FHWA-AZ-EIS-19-01-D

Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation

Chapter 1, Purpose and Need

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ADOT

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1 PURPOSE AND NEED

1.1 Introduction

The Federal Highway Administration (FHWA) and Arizona Department of Transportation (ADOT) are conducting the environmental review process for the Interstate 11 (I-11) Corridor from Nogales to Wickenburg, Arizona. An Alternatives Selection Report and Draft Tier 1 Environmental Impact Statement and Preliminary Section 4(f) Evaluation (Draft Tier 1 EIS) were prepared as part of this process in accordance with the National Environmental Policy Act of 1969 (NEPA) and other regulatory requirements. FHWA is the federal lead agency and ADOT is the local project sponsor under NEPA.

1.1.1 Tiered EIS

FHWA is responsible for compliance with NEPA and related statutes. FHWA is following a tiered environmental process, and a Tier 1 EIS will be completed during this I-11 Corridor Study. The Tier 1 EIS is an effective method for managing the NEPA process across a large geographic area, such as the I-11 Corridor. It allows the NEPA process to move forward with no identified funding, laying the groundwork for where the corridor would be located.

A Tier 1 EIS consists of a programmatic approach for identifying existing and future conditions and evaluating the comprehensive effects of the project on the region. The decision to be made at the conclusion of the Tier 1 EIS process would be to select a 2,000-foot-wide Build Corridor Alternative that would advance to further design and Tier 2 NEPA analysis, or to select the No Build Alternative. Tier 2 environmental studies would be required to determine the specific alignment of I-11, including design details and traffic interchange locations, and would evaluate more specific project-level issues, such as individual property impacts and mitigation. Tier 2 environmental studies could occur in phases, breaking up the 280-mile-long Nogales to Wickenburg corridor into interim projects or shorter segments, as funding becomes available for further study and construction.

1.1.2 Project Development Status

In December 2015, the United States (US) Congress approved the *Fixing America's Surface Transportation Act* (FAST Act), which is 5-year legislation to improve the nation's surface transportation infrastructure. The FAST Act formally designates I-11 as an interstate freeway throughout Arizona that replaces the corridor formerly known as CANAMEX (defined as High Priority Corridor #26).

This NEPA process builds upon the prior *I-11 and Intermountain West Corridor Study* (IWCS), a multimodal planning effort completed in 2014 that involved ADOT, Nevada Department of Transportation (NDOT), FHWA, Federal Railroad Administration (FRA), Maricopa Association of Governments (MAG), Regional Transportation Commission of Southern Nevada (RTC), and other key stakeholders. The IWCS identified the I-11 Corridor as a critical piece of multimodal infrastructure that would diversify, support, and connect the economies of Arizona and Nevada, and that would be a smaller segment of the larger north-south transportation corridor linking the US to Mexico and Canada. More information on the IWCS is available online at i11study.com.

Based on the regional perspective of need established in the IWCS, several different studies are advancing shorter segments of the I-11 Corridor in the southwest, addressing both regional transportation needs and the national corridor need established in the IWCS.

NDOT, in conjunction with RTC, is advancing two segments of I-11 in Nevada. The first is a two-phased construction project known as the I-11 Boulder City Bypass connecting US 95/US 93 southeast of Las Vegas with the Hoover Dam Bypass Bridge, which is expected to be fully open to traffic by the end of 2018 (NDOT 2017). The second is a Planning and Environmental Linkages (PEL) study for the segment between the northwest edge of the Las Vegas metropolitan area and I-80 in western Nevada. The I-11 Corridor in northern Nevada generally follows US 95. However, the primary purpose of the PEL study is to determine the most reasonable connection with I-80, and the study will evaluate corridor options between Reno/Sparks and the area north of Fallon, Nevada. A PEL study often precedes NEPA to advance high-level corridor planning for a broad study area, such as this 450-mile span.

This Draft Tier 1 EIS is the next step in the continuum of project development activities for the I-11 Corridor between Nogales and Wickenburg, which extends approximately 280 miles, as shown on **Figure 1-1** (State of Arizona, USA) and **Figure 1-2** (I-11 Corridor Study Area Evolution). It evaluates the No Build Alternative as well as the 2,000-foot-wide corridors under consideration for the location of I-11. Future Tier 2 environmental studies would determine the specific location of the I-11 alignment. The No Build Alternative, which is described in more detail in **Chapter 2** (Alternatives Considered), represents the existing transportation network along with the committed projects that are programmed for funding.

This chapter explains the background context of this project and provides the Purpose and Need for pursuing the proposed action of implementing an I-11 Corridor between Nogales and Wickenburg. The *Purpose and Need Memorandum* (ADOT 2017a) provides additional technical information and is available on the project website: i11study.com/.

1.2 Background

The concept of a high-capacity, north-south interstate freeway facility connecting Canada and Mexico through the western US has been considered for more than 25 years. It was initially identified as the CANAMEX trade corridor in the 1991 Intermodal Surface Transportation Efficiency Act, established under the North American Free Trade Agreement in 1993, and defined by Congress in the 1995 National Highway Systems Designation Act (Public Law 104-59). CANAMEX was designated as High Priority Corridor #26 in the National Highway System, recognizing the importance of the corridor to the nation's economy, defense, and mobility.

In 2014, NDOT and ADOT jointly completed the IWCS that encompassed a broad study area for the Intermountain West region from Mexico to Canada. The purpose of the IWCS was to determine whether sufficient justification exists for a new high-capacity, high-priority transportation corridor and, if so, to identify potential routes. The study established the corridor vision, developed justification, and defined an implementation plan to move forward. It was intended to provide an overview of the corridor opportunities within the two states and a foundation for subsequent alternative and environmental studies.

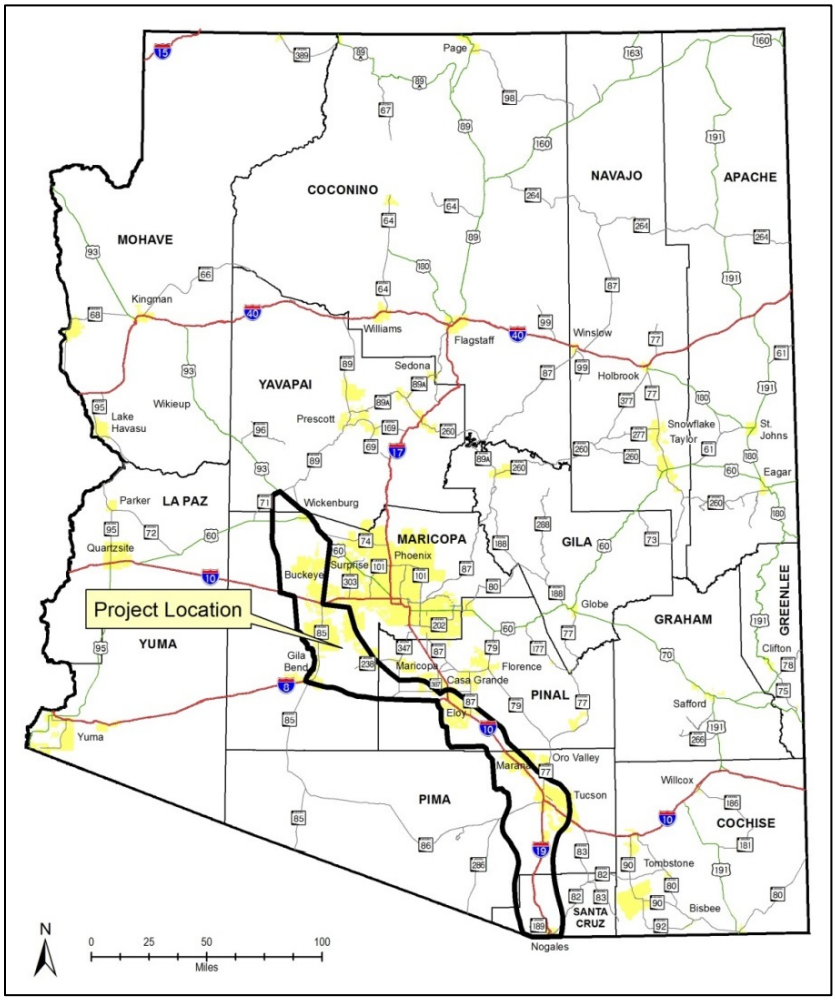

Figure 1-1 State of Arizona, USA

NDOT and ADOT engaged the public and stakeholders throughout the IWCS. The study included a high-level environmental review of Build Corridor Alternatives through FHWA's PEL process. This effort resulted in the definition of a set of feasible corridors to advance into future planning and/or environmental studies, with the intent that these studies would occur via individual studies on components of the overall corridor (such as this Draft Tier 1 EIS). Each proposed segment from the IWCS includes logical beginning and ending points to allow future studies to advance as needed without requiring completion of an adjacent segment. Accordingly, the IWCS provided the initial basis for the I-11 Corridor Study Area (Study Area) for this Tier 1 EIS process.

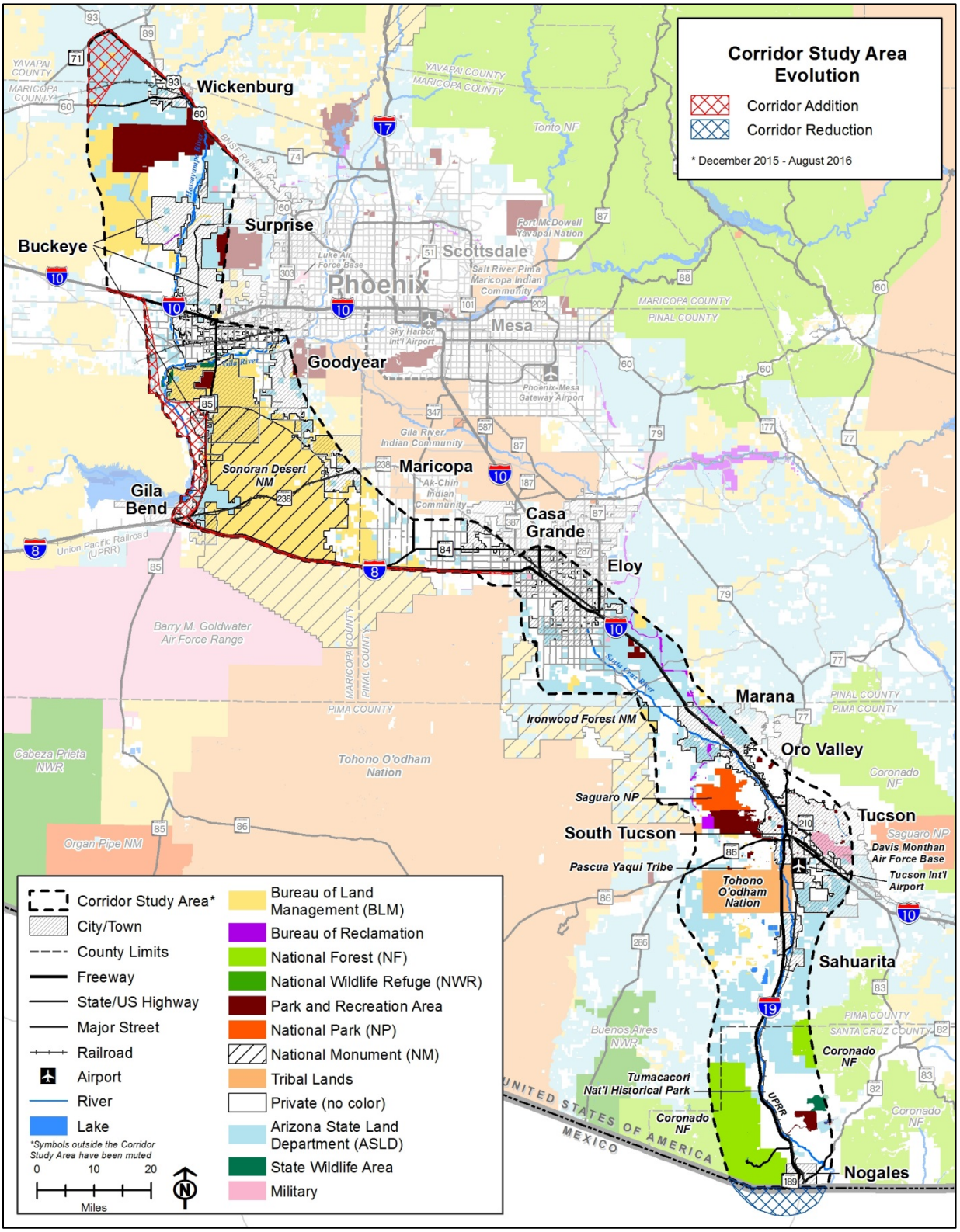

Figure 1-2 I-11 Corridor Study Area Evolution

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1.3 Study Area

Figure 1-2 (I-11 Corridor Study Area Evolution) depicts the Study Area for this Draft Tier 1 EIS. The initial Study Area boundary represented the outer limits of the range of feasible Build Corridor Alternatives recommended for further study in the IWCS, as vetted through that study's stakeholder team and public outreach process. Minor revisions were made to the boundary in response to input received during the scoping process that initiated the Draft Tier 1 EIS in May 2016. These refinements included widening the Study Area west of State Route (SR) 85 to allow a wider range of alternatives to be considered in this area of sensitive environmental resources associated with the Sonoran Desert National Monument, Gila River, and other topographical/ hydrological constraints; and extending the northern terminus to the US 93/SR 71 intersection to allow a wider range of connectivity options into US 93. During scoping, the southern boundary of the Study Area was confirmed as the I-19/SR 189 interchange in Nogales, where improvements to address the connection to the Sonora-Arizona border are planned. The Study Area contains a wide enough buffer around Tribal lands to ensure alternatives can be reasonably developed off Tribal lands, which are sovereign nations that did not give FHWA and ADOT permission to assess routes on their lands.

Figure 1-2 (I-11 Corridor Study Area Evolution) shows the existing transportation network, municipalities, and major public and private land ownership in the Study Area. The Study Area extends approximately 280 miles from Nogales to Wickenburg, traversing five counties (Santa Cruz, Pima, Pinal, Maricopa, and Yavapai); 13 municipalities (Nogales, Sahuarita, South Tucson, Tucson, Oro Valley, Marana, Eloy, Casa Grande, Gila Bend, Goodyear, Buckeye, Surprise, and Wickenburg); and two Tribal communities (Tohono O'odham Nation and Pascua Yaqui).

Existing interstate freeways in the Study Area include I-19 from Nogales to Tucson, I-10 from Tucson to Casa Grande, I-8 from Casa Grande to Gila Bend, and I-10 from Buckeye to Tonopah. US 60 and US 93 border the northern end of the Study Area. The state highway network also contains:

- SRs 82 and 189 in Nogales
- SRs 77, 86, and 210 near Tucson
- SRs 84, 87, 287, and 347 near Casa Grande
- SR 238 near the Sonoran Desert National Monument
- SR 85 between Gila Bend and Buckeye
- SRs 71 and 89 near Wickenburg

The Union Pacific Railroad runs adjacent to I-19 (Nogales Subdivision) and I-10 (Sunset Corridor) in the southern end of the Study Area, before turning west toward Gila Bend along SR 238. The BNSF Railway parallels US 60 in the northern portion of the Study Area to Wickenburg (Phoenix Subdivision, also referred to as the "Peavine Corridor").

The Study Area includes a mix of privately owned properties, military (US Department of Defense), and Tribal lands, as well as lands owned or managed by the Arizona State Land Department (ASLD), Bureau of Land Management (BLM), Bureau of Reclamation (Reclamation), National Park Service (NPS), US Fish and Wildlife Service (USFWS) National

Wildlife Refuges, and US Forest Service (USFS). Tribal lands within the Study Area include lands owned by the Tohono O'odham Nation and Pascua Yaqui. While these lands are physically within the Study Area, the Tohono O'odham Nation and Pascua Yaqui did not grant permission to study transportation corridors on them, and therefore alternatives were not identified on Tribal lands. State Wildlife Areas are managed or deeded to the Arizona Game and Fish Department (AGFD), conveyed by various landowners, including but not limited to the ASLD, BLM, Reclamation, USFS, and private landowners. Major rivers in the Study Area include the Santa Cruz from Nogales to Casa Grande, the Gila from Gila Bend to Goodyear, and the Hassayampa from Buckeye to Wickenburg.

1.4 Prior Studies

The I-11 Corridor was identified as a critical need in statewide plans, regional transportation plans, and municipal planning documents. These prior studies and plans provide insight into the issues and needs identified by ADOT, regional agencies, and local communities and lay the groundwork for the concept of a new interstate in Arizona.

The 2014 IWCS directly investigated the problems and possible solutions that inform the Purpose and Need for the I-11 Corridor. This study incorporated the findings of many prior regional and statewide plans and confirmed the need and provided justification for advancing I-11. This background planning context is summarized in **Chapter 2** (Alternatives Considered), as well as in the full *Purpose and Need Memorandum*, available on the study website (i11study.com/Arizona/PDF/I-11-Purpose-and-Need-Memorandum-022417.pdf).

The 2014 IWCS, which is the foundational study providing context to this Draft Tier 1 EIS, stated that the overall purpose of the I-11 Corridor is to:

> *Provide an access-controlled, north-south transportation corridor that will connect important metropolitan areas and markets in the Intermountain West with Mexico and Canada to support improved regional mobility for people and freight, and provide enhanced opportunities for trade and economic development.* (NDOT and ADOT 2014a)

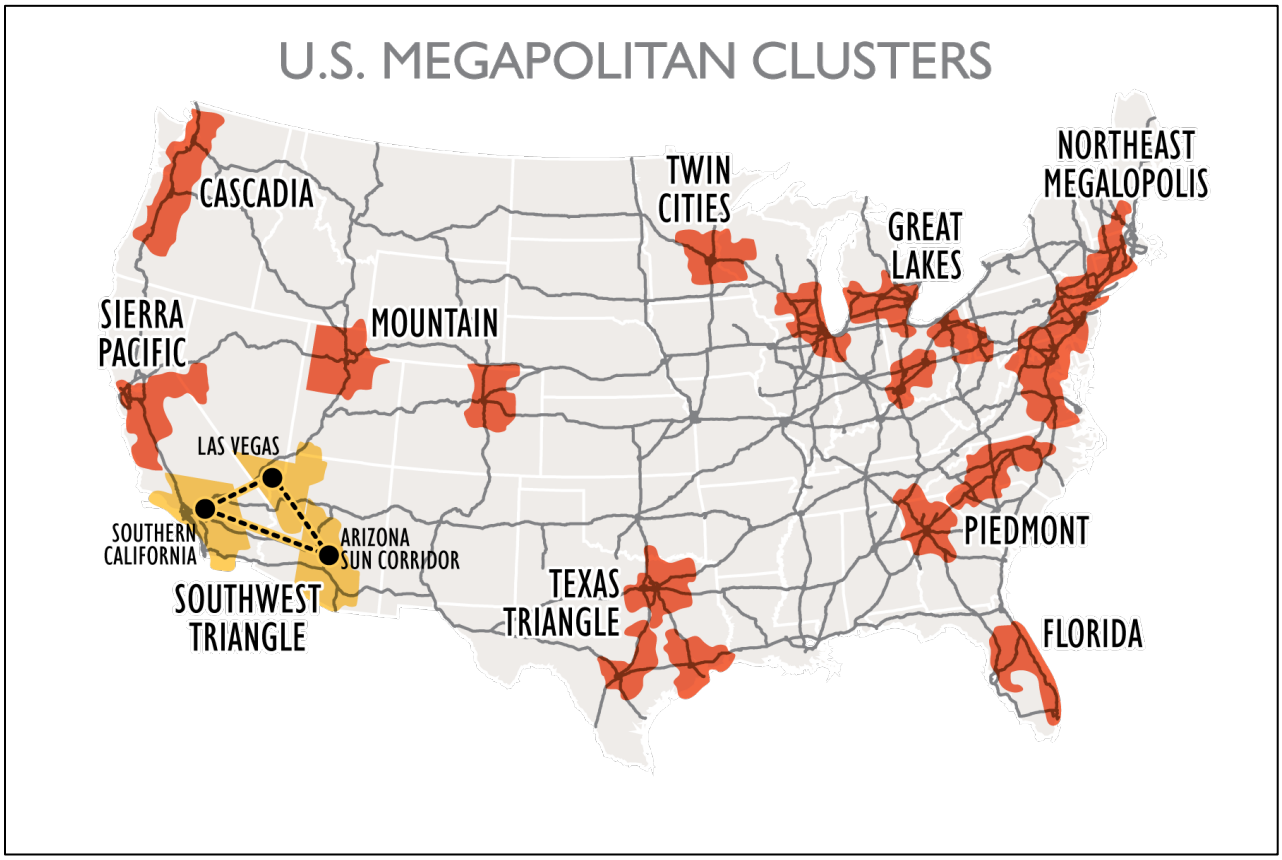
The IWCS demonstrated that improving connectivity, access, and travel time reliability through an I-11 Corridor could expand opportunities for economic growth in Arizona (NDOT and ADOT 2014b). This is a key priority of the Governor's Office. It is consistent with ADOT's mission and vision of creating a transportation system for Arizona that improves the quality of life (azdot.gov/about/inside-adot/MissionandVision), and it is compatible with one of the major tenets of the FAST Act, which is to create jobs and support economic growth (FHWA 2016).

The IWCS concluded that the I-11 Corridor would:

- **Connect regional economies to each other and global markets.** The megapolitan areas in the greater southwestern US – Southern California, Las Vegas, and the Phoenix/Tucson metropolitan areas (the Arizona Sun Corridor) – have expanded and are interlinked, forming the Southwest Triangle Megaregion shown on **Figure 1-3** (Southwest Triangle within Megapolitan America). The increased mobility of workers and goods between the cities of these megapolitan areas would enable greater collaboration, flexibility, and innovation, which would lead to a more diverse and stable economy built on technology, innovation, and high-value manufacturing. The Interstate Highway System is much sparser in the west than the east, especially regarding north-south linkages. Only three north-south interstates exist in the western US: I-5, I-15, and I-25. The I-11 Corridor would create a key parallel high-capacity

transportation facility in the Intermountain West, filling a gap in the national transportation system.

- **Create opportunities for integrated manufacturing.** The I-11 Corridor is positioned to support and promote economic activity related to the current and emerging manufacturing and trade relationship with Mexico. Efficient transportation links with Mexico would create opportunities for specialized manufacturing in the US, supported by Mexican production. Each country would be able to leverage its inherent competitive advantages.



SOURCE: NDOT and ADOT 2014a; Nelson and Lang 2011.

Figure 1-3 Southwest Triangle within Megapolitan America

- **Advance statewide economic development initiatives.** Agencies and communities in Arizona formulated economic development initiatives, recognizing the importance of creating high-wage jobs, leveraging existing statewide assets, and improving the foundations that support economic development, such as the construction of efficient transportation infrastructure. To compete nationally and internationally, Arizona communities have advanced economic development initiatives focused on building the economy and targeting specific industry clusters − many of which directly depend on good transportation infrastructure.

The IWCS demonstrated the need for the I-11 Corridor as a means to enhance regional, national, and international mobility by:

- Improving long-distance travel time reliability;

- Providing key facilities in the national Interstate Highway System where a gap currently exists;
- Serving emerging trade patterns of integrated manufacturing between North American countries;
- Connecting communities; and
- Providing capacity to accommodate future growth in commerce.

The IWCS indicated that overall congestion in the Southwest Triangle is increasing. This area is on a trajectory to be economically the strongest American region that maintains linkages to the world's fastest emerging economies in Asia and Latin America. The transportation network in this region was developed decades ago to serve the economic, population, and mobility needs at that time – east-west movements of people and goods between Southern California and the rest of the country. The current need is increasingly reflecting north-south demands due to integrated manufacturing between the US and Mexico as well as the increased demand as Mexican ports increasingly function as alternative ports for foreign goods to enter North American markets. Currently, the ports of Los Angeles and Long Beach are the key ports for trade with Asia, but expansion possibilities are constrained by adjacent urban development, and the increasingly congested I-5 in California may stimulate demand for additional north-south routes, such as the I-11 Corridor, to accommodate the movement of freight (NDOT and ADOT 2014b).

1.4.1 Multimodal Considerations

The 2016 progress update of the Arizona *Long Range Transportation Plan* suggested that the economic outlook of Arizona would outpace the US in terms of jobs, population, and real income growth (ADOT 2016a). This economic growth would result in demands on the multimodal transportation system. Rail facilities and services already exist within the Study Area, or were examined as part of the *Arizona Passenger Rail Corridor Study*, *State Rail Plan Update*, and *State Freight Plan*. These independent study efforts identified objectives for passenger and freight rail service within or near the Study Area. The Draft Tier 1 EIS does not re-evaluate these study outcomes, although the potential for incorporating other transportation modes into the I-11 Corridor was considered as part of both IWCS and the scoping and alternatives development process.

Throughout the IWCS, NDOT and ADOT engaged utility and energy industry stakeholders and invited them to provide data and share options and ideas on decision points. As part of this effort, a Utility/Energy Focus Group was established early in the process to frame the discussion of multimodal needs and opportunities. The discussions highlighted the point that utility providers typically only invest in additional infrastructure as demand merits. The participants indicated that no long-range utility or energy plans currently exist, nor do utility or energy expansion needs exist. However, long-term flexibility of a common or consolidated corridor should be considered (NDOT and ADOT 2013).

Prior to and during scoping, FHWA and ADOT re-engaged with Class I railroads and utility providers within the Study Area. This outreach did not identify specific needs or proposals to include as part of the I-11 Build Corridor Alternatives. Large portions of the Study Area are already served by Class I railroads, and freight capacity improvements (such as double-tracking Union Pacific Railroad's Sunset Route) have been recently completed. ADOT and the FRA recently completed the *Arizona Passenger Rail Corridor Study*, a Tier 1 EIS that outlined an

approach to implementing intercity passenger rail between Tucson and Phoenix. FHWA and ADOT will continue to coordinate with stakeholders to ensure that a multimodal facility (i.e., rail and utility) is allowable within the I-11 Corridor in the future, to the maximum extent feasible.

1.5 Need for Proposed Facility

The assessment of needs associated with the I-11 Corridor from Nogales to Wickenburg builds upon the IWCS and its accompanying PEL (NDOT and ADOT 2014a). Key transportation-related problems and issues in the Study Area were identified based on a combination of previous studies and input from agency coordination and public involvement during the I-11 Corridor Study scoping process. The problems, issues, and opportunities identified in the Study Area are:

- **Population and employment growth**: High-growth areas need access to the high-capacity, access-controlled transportation network.
- **Traffic growth and travel time reliability:** Increased traffic growth reduces travel time reliability due to unpredictable freeway conditions that impede travel flows, and hinder the ability to move people and goods around and between metropolitan areas efficiently.
- **System linkages and regional mobility:** The lack of a north-south interstate freeway link in the Intermountain West constrains trade, reduces access for economic development, and inhibits efficient mobility.
- **Access to economic activity centers:** Efficient freeway access and connectivity to major economic activity centers are required to operate in a competitive economic market.
- **Homeland security and national defense:** Alternate interstate freeway routes and regional route redundancy help alleviate congestion and prevent bottlenecks during emergency situations. These routes may be parallel or may generally serve the same major origin and destination points, with local or regional roads connecting the freeways.

1.5.1 Population and Employment Growth

Table 1-1 (Population and Employment Growth, 2015 to 2040 [No Build Alternative]) shows anticipated growth in the Study Area. **Figure 1-4** (Population Density 2015 and 2040 and Planned High-Growth Areas) and **Figure 1-5** (Employment Density 2015 and 2040 and Planned High-Growth Areas) compare actual population and employment for 2015 and projections for 2040. The projections are from the Arizona Statewide Travel Demand Model, which forecasts future conditions based on data from the state's metropolitan planning organizations and the Arizona State Demographer's Office. **Figures 1-4** and **1-5** also show the areas where local municipalities are planning for high growth (in pink). The growth areas were determined based on municipal general and county comprehensive plans, and supported by interviews with local planning and economic development staff. High-capacity, access-controlled facilities are needed to serve these high-growth areas.

Within the Maricopa County portion of the Study Area, population and employment are projected to increase by 259 percent (+247,000) and 248 percent (+34,900) from 2015 to 2040, respectively. During that same time period, employment within the Pinal County portion of the Study Area is projected to have similar high-growth rates at 234 percent (+34,000). Pima County would have the greatest growth in both population (+219,500) and employment (+120,400).

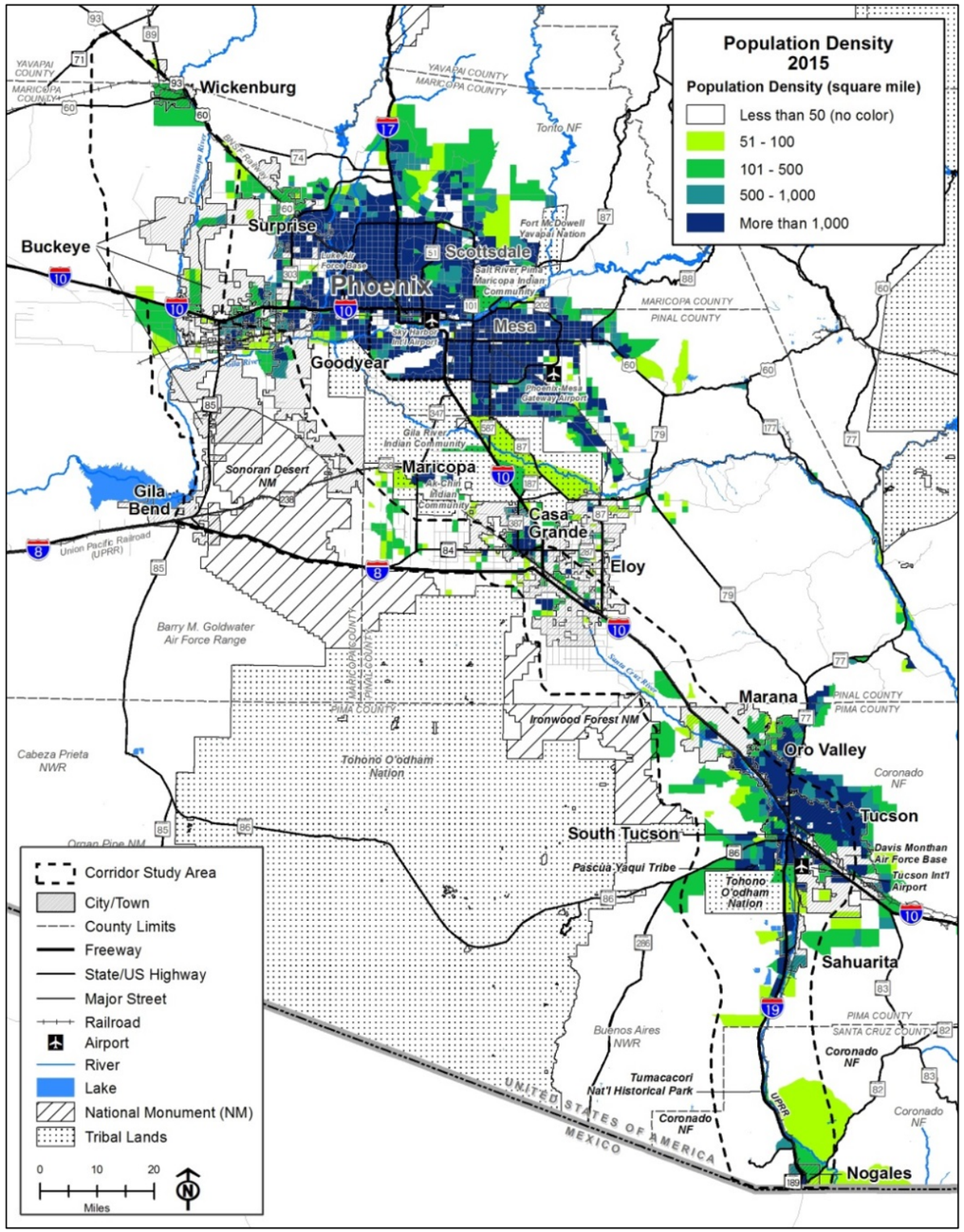
In 2015, the Study Area contained approximately 370,000 jobs, or about 15 percent of all employment in Arizona (ADOT 2017b). This share is projected to grow to 23 percent of the state's employment by 2040. Nogales, Tucson, Casa Grande, Goodyear, Buckeye, Wickenburg, and other communities will contribute to this employment growth. The I-11 Corridor would improve access to this employment base on the regional transportation system.

Agriculture, manufacturing, and mining were the leading economic sectors in the Study Area in 2015. However, a greater percentage of employment is expected in the construction, health services, retail, and wholesale trade sectors by 2040, with manufacturing jobs projected to grow by 23 percent.

Table 1-1 Population and Employment Growth, 2015 to 2040

County	Population							
	County Totals				Within Study Area			
	2015	2040	Growth	% Growth	2015	2040	Growth	% Growth
Santa Cruz	49,500	71,000	+21,500	43	47,000	54,400	+7,400	16
Pima	1,007,300	1,343,000	+335,700	33	838,700	1,048,800	+219,500	25
Pinal	369,100	851,000	+481,900	131	56,200	101,200	+45,000	80
Maricopa	4,110,600	6,077,000	+1,966,400	48	95,400	342,400	+247,000	259
Yavapai	218,500	317,000	+98,500	45	400	600	+200	50
Total	5,755,000	8,659,000	2,904,000		1,037,700	1,547,400	519,100	
County	**Employment**							
	County Totals				Within Study Area			
	2015	2040	Growth	% Growth	2015	2040	Growth	% Growth
Santa Cruz	13,400	20,000	+6,600	49	13,000	16,300	+3,300	25
Pima	351,800	495,600	+143,800	41	328,500	448,900	+120,400	38
Pinal	54,000	294,000	+240,000	444	14,500	48,500	+34,000	234
Maricopa	1,732,600	2,777,800	+1,045,200	60	14,100	49,000	+34,900	248
Yavapai	57,200	87,100	+29,900	52	20	40	+20	50
Total	2,209,000	3,674,500	1,465,500		370,120	562,740	192,620	

SOURCE: ADOT 2017b.



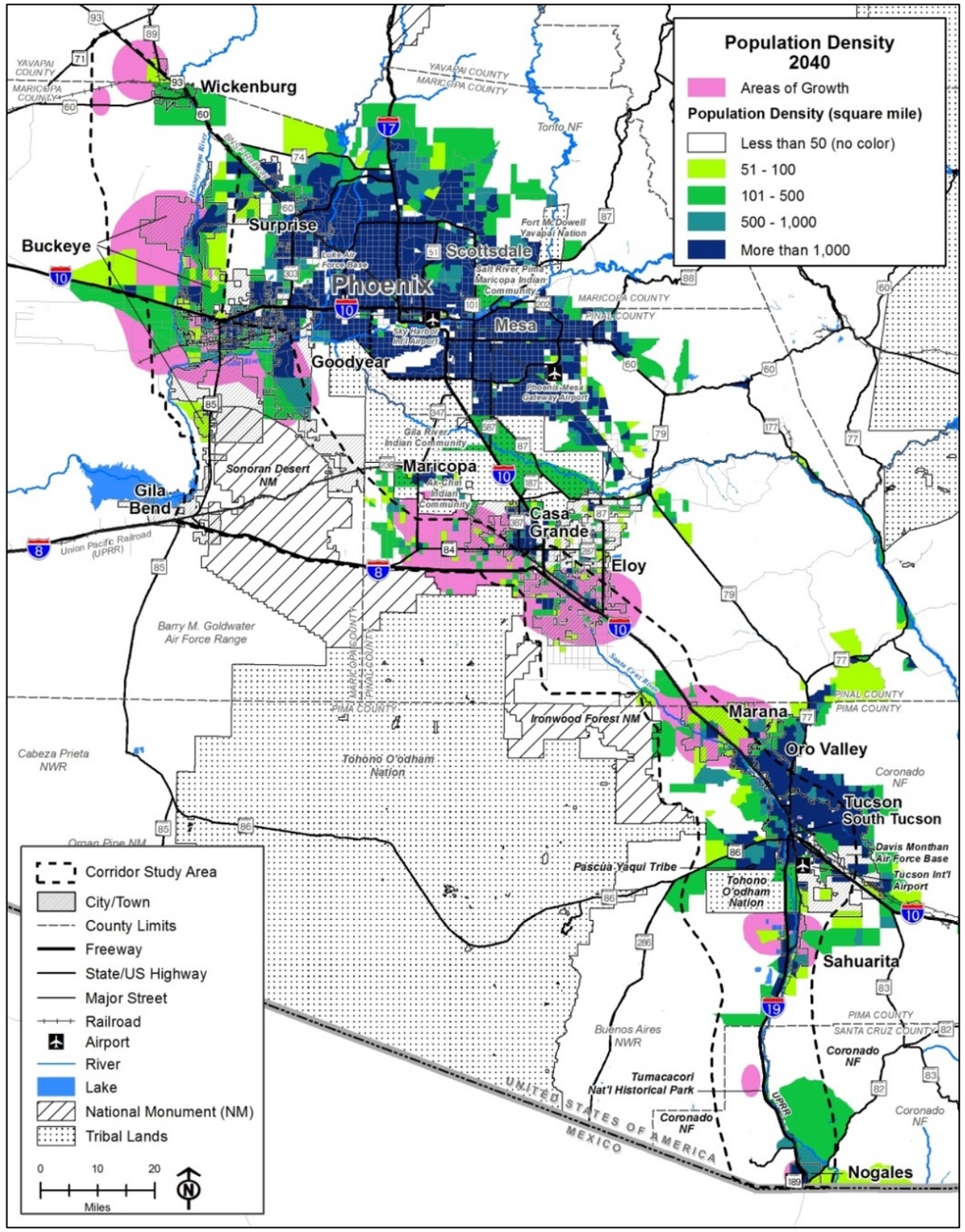
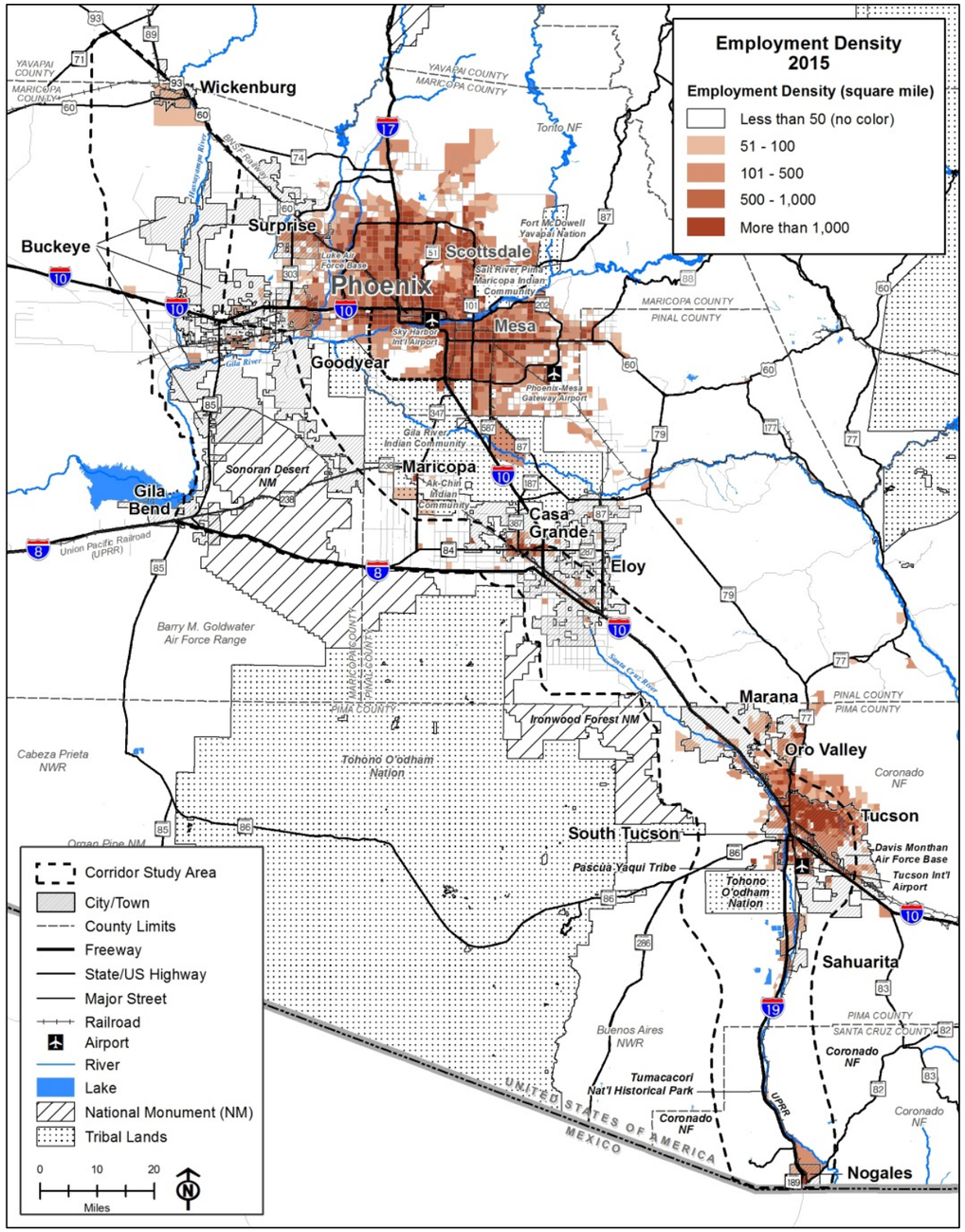


Figure 1-4 Population Density 2015 and 2040 and Planned High-Growth Areas



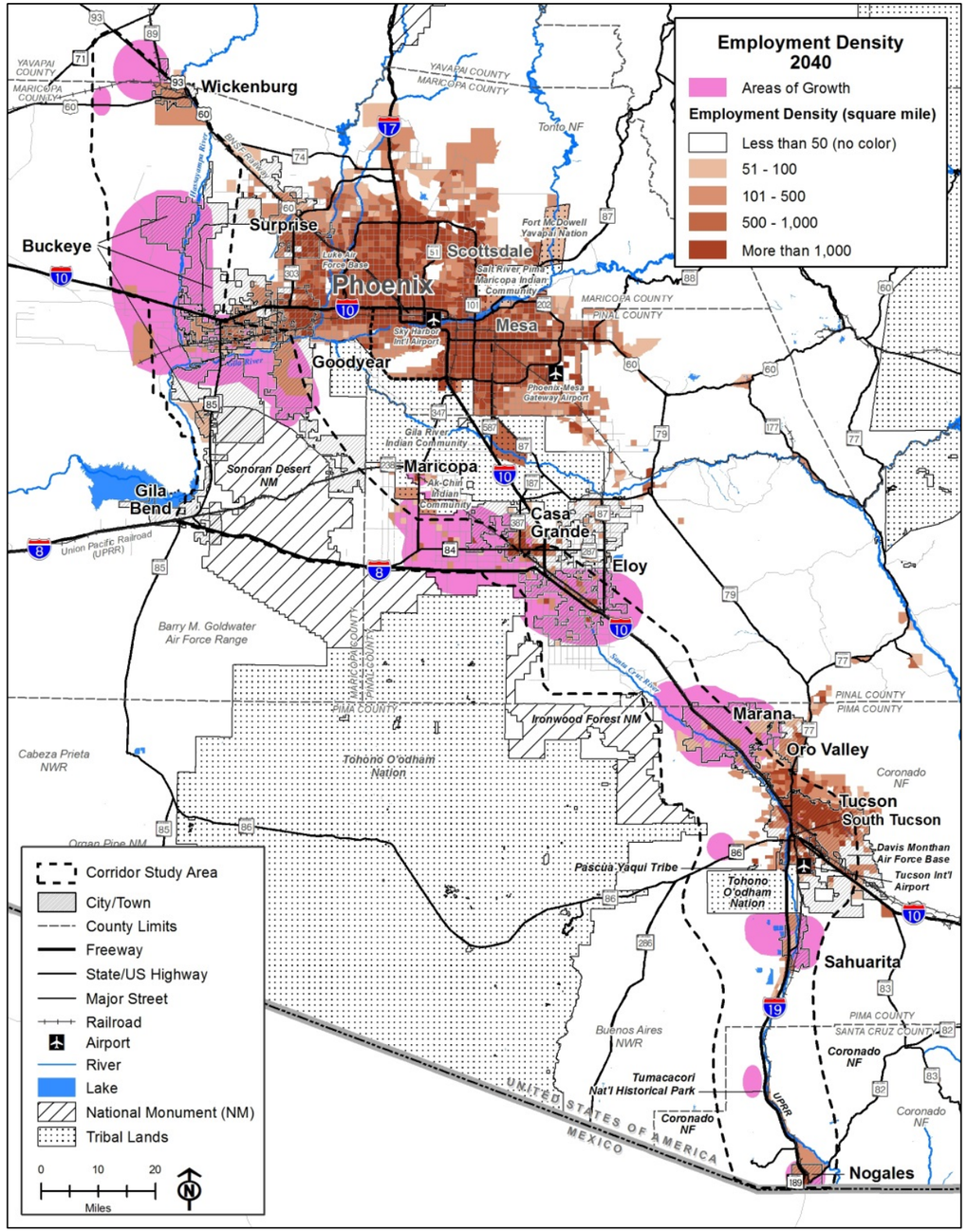


Figure 1-5 Employment Density 2015 and 2040 and Planned High-Growth Areas

1.5.2 Traffic Growth and Travel Time Reliability

Already, travel demand levels on the interstate freeway facilities within the Study Area cause congestion that reduces travel time reliability during peak and non-peak periods. Other contributors include unpredictable freeway conditions that impede travel flows (e.g., road restrictions or closures due to crashes, work zones, oversized vehicles, and isolated weather events such as dust storms, flooding, and wildfires). Over the next 20 years, interstate congestion and travel time reliability are expected to worsen due to population and employment growth inside and outside the Study Area, the increase in truck traffic, and the growth of international trade.

Table 1-2 (Average Weekday Traffic and Level of Service, 2015 and 2040 [No Build Alternative]) provides level of service (LOS) information for an average weekday between specific city pairs and indicates that existing freeways within the Study Area were generally operating at LOS C or better in 2015. This information reflects the future committed highway network, which is the existing highway network plus capacity improvements identified in the ADOT 2017-2021 Five-Year Transportation Facilities Construction Program (ADOT 2016b).

Table 1-2 Average Weekday Traffic and Level of Service, 2015 and 2040 (No Build Alternative)

Facility	City Pair	Lanes	Average Weekday Traffic(1)	Level of Service
2015				
I-19	Nogales–Tucson	4	19,000	A
I-10	Tucson–Casa Grande (2) (3)	4 to 8	60,000	C
I-8	Casa Grande–Gila Bend	4	8,000	A
I-10	Casa Grande–Phoenix (at SR 347) (4)	4	56,000	C to D
SR 85	Gila Bend–I-10	4	14,000	A
2040				
I-19	Nogales–Tucson (3) (4)	4 to 6	24,200-135,400	C to F
I-10	Tucson–Casa Grande (2) (3) (4)	6 to 8	63,600-254,300	C to F
I-8	Casa Grande–Gila Bend (4)	4	7,700-26,800	B to C
I-10	Casa Grande–Phoenix (at SR 347) (3) (4)	4 to 6	95,400	C to F
SR 85	Gila Bend–I-10 (4)	4	14,300-60,900	C to F

(1) March 2015 weekday traffic counts from ADOT Transportation Management System. Rounded to nearest thousand.
(2) This represents an average condition of 60 miles of I-10 between I-19 and I-8, which includes the Tucson central business district.
(3) The number of travel lanes varies across this segment.
(4) LOS varies across this segment.

SOURCES: ADOT 2017b; Transportation Research Board 2010.

Some portions of I-10 near Phoenix and Tucson experienced worse traffic conditions, as compared to the rest of the corridor. The levels of service for freeways are defined on **Figure 1-6** (Levels of Service for Freeways). Freeway quality of service is graded using six letters "A" through "F," with LOS A being the best and LOS F being the worst. LOS C is generally considered to be a satisfactory level in rural areas, while LOS D is considered satisfactory for urban areas. By 2040, traffic operations on both urban and rural segments of I-10 would deteriorate due to the increased travel demand in the Study Area. For example, the segment of I-10 between Casa Grande and the southern edge of the Phoenix metropolitan area is projected to operate at LOS C to LOS F in 2040. The Tucson to Casa Grande segment also would experience an increase in traffic congestion, with LOS ranging from LOS C to LOS F by 2040. These projected levels of service are at the poor end of the traffic flow condition scale (as illustrated on **Figure 1-6**), and indicate expected delays and the need for transportation improvements to increase travel efficiency.

Figure 1-7 (Peak Period Travel Time Ratings, 2015) shows the current 2015 travel time ratings for all traffic in the Study Area. This travel time index calculates the ratio of the average peak period travel time to the free-flow travel time, representing recurring delay along the corridor that is ranked poor, fair, or good. A "good" travel time rating means travel speeds are close to the posted speed limit, whereas a "poor" rating means travel speeds are much slower than the posted speed limit. Overall traffic mobility is affected by congestion concentrated in the Phoenix and Tucson urbanized areas, resulting in poor travel time ratings. Poor travel times also were found at the junctions of I-19/I-10, I-10/I-8, I-8/SR 84, I-8/SR 85/SR 238, and I-10/SR 85.

Figure 1-8 (Average Weekday Level of Service, 2040) shows future weekday levels of service in the Study Area by 2040. LOS F traffic conditions are projected to occur throughout the I-10 corridor between Casa Grande and Phoenix, between Phoenix and Buckeye, and in the Tucson metropolitan area. US 60 shows LOS F from Phoenix to Wickenburg. LOS F represents the worst traffic conditions, and when LOS F is projected, transportation agencies typically add highway capacity to improve traffic operations, decrease congestion, and enhance travel time reliability.

Input from freight shippers and receivers to the *Arizona State Freight Plan* (ADOT 2017c) affirmed that they are largely satisfied with the current performance of the transportation system, with the exception of recurring congestion and bottlenecks in urban centers – particularly in Phoenix and on I-10 between Phoenix and Tucson. Stakeholders indicated that for Arizona to maintain and enhance its competitiveness in this area, it must develop policies and projects that maintain system reliability through measures that either improve travel time reliability or provide capacity additions (ADOT 2017c).

LEVELS OF SERVICE
for Freeways

Level of Service	Flow Conditions	Operating Speed (mph)	Technical Descriptions
A		70	Highest quality of service. Traffic flows freely with little or no restrictions on speed or maneuverability. **No delays**
B		70	Traffic is stable and flows freely. The ability to maneuver in traffic is only slightly restricted. **No delays**
C		67	Few restrictions on speed. Freedom to maneuver is restricted. Drivers must be more careful making lane changes. **Minimal delays**
D		62	Speeds decline slightly and density increases. Freedom to maneuver is noticeably limited. **Minimal delays**
E		53	Vehicles are closely spaced, with little room to maneuver. Driver comfort is poor. **Significant delays**
F		<53	Very congested traffic with traffic jams, especially in areas where vehicles have to merge. **Considerable delays**

Figure 1-6 Levels of Service for Freeways

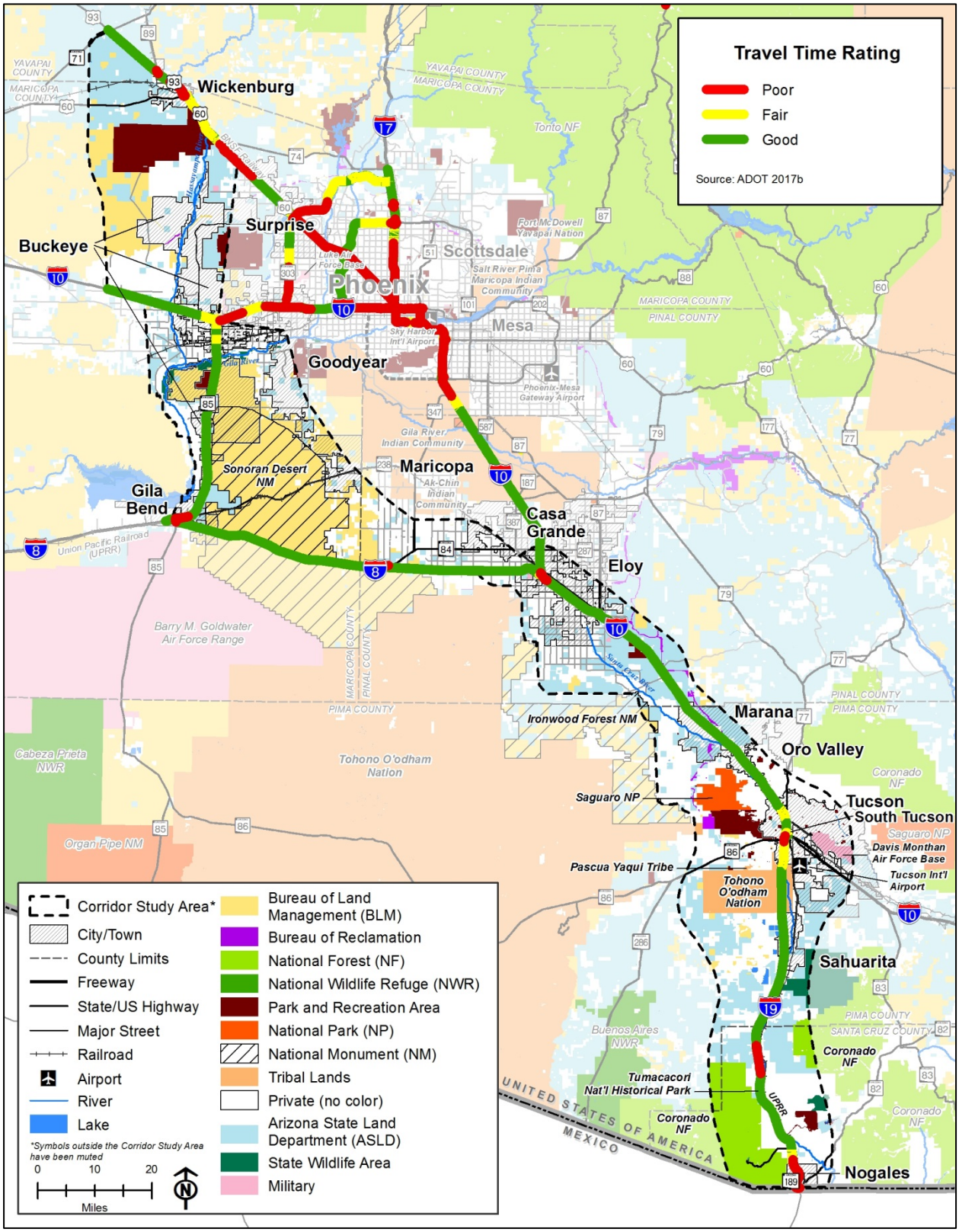


Figure 1-7 Peak Period Travel Time Ratings, 2015

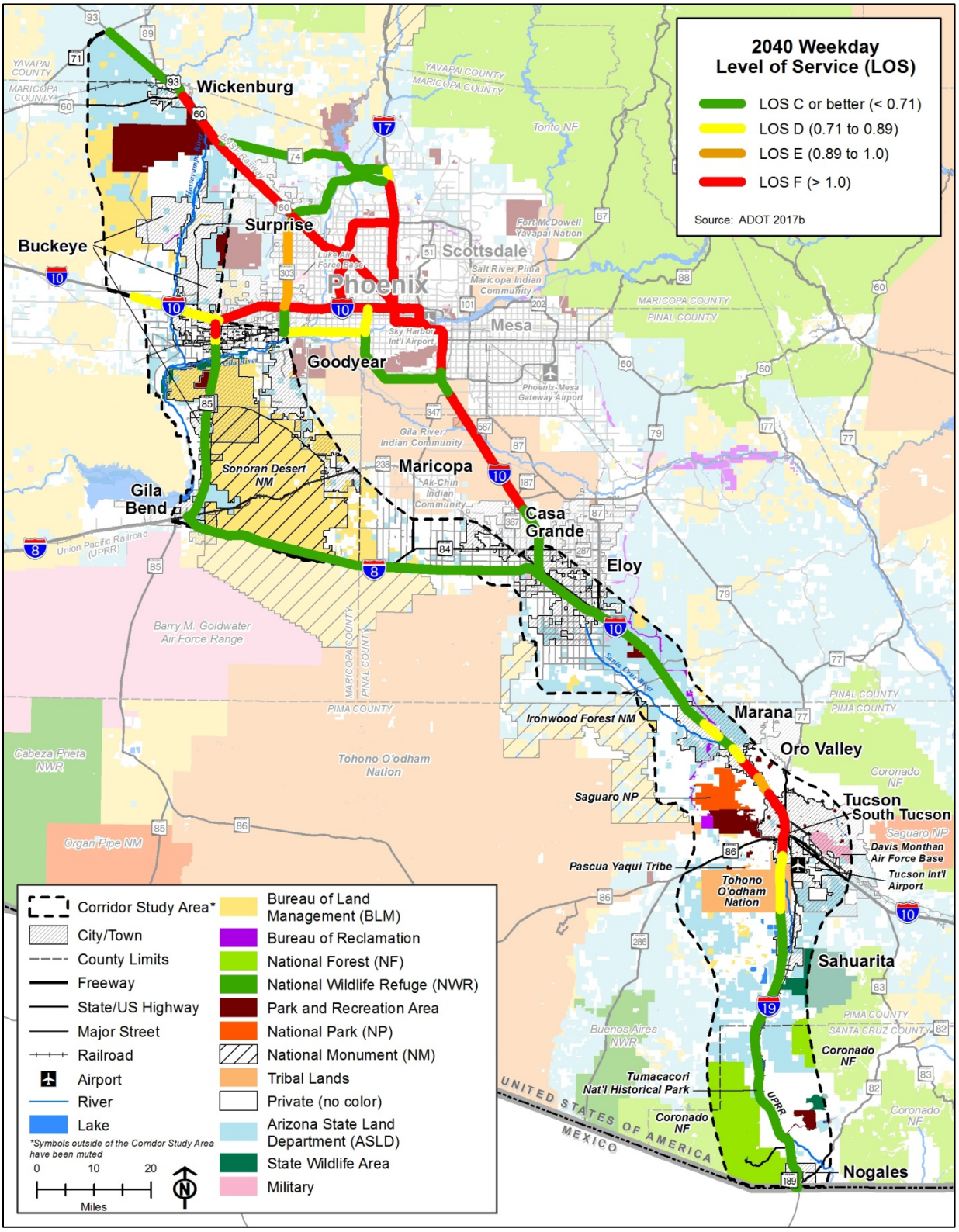


Figure 1-8 Average Weekday Level of Service, 2040

Table 1-3 (Peak Period Travel Times from Nogales to Wickenburg in Afternoon, 2015 and 2040 [No Build Alternative]) presents a comparison of peak period travel times for various trips between Nogales and Wickenburg (3 p.m. to 6 p.m.). Travel times would increase overall by approximately 90 minutes, and average speeds would decrease by as much as 19 miles per hour (mph) between Nogales and Wickenburg by 2040 due to the growing congestion along existing freeways and arterials. This information includes local, regional, and long-distance personal vehicle and truck activity, including freight movements to and from Arizona to Mexico and the west coast.

Table 1-3 Peak Period Travel Times from Nogales to Wickenburg in Afternoon, 2015 and 2040 (No Build Alternative)

Trips Between Nogales and Wickenburg [1]	Northbound			Southbound		
	Distance (miles)	Travel Time [2] (minutes)	Average Speed (mph)	Distance (miles)	Travel Time [1] (minutes)	Average Speed (mph)
2015						
I-19/I-10/I-17/SR 74/US 60/US 93	244	235	62	244	240	61
I-19/I-10/US 60/US 93	232	240	58	232	260	54
I-19/I-10/I-8/SR 85/I-10/SR 303L/US 60/US 93	275	250	66	275	250	66
I-19/I-10/L101/US 60/US 93	238	235	61	238	250	57
I-19/I-10/L303/US 60/US 93	243	230	63	243	240	61
2040						
I-19/I-10/I-17/SR 74/US 60/US 93	248	331	45	246	347	43
I-19/I-10/US 60/US 93	235	343	41	234	358	39
I-19/I-10/I-8/SR 85/I-10/SR 303L/US 60/US 93	279	329	51	278	335	50
I-19/I-10/L202/I-10/ L101/US 60/US 93 [3]	241	326	44	240	340	42
I-19/I-10/L202/I-10/ L303/US 60/US 93 [3]	246	320	46	245	332	44
I-19/I-10/L101/US 60/US 93	242	342	44	240	355	41
I-19/I-10/L303/US 60/US 93	246	335	44	245	348	42

(1) LOS and travel time rating are shown for these trips on **Figure 1-6, Figure 1-7,** and **Figure 1-8**, respectively; however, travel time rating data are not available along SR 74.
(2) Travel times based on Google estimates for a 4 p.m. departure on March 18, 2015.
(3) Reflects 2040 travel times for a route that includes the South Mountain Freeway (L202), not built in 2015.
SOURCE: ADOT 2017b; Google Maps 2015.

Table 1-4 (Peak Period Travel Times for City Pairs in Afternoon, 2015 and 2040) provides a closer look at the travel times between cities within the Study Area and confirms that travel times would continue to worsen over the 25-year period. Increased travel times will result in higher costs not only in terms of the value of time for passengers and cargo, but also in increased fuel consumption resulting from vehicles idling in traffic. The slowest 2015 peak

period travel speeds were between Casa Grande and Phoenix in the evening, with average speeds of 43 mph for northbound vehicles and 38 mph for southbound vehicles. Future travel times show that the slowest 2040 peak period travel speeds would occur between Phoenix and Wickenburg, with average speeds at 38 mph heading northbound and 35 mph heading southbound. Southbound trips between Phoenix and Wickenburg also show the greatest decline, from 57 mph in 2015 to 35 mph in 2040.

Table 1-4 Peak Period Travel Times for City Pairs in Afternoon, 2015 and 2040 (No Build Alternative)

City Pair	Northbound			Southbound		
	Distance (miles)	Travel Time (minutes)	Average Speed (mph)	Distance (miles)	Travel Time (minutes)	Average Speed (mph)
2015						
Nogales – Tucson	66	68	58	66	68	58
Tucson – Casa Grande	66	68	58	66	65	61
Casa Grande – Phoenix	50	70	43	50	80	38
Phoenix – Wickenburg	65	85	46	65	68	57
Casa Grande – Wickenburg	116	145	48	114	140	50
2040						
Nogales – Tucson	65	68	60	65	70	56
Tucson – Casa Grande	67	83	48	66	77	51
Casa Grande – Phoenix	54	70	46	54	80	42
Phoenix – Wickenburg	67	106	38	67	115	35
Casa Grande – Wickenburg	120	167	43	143	168	51

NOTE: Travel times based on Google estimates for a 4 p.m. departure on March 18, 2015.
SOURCE: Google Maps 2015, ADOT 2017b.

Under a No Build scenario, the travel time between Casa Grande and Wickenburg through the Phoenix metropolitan core would substantially increase between 2015 and 2040. Because of congestion in the Phoenix area, some traffic between Casa Grande and Wickenburg may divert west to less congested alternate routes, such as I-8 and SR 85. Travel forecasts suggest that long-distance truck traffic and long-distance passenger vehicle traffic would be less likely to divert to longer routes. However, local and regional passenger vehicle traffic may divert to longer but less congested alternate routes.

Figure 1-9 (Peak Period Travel Speeds in the Afternoon, 2015 and 2040) illustrates estimated speeds in 2015 and 2040. This illustration shows that longer alternate routes to the west using I-8, SR 85, Sun Valley Parkway, and Vulture Mine Road would have faster speeds, resulting in shorter travel times, than routes through the Phoenix metropolitan core. However, travel times and LOS would then deteriorate on these alternate routes.

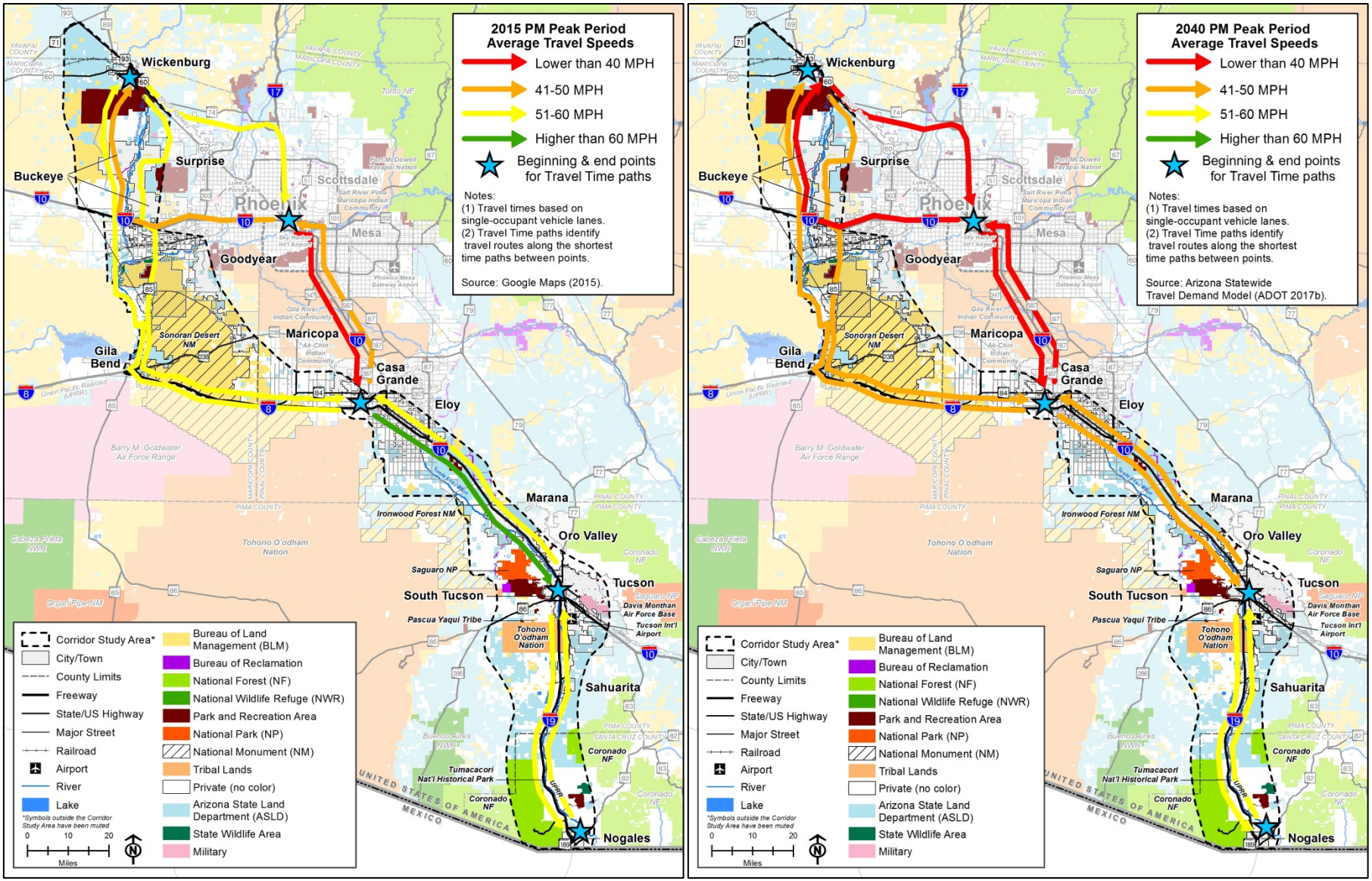


Figure 1-9 Peak Period Travel Speeds in the Afternoon, 2015 and 2040

Highways in the Study Area are subject to unpredictable bottlenecks due to crashes and weather events that can impede travel flows (e.g., road restrictions or closures due to crashes, work zones, and isolated weather events such as dust storms, flooding, and wildfires). Most locations have no comparable alternate routes. Notable hot spots with crash rates that are above average include, but are not limited to, central Tucson, SR 85 south of I-10, most highways approaching or within the Phoenix metropolitan core, and US 60 and US 93 northwest of the Hassayampa River. The lack of redundancy in route options in times of highway closures or severe bottlenecks is a major factor that contributes to deterioration in travel times and LOS.

1.5.3 System Linkages and Regional Mobility

The lack of a north-south interstate freeway link in the Intermountain West inhibits efficient freight movement and access to economic activity centers, thus limiting trade opportunities. Congress recognized this need and designated I-11 as a High Priority Corridor (ADOT 2014). I-11 is a component of the CANAMEX corridor, which was originally designated by the US Congress as a key trade corridor to support the nation's economy, defense, and mobility. **Figure 1-10** (FHWA High Priority Corridors in the Western US) illustrates the designated corridors relative to the Study Area.

As shown on **Figure 1-10** (FHWA High Priority Corridors in the Western US), the Intermountain West has a large gap in north-south interstate connectivity. From the southern to northern US borders, east-west interstates are spaced approximately 100 to 200 miles apart, whereas the gap between I-5 and I-15 can be wider than 500 miles. The west in general and the southwest region in particular, are underserved by north-south interstate freeway capacity. I-85 and I-81 in the eastern US serve as a critical redundancy to the I-95 coastal interstate. This capacity enables a logistics (i.e., planning and control of the flow of goods and materials), supply chain, and manufacturing capacity to emerge for a wide-array of products.

Mexico is Arizona's number one trade partner (University of Arizona 2017). Trade generated between Arizona and Mexico has steadily increased from $14 billion in 2013 to $15.7 billion in 2016 (Arizona Commerce Authority 2014; Arizona-Mexico Commission 2017). Economic development initiatives underway in Arizona focus on this interaction with Mexico to create high-value manufactured goods. These initiatives rely on a connected system of high-quality freeways for the mobility of raw materials, finished products, and workers.

The reliability of freight movement will play a major role in deciding how goods are moved from international manufacturers to markets throughout the Intermountain West. Currently, a continuous north-south high-capacity transportation facility does not exist due to gaps in the system. Continuing transportation investments to improve system linkages and access are critical. Worsened congestion and poor travel time reliability on the interstate freeway system would adversely affect economic competitiveness.

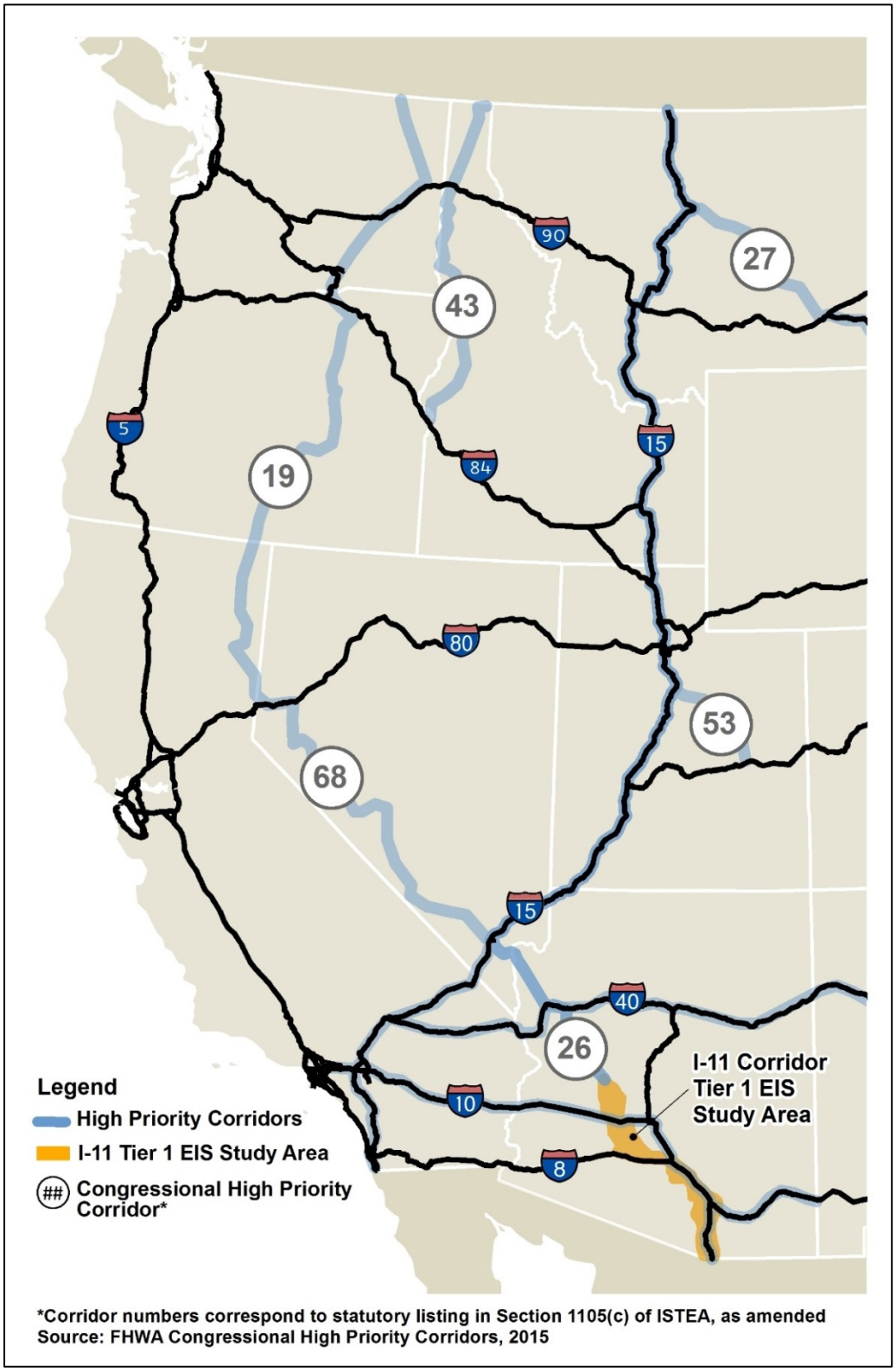


Figure 1-10 FHWA High Priority Corridors in the Western US

Thus, adding capacity to the west with the I-11 Corridor would enhance regional mobility and create transportation linkages with intersecting interstates. I-11 also would create comparable supply chain and trade links between the interior west and Mexico, as illustrated in **Figure 1-11** (Integrated Manufacturing in the Southwest US). This, when coupled with the high levels of congestion in Southern California (specifically the I-5 corridor, which is vulnerable to natural disasters and extended closures, closing as recently as early September 2018 for 6 days due a raging fire in California's Shasta-Trinity National Forest and requiring a more than 70-mile detour route), suggests that a north-south corridor in the Intermountain West could become the corridor of choice for trade-related traffic to and from Mexico, particularly as nearshoring is expected to increase.

Nearshoring refers to the trend of moving manufactured goods production to Mexico from Asia and the Pacific Rim (NDOT and ADOT 2013). It is a growing trend to address rising labor costs in emerging countries, increased shipping times and costs, and shifting consumer expectations for reduced time to market. With the desire for supply chain reliability to support just-in-time delivery in integrated manufacturing and distribution systems, a new or upgraded corridor in the Intermountain West becomes more attractive and would result in a more competitive economic market for Arizona (NDOT and ADOT 2013). As the ports of Los Angeles and Long Beach become increasingly busier and the north-south freeways in California become more congested, demand for alternative north-south routes to accommodate the movement of freight will increase.

Table 1-5 (State-to-State Daily Freight Truck Flows, 2013 and 2040) shows the state-to-state freight truck flows that could use the I-11 Corridor. Export cargo values from Arizona to Mexico are forecast to more than triple from 2013 to 2040. The Arizona to Nevada market is a fast-growing one, with daily freight truck units projected to increase 175 percent between 2013 and 2040 (Transearch 2013).

Table 1-5 State-to-State Daily Freight Truck Flows, 2013 and 2040

State Pair	Cargo Value (1,000s) (1)			Daily Freight Truck Units (1)		
	2013	2040	% Change	2013	2040	% Change
Arizona – Mexico	$13,971	$61,781	342%	137	492	259%
Arizona – Nevada	$10,521	$24,390	132%	680	1,870	175%
Arizona – Idaho	$2,610	$15,828	506%	100	223	123%
Arizona – Canada	$1,255	$4,598	266%	18	62	244%
Nevada – Mexico	$543	$3,060	464%	3	13	333%
Idaho – Mexico	$41	$157	283%	2	7	250%

(1) Annual flows converted to daily estimates by assuming 300 days per year.
SOURCE: Transearch 2013.

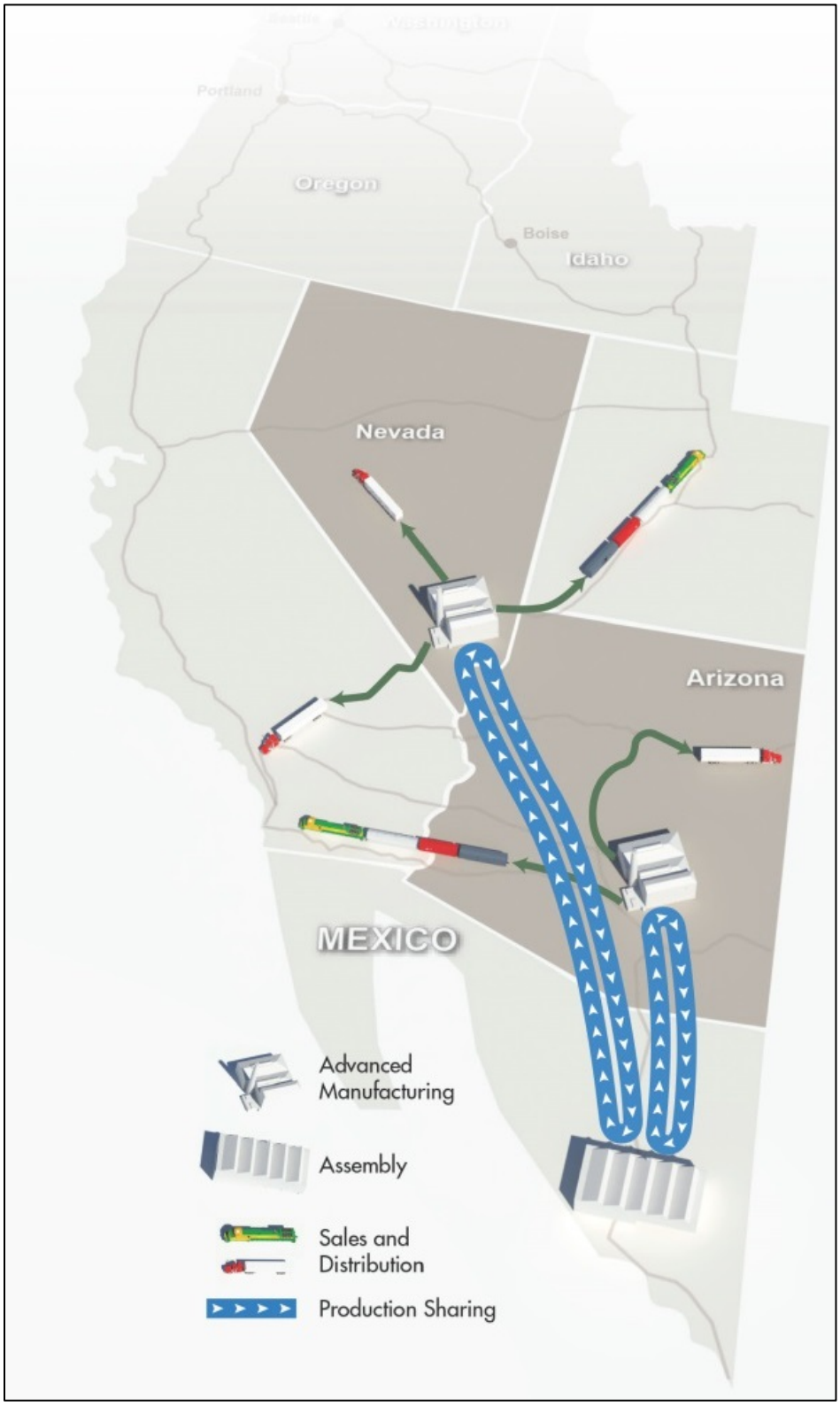


Figure 1-11 Integrated Manufacturing in the Southwest US

1.5.4 Access to Economic Activity Centers

An interstate freeway facility would provide improved access and connectivity to major employment areas, economic development opportunities, warehouse/distribution facilities, and airports, all of which depend upon freeway access to operate in a competitive economic market. A high-capacity transportation facility connecting Nogales, Wickenburg, and other destinations in between would make long-distance travel quicker, easier, and more direct. Improved interstate freeway access would serve the existing and emerging economic centers in the Study Area, which are shown on **Figure 1-12** (Economic Centers and Employment Densities, 2040).

1.5.5 Homeland Security and National Defense

The original interstate freeways (the National System of Interstate and Defense Highways) were planned in part as a primary element of the national defense system. A fundamental purpose was to provide ground transportation for military supplies and troop deployments. The I-11 Corridor may become an element of the Strategic Highway Network (STRAHNET), which is designated by FHWA in coordination with the US Department of Defense. STRAHNET designation is given to roads that provide defense access, continuity, and emergency capabilities for movement of personnel and equipment in peacetime and wartime. The STRAHNET system is 62,700 miles, which includes the 47,000-mile interstate system and 15,800 miles of other important public highways (FHWA 2004).

Congestion on I-10 and other existing interstate freeways and state routes may prevent efficient and safe emergency evacuation and defense access. Regional route redundancy, including alternate interstate freeway routes, would facilitate efficient mobility, alleviate congestion, and prevent bottlenecks during emergencies. Higher-risk facilities, such as the Palo Verde Nuclear Generating Station, support the need for an improved interstate freeway system with alternate routes in case of an emergency evacuation. Military facilities in the Phoenix and Tucson areas would benefit from alternate routes for transporting personnel and equipment.

1.6 Purpose of Proposed Facility

Given the need for greater connectivity and travel time reliability as population and employment continue to increase in the Study Area, the purpose of the I-11 Corridor is to:

- Provide a high-priority, high-capacity, access-controlled transportation corridor to serve population and employment growth.
- Support improved regional mobility for people and goods to reduce congestion and improve travel efficiency.
- Connect metropolitan areas and markets in the Intermountain West with Mexico and Canada through a continuous, high-capacity transportation corridor.
- Enhance access to the high-capacity transportation network to support economic vitality.
- Provide for alternate regional routes to facilitate efficient mobility for emergency evacuation and defense access.

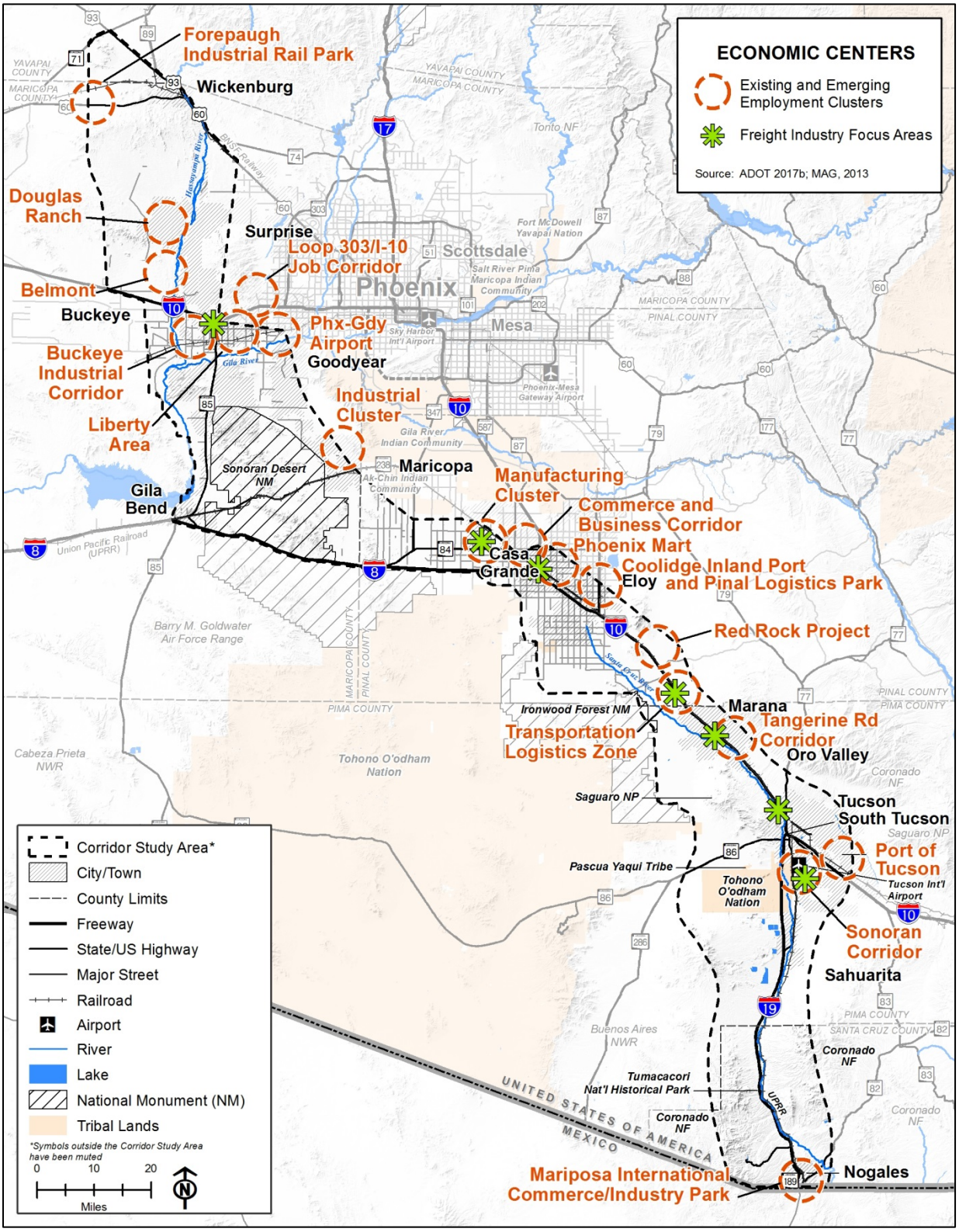


Figure 1-12 Economic Centers and Employment Densities, 2040

1.7 Purpose and Need Metrics

The Project Team developed metrics to evaluate how well alternative corridors would meet the I-11 Purpose and Need. These metrics are shown in **Table 1-6** (Purpose and Need Metrics).

1.8 Other Desirable Outcomes

Cooperating agencies and project stakeholders identified desirable outcomes for I-11 in addition to the purpose and need metrics above. They are:

- Provide the opportunity for multimodal use as the need arises in the future.
- Support the protection of sensitive tourist attractions in accordance with applicable plans and policies.
- Support the protection of the environment and cultural resources in accordance with applicable plans and policies.
- Support coordination with other federal and state agencies to maintain the integrity of wildlife movement.

These desirable outcomes were considered in the development of the alternatives (described in **Chapter 2** [Alternatives Considered]) and in the evaluation of the corridors (described in **Chapter 3** [Affected Environment and Environmental Consequences]).

Table 1-6 Purpose and Need Metrics

Need	Purpose	Metric
Population and Employment Growth: High-growth areas need access to the high-capacity, access controlled transportation network.	Provide a high-priority, high-capacity, access-controlled transportation corridor to serve population and employment growth.	Provides access to planned growth areas.
Traffic Growth and Travel Time Reliability: Increased traffic growth reduces travel time reliability due to unpredictable freeway conditions that impede travel flows and hinder the ability to move people and goods around and between metropolitan areas efficiently.	Support improved regional mobility for people and goods to reduce congestion and improve travel efficiency.	Reduces travel time for long-distance traffic (2040 travel time from Nogales to Wickenburg in minutes). Achieves LOS C or better in rural areas and LOS D or better in urban areas (Tucson) on I-11.
System Linkages and Regional Mobility: The lack of a north-south interstate freeway link in the Intermountain West constrains trade, reduces access for economic development, and inhibits efficient mobility.	Connect metropolitan areas and markets in the Intermountain West with Mexico and Canada through a continuous, high-capacity transportation corridor.	Effectively attracts/diverts traffic from existing roadways, as measured by: Percent increase in vehicle miles traveled (VMT) in the study area compared to the No Build Alternative. Percent increase in truck VMT in the study area compared to the No Build Alternative.
Access to Economic Activity Centers: Efficient freeway access and connectivity to major economic activity centers are required to operate in a competitive economic market.	Enhance access to the high-capacity transportation network to support economic vitality.	Serves key economic centers (number of economic activity centers).
Homeland Security and National Defense: Alternate interstate freeway routes help alleviate congestion and prevent bottlenecks during emergency situations. These routes may be parallel or may generally serve the same major origin and destination points, with local or regional roads connecting the freeway routes in various places.	Provide for alternate regional routes to facilitate efficient mobility for emergency evacuation and defense access.	Provides an alternate regional route to existing interstate route.