To avoid duplicating the dTIMS effort, the CPS pavement analysis focused only on locations with patterns of high level of historical repetitive investment. Identified pavement needs were limited to locations where strategic reconstruction of the pavement section is warranted and cost-effective. The total value of the CPS pavement needs identified in 2018 was \$137 million, which is \$315 million in 2026 dollars.



The TAMP also identified an annual pavement maintenance need (for minor improvements such as filling in potholes) of \$7 million in 2021 dollars, which is \$12 million in 2026 dollars and \$746 million over 2026-2050 in 2026 dollars.

The SHS pavement needs for 2026-2050 total \$63.3 billion and are summarized in **Table 6**.

**Table 6: SHS Pavement 2026-2050 Needs**

Needs Source	Interstate/NHS Needs (2026 Dollars in Millions)	Non-NHS Needs (2026 Dollars in Millions)	Total Needs (2026 Dollars in Millions)
dTIMS Analysis	\$40,145	\$22,094	\$62,239
CPS	\$315	\$0	\$315
TAMP Maintenance	\$533	\$213	\$746
<b>Total</b>	<b>\$40,993</b>	<b>\$22,307</b>	<b>\$63,300</b>

It is acknowledged that the full value of SHS pavement needs may be different than what is listed herein due to a lack of available data. It is worth noting that the dTIMS assumptions may not match what actually happens, the CPS do not evaluate Non-NHS SHS segments, and TAMP maintenance needs reflect historical annual allocations and may not fully cover pavement maintenance needs. Following this Multimodal Needs Analysis, a Gap Analysis Report will be produced to identify gaps between the current pavement performance and investments. Further analysis of pavement maintenance needs will be conducted to inform the gap analysis.

### 2.1.5 Bridge Needs

Bridges serve a vital role in the SHS by allowing roadways to go over waterways, canyons, railroad tracks, and other features. According to ADOT’s TAMP, there were 4,808 bridges on the SHS in 2019, 3,031 of which are also on the NHS. This needs analysis only looks at bridges on the SHS. The needs associated with ADOT’s inspection responsibilities for local non-SHS bridges are addressed as part of the ADOT Stewardship component.

The main source of the bridge needs estimates for the analysis is the Bridge Management System (BrM) model, which ADOT’s Asset Management Group manages, using available bridge condition ratings and deterioration model data to estimate the investment required to achieve certain bridge system performance levels based on general engineering principles, NBI data factors, and Arizona-specific unit costs. Other sources of bridge needs are the CPS, TAMP, and RMC. Specifically, the TAMP details the Bridge Preservation Program manual rehabilitation category, which includes major work required to restore or increase the structural integrity of a bridge, as well as improvements to function, capacity, resilience, or safety.

#### 2.1.5.1 Bridge Performance Measures and Thresholds

All bridge inspections are performed in accordance with ADOT’s bridge inspection guidelines, which comply with the NBI Standards. The NBI lists three bridge conditions (good, fair, and poor) based on various performance measures that evaluate the bridge deck area and structural deficiency of the superstructure and substructure.



ADOT Federal Bridge Performance Targets for 2021 are:

- Percent of NHS bridges classified in good condition based on deck area:  $\geq 52$  percent
- Percent of NHS bridges classified in poor condition based on deck area:  $\leq 4$  percent

These Federal targets are conservative, meaning ADOT aspires to perform better than these targets to meet the goals of preserving and maintaining infrastructure, enhancing safety, and improving reliability. ADOT has developed other related performance measures and targets as described below to capture existing and projected future needs more fully.

Other performance measures include:

- ADOT’s TAMP established SOGR bridge targets, as shown in **Table 7**, to evaluate the level of service that could be achieved at the expected funding level.

**Table 7: TAMP Bridge Deck Area Targets**

Bridge Class	Minimum % Good/Fair	Maximum % Poor
NHS	96	4
SHS	96	4

Source: ADOT Transportation Asset Management Plan 2021

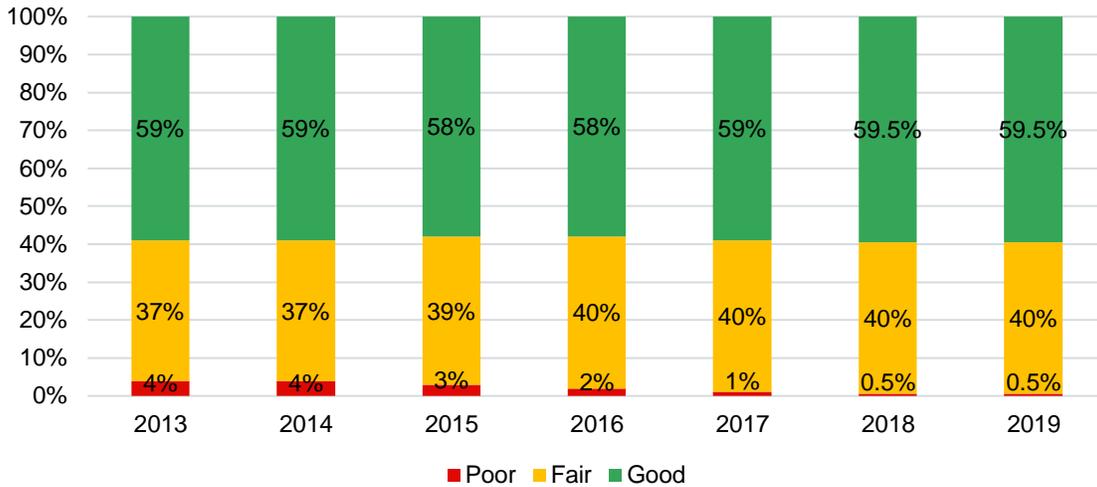
- The official State bridge targets and TAMP bridge targets, along with BrM, rely on performance measures of good, fair, and poor condition that are based on a combination of deck, superstructure, and substructure ratings.
- ADOT’s CPS uses this same bridge rating data to develop a primary performance measure called the Bridge Index and then multiple secondary performance measures, with values similarly identified as being in good, fair, and poor condition.

### 2.1.5.2 Bridge Conditions

ADOT’s TAMP indicates approximately 58 percent of all SHS bridges (measured by deck area) were in good condition and one percent was in poor condition in 2019. Similarly, 59 percent of all ADOT-owned NHS bridges (measured by deck area) were in good condition and one percent was in poor condition, as shown in **Figure 11**. As measured, current bridge conditions meet all the Federal performance measures targets, but future investments are needed to maintain this level of performance as bridge conditions naturally deteriorate over time.



Figure 11: TAMP ADOT-Owned NHS Bridge Conditions by Deck Area



Source: ADOT Transportation Asset Management Plan 2021

### 2.1.5.3 Identified Bridge Needs

From ADOT’s BrM analysis, bridge needs were estimated through the year 2050. A comparison of over 16 scenarios of various preservation approaches, funding amounts, and inflation factors was prepared to determine the impacts to performance measures. The selected scenario that resulted in acceptable long-term performance was a “hybrid” approach that assumed an 11 percent annual increase in spending. Additional detail on the hybrid need scenario is provided below.

The analysis assumed a budget of \$89.2 million in 2026 as a baseline for bridge preservation expenditures in the model.

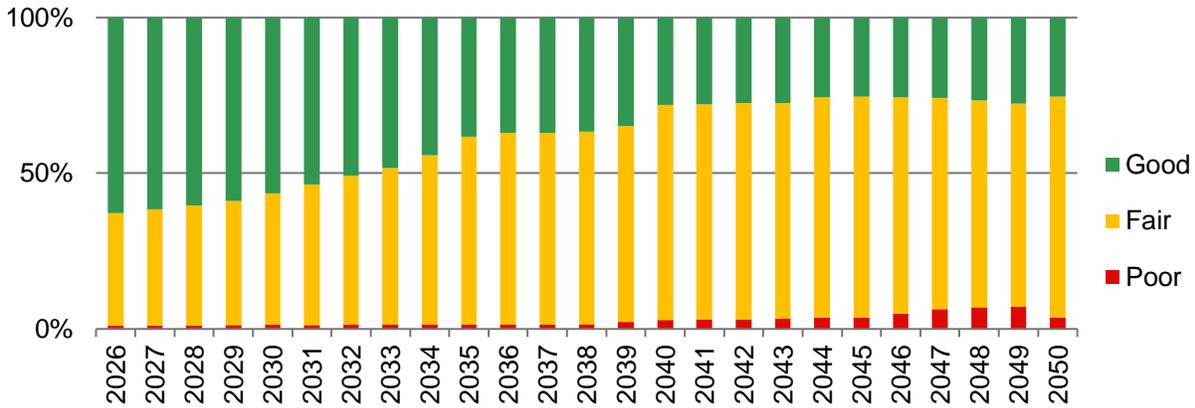
To achieve the performance thresholds with a growing demand for treatment and preservation, the model expenditures were assumed to annually increase by 11 percent.

Informed by global inflation trends from the last few years with projections into the future, an annual inflation rate of 7 percent was assumed in the modeling analysis to reflect anticipated growing prices for resources associated with bridge preservation and rehabilitation into the future. A discount, or interest, rate of 3 percent was assumed in the modeling to reflect anticipated interest rates based on recent and projected trends.

The findings from the scenario modeling analysis, displayed in **Figure 12**, indicate how the hybrid approach of bridge preservation will impact the performance measures through 2050. This approach keeps poor performance of bridges below the four percent target, with the percentage of bridges by deck area in fair condition increasing over time, recognizing that many of the bridges constructed in the last few decades will begin to deteriorate over the next 25 years. It should be noted that the BrM analysis looks at all SHS bridges, not just the NHS bridges, and that the proposed hybrid approach maintains the percentage of NHS bridges in good condition per the Federal target. This approach will enable ADOT to meet the goals of preserving and maintaining infrastructure, enhancing safety, and improving reliability.



Figure 12: Projected Future SHS Bridge Conditions by Deck Area



Source: ADOT BrM Scenario Modeling 2022

To achieve the bridge conditions, for SHS bridges, modeled for the needs analysis, the total 2026-2050 investment is estimated (in 2026 dollars) at approximately \$7.6 billion.

To avoid duplicating the BrM effort, the CPS bridge analysis focused on locations with patterns of high level of historical repetitive investment. Identified bridge needs were limited to locations where strategic replacement of the bridge is warranted and cost-effective. The total value of the CPS bridge needs identified in 2018 was \$137 million, which is \$315 million in 2026 dollars.

The TAMP also identified an annual bridge maintenance need (for minor improvements such as bridge painting) of \$3 million in 2021 dollars, which is \$5 million in 2026 dollars and \$320 million over 2026-2050 in 2026 dollars.

The RMC identified \$8 million is needed annually in 2019 dollars for bridge inspections statewide on all bridges not within federal and tribal lands. With SHS bridges constituting approximately 57 percent of all bridges in Arizona (per NBI), that means approximately \$4.56 million annually for SHS bridge inspections in 2019 dollars, which is \$9.47 million in 2026 dollars and \$599 million over 2026-2050 in 2026 dollars.

The SHS bridge needs for 2026-2050 total \$8.8 billion and are summarized in **Table 8**.

Table 8: SHS Bridge 2026-2050 Needs

Needs Source	Total Needs (2026 Dollars in Millions)
BrM Analysis	\$7,608
CPS	\$315
TAMP Maintenance	\$320
RMC SHS Bridge Inspections	\$599
<b>Total</b>	<b>\$8,842</b>

It is acknowledged that the full value of SHS bridge needs may be different than what is listed herein due to a lack of available data. It is worth noting that the BrM assumptions may not match



what actually happens, the CPS do not evaluate Non-NHS SHS segments, and TAMP maintenance needs and RMC SHS bridge inspection needs reflect historical annual allocations and may not fully cover bridge maintenance and inspection needs. Following this Multimodal Needs Analysis, a Gap Analysis Report will be produced to identify gaps between the current bridge performance and investments. Further analysis of bridge maintenance needs will be conducted to inform the gap analysis.

### 2.1.6 Mobility Needs

Mobility on the SHS refers to the ability of travelers to move via their mode(s) of choice efficiently and reliably through a well-connected transportation network with reasonable access to adjacent land. What constitutes a mobility need can vary substantially depending on SHS roadway classification and characteristics as mobility performance targets may have different values and thresholds for different facilities in the SHS (e.g., Interstates vs. Non-Interstates, urban vs. rural roadways, interrupted flow vs. uninterrupted flow, and roadways vs. pedestrian/bicycle facilities).

Mobility needs on the SHS are typically addressed by increasing capacity or connectivity, improving operational efficiency through intelligent transportation systems (ITS), and providing multimodal facilities. It is recognized that the local transportation network can have an impact on SHS mobility (e.g., increasing capacity on a parallel local arterial can divert traffic from the SHS, thereby improving mobility on the SHS), but for purposes of this needs analysis, the SHS mobility needs refer only to improvements on the SHS. Mobility needs on the local network that could be mitigated by improvements that use federal funding are addressed as part of the ADOT Stewardship component.

Mobility needs have been identified using INRIX travel data, CPS (which covers all of the SHS that is part of the NHS except for within the Phoenix area), the portions of MPO RTPs that deal with the SHS in the Phoenix (MAG) and Tucson (PAG) areas, RMC, and the 5-Year Program.

#### 2.1.6.1 Mobility Performance Measures and Thresholds

Travel time reliability is one performance measure related to mobility that FHWA has identified. FHWA uses the Level of Travel Time Reliability (LOTTR), which is defined as the ratio of the 80<sup>th</sup> percentile travel time to the 50<sup>th</sup> percentile travel time for all vehicles. A “reliable” LOTTR is any value below 1.5. INRIX data provides the travel time data necessary to calculate the LOTTR.

ADOT Federal Mobility Performance Targets for 2019 related to reliability are:

- Percent of person-miles that have reliable travel times on the Interstate:  $\geq 86$  percent
- Percent of person-miles that have reliable travel times on the Non-Interstate NHS:  $\geq 75$  percent (2021 target – no target existed in 2019)
- Annual peak hour excessive delay per capita:  $\leq 11$  hours (Phoenix urban area only) (2021 target – no target existed in 2019)
- Percent non-single occupancy vehicle (SOV) travel:  $\geq 23$  percent (Phoenix urban area only)

Air quality emissions is another performance measure related to mobility that FHWA has identified. Data related to air quality emissions is available via existing travel demand and air quality models



for the state and for non-attainment area such as the Phoenix metropolitan area. ADOT Federal Mobility Performance Targets for 2019 related to air quality emissions reductions (in kilograms per day) through the Congestion Mitigation and Air Quality Improvement (CMAQ) program are:

- Volatile organic compounds:  $\geq 210$
- Carbon monoxide:  $\geq 3,720$
- Nitrogen oxides:  $\geq 418$
- Particulate matter (< 10 microns):  $\geq 873$
- Particulate matter (< 2.5 microns):  $\geq 69$

These Federal performance targets are generally conservative, meaning ADOT aspires to perform better than these targets to meet the goals of improving mobility, reliability, and accessibility, supporting economic vitality, and improving environmental and health stewardship. ADOT has developed other related performance measures and targets as described below to capture existing and projected future needs more fully.

Other performance measures include:

- ADOT’s CPS use a volume-to-capacity (v/c) ratio to identify level of service (LOS) from which a primary performance measure was developed called the Mobility Index along with multiple secondary performance measures related to LOTTR, unplanned closures, bicycle accommodations, and Non-SOV ridership.
- The RTPs of MAG and PAG contain several additional performance measures related to mobility. Many of these performance measures deal with transit, bicycle, and pedestrian facilities and services.

### 2.1.6.2 Mobility Conditions

FHWA’s Arizona State Highway Reliability Report indicates that, in 2020, 93 percent of Interstate traveled person-miles had reliable travel times and Non-Interstate NHS had 96 percent. For comparison purposes in recognition of the impacts of Covid on travel, in 2019, 86 percent of Interstate traveled person-miles had reliable travel times and Non-Interstate NHS had 81 percent.

FHWA’s Phoenix--Mesa, AZ Urbanized Area Congestion Report indicates that, in 2020, the Phoenix urban area in 2020 experienced three hours of annual peak hour excessive delay per capita and had 24 percent Non-SOV travel. For comparison purposes in recognition of the impacts of Covid on travel, in 2019, the Phoenix urban area in 2020 experienced five hours of annual peak hour excessive delay per capita and had 24 percent Non-SOV travel.

FHWA’s Arizona State On-Road Mobile Source Emissions Reductions Report indicates the air quality emissions reductions in 2019 were as follows (in kilograms per day) for the categories for which FHWA performance targets exist:



- Volatile organic compounds: 347
- Carbon monoxide: 5,149
- Nitrogen oxides: 553
- Particulate matter (< 10 microns): 5,815
- Particulate matter (< 2.5 microns): 289

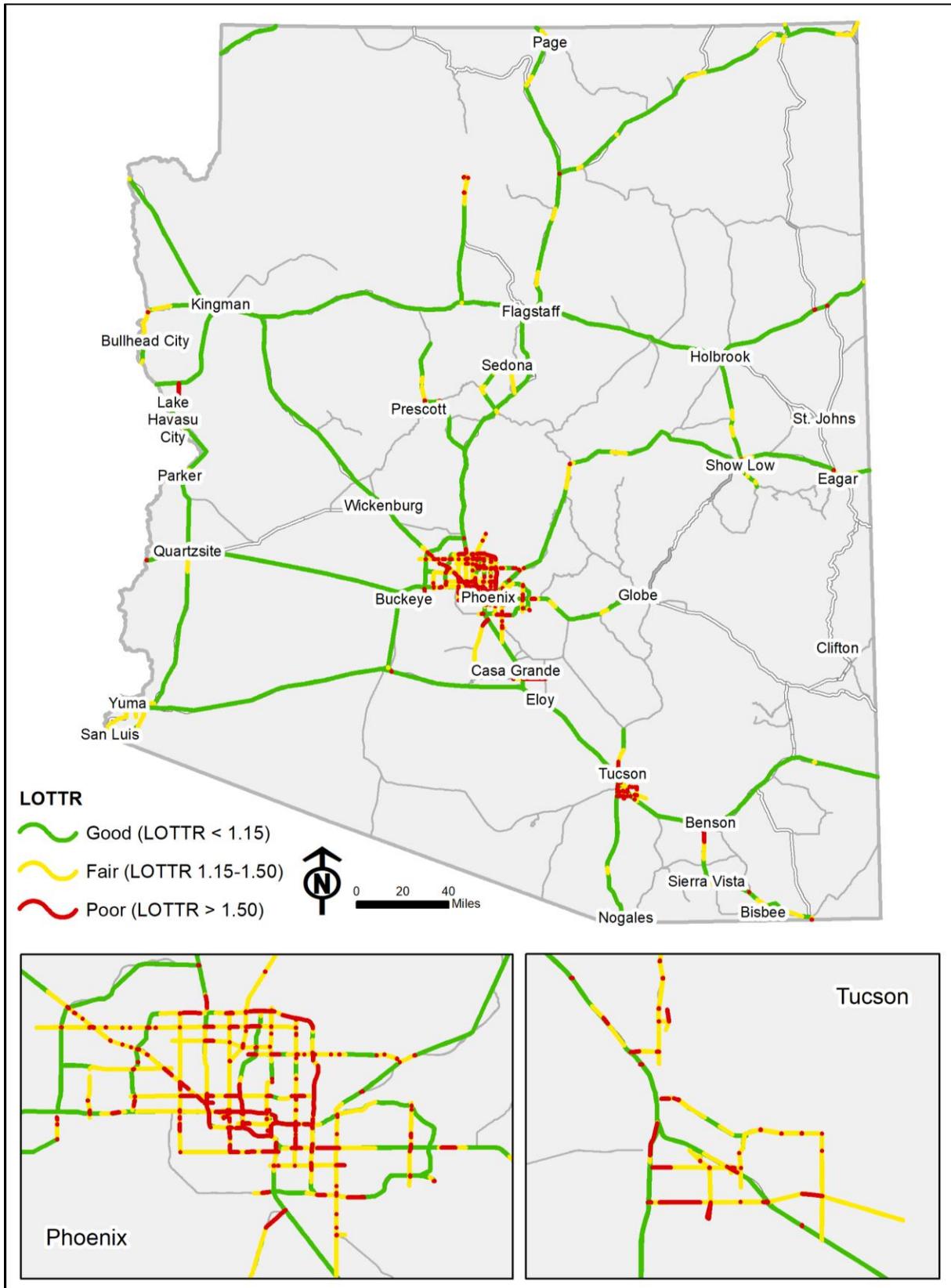
As measured, current mobility conditions meet all the Federal performance measures targets. Future investments will likely be needed to maintain this level of performance as mobility conditions can degrade as travel increases.

**Figure 13** shows the LOTTR conditions in Arizona per INRIX data from 2019. Most of the poor LOTTR is in the Phoenix and Tucson urban areas. **Figure 14** shows the Mobility Index needs per the CPS.

The MAG RTP provides more detail on current and projected congestion in the Phoenix area, including identifying several freeway bottlenecks, as well as information on current and projected conditions for transit, active transportation, and aviation facilities in the MAG region using a variety of performance measures. The PAG RTP similarly identifies current and projected conditions for various modes of travel in the Tucson area using a variety of performance measures.



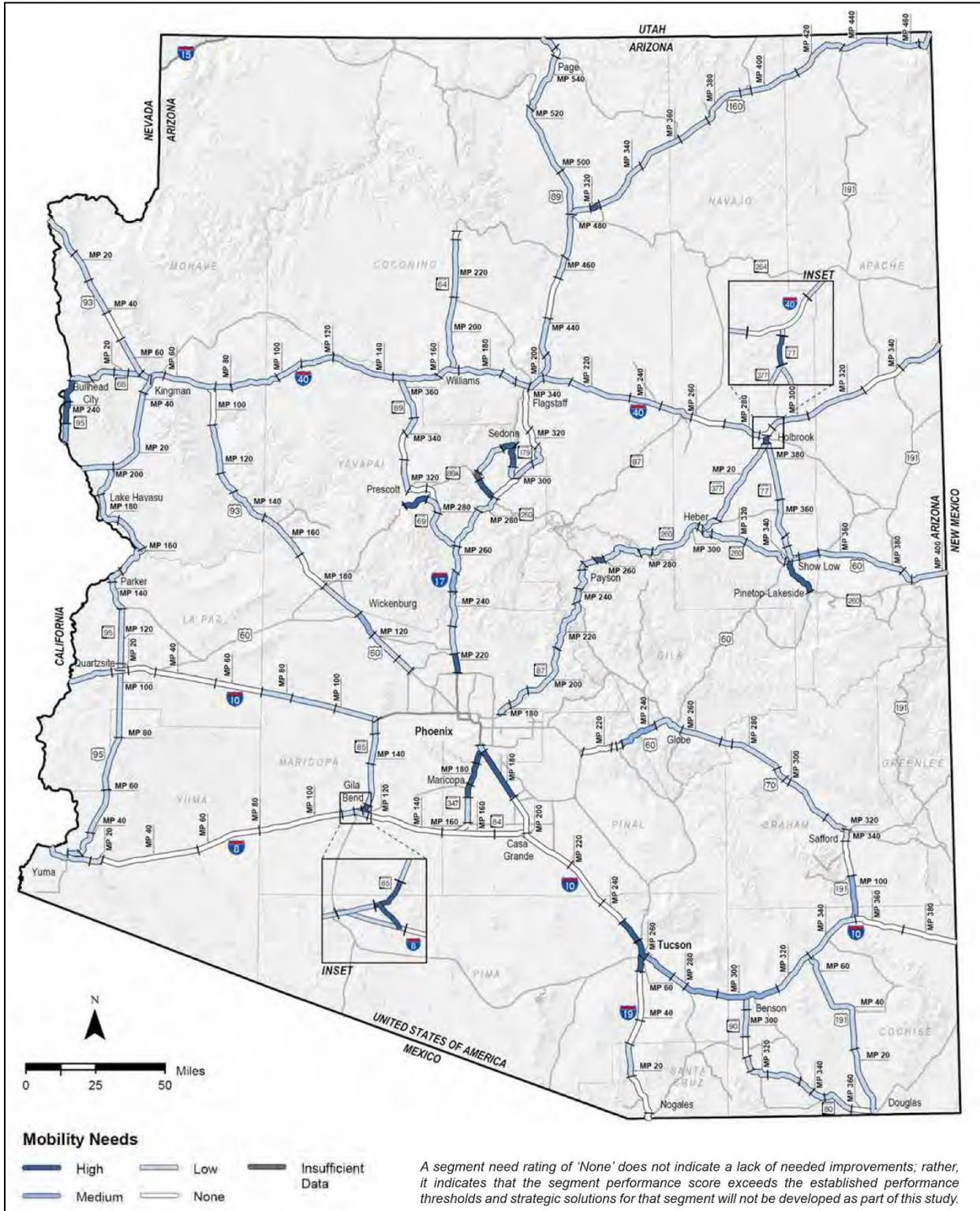
Figure 13: Level of Travel Time Reliability (LOTRR)



Source: ADOT INRIX Data 2019



Figure 14: CPS Mobility Index Needs



Source: ADOT Corridor Profile Studies Statewide Summary 2018



### 2.1.6.3 Identified Mobility Needs

The total value of CPS mobility needs identified in 2018 was \$1.223 billion, which is \$2.817 billion in 2026 dollars.

The total value of the MAG RTP SHS mobility needs identified in 2020 was \$38 billion, which is \$71.076 billion in 2026 dollars.

The total value of the PAG RTP SHS mobility needs identified in 2019 for unfunded projects was \$3.156 billion and in 2020 for funded projects was \$1.847 billion, which is \$10.006 billion in 2026 dollars.

The RMC identified mobility-related 2026-2050 maintenance needs in the ADOT Central District (which generally covers the Phoenix area) for items such as incident response, sweeping, and roadside repairs control at a value of \$1.311 billion in 2019 dollars, which is \$2.723 billion in 2026 dollars.

The 5-Year Program includes \$10 million annually in 2022 dollars to cover general operations and maintenance (O&M) needs related to mobility and \$5 million annually in 2022 dollars to cover ITS O&M needs related to mobility, which together is approximately \$22.77 million in 2026 dollars and \$1.440 billion over 2026-2050 in 2026 dollars.

The SHS mobility needs for 2026-2050 total \$88.1 billion and are summarized in **Table 9**.

**Table 9: SHS Mobility 2026-2050 Needs**

Needs Source	Total Needs (2026 Dollars in Millions)
CPS	\$2,817
MAG	\$71,076
PAG	\$10,006
RMC Maintenance	\$2,723
5-Year Program O&M	\$1,440
<b>Total</b>	<b>\$88,062</b>

It is acknowledged that the full value of SHS mobility needs may be different than what is listed herein due to a lack of available data. The CPS do not evaluate Non-NHS SHS segments, there may be additional SHS mobility needs in the MAG and PAG regions beyond what was included in the RTPs. Additionally, RMC maintenance needs only reflect Phoenix area mobility needs, and O&M costs reflect historical annual allocations and may not fully cover O&M needs.

### 2.1.7 Safety Needs

ADOT actively works towards its long-term goal of reducing crashes on the SHS, particularly those involving fatalities and suspected serious injuries. Safety is a primary consideration in the planning and implementation of all highway investments. When viewed through this lens, almost all needs likely have a safety element. Mobility needs, in particular, often have a correlating safety need,



meaning addressing a mobility need will often also address a correlated safety need (e.g., eliminating a road bottleneck typically results in fewer crashes where the bottleneck used to be).

Safety needs can be addressed by applying the 4 E's of safety: Engineering, Education, Enforcement and Emergency Medical Services. However, ADOT's safety-related funding has historically been allocated to Engineering strategies as these are most aligned with ADOT's mission and responsibilities. As such, safety needs for this LRTP effort focus on Engineering-related needs.

As mentioned previously, it is recognized that safety needs often occur in conjunction with other types of needs. To avoid double-counting needs, the only needs identified herein as safety needs are those whose primary need has been identified as a safety need.

Safety needs have been identified using ACIS crash data, CPS, the Statewide Pedestrian Safety Action Plan (PSAP), the Statewide Wildlife-Vehicle Conflict Study (WVCS), RMC, and the 5-Year Program. The analysis includes a statistical comparative analysis across similar roadways around the state to confirm statistical significance as the nature of crashes can be random.

#### 2.1.7.1 Safety Performance Measures and Thresholds

ADOT's vision and goal is to enhance safety and security along the statewide transportation system. Safety targets and performance measures are observed for the purposes of the needs analysis. Safety targets for the 2020 calendar year were developed using injury and fatality data analysis assumptions. As previously stated, various goals and performance measures developed by different entities at the federal, state, regional and local levels, resulted in needs being identified and defined in different ways. With such variety, a single source could not be used for identifying the needs for the statewide transportation system. For the purposes of this analysis, safety needs identified have been summed from the various sources with an understanding that the total level of statewide safety need likely exceeds what has been identified and quantified.

Safety-related performance measures are typically based on the most recently available five years of crash data related to fatalities and suspected serious injuries for those in vehicles as well as those using non-motorized modes (e.g., bicyclists and pedestrians).

ADOT Federal Safety Performance Targets for 2020 are (based on a five-year average):

- Number of fatalities:  $\leq 1,014$
- Rate of fatalities/100 million VMT:  $\leq 1.522$
- Number of serious injuries:  $\leq 3,934$
- Rate of serious injuries/100 million VMT:  $\leq 5.936$
- Number of non-motorized fatalities and serious injuries:  $\leq 865$

These Federal performance targets help meet the goals of enhancing safety, improving reliability, supporting economic vitality, and improving health stewardship. ADOT has developed other related performance measures and targets as described below to capture existing and projected future needs more fully.



Other performance measures include:

- ADOT's CPS use fatal and suspected serious injury crash data to develop a primary performance measure called the Safety Index along with multiple secondary performance measures related to crash types and Strategic Traffic Safety Plan (STSP) emphasis areas.
- The PSAP and WVCS contain safety-related performance measures for crashes involving pedestrians and wildlife, respectively.

### 2.1.7.2 Safety Conditions

FHWA's Arizona State Highway Safety Report indicates the following safety-related metrics for 2020 (based on the five-year average of 2016-2020):

- Number of fatalities: 999
- Rate of fatalities/100 million VMT: 1.500
- Number of serious injuries: 3,860
- Rate of serious injuries/100 million VMT: 5.808
- Number of non-motorized fatalities and serious injuries: 802

As measured, current safety conditions meet all the Federal performance measures targets. Future investments will likely be needed to maintain this level of performance as safety conditions can degrade as infrastructure ages and travel increases.

**Figure 15** shows a map of the locations of Levels of Service of Safety (LOSS) 3 and 4 based on 2016-2020 fatal crashes on the SHS per ACIS crash data. LOSS is a ranking methodology that compares a road segment's crash frequency and severity to the crash frequencies and severities that would be expected to occur based on road characteristics and operating environment, as predicted by Safety Performance Functions (SPFs) developed for various road characteristics and operating environments. Road segments are then ranked as having a LOSS between 1 and 4. Lower LOSS (i.e., 1 and 2) values denote locations where a road segment's safety performance is better than would be expected (i.e., fewer or less severe crashes) while higher LOSS values (i.e., 3 and 4) denote locations where a road segment's safety performance is worse than would be expected (i.e., more or more severe crashes). So, the LOSS 3 and 4 locations are where there are likely safety needs.

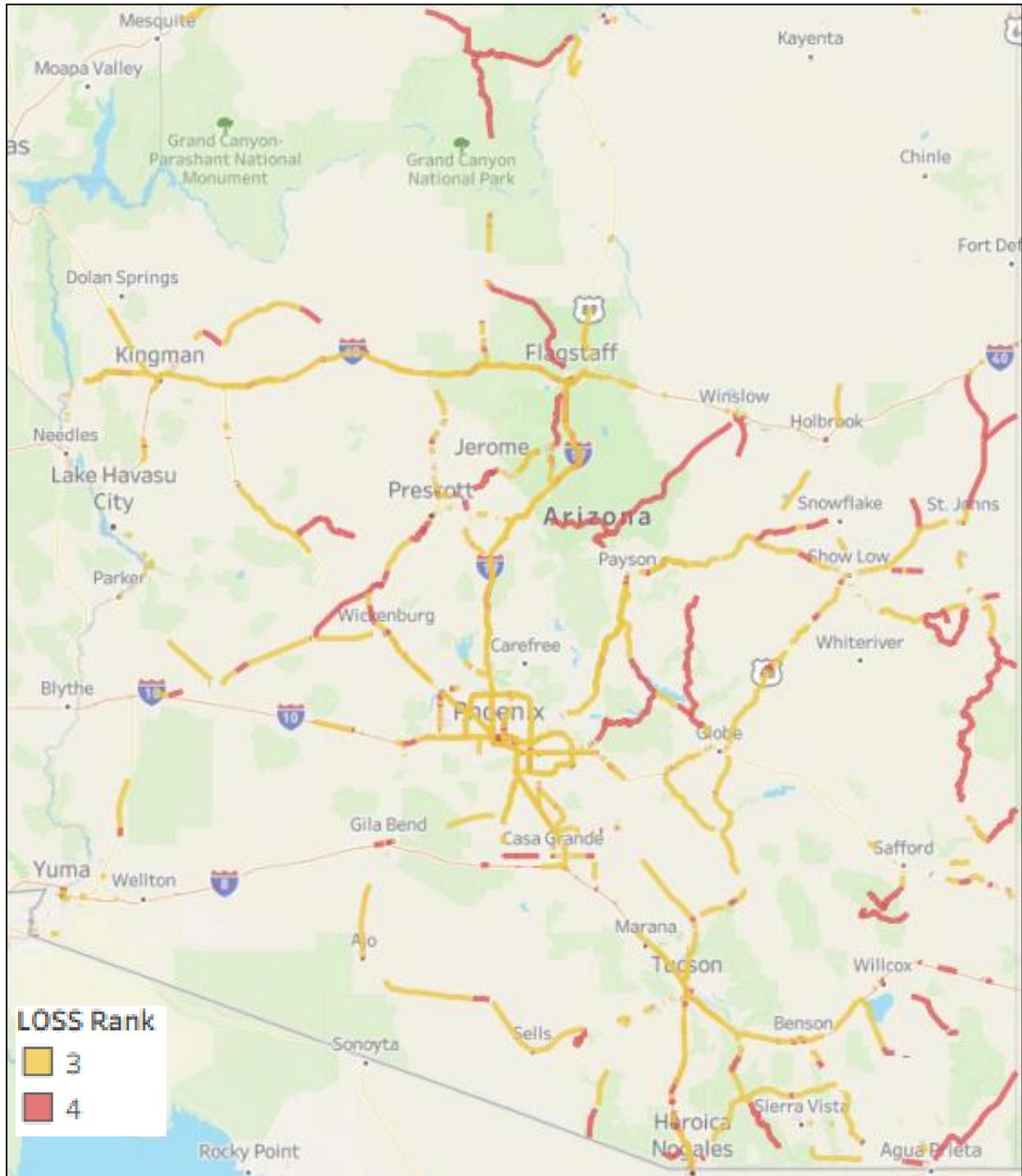
**Figure 16** shows the Safety Index needs per the CPS. The CPS Safety Index was developed based on comparing crash history for a given segment to crash history for other road segments with similar operating environments, a similar process to the LOSS methodology just mentioned. The CPS only analyzed the portions of the SHS that are also on the NHS and that are outside the Phoenix metropolitan area.

The PSAP identified more than 70 locations in three tiers of priority where there are pedestrian-related safety needs and developed countermeasures for the top tier (17 locations).

The WVCS identified 51 wildlife-vehicle crash hot spots and developed mitigation measures for the top 9 hot spots.



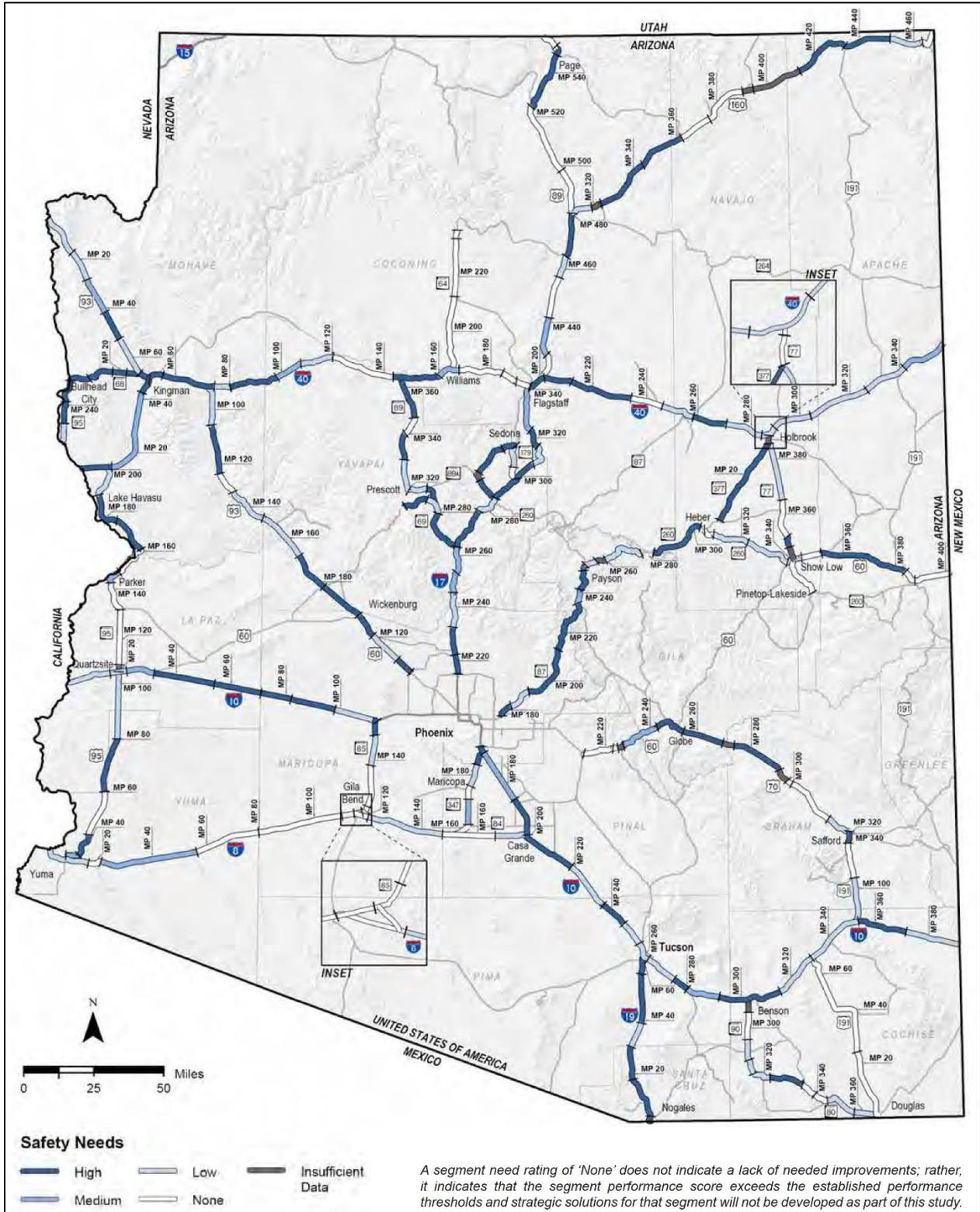
Figure 15: 2016-2020 Levels of Service of Safety (LOSS) 3 and 4 Map



Source: ADOT ACIS Data 2016-2020, WSP analysis



Figure 16: CPS Safety Index Needs



Source: ADOT Corridor Profile Studies Statewide Summary 2018



### 2.1.7.3 Identified Safety Needs

The total value of CPS safety needs identified in 2018 was \$904 million, which is \$2.085 billion in 2026 dollars.

Recognizing that CPS only covered approximately 39 percent of the SHS centerline miles, a comparison of the LOSS analysis findings and CPS findings allowed for a proportional estimation of the safety needs on the rest of the SHS not covered by CPS. The total value of estimated safety needs not covered by CPS in 2018 dollars was \$969 million, which is \$2.233 billion in 2026 dollars.

The total value of the PSAP safety needs identified in 2017 was \$73 million, which is \$187 million in 2026 dollars.

The total value of the WVCS safety needs identified in 2021 was \$40 million, which is \$67 million in 2026 dollars.

The RMC identified safety-related 2026-2050 maintenance needs for ADOT Transportation System Management and Operations (TSMO) in the ADOT Central District (which generally covers the Phoenix area) for items such as lighting, signing, marking, and traffic signals at a value of \$512 million in 2019 dollars, which is \$1.062 billion in 2026 dollars.

The 5-Year Program includes \$1.7 million annually in 2022 dollars to cover O&M needs related to safety and \$0.98 million annually in 2022 dollars to cover traffic incident management (TIM) coordination with the Department of Public Safety (DPS) within ADOT’s Traffic Operations Center (TOC), which together is approximately \$4.07 million in 2026 dollars and \$257 million over 2026-2050 in 2026 dollars.

The SHS safety needs for 2026-2050 total \$5.9 billion and are summarized in **Table 10**.

**Table 10: SHS Safety 2026-2050 Needs**

Needs Source	Total Needs (2026 Dollars in Millions)
CPS	\$2,085
SHS not in CPS	\$2,233
PSAP	\$187
WVCS	\$67
RMC TSMO Maintenance	\$1,062
5-Year Program O&M and TIM	\$257
<b>Total</b>	<b>\$5,892</b>

It is acknowledged that the full value of SHS safety needs may be different than what is listed herein due to a lack of available data. The CPS did not evaluate Non-NHS SHS segments, the PSAP and WVCS only developed costs for the highest priority safety needs, crash data has historically not always been complete on tribal lands, RMC maintenance needs only reflect Phoenix area safety needs, and O&M costs reflect historical annual allocations and may not fully cover O&M needs.



### 2.1.8 Freight Needs

Freight needs are important because Arizona’s economic potential is supported by the state’s transportation infrastructure, which connects sources of production to markets. When transportation infrastructure and related services are efficiently designed and competitively positioned, businesses benefit from lower transportation costs, faster and better transportation services, and increased reliability, which in turn contribute to their own competitiveness and growth, and to that of the broader region.

Freight delivered by trucks accounts for 70 percent of total freight tonnage in the state and 45 percent of total freight value. The Interstates are the most heavily utilized freight infrastructure in the state and support freight traffic moving between ports in California and Mexico and markets further inland. The total statewide truck freight data by tonnage, value, and destination is provided in **Table 11**.

**Table 11: Arizona Truck Freight by Tonnage and Value**

Category	Outbound (AZ to Other)	Inbound (Other to AZ)	Internal (AZ to AZ)	Through (Other to Other)	Total
Tonnage (Thousands)	22,650	35,552	118,170	108,565	284,937
Value (Million \$)	\$25,099	\$72,120	\$58,218	\$239,795	\$395,231

Source: ADOT State Freight Plan 2022

Most freight-related needs are closely linked to mobility needs but focus specifically on SHS roadways that accommodate a large volume or percentage of truck traffic. Freight needs can be addressed by increasing capacity or connectivity, improving operational efficiency through ITS, enhancing reliability, and reducing emissions.

Facilities owned by ADOT that deal with the movement of freight (e.g., State ports of entry, truck parking areas, and rest areas) are not included in SHS freight needs but are addressed in the Other Facilities section of the LRTP needs analysis.

Freight rail facilities (e.g., those owned and operated by Union Pacific Railroad, BNSF Railway, and short-line railroads) are also not included in SHS freight needs but are discussed in the Complementary Transportation Systems component of the LRTP needs analysis.

Freight needs have been identified using INRIX travel data, CPS (which covers all of the SHS that is part of the NHS except for within the Phoenix area), SFP, and BIMP.

#### 2.1.8.1 Freight Performance Measures and Thresholds

Travel time reliability for trucks is one performance measure related to freight that FHWA has identified. FHWA uses the Truck Travel Time Reliability (TTTR), which is defined as the ratio of the 95<sup>th</sup> percentile travel time to the 50<sup>th</sup> percentile travel time for all vehicles. INRIX data provides the travel time data necessary to calculate the TTTR.



ADOT Federal Freight Performance Target for 2019 related to reliability is:

- Interstate TTTR:  $\leq 1.21$

This Federal performance target is generally conservative, meaning ADOT aspires to perform better than this target to meet the goals of improving mobility, reliability, and accessibility, supporting economic vitality, and improving environmental and health stewardship. ADOT has developed other related performance measures and targets as described below to capture existing and projected future needs more fully.

Other performance measures include:

- ADOT's CPS use TTTR to develop a primary measure called the Freight Index along with multiple secondary performance measures related to the duration of unplanned closures and vertical clearance restrictions.
- The SFP contains several freight-related performance measures related to the SFP goals in the areas of safety, system management and mobility, competitiveness, and stewardship.

### 2.1.8.2 Freight Conditions

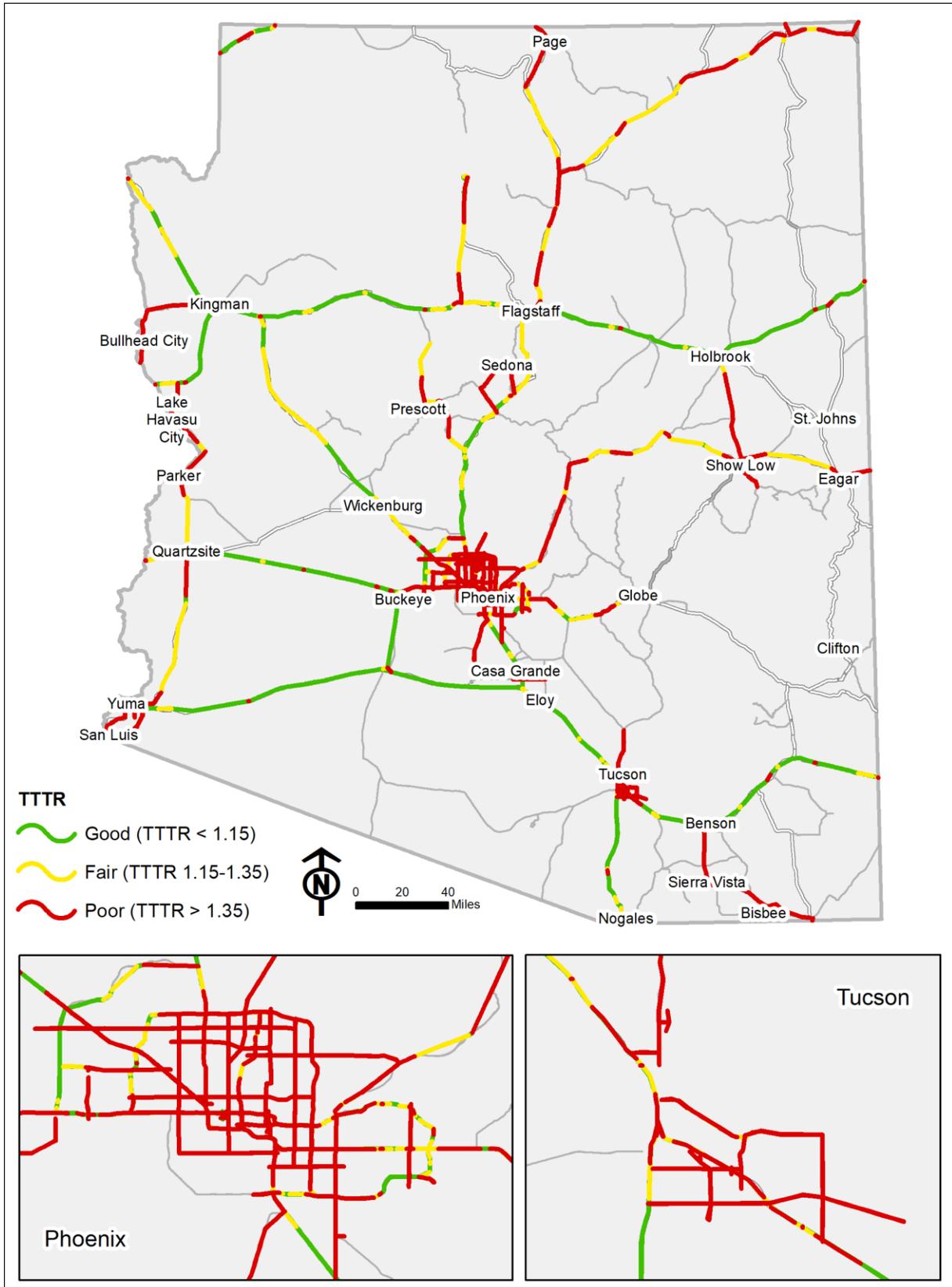
FHWA's Arizona State Highway Reliability Report indicates the Interstate TTTR was 1.20 in 2020. For comparison purposes in recognition of the impacts of Covid on travel, in 2019, the Interstate TTTR was 1.25. As measured, current freight conditions meet all the Federal performance measures targets. Future investments will likely be needed to maintain this level of performance as freight conditions can degrade as travel increases.

**Figure 17** shows the TTTR conditions in Arizona per INRIX data from 2019. Most of the poor TTTR is in the urban areas and on two-lane highways in rural areas. **Figure 18** shows the Freight Index needs per the CPS.

The SFP identifies the top 20 urban and top 20 rural freight bottlenecks on the SHS portion of the NHS. The BIMP identifies 107 freight-related multimodal infrastructure projects that are needed in Arizona, with 17 of those on the SHS and not already programmed or covered by the CPS.



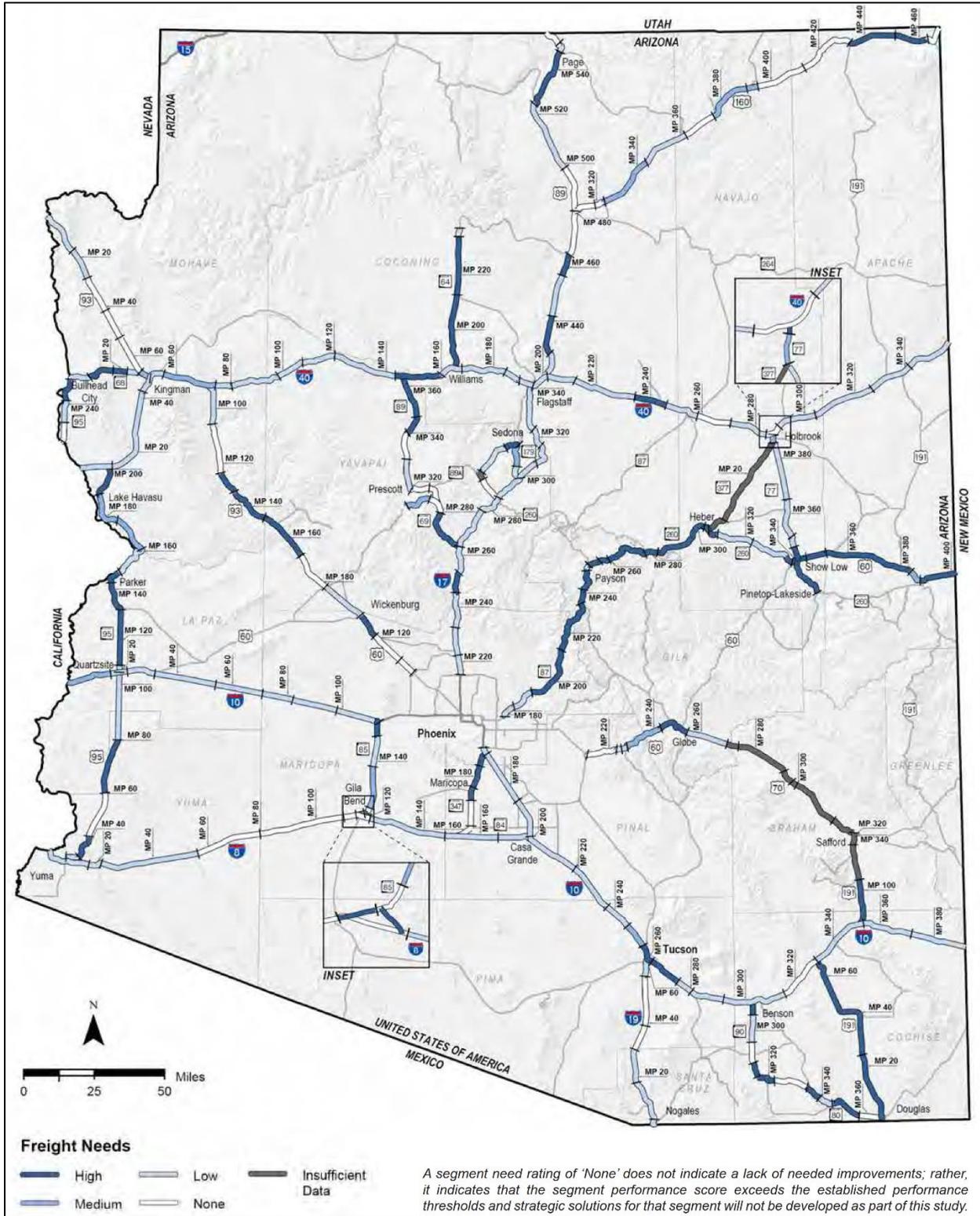
Figure 17: Truck Travel Time Reliability (TTTR)



Source: ADOT INRIX Data 2019



Figure 18: CPS Freight Index Needs



Source: ADOT Corridor Profile Studies Statewide Summary 2018



### 2.1.8.3 Identified Freight Needs

The total value of CPS freight needs identified in 2018 was \$440 million, which is \$1.013 billion in 2026 dollars.

Most of the SFP freight needs are already covered under the mobility needs or the CPS freight needs. The total value of the unique SFP freight needs identified in 2022 was \$12 million, which is \$18 million in 2026 dollars.

Most of the 2013 BIMP freight needs have already been built, are for local roads, or are already including in CPS. The total value of the unique BIMP freight needs identified in 2013 was \$869 million, which is \$3.373 billion in 2026 dollars.

The SHS freight needs for 2026-2050 total \$4.4 billion and are summarized in **Table 12**.

**Table 12: SHS Freight 2026-2050 Needs**

Needs Source	Total Needs (2026 Dollars in Millions)
CPS	\$1,013
SFP	\$18
BIMP	\$3,373
<b>Total</b>	<b>\$4,404</b>

It is acknowledged that the full value of SHS freight needs may be different than what is listed herein due to a lack of available data. The CPS did not evaluate Non-NHS SHS segments and the SFP and BIMP are both in the process of being updated so they may not reflect all needs.

## 2.2 Other Facilities

Other facilities owned by the State of Arizona that are operated and maintained by ADOT include State ports of entry (POEs), rest areas/truck parking areas, and Grand Canyon Airport.

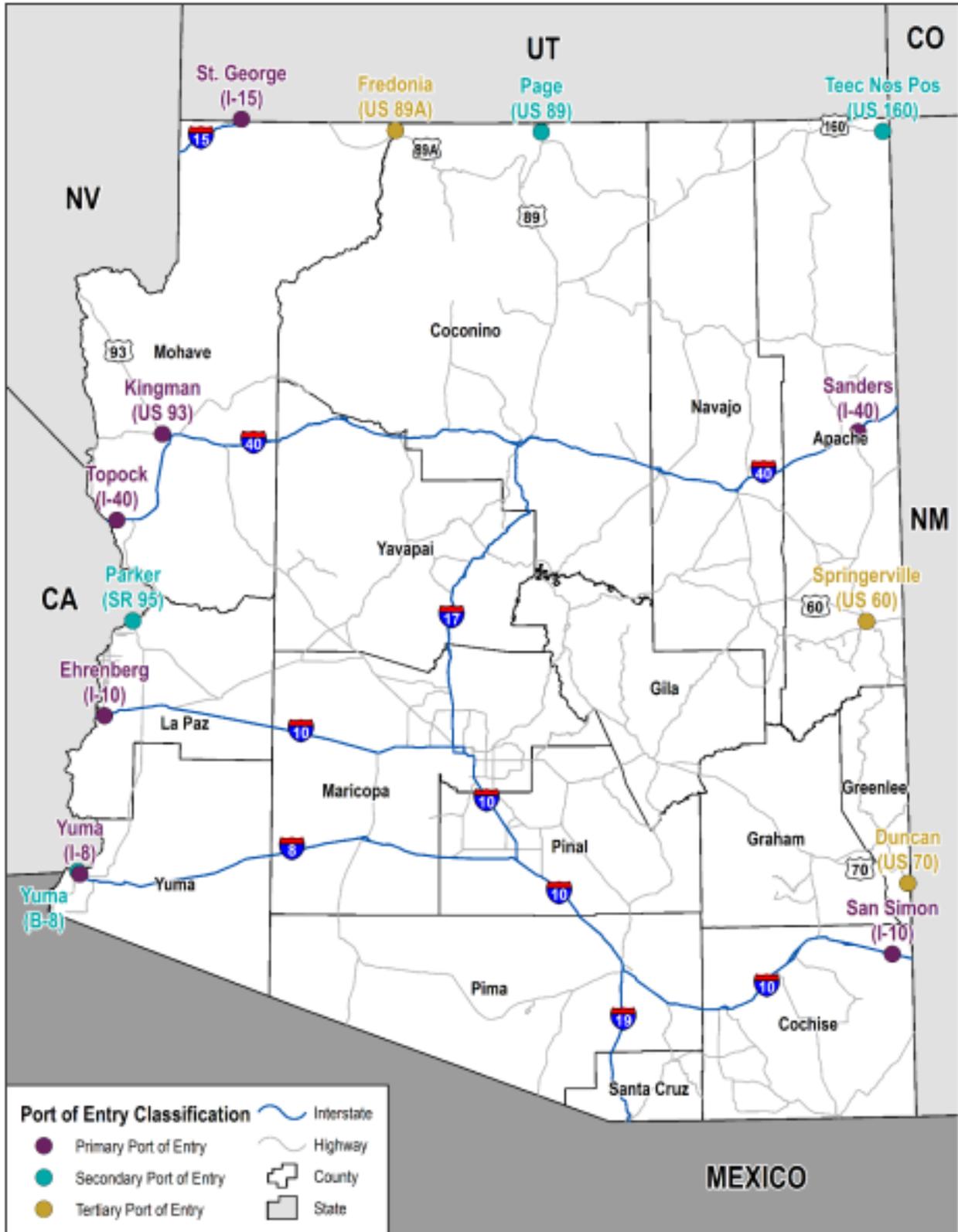
### 2.2.1 State Ports of Entry

There are 22 State POEs in Arizona – 14 “domestic” ports along Arizona’s state borders and 8 ports along Arizona’s international border with Mexico that are paired with federal international POEs. These POEs monitor freight truck traffic entering Arizona for registration, taxes, size and weight restrictions, commercial driver license requirements, insurance requirements and equipment safety requirements, and issue permits as required.

POE needs for the 14 domestic ports shown in **Figure 19** were documented in the 2021 POE Study based on field observations of existing conditions, POE staff interviews, and a comparison of POE existing features to those of an “ideal” port. POE needs are freight-related needs and can typically be addressed by preserving and maintaining POE elements, increasing capacity, improving operational efficiency, and strengthening reliability, thereby enhancing safety and security and supporting economic vitality.



Figure 19: State Domestic Ports of Entry



Source: ADOT Ports of Entry Study 2021



The total value of State domestic POE needs identified in 2021 was \$74.0 million, which is \$125 million in 2026 dollars.

The 5-Year Program includes \$10 million annually in 2022 dollars to cover general O&M needs related to POEs, which is approximately \$15.18 million in 2026 dollars and \$960 million over 2026-2050 in 2026 dollars.

The State POE needs for 2026-2050 total \$1.1 billion and are summarized in **Table 13**.

**Table 13: State POE 2026-2050 Needs**

Needs Source	Total Needs (2026 Dollars in Millions)
POE Study	\$125
5-Year Program O&M	\$960
<b>Total</b>	<b>\$1,085</b>

It is acknowledged that the full value of State POE needs may be different than what is listed herein due to a lack of available data. The POE Study did not evaluate the State POE needs at the eight ports along Arizona’s international border with Mexico that are paired with federal international POEs and the 5-Year Program O&M costs reflect historical annual allocations and may not fully cover O&M needs.

### 2.2.2 Rest Areas/Truck Parking Areas

ADOT provides rest areas along the SHS for use by the traveling public and commercial vehicle drivers. There are currently 523 public truck parking spaces statewide, split between the State’s rest areas, overflow lots at rest areas, and parking-only locations that have no amenities, as shown in **Figure 20**.

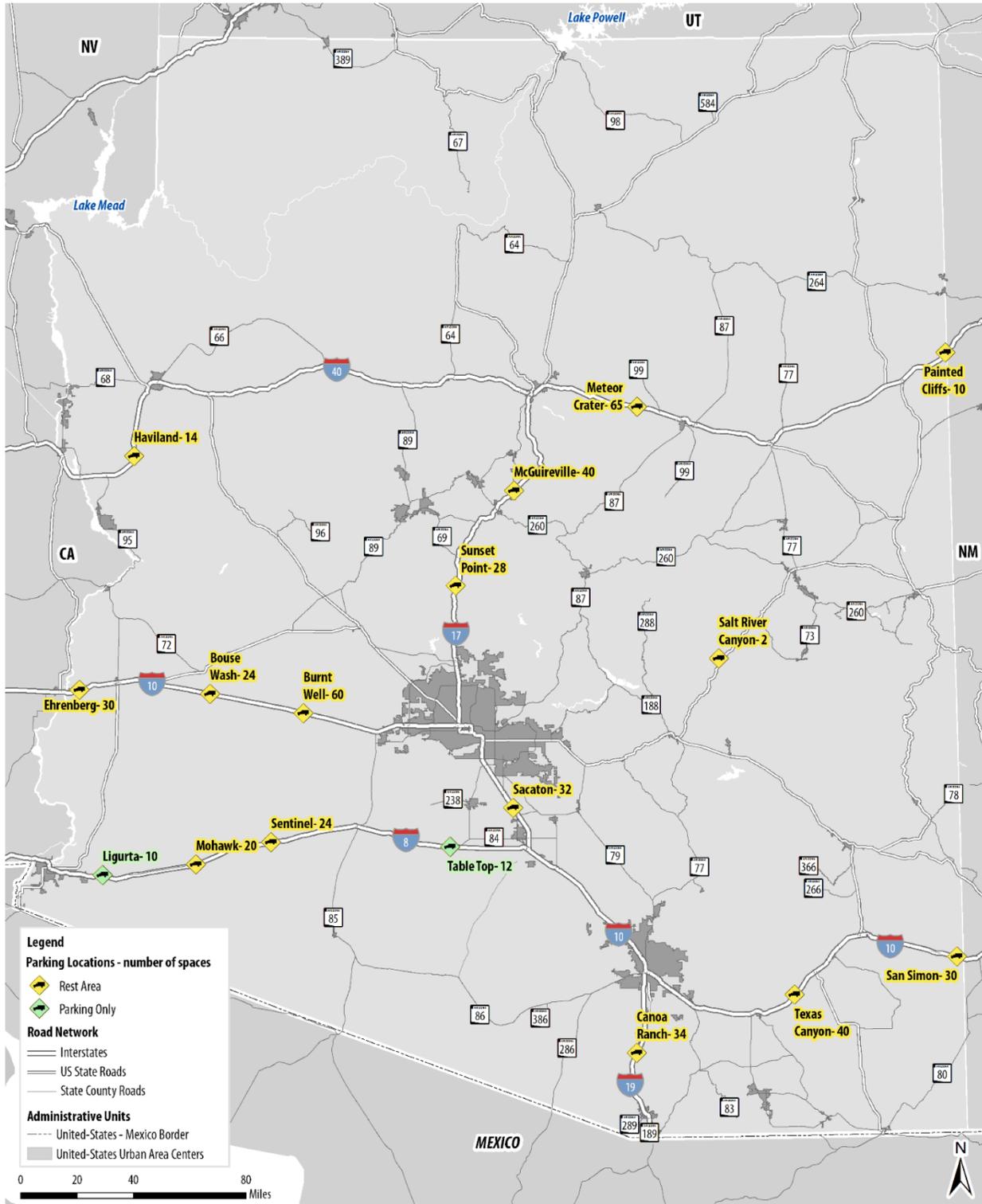
Rest area needs were documented in a 2023 Draft Statewide Rest Area Study. This study is currently being updated but has not yet been finalized. This study identified \$150 million in project needs in 2023 dollars, or \$205 million in 2026 dollars.

Short-term (through 2023) truck parking needs were documented in the 2019 Truck Parking Study. This study identified truck parking needs through interviews with those in the trucking industry and analysis of truck parking data. Truck parking needs beyond 2023 were identified as being needed but no detail or costs were provided on those needs.

The RMC noted ADOT typically spends \$17.7 million annually in 2018 dollars to cover general O&M needs related to rest areas/truck parking areas, which is approximately \$40.8 million in 2026 dollars and \$2.580 billion over 2026-2050 in 2026 dollars.



Figure 20: State Rest Areas/Truck Parking Areas



Source: ADOT State Truck Parking Study 2019



The rest area/truck parking area needs for 2026-2050 total \$2.8 billion and are summarized in **Table 14**.

**Table 14: Rest Areas/Truck Parking Areas 2026-2050 Needs**

Needs Source	Total Needs (2026 Dollars in Millions)
Rest Area Study	\$205
RMC O&M	\$2,580
<b>Total</b>	<b>\$2,785</b>

It is acknowledged that the full value of rest area/truck parking area needs may be different than what is listed herein as the Rest Area Study is currently being updated.

### 2.2.3 Grand Canyon National Park Airport

Grand Canyon National Park (GCNP) Airport is owned by the State of Arizona and operated and maintained by ADOT. It is the only airport in Arizona owned by the State. The 2018 GCNP Airport Master Plan (AMP) identified airport needs and developed short-term, mid-term, and long-term improvements to address the identified needs. The long-term improvements correspond to the 2026-2050 timeframe.

The total value of GCNP Airport needs identified in 2018 was \$15.0 million, which is \$34 million in 2026 dollars.

The GCNP Airport needs for 2026-2050 total \$34 million and are summarized in **Table 15**.

**Table 15: Grand Canyon National Park Airport 2026-2050 Needs**

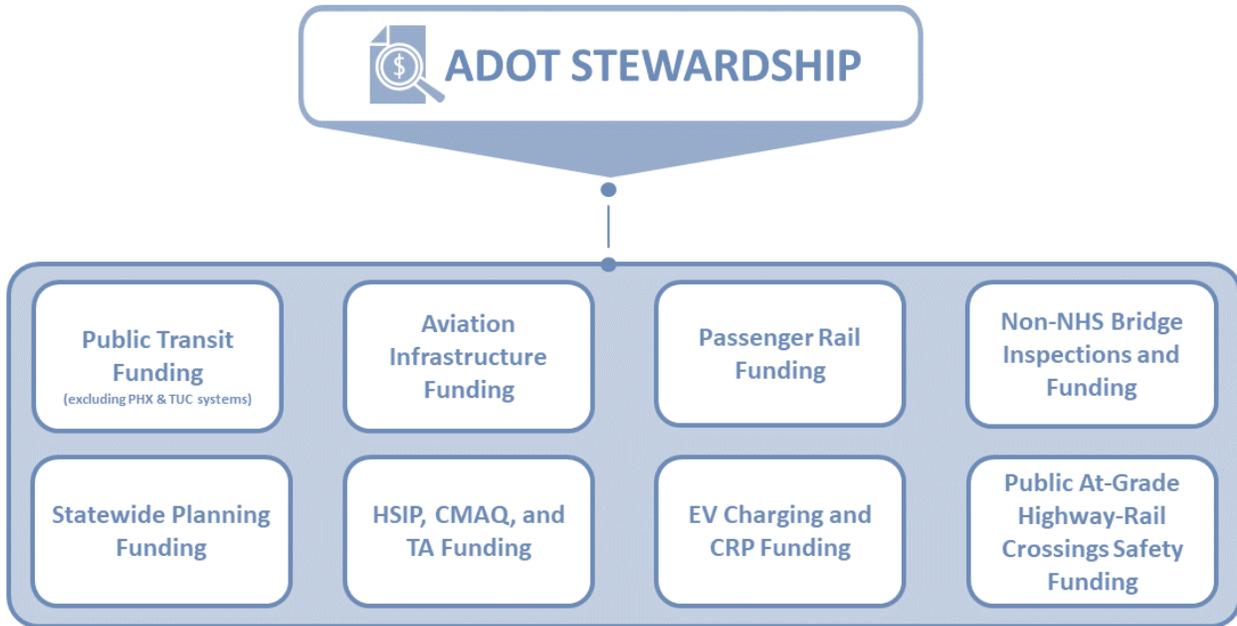
Needs Source	Total Needs (2026 Dollars in Millions)
GCNP AMP	\$34
<b>Total</b>	<b>\$34</b>

It is acknowledged that the full value of GCNP Airport needs may be different than what is listed herein due to a lack of available data. The GCNPAMP only covers approximately 10 years of the 25-year 2026-2050 timeframe.

### 3 ADOT Stewardship Needs

ADOT Stewardship needs are the secondary focus of the LRTP needs analysis. The ADOT Stewardship component includes the subcomponents shown in **Figure 21**. These are all funding programs administered by ADOT but where ADOT either cannot, or can choose not to, apply the funding to transportation facilities operated and maintained by ADOT.

**Figure 21: ADOT Stewardship Component**



The needs for ADOT Stewardship subcomponents are determined in a different manner than the ADOT Infrastructure needs. Ideally, ADOT Stewardship needs should reflect user needs, meaning the desired improvement in performance by users of the program or facility for which ADOT has stewardship, but many times these needs are unknown. In cases where the user need is unidentified or not quantifiable, the ADOT Stewardship needs reference the amount of typical funding within the program ADOT receives from the federal government. In such cases, the program funding need represents a minimum level of identified need but it is recognized the level of need may be higher.

#### 3.1 Public Transit Funding Needs

ADOT has been designated by the Governor of Arizona as the principal authority and designated recipient (DR) for administering the following Federal Transit Administration (FTA) programs within the state:

- Section 5305 (Metropolitan transportation planning)
- Section 5307 (Urbanized area public transit)
- Section 5310 (Enhanced mobility of seniors and individuals with disabilities)
- Section 5311 (Rural public transit)



- Section 5337 (Urban state of good repair)
- Section 5339 (Urban bus and bus facilities)

Arizona has two 5307 urban transit systems (Phoenix and Tucson), five 5307 small urban transit systems (Yuma, Flagstaff, Avondale-Goodyear, Sierra Vista, Lake Havasu), and 29 5311 rural transit systems operating in smaller municipalities, tribal reservations, and rural areas.

ADOT has identified the City of Phoenix as a DR for 5307, 5310, 5337, and 5339 funds, the City of Tucson as a DR for 5307, 5337, and 5339 funds, and the small urban transit agencies as DRs for 5307 funds, meaning ADOT passes these funds through to the DR agencies with minimal ADOT involvement. As such, FTA funding for local DRs is not considered an ADOT need for purposes of the LRTP needs analysis.

The two FTA programs for which ADOT has primary funding stewardship responsibilities are the Section 5310 (excluding the City of Phoenix) and Section 5311 programs. **Figure 22** shows the locations of the Section 5310 and Section 5311 public transit providers.

Transit needs for the Section 5310 and Section 5311 programs were identified as the funding received annually per data provided by ADOT Transit staff. Transit needs as seen from the perspective of transit users and transit agencies are typically addressed by improving transit coverage, efficiency, frequency, capacity, security, comfort, or convenience.

Funding associated with the Section 5310 and Section 5311 programs is typically used to fund “dial-a-ride” (5310) and fixed bus route programs (5311), thereby supporting equitable access to the transportation system, promoting environmental and health stewardship, improving mobility, reliability, and accessibility, and supporting economic vitality.

The total value of Section 5310 and Section 5311 funding requested by local transit agencies from ADOT averaged \$37 million in 2020/2021, which is approximately \$3.5 billion over 2026-2050 in 2026 dollars. (For reference, the actual funded amounts in this same timeframe averaged \$17.6 million in 2020/2021, which is approximately \$1.6 billion over 2026-2050.)

The ADOT 5310 and 5311 public transit funding needs for 2026-2050 total \$3.5 billion and are summarized in **Table 16**.

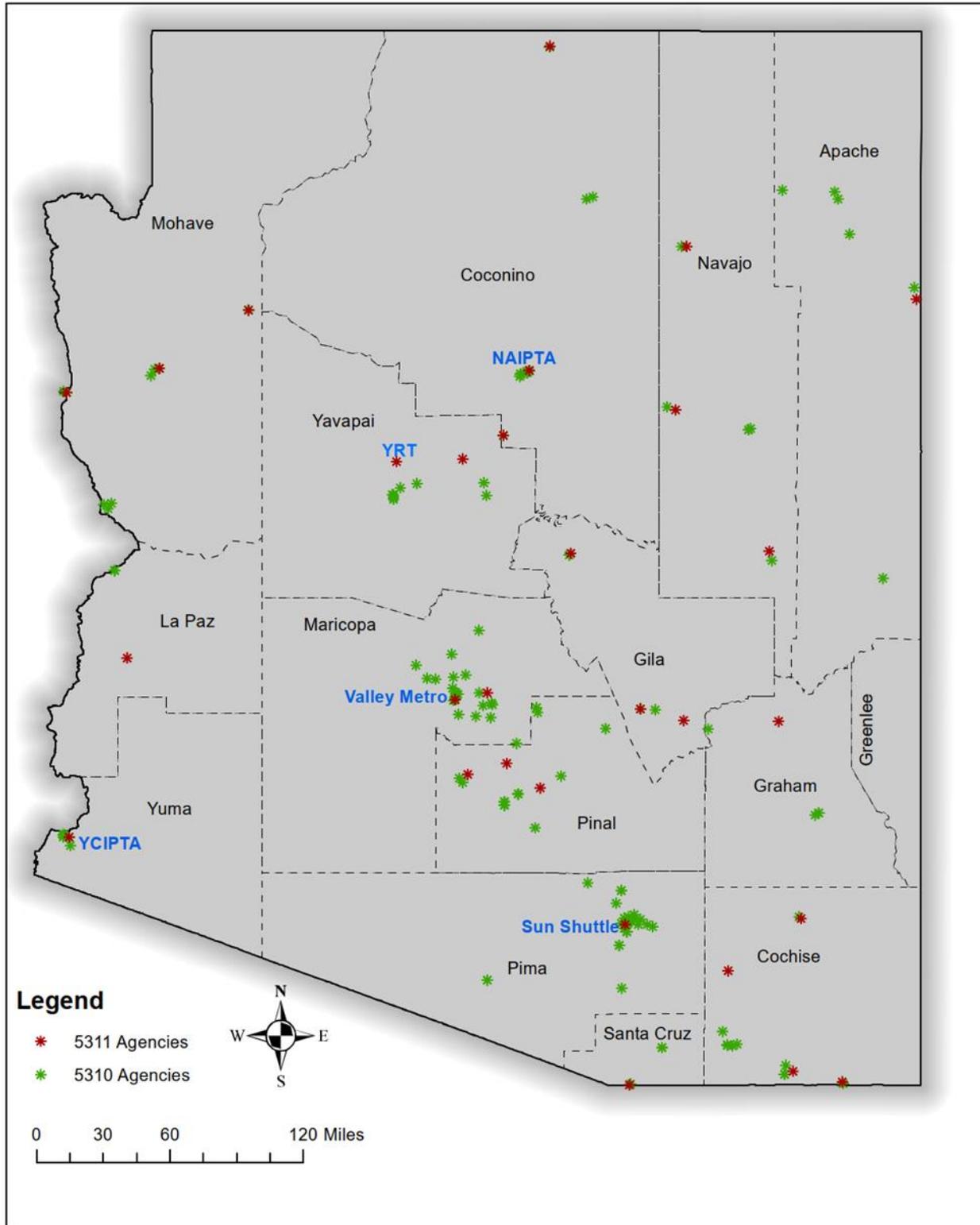
**Table 16: ADOT 5310 and 5311 Public Transit Funding 2026-2050 Needs**

Needs Source	Total Needs (2026 Dollars in Millions)
Section 5310 Funds	\$1,114
Section 5311 Funds	\$2,343
<b>Total</b>	<b>\$3,457</b>

It is acknowledged that the full value of transit needs may be different than what is listed herein due to a lack of available data, particularly if the funding passed through to the local DRs is included as a need.



Figure 22: Arizona 5310 and 5311 Transit Providers



Source: ADOT, ESRI 2022



### 3.2 Aviation Infrastructure Funding Needs

ADOT is responsible for administering monies that are appropriated by the legislature from the state aviation fund. The ADOT Aeronautics Group duties and responsibilities include an aeronautical chart, aircraft registration, airfield maintenance project funding, airfield pavement management program, hangar construction funding, operation of state-owned airports, ownership and operation of state aircraft, state funding (Federal Aviation Administration Match and state-only grants), and state-only loans.

Arizona has 11 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. 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-nine of the seventy-eight public-use airports in Arizona are included in the NPIAS. **Figure 23** shows the locations of the public-use airports in Arizona.

Aviation needs were identified in the 2018 State Aviation System Plan (SASP). Aviation needs as seen from the perspective of airport users and airport agencies are typically addressed by increasing airport efficiency, frequency, capacity, security, comfort, or convenience.

Funding associated with aviation needs is typically used to fund airport infrastructure improvements, thereby improving mobility, reliability, and accessibility, and supporting economic vitality.

The total value of aviation needs identified in 2018 was approximately \$8.7 billion, which is \$20.0 billion in 2026 dollars.

The ADOT aviation infrastructure funding needs for 2026-2050 total \$20.0 billion and are summarized in **Table 17**.

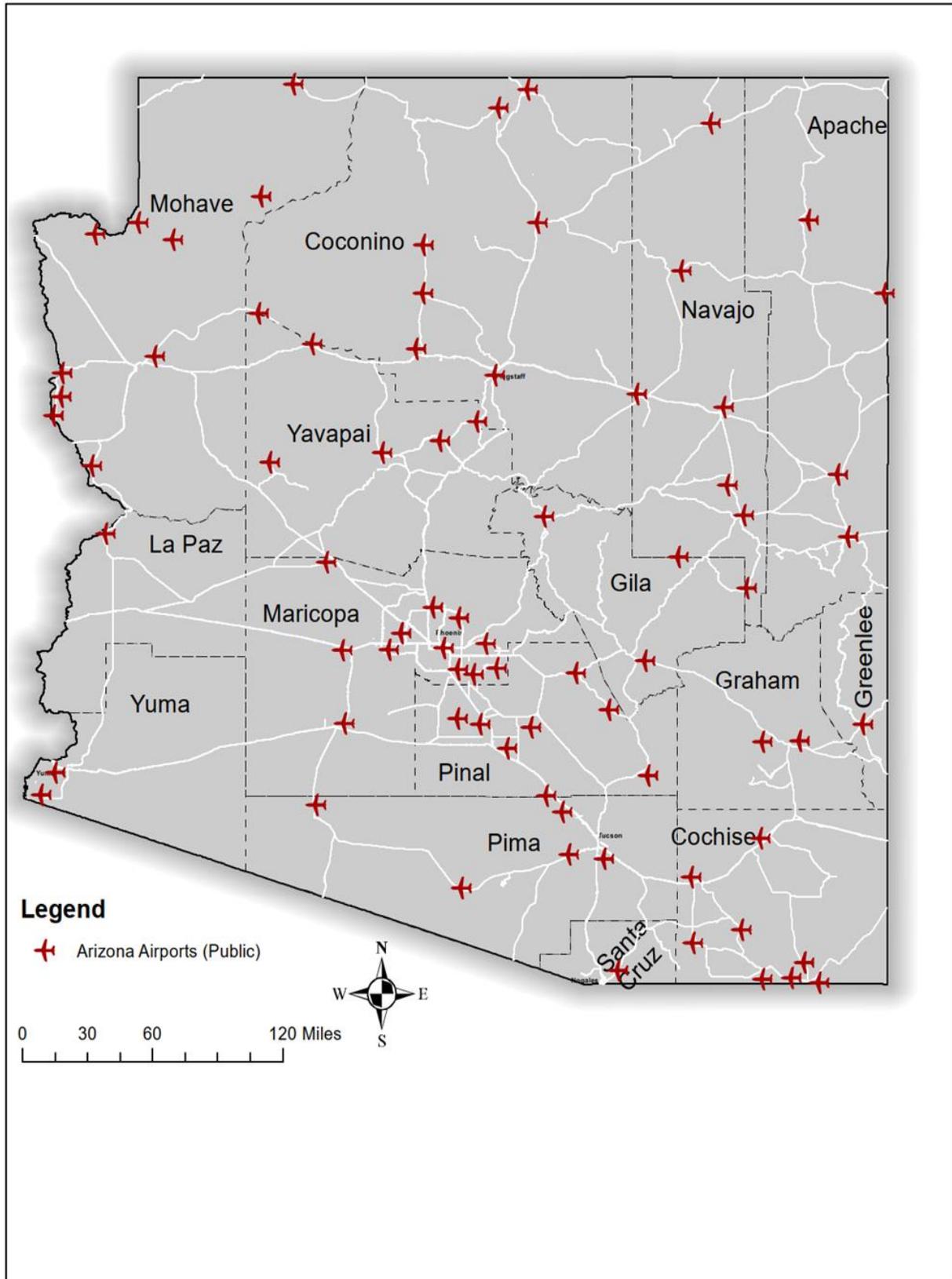
**Table 17: ADOT Aviation Infrastructure Funding 2026-2050 Needs**

Needs Source	Total Needs (2026 Dollars in Millions)
SASP	\$19,968
<b>Total</b>	<b>\$19,968</b>

It is acknowledged that the full value of aviation needs may be different than what is listed herein due to a lack of available data, considering the SASP only identified needs through 2037.



Figure 23: Arizona Airports



Source: AZ Open Geo Data, ESRI 2022



### 3.3 Passenger Rail Funding Needs

There is no passenger rail service in Arizona that is owned, operated, and funded by the State of Arizona. (The private passenger rail service Amtrak is discussed later in the Complementary Transportation Systems component.) ADOT does, however still have some administrative responsibilities related to passenger rail service in Arizona.

ADOT is responsible for the FTA Section 5329 (State Safety Oversight) program for the regional passenger rail services in the Phoenix and Tucson areas (light rail and streetcar). This funding is intended to ensure passenger rail travel is safe in Arizona, thereby meeting the goals of enhancing safety, improving reliability, and supporting economic vitality. ADOT typically has received \$300,000 annually in 2022 dollars of FTA Section 5329 funding, which is \$455,000 annually in 2026 dollars and totals roughly \$28.8 million over 2026-2050 in 2026 dollars.

ADOT also is responsible for long-range planning related to public passenger rail services that travel between regions, thereby supporting equitable access to the transportation system, promoting environmental and health stewardship, improving mobility, reliability, and accessibility, and supporting economic vitality. In 2013, ADOT conducted a Passenger Rail Corridor Study (PRCS): Tucson to Phoenix to continue building on statewide and regional planning efforts to identify passenger rail alternatives between Arizona’s two largest cities, Tucson and Phoenix. A preferred alternative was selected and its cost was determined to total approximately \$4.5 billion in 2013 dollars, which is approximately \$17.5 billion in 2026 dollars.

The ADOT passenger rail funding needs for 2026-2050 total \$17.5 billion and are summarized in **Table 18**.

**Table 18: ADOT Passenger Rail Funding 2026-2050 Needs**

Needs Source	Total Needs (2026 Dollars in Millions)
Section 5329 Funds	\$29
PRCS	\$17,475
<b>Total</b>	<b>\$17,504</b>

It is acknowledged that the full value of passenger rail needs is likely higher than what is listed herein due to a lack of available funding as the PRCS only evaluated travel between two cities in Arizona (Phoenix and Tucson).

### 3.4 Non-SHS Bridge Inspections and Funding Needs

Addressing Non-SHS bridge needs will help meet the goals of preserving and maintaining infrastructure, enhancing safety, and improving reliability. It is acknowledged that the level of need has not been previously quantified, therefore the needs are based largely on the historical annual funding allocations that ADOT has utilized.

ADOT is required by FHWA to set aside funding for an Off-System Bridge Program. Any non-ADOT bridge that is in poor condition and is on a federally functionally classified road is an eligible



candidate for which the local agency can submit an application for funding consideration. Per ADOT’s 2022 guidelines for this program, \$3.9 million is set aside annually in 2022 dollars for improving non-SHS bridges, which is \$5.9 million in 2026 dollars and \$374 million over 2026-2050 in 2026 dollars.

ADOT also has responsibility for conducting bridge inspections statewide on all bridges not within federal and tribal lands, with \$8 million identified annually in the RMC for bridge inspections statewide. With Non-NHS bridges constituting approximately 43 percent of all bridges in Arizona (per NBI), that means approximately \$3.44 million annually for Non-SHS bridge inspections in 2019 dollars, which is \$7.14 million in 2026 dollars and \$452 million over 2026-2050 in 2026 dollars.

The ADOT Non-SHS bridge needs for 2026-2050 total \$826 million and are summarized in **Table 19**.

**Table 19: ADOT Non-SHS Bridge Inspections and Funding 2026-2050 Needs**

Needs Source	Total Needs (2026 Dollars in Millions)
Off-System Bridge Program	\$374
RMC Non-SHS Bridge Inspections	\$452
<b>Total</b>	<b>\$826</b>

### 3.5 Statewide Planning Funding

Providing planning resources to transportation owner and operator agencies can increase the understanding, timing, and programming of needs across the various systems and inform the development cycle. It is acknowledged that the level of need has not been previously quantified, therefore the needs are based largely on the historical annual funding allocations that ADOT has utilized.

ADOT’s federal apportionment of funds includes a two percent annual set-aside for state planning and research (SPR). These SPR funds are typically utilized by ADOT to conduct planning activities (such as the development of the LRTP) and to strengthen partnerships by assisting local agencies in their planning activities. The 2022 SPR annual allocation, which can be considered the minimum level of need, was \$18.2 million in 2022 dollars, which is \$27.6 million in 2026 dollars and \$1.748 billion over 2026-2050 in 2026 dollars.

The ADOT statewide planning funding needs for 2026-2050 total \$1.748 billion and are summarized in **Table 20**.

**Table 20: ADOT Statewide Planning Funding 2026-2050 Needs**

Needs Source	Total Needs (2026 Dollars in Millions)
SPR	\$1,748
<b>Total</b>	<b>\$1,748</b>



### 3.6 HSIP, CMAQ, and TA Funding

ADOT administers several federally funded programs available to both SHS facilities and Non-SHS facilities. These programs include the Highway Safety Improvement Program (HSIP), CMAQ, and Transportation Alternatives (TA) programs. It is acknowledged that the level of need across these programs has not been previously quantified, therefore the needs are based largely on the historical annual funding allocations that ADOT has utilized.

HSIP funding must be used on safety-related projects aimed at reducing traffic fatalities and suspected serious injuries and can be used on any public roads statewide. Local agencies, tribes, and groups within ADOT must submit an improvement project application to be considered for HSIP funding in a competitive process that seeks to maximize the effectiveness of how the HSIP funding is utilized, which will also help meet the LRTP goals of enhancing safety, improving reliability, supporting economic vitality, and improving health stewardship. HSIP funding can be used to address the aforementioned SHS safety needs but also can be used to address Non-SHS safety needs. Every year the split of HSIP funding between SHS and Non-SHS facilities varies depending on project applications. The aggregate amount of HSIP funding requested via submitted applications is typically higher than the available funding, indicating safety needs exceed the allocated HSIP funding. The 2022 HSIP annual allocation, which can be considered the minimum level of need, was \$54.6 million in 2022 dollars, which is \$82.9 million in 2026 dollars and \$5.246 billion over 2026-2050 in 2026 dollars.

CMAQ funding must be used for transportation improvements whose purpose is to reduce congestion and/or improve air quality in areas designated as being in nonattainment or maintenance of the national ambient air quality standards. CMAQ funding can be used by ADOT or local entities to meet the goals of improving mobility, reliability, and accessibility, supporting economic vitality, and improving environmental and health stewardship. Similar to HSIP, CMAQ project applications must be submitted and ranked, with funding requests typically exceeding available funding. In Arizona, most CMAQ project applications are for improvements in the Phoenix area, and MAG as the regional planning agency coordinates with ADOT on CMAQ project evaluation and selection. The 2022 CMAQ annual allocation, which can be considered the minimum level of need, was \$55.4 million in 2022 dollars, which is \$84.1 million in 2026 dollars and \$5.319 billion over 2026-2050 in 2026 dollars.

TA funding must be used for smaller-scale alternative mode transportation projects and activities such as pedestrian and bicycle facilities, recreational trails, safe routes to school projects, and community improvements. TA funding can be used by ADOT or local entities to meet the goals of improving mobility, reliability, and accessibility, supporting equitable access to the transportation system, supporting economic vitality, and improving environmental and health stewardship. TA project applications also must be submitted and ranked, with funding requests typically exceeding available funding. The 2022 TA annual allocation, which can be considered the minimum level of need, was \$26.9 million in 2022 dollars, which is \$40.8 million in 2026 dollars and \$2.583 billion over 2026-2050 in 2026 dollars.

The ADOT HSIP, CMAQ, and TA funding needs for 2026-2050 total \$13.147 billion and are summarized in **Table 21**.



**Table 21: ADOT HSIP, CMAQ, and TA Funding 2026-2050 Needs**

Needs Source	Total Needs (2026 Dollars in Millions)
HSIP	\$5,246
CMAQ	\$5,319
TA	\$2,583
<b>Total</b>	<b>\$13,147</b>

### 3.7 EV Charging and CRP Funding

ADOT, as tasked by the Bipartisan Infrastructure Law (BIL) and the National Electric Vehicle Infrastructure (NEVI) Formula Program, has developed Arizona's Electric Vehicle (EV) Infrastructure Deployment Plan (IDP). This plan seeks to increase the long-range mobility of EV drivers by reducing gaps in electric vehicle infrastructure that contribute to an equitable, reliable, resilient, and accessible network that promotes environmental stewardship. The deployment of ADOT's EV infrastructure will involve partnerships with third-party private entities that have the interest, expertise, and resources to meet federal funding match requirements. User needs for EV charging stations have not been fully quantified at this point, but ADOT will receive \$76.5 million over five years of funding to help strategically site electric vehicle supply equipment (EVSE) along state alternative fuel corridors (AFC) every 50 miles to establish an interconnected network. ADOT's EVIDP allocates funding through the year 2026, so the \$16.3 million in 2022 dollars in the EVIDP for 2026, which is approximately \$24.7 million in 2026 dollars, is within the 2026-2050 timeframe of the LRTP needs analysis. EV charging needs beyond 2026, and whether FHWA will provide additional EV charging funding beyond 2026, are unknown at this time.

The BIL also created a new five-year Carbon Reduction Program (CRP) that provides funding through 2026 for improvements that specifically reduce carbon dioxide emissions. The 2026 CRP allocation, which is within the 2026-2050 timeframe of the LRTP needs analysis, if assumed to be the same as the 2022 CRP allocation, would be \$22.5 million in 2022 dollars, which is \$34.2 million in 2026 dollars. CRP needs, and whether FHWA will provide additional CRP funding beyond 2026, are unknown at this time.

The ADOT EV Charging and CRP funding needs for 2026-2050 total \$58.9 million and are summarized in **Table 22**.

**Table 22: ADOT EV Charging and CRP Funding 2026-2050 Needs**

Needs Source	Total Needs (2026 Dollars in Millions)
EV Charging	\$25
CRP	\$34
<b>Total</b>	<b>\$59</b>



### 3.8 Public At-Grade Highway-Rail Crossings Safety Funding

ADOT has responsibility for safety at the approximately 700 public at-grade highway-rail crossings on transportation facilities statewide, including those not part of the SHS. ADOT’s federal apportionment of funding includes an annual allocation for what is known as Section 130 (Railway-Highway Crossings Program) funding. These Section 130 funds must be utilized by ADOT, in coordination with the jurisdictional agency responsible for the road and the railroad company responsible for the railroad tracks that cross the road, to eliminate hazards at railway-highway crossings, thereby meeting the goals of enhancing safety and improving reliability.

ADOT’s State Highway-Rail At-Grade Crossing Action Plan (SHRAP) provided a safety ranking for all crossings and developed cost estimates for the top 15 crossings. The full need at all 700 crossings is unknown at this time, but it is important to note that most of the higher-ranking crossings (i.e., those that need improvements) are on Non-SHS facilities. While the cost estimates for the top 15 crossings provide a sense of the level of need related to improving at-grade highway-rail crossings, it should be noted that most of these crossings are on Non-SHS facilities, so the ADOT funding need related to improving these crossings is best represented by the Section 130 annual allocation. The 2022 Section 130 annual allocation, which can be considered the minimum level of need, was \$3.2 million in 2022 dollars, which is \$4.8 million in 2026 dollars and \$306 million over 2026-2050 in 2026 dollars.

The ADOT public at-grade highway-rail crossings safety funding needs for 2026-2050 total \$306 million and are summarized in **Table 23**.

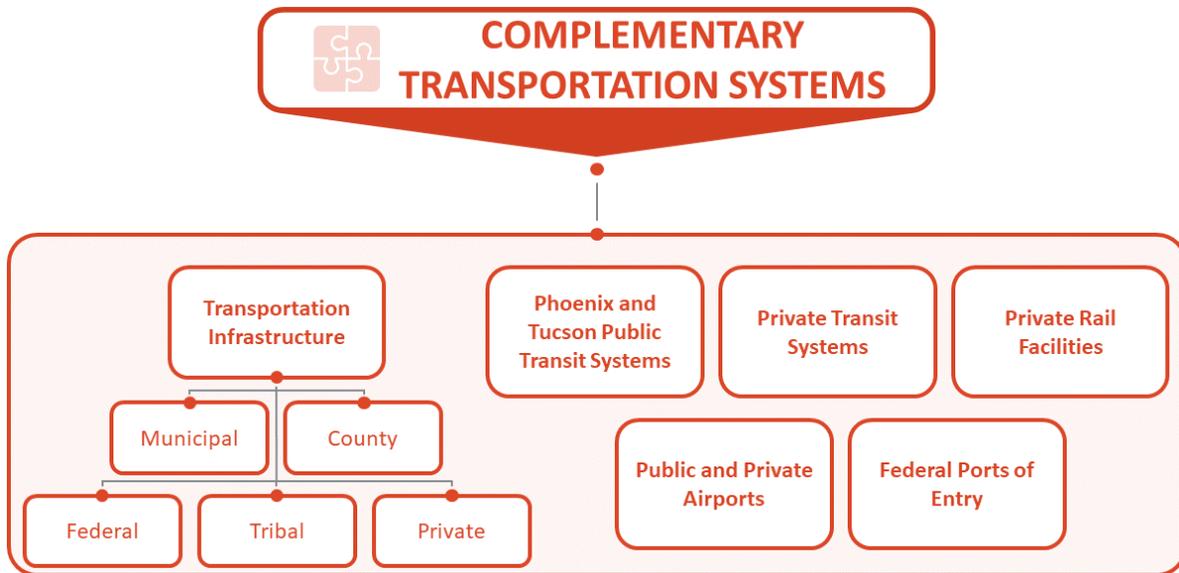
**Table 23: ADOT Public At-Grade Highway-Rail Crossings Safety Funding 2026-2050 Needs**

Needs Source	Total Needs (2026 Dollars in Millions)
Section 130	\$306
<b>Total</b>	<b>\$306</b>

## 4 Needs of Complementary Transportation Systems

Complementary Transportation Systems are the third component of the Arizona Transportation System and contain the subcomponents shown in **Figure 24**. ADOT does not own, operate, or maintain any of the facilities, assets, or programs included in the Complementary Transportation Systems.

**Figure 24: Complementary Transportation Systems Component**



The needs for Complementary Transportation Systems are not included in the LRTP needs analysis as they are not ADOT’s responsibility to address. The subcomponents of the Complementary Transportation Systems are subsequently described briefly as they do complement the ADOT Infrastructure and ADOT Stewardship components of the Arizona Transportation System.

### 4.1 Transportation Infrastructure – Municipal, County, Federal, Tribal, and Private

Various entities maintain and have jurisdiction over transportation infrastructure that is complementary to the SHS but are not overseen by the state. Roadways like local or county arterials and collectors owned by the various municipalities and counties in the state tie in with the SHS. Federally-owned and maintained roads include those in National Parks and on military bases. Tribal roads connect to the SHS but are owned, operated, and maintained by tribal governments. Private roads like those found in gated communities in the state are often linked to municipal, county, or ADOT facilities. ADOT does not own or operate transportation infrastructure within these entities; however, partnerships and collaboration with these entities (in terms of funding connections to ADOT infrastructure) is important to ADOT.

### 4.2 Phoenix and Tucson Public Transit Systems

Urban transit systems play an important role in the overall transportation network, but as direct recipients of FTA funds, the urban public transit systems in Phoenix and Tucson are outside of



ADOT’s stewardship. More information on these transit systems and their needs can be found in the MAG and PAG RTPs.

### **4.3 Private Transit Systems**

Private transit systems like certain dial-a-ride ride services, Greyhound intercity bus service, and college campus shuttles improve mobility and connectivity in Arizona but are not funded by any programs administered by ADOT.

### **4.4 Private Rail Facilities**

Private rail facilities and services include freight railroads (e.g., Union Pacific and BNSF) and Amtrak. As railroad facilities and services are privately owned and operated, ADOT has no jurisdiction over railroads besides for safety at highway-rail at-grade crossings as discussed previously in the needs analysis.

### **4.5 Public and Private Airports**

Public and private airports account for nearly the entirety of the state’s aviation system. The only State-owned airport is the Grand Canyon National Park Airport, as discussed previously. While ADOT administers the state aviation funds to all eligible airports in Arizona, any operations, maintenance, or capital improvements done at airports using other funding sources than the state aviation funds are outside of ADOT’s responsibility.

### **4.6 Federal Ports of Entry**

Arizona has nine federal POEs that regulate the passage of people and goods from Mexico into the United States. These are maintained and operated by the federal government and are separate from state POEs but work in coordination with them. The ongoing Arizona-Sonora BIMP will identify needs associated with the federal POEs in Arizona.



## 5 Summary of Findings

---

The LRTP needs analysis identifies the projected transportation needs in Arizona for the years 2026-2050. **Table 24** summarizes the ADOT Infrastructure needs while **Table 25** summarizes the ADOT Stewardship needs. **Figure 25** displays the proportional composition of the ADOT Infrastructure needs while **Figure 26** displays the proportional composition of the ADOT Stewardship needs.

The total quantified need for the Arizona Transportation System is \$231.4 billion in 2026 dollars. As shown in **Table 26**, this includes \$174.4 billion in 2026 dollars in ADOT Infrastructure needs and \$57.0 billion in 2026 dollars in ADOT Stewardship needs. **Figure 27** and **Figure 28** display the proportional composition of the Arizona Transportation System needs at detailed and summary levels, respectively.



**Table 24: ADOT Infrastructure 2026-2050 Needs**

Needs Source		Total Needs (2026 Dollars in Millions)
State Highway System (SHS)	Pavement	\$63,300
	Bridge	\$8,842
	Mobility	\$88,062
	Safety	\$5,892
	Freight	\$4,404
Other Facilities	State Ports of Entry	\$1,085
	Rest Areas/Truck Parking	\$2,785
	Grand Canyon Airport	\$34
<b>Total</b>		<b>\$174,405</b>

**Table 25: ADOT Stewardship 2026-2050 Needs**

Needs Source	Total Needs (2026 Dollars in Millions)
Public Transit Funding	\$3,457
Aviation Infrastructure Funding	\$19,968
Passenger Rail Funding	\$17,504
Non-SHS Bridge Inspections and Funding	\$826
Statewide Planning Funding	\$1,748
HSIP, CMAQ, and TA Funding	\$13,147
EV Charging and CRP Funding	\$59
Public At-Grade Highway-Rail Crossings Safety Funding	\$306
<b>Total</b>	<b>\$57,014</b>

**Figure 25: ADOT Infrastructure Needs**

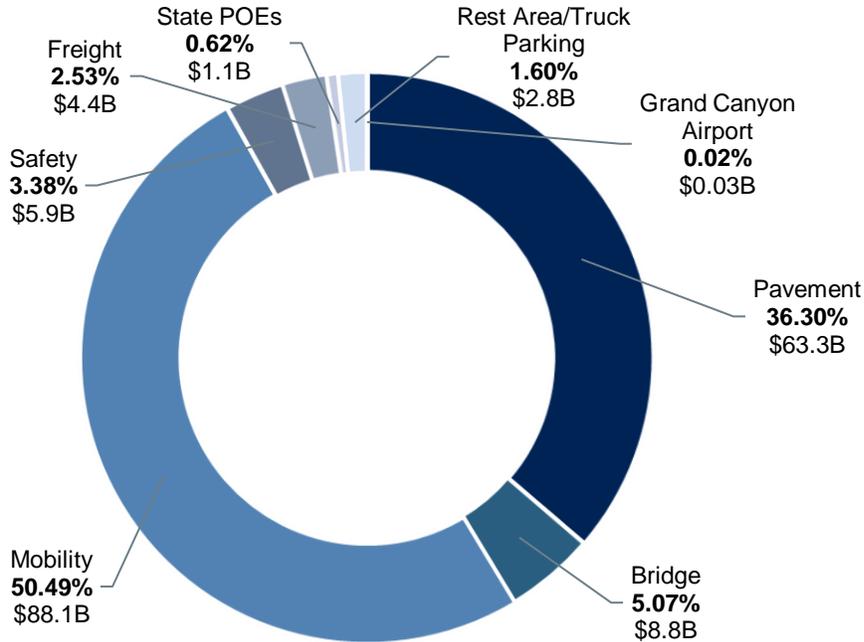
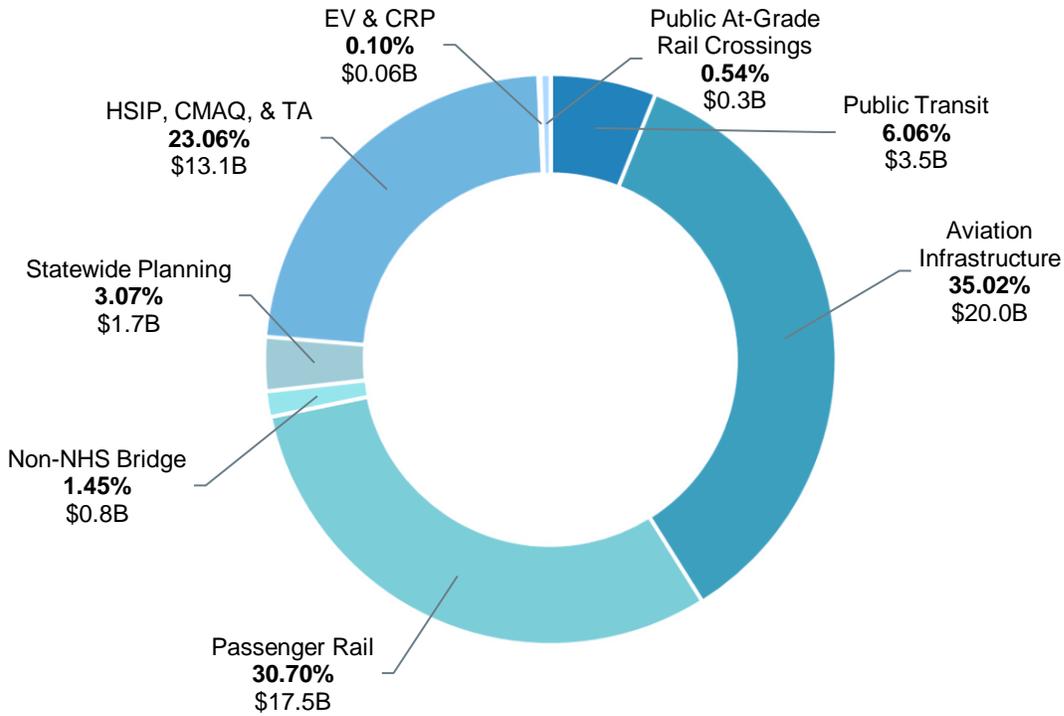


Figure 26: ADOT Stewardship Needs

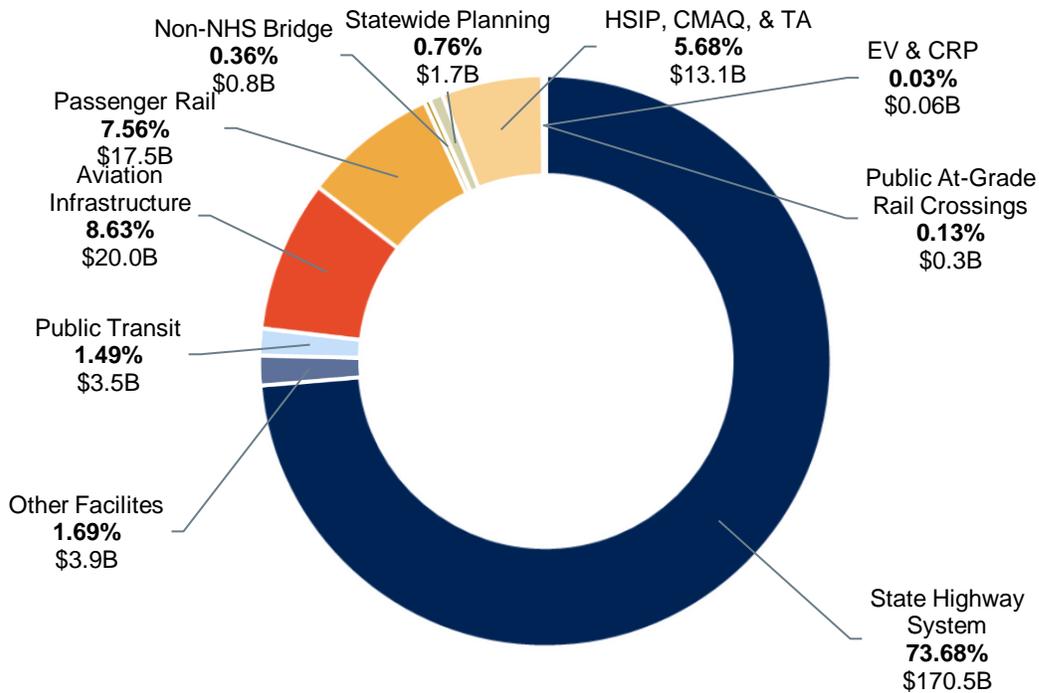




**Table 26: Arizona Transportation System 2026-2050 Needs**

Transportation System Component	Total Needs (2026 Dollars in Millions)
ADOT Infrastructure	\$174,405
ADOT Stewardship	\$57,014
Complementary Transportation Systems	Not Included
<b>Total</b>	<b>\$231,419</b>

**Figure 27: Arizona Transportation System Detailed Needs**





**Figure 28: Arizona Transportation System Summary Needs**

