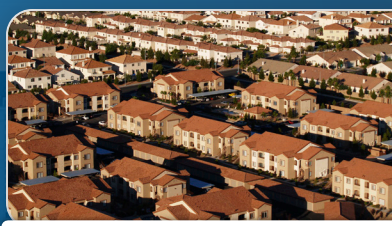
I-11 and Intermountain West Corridor Study

# Corridor Justification Report



*Prepared for*

NEVADA DOT and ADOT

August 21, 2013

*I-11 AND INTERMOUNTAIN WEST CORRIDOR STUDY*

# Corridor Justification Report

Prepared for

**Nevada Department of Transportation**

and

**Arizona Department of Transportation**

August 21, 2013


Prepared by

CH2MHILL® and AECOM

In association with:
HDR, Inc., ESI Corporation, and Partners for Strategic Action, Inc.

## DISCLAIMER

The contents of this planning document are based on information available to the Arizona Department of Transportation and the Nevada Department of Transportation (herein referred to as the Sponsoring Agencies) as of the date of this report. Accordingly, this report may be subject to change.

The Sponsoring Agencies' acceptance of this report as evidence of fulfillment of the objectives of this planning study does not constitute endorsement/approval of any recommended improvements nor does it constitute approval of their location and design or a commitment to fund any such improvements. Additional project-level environmental impact assessments and/or studies of alternatives will be necessary.

The Sponsoring Agencies do not warrant the use of this report, or any information contained in this report, for use or consideration by any third party. Nor do the Sponsoring Agencies accept any liability arising out of reliance by a third party on this report, or any information contained in this report. Any use or reliance by third parties is at their own risk.

# Executive Summary

This region is facing a rapidly growing population, expanding global trade, and an aging transportation infrastructure that is reaching capacity and not expected to sustain future growth.

## The I-11 and Intermountain West Corridor

The Arizona Department of Transportation and Nevada Department of Transportation are working together on the 2-year Interstate 11 (I-11) and Intermountain West Corridor Study that includes detailed corridor planning of a possible high-priority Interstate link between Phoenix, Arizona, and Las Vegas, Nevada (I-11), as well as high-level visioning for potentially extending the Corridor north to Canada and south to Mexico (the Intermountain West Corridor). The Corridor is proposed to include an upgraded highway facility, but it could be paired with rail and other major infrastructure components—such as energy and telecommunications—to serve the nation's needs from Mexico to Canada.

Key justifications for the I-11 and Intermountain West Corridor:

- Enable economic development
- Add needed north-south capacity
- Integrate the economies of the Southwest Triangle megaregion and improve connections to other regions
- Capitalize on Mexico's growing role in North American manufacturing and trade
- Support economic development initiatives of Arizona and Nevada
- Prevent congestion from crippling economic competitiveness
- Comply with enabling federal legislation

For the purposes of this study, the Intermountain West is the geographic region of the western United States (U.S.) located between the Rocky Mountains on the east and the Cascade Range and Sierra Nevada on the west. This region is facing a rapidly growing population, expanding global trade, and an aging transportation infrastructure that is reaching capacity.

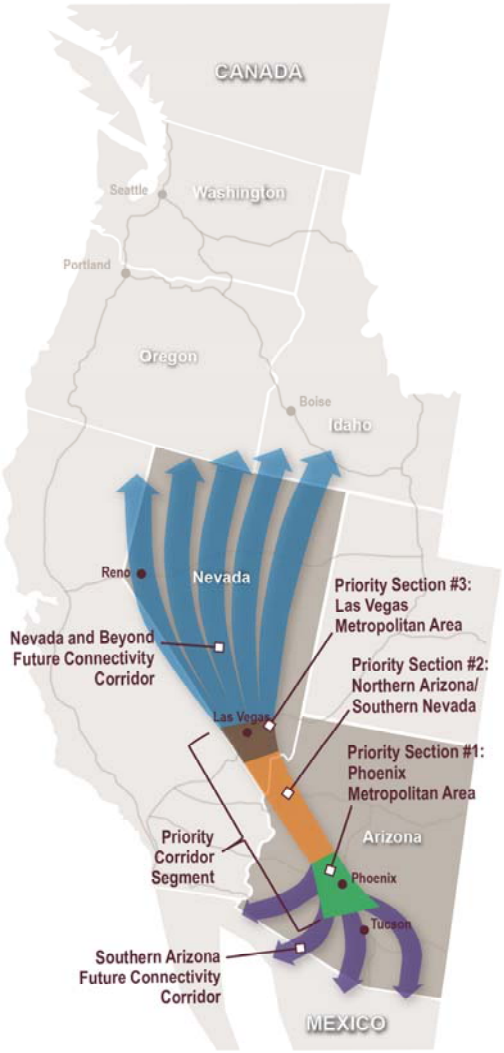
In addition to the designation of the CANAMEX High Priority Corridor in 1995, recently enacted federal transportation legislation called Moving Ahead for Progress in the 21st Century (MAP-21) designates I-11 as a future Interstate between Phoenix and Las Vegas. In approving the I-11 designation, Congress recognized the need for, and importance of, an Interstate link between these two metropolitan areas.

## Overview of the Corridor Study

The purpose of this report is to determine whether sufficient justification exists for a new high-speed transportation corridor, and if so, to establish and characterize the likely range of future transportation demand in the region that would give rise to the need for a new I-11 and Intermountain West Corridor.

This study is the first part of a planned two-phase process to illustrate and document the state of transportation capacity, supply, and future growth in the Intermountain West Corridor, and to assess the potential suitability of the proposed I-11 and Intermountain West Corridor linking Phoenix and Las Vegas in addressing future needs. The next study phase will provide support for and define the modal and alignment characteristics of an appropriate I-11 and Intermountain West Corridor and the economic benefits expected to result.

Figure ES-1. Study Area Segments




## The Study Area

The study area includes the entire states of Arizona and Nevada, although more detailed planning will occur in concentrated study segments. The principal project goal is to identify and establish feasible corridor(s) and transportation connections for the portion of the study corridor between Phoenix and Las Vegas, with options for extensions to the north and south. Because of its length and varying characteristics, this Corridor segment is divided into three sections. Two additional segments beyond the Phoenix and Las Vegas metropolitan areas will allow higher-level visioning for potential extensions (Figure ES-1).

## Initial Findings

This report will show that further study of the I-11 and Intermountain West Corridor is indeed justified and that the Corridor is needed for the following key reasons:

- Transportation is a key enabler of economic development.
- There is currently a lack of sufficient north-south capacity for existing goods movement or any increase in economic activity in Arizona and Nevada.
- The effective integration of the economies of the Southwest Triangle megaregion (Southern California, Sun Corridor, and Las Vegas) will require continuing investment in transportation capacity over the planning horizon of the study. This megaregion, and particularly the cities of Phoenix and Las Vegas, are poorly served by surface transportation when compared to other U.S. cities of comparable size and proximity, and the areas lacks sufficient connectivity to the rest of the Intermountain West.
- Current developments in the structure of the North American economy and the role of Mexico in North American manufacturing and trade have the potential to add substantial economic growth and transportation demand to north-south transportation corridors in the region, further exacerbating the congestion described above.
- Economic development initiatives underway by Arizona and Nevada, which are focused on selected cluster targets in aerospace, life sciences, and other high-value manufactured goods, rely on high-quality transportation corridors for mobility of raw materials, finished products, and workers. The success of state economic development initiatives will depend on continuing transportation investment to maintain competitiveness.
- Over the planning horizon of the study, ongoing and established growth trends will result in a significant increase in the portion of the states' highways reaching unacceptable levels of congestion, posing a significant threat to economic competitiveness.

- The significance of this Corridor has already been recognized by Congress through its designation of I-11 as a future Interstate between Phoenix and Las Vegas, and previous congressional action in 1995 designating CANAMEX as a High Priority Corridor. Other High Priority Corridors in the Intermountain West relevant to this study are US 395 from Reno to Canada, US 95/I-580 from Reno to Las Vegas, and US 95 from the Idaho/Oregon state border to Canada.

Current global and regional trends are creating demands for new north-south transportation links.

Taken together, the current state of surface transportation in the region supports the need for sustained investment in incremental capacity, with a particular emphasis on north-south corridors, over the time frame of this study. The second part of the current assignment will address the quantification of transportation demand shortfalls in the Corridor, suggest the appropriate range of modes to address this shortfall, and confirm the role that the I-11 and Intermountain West Corridor may be able to play in addressing in this shortfall.

## Growing Opportunities in the Region

This region has the weakest ground-based transportation connectivity of any U.S. megapolitan cluster, especially between Phoenix and Las Vegas.

Current global and regional trends are creating demands for new transportation links. It is now more cost-effective to manufacture and import goods from Mexico than it is from Asia Pacific, increasing the need for high-capacity, north-south transportation infrastructure. The transportation network in the Intermountain West was developed decades ago to serve the economic, population, and mobility needs at that time—east-west movement of people and goods between Southern California and the rest of the country. The need is now shifting to north-south demand.

The emerging Southwest Triangle, with a population approaching 30 million, (Figure ES-2) consists of three main centers of growth: Southern California, the Sun Corridor, and the Greater Mojave Region centered around Las Vegas.

The Southwest Triangle is on a trajectory to be the strongest American region that maintains linkages to the world's fastest emerging economies in both Asia and Latin America.

Figure ES-2. The Southwest Triangle: Expanding Megapolitans

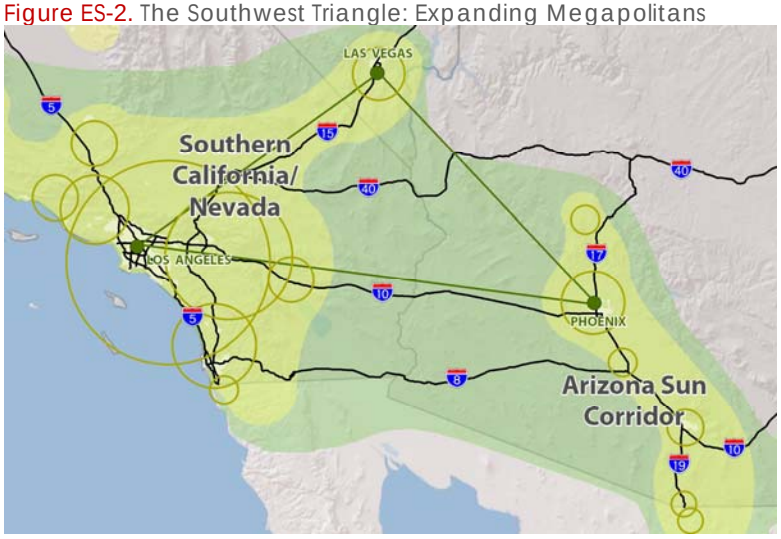
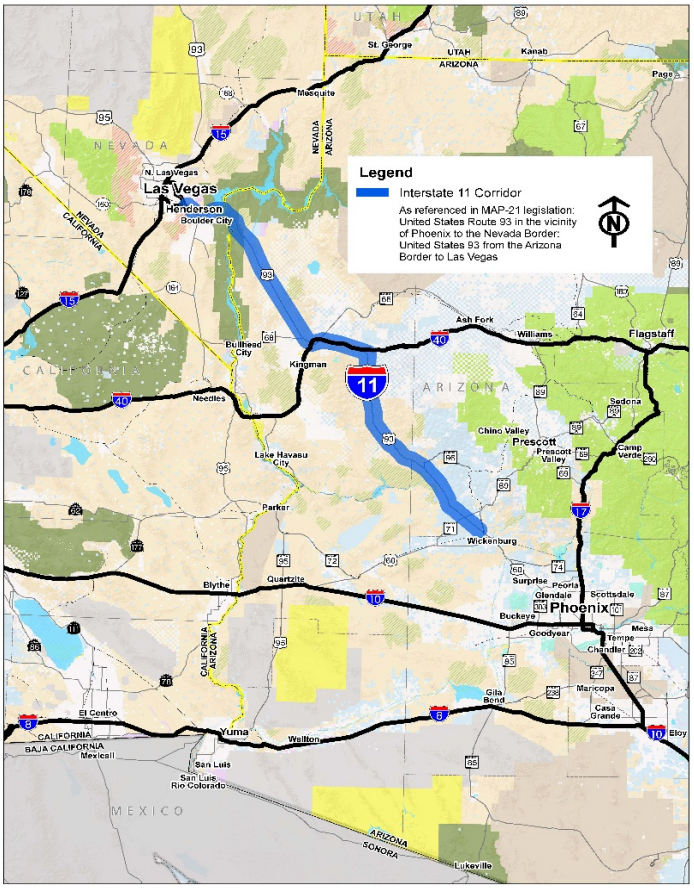


Figure ES-3. I-11 Corridor as Identified in MAP-21 Legislation




The Southwest Triangle is on a trajectory to be the strongest American region that maintains linkages to the world's fastest emerging economies in both Asia and Latin America. For the last half century, Southern California has built America's most significant connections to Asia, displacing San Francisco as the nation's leading region for this trade. Southern California is now hyperlinked to Asia, and Las Vegas and the Sun Corridor are actively engaged in establishing new trade with Latin America.

The key issue now is to determine what infrastructure improvements would facilitate greater economic integration of this megaregion. This region has the weakest ground-based transportation connectivity of any U.S. megapolitan cluster. The Southwest Triangle, especially Phoenix and Las Vegas, has an underdeveloped Interstate network that does not meet current demand—which is expected to double between these cities by 2040 (Nelson and Lang 2011).

## How the I-11 and Intermountain West Corridor Has Evolved Over the Past Two Decades

Corridor concepts for a transportation facility through the Intermountain West have been suggested and studied at various levels of detail over the past several decades. The first major study began with the 1991 Intermodal Surface Transportation Efficiency Act legislation where the Federal Highway Administration (FHWA) designated a series of High Priority Corridors for federal funding, to the more recently enacted federal transportation legislation, MAP-21, which designates I-11 as a future Interstate between the Phoenix and Las Vegas metropolitan areas (Figure ES-3).

# Preliminary Business Case Foundation

The I-11 and Intermountain West Corridor has the potential to play a transformative role for both the Intermountain West and the nation in facilitating and shaping trade patterns and related economic growth in the Southwest.

The Business Case Foundation is intended to address a key fundamental question: Is the I-11 and Intermountain West Corridor worthy of future investment? A two-step process is used to answer this question. The first step, the Preliminary Business Case Foundation, considers four possible future economic scenarios that might exist alone or in combination when the

The increased economic activity associated with the Growth in Asia Pacific Trade Scenario results in a greater number of vehicles throughout the region, exacerbating the already congested urban Interstates and some regional routes.

The Nearshoring Scenario would add demand for north-to-south transportation facilities, including this Corridor as a result of significant production growth occurring in Mexico. The modeled economic output in Arizona and Nevada, and resulting congestion, are greatest with this scenario.

Many of the industry clusters in Arizona and Nevada rely on a robust transportation infrastructure for the movement of goods and access to customers.

Corridor is completed, and it provides a qualitative evaluation and preliminary analysis of the potential economic impact the Corridor might have.

The next step, the Final Business Case, will be completed at the end of this study and will provide additional analyses refinements and a further understanding of the potential economic impacts that an I-11 Corridor could have in Arizona and Nevada.

### Four Possible Future Economic Scenarios

1. **Baseline Scenario.** This scenario serves as the background against which the results of the other scenarios are compared. Generally, this scenario reflects a continuation of recent background growth in the region and of current trends, without major structural changes. It is presented as the highly probable economic future of the region, in the absence of significant changes from the recent past.
2. **Growth in Asia Pacific Trade Scenario.** This scenario is based on continued growth of the trade flows with Asia that have characterized West Coast trade during recent decades. This scenario is predicated on the continued growth in U.S. imports of a wide array of low-cost consumer goods from China and other low-cost Asian sources. This scenario assumes that current trends in manufacturing in the Asia Pacific region continue and that the U.S. continues to receive a growing volume of goods from Asia.
3. **Trade with Mexico Expands (Nearshoring) Scenario.** This scenario assumes that Asia Pacific manufacturing for the U.S. market flattens and significant production growth occurs in Mexico (nearshoring). Nearshoring refers to the current trend of moving manufactured goods production, much of which was previously in Asia, to Mexico. Since the enactment of the North American Free Trade Agreement, bilateral trade has grown exponentially and reached a record high of nearly $400 billion in 2010. Mexico's gross domestic product growth of 5.4 percent in 2010 resulted in a $35 billion increase in Mexican purchases from the U.S. (New Policy Institute 2012). This trend reflects the advantages of Mexico's proximity to the U.S. market and its growing strength as the 14th largest economy in the world. In addition, China's labor cost advantage in relation to Mexico's is estimated to have shrunk to 14 percent (Thunderbird School of Global Management n.d.).
4. **State Economic Development Plans are Fully Realized Scenario.** This scenario assumes that Arizona and Nevada are able to realize their major economic development goals. A cornerstone of their plans is the implementation of an industry cluster-based approach to foster economic sustainability by stimulating growth in key sectors—such as aerospace, life sciences, and other high-value manufactured goods—and increasing trade with Mexico and Canada. The end result is a group of industry clusters that has the ability to generate economic growth both in the short and long term.

Each of the scenarios examined has the potential to make a major contribution to the economic well-being of the region's residents, bringing up to an additional half a million people and 240,000 employees to the region over the next 25 years. The specifics of the modeled increases in economic output, population, and employment are shown in Table ES-1.

Table ES-1. Key Modeled Results Corresponding to Each Scenario

| Scenario | Economic Output ($ billions) | Population (high range) | Employment (high range) | Unacceptably Congested Highways (%) |
|---|---|---|---|---|
| Current Conditions (2011) | 381 | 9,253,806 | 4,711,352 | 9 |
| Projected Baseline Conditions (2040) | 642 | 15,078,114 | 7,971,629 | 28 |
| Growth in Asia Pacific Trade | 649-666 | 15,361,219 (1.9%) | 8,121,168 (1.9%) | 34 |
| Trade with Mexico Expands (Nearshoring) | 651-664 | 15,535,411 (3.0%) | 8,213,079 (3.0%) | Up to 43 |
| State Economic Development Plans are Fully Realized | 646-650 | 15,247,957 (1.1%) | 8,061,322 (1.1%) | 34 |

The region will, under the entire range of alternative future scenarios considered, experience significant sustained growth in the regional economy, accompanied by corresponding growth in travel demand.

A brief consideration of the range of current and anticipated trends in U.S. trade, together with the natural geographic advantages of the Intermountain West region, suggests that the region will, under the entire range of alternative future scenarios considered, experience significant sustained growth in the regional economy, accompanied by corresponding growth in travel demand.

The level of highway congestion associated with some of these possible economic futures (Figure ES-4 shows the projected congestion under the Nearshoring Scenario) suggests that additional investment in transportation infrastructure is likely required to realize the full extent of these benefits. In fact, the levels of system congestion for the scenarios examined suggest that without additional system capacity such as the I-11 Corridor, even the most conservative growth scenarios may not be realized due to the constraining factor of transportation congestion. By strategically enhancing regional transportation infrastructure, the region has the opportunity to enjoy full access to the significant incremental and economic growth related to important trends in regional and national trade.

Figure ES-4. Projected Congestion under the Nearshoring Scenario


*Sources: Arizona Department of Transportation 2012k, California Department of Finance 2012, Florida Department of Transportation 2012, Maricopa Association of Governments 2012b, Nevada Department of Transportation 2012f*

By strategically enhancing regional transportation infrastructure, the region has the opportunity to enjoy full access to the significant incremental and economic growth related to important trends in regional and national trade.

The increasing importance of Mexico as a trading partner, the emergence of nearshoring as an important and strongly growing structural feature of U.S. commerce, and the continuation of the historic growth of the region all suggest that during the next few decades the Intermountain West region's demands on its transportation infrastructure will grow strongly.

The high levels of congestion in Southern California (Figure ES-4) suggest that a high-quality, north-south corridor in the Intermountain West such as I-11 has the potential to become the corridor of choice for trade-related traffic to and from Mexico, particularly should the nearshoring phenomenon continue to grow. When the current preference for supply chain reliability and resilience to support just-in-time delivery in integrated manufacturing and distribution systems is factored in, the potential attractiveness of the I-11 Corridor is further strengthened. Analysis in the next project phase will further examine the implications of these insights.

# Contents



## Appendices

# 1. Introduction and Overview

## The I-11 and Intermountain West Corridor

This region is facing a rapidly growing population, expanding global trade, and an aging transportation infrastructure that is reaching capacity and not expected to sustain future growth.

Key justifications for the I-11 and Intermountain West Corridor:

- Enable economic development
- Add needed north-south capacity
- Integrate the economies of the Southwest Triangle megaregion and improve connections to other regions
- Capitalize on Mexico's growing role in North American manufacturing and trade
- Support economic development initiatives of Arizona and Nevada
- Prevent congestion from crippling economic competitiveness
- Comply with enabling federal legislation

The Arizona Department of Transportation (ADOT) and Nevada Department of Transportation (NDOT) are working together on the 2-year Interstate 11 (I-11) and Intermountain West Corridor Study that includes detailed corridor planning of a possible high priority Interstate link between Phoenix, Arizona, and Las Vegas, Nevada (I-11), as well as high-level visioning for potentially extending the Corridor north to Canada and south to Mexico (the Intermountain West Corridor). The Corridor is proposed to include an upgraded highway facility, but it could be paired with rail and other major infrastructure components—such as energy and telecommunications—to serve the nation's needs from Mexico to Canada.

For the purposes of this study, the Intermountain West is the geographic region of the western United States (U.S.) located between the Rocky Mountains on the east and the Cascade Range and Sierra Nevada on the west (Figure 1-1). This region is facing a rapidly growing population, expanding global trade, and an aging transportation infrastructure that is reaching capacity.

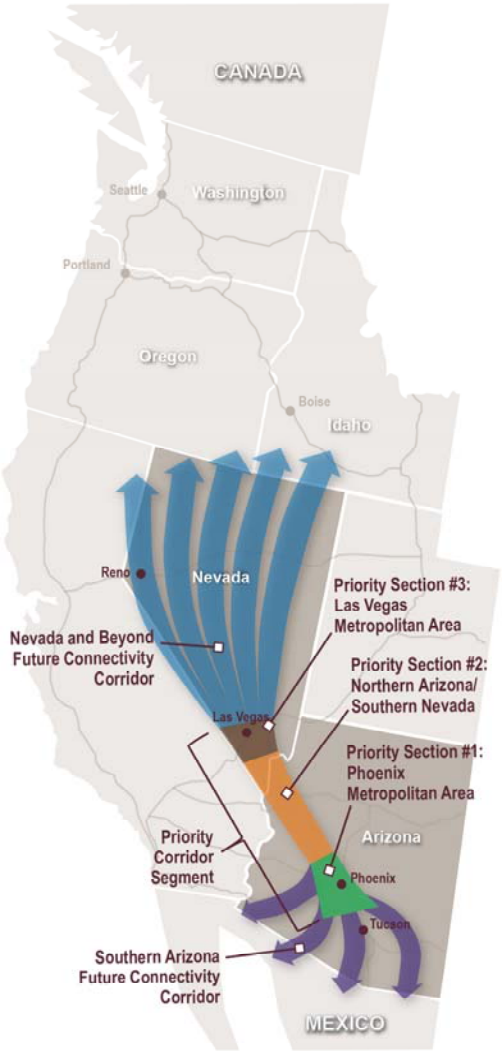
In addition to the designation of the CANAMEX High Priority Corridor in 1995, recently enacted federal transportation legislation called Moving Ahead for Progress in the 21st Century (MAP-21) designates I-11 as a future Interstate between Phoenix and Las Vegas. In approving the I-11 designation, Congress recognized the need for, and importance of, an Interstate link between these two metropolitan areas.

## Overview of the Corridor Study

The purpose of this report is to determine whether sufficient justification exists for a new high-speed transportation corridor, and if so, to establish and characterize the likely range of future transportation demand in the region that would give rise to the need for a new I-11 and Intermountain West Corridor.

This study is the first part of a planned two-phase process to illustrate and document the state of transportation capacity, supply, and future growth in the I-11 and Intermountain West Corridor, and to assess the potential suitability of the proposed Corridor linking Phoenix and Las Vegas in addressing future needs. The next phase will provide support for and define the modal and alignment characteristics of an appropriate I-11 and Intermountain West Corridor and the economic benefits expected to result from it.

Figure 1-1. Study Area Segments




## The Study Area

The study area includes the entire states of Arizona and Nevada, although more detailed planning will occur in concentrated study segments. The principal project goal is to identify and establish feasible corridor(s) and transportation connections for the portion of the study corridor between Phoenix and Las Vegas, with options for extensions to the north and south. Because of its length and varying characteristics, this Corridor segment is divided into three sections. Two additional segments beyond the Phoenix and Las Vegas metropolitan areas will allow higher-level visioning for potential extensions (Figure 1-1). A general study vicinity map is presented in Figure 1-2 that illustrates the MAP-21 I-11 designation, Interstate highway corridors, Class I railroad facilities, county boundaries, and major corridor cities.

The I-11 Corridor divisions are as follows:

- Southern Arizona Future Connectivity Segment: Mexico to Casa Grande
- Priority Corridor Section 1: Phoenix Metropolitan Area (Casa Grande to Wickenburg)
- Priority Corridor Section 2: Northern Arizona/Southern Nevada (Wickenburg to the Las Vegas Metropolitan Area)
- Priority Corridor Section 3: Las Vegas Metropolitan Area
- Northern Nevada Future Connectivity Segment: Beyond the Las Vegas Metropolitan Area

The study includes two levels of analysis over a 24-month schedule:

- Detailed planning for the high-priority I-11 segment between (and including) Phoenix and Las Vegas
- A high-level visioning approach to possible future connectivity segments from Las Vegas to Canada and from Phoenix to Mexico

## Initial Findings

This report will show that further study of the I-11 and Intermountain West Corridor is indeed justified and that the Corridor is needed for the following key reasons:

- Transportation is a key enabler of economic development.
- There is currently a lack of sufficient north-south capacity for existing goods movement or any increase in economic activity in Arizona and Nevada.

Figure 1-2. General Study Vicinity Map

- The effective integration of the economies of the Southwest Triangle megaregion (Southern California, Sun Corridor, and Las Vegas) will require continuing investment in transportation capacity over the planning horizon of the study. This megaregion, and particularly the cities of Phoenix and Las Vegas, are poorly served by surface transportation when compared to other U.S. cities of comparable size and proximity, and the area lacks sufficient connectivity to the rest of the Intermountain West.
- Current developments in the structure of the North American economy and the role of Mexico in North American manufacturing and trade have the potential to add substantial economic growth and transportation demand to north-south transportation corridors in the region, further exacerbating the congestion described above.
- Economic development initiatives underway by the states of Arizona and Nevada, which are focused on selected cluster targets in aerospace, life sciences, and other high-value manufactured goods, rely on high-quality transportation corridors for mobility of raw materials, finished products, and workers. The success of state economic development initiatives will depend on continuing transportation investment to maintain competitiveness.

Current global and regional trends are creating demands for new north-south transportation links.

- Over the planning horizon of the study, ongoing and established growth trends will result in a significant increase in the portion of the states' highways reaching unacceptable levels of congestion, posing a significant threat to economic competitiveness.
- The significance of the I-11 and Intermountain West Corridor has already been recognized by Congress through its designation of I-11 as a future Interstate between Phoenix and Las Vegas, and previous congressional action in 1995 designating CANAMEX as a High Priority Corridor. Other High Priority Corridors in the Intermountain West relevant to this study are US 395 from Reno to Canada, US 95/I-580 from Reno to Las Vegas, and US 95 from the Idaho/Oregon state border to Canada.

Megapolitans are key areas of integration with world trade and are characterized by interlocking economic systems, shared natural resources and ecosystems, and common transportation systems.

Taken together, the current state of surface transportation in the region supports the need for sustained investment in incremental capacity, with a particular emphasis on north-south corridors, over the time frame of this study. The second part of the current assignment will address the quantification of transportation demand shortfalls in the Corridor, suggest the appropriate range of modes to address this shortfall, and confirm the role that the I-11 and Intermountain West Corridor may be able to play in addressing in this shortfall.

## Growing Opportunities in the Region

Current global and regional trends are creating demands for new transportation links. It is now more cost-effective to manufacture and import goods from Mexico than it is from Asia Pacific, increasing the need for high-capacity, north-south transportation infrastructure. The transportation network in the Intermountain West was developed decades ago to serve the

economic, population, and mobility needs at that time—east-west movement of people and goods between Southern California and the rest of the country. The need is now shifting to north-south demand.

Efficient mobility is a major competitive advantage in the global playing field.

Investment in regional transportation infrastructure has not kept pace with population growth and changing economic trends. The population of the Intermountain West states (Arizona, Idaho, Montana, Nevada, Oregon, Utah, and Washington) is currently 25 million. Between 2000 and 2010, the rate of growth for the Intermountain West states was 19.6 percent—double that of the U.S. as a whole, which grew at a rate of 9.8 percent. Population and economic growth in Arizona and Nevada are expected to continue to outpace the U.S. average.

Linked metropolitan areas create megapolitans. Linked megapolitans create megaregions which foster economic cooperation and security.

Without strategic improvements in transportation infrastructure, the region will lose the opportunity to capitalize on enhanced economic growth related to important trends in regional and national trade. For instance, manufacturing growth in Arizona and Nevada exceeded the U.S. average, indicating a strengthening economic sector that is strongly linked with transportation demand. State economic development departments are focused on diversifying the Arizona and Nevada economies to target industry clusters that rely heavily on interconnected and efficient transportation systems to both transport goods and facilitate business attraction/retention.

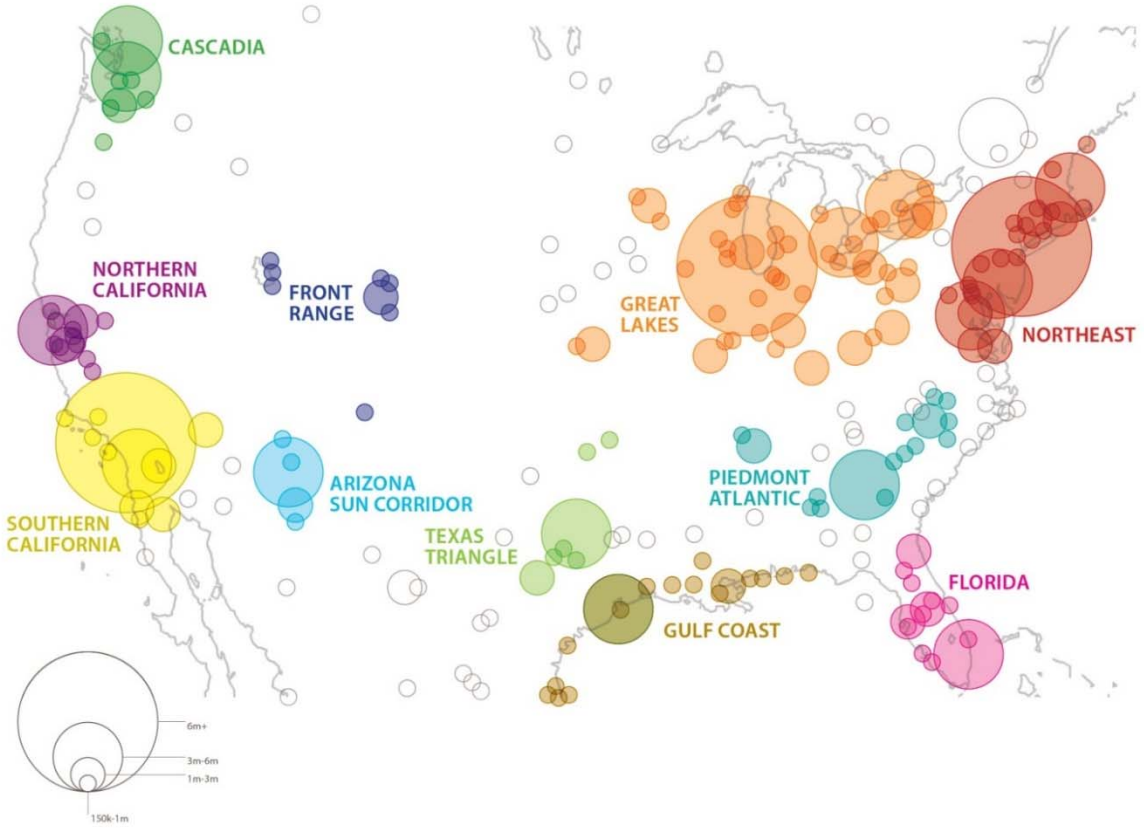
## Economic Opportunities Created by Connected Megaregions

The Brookings Institution, Regional Plan Association, and others have developed and furthered the concept of "megapolitans" as the key U.S. areas of integration with world trade (Regional Plan Association 2005) (Figure 1-3).

A megapolitan, of which 11 have been designated in the U.S., can be defined as a conglomeration of two or more intertwined metropolitan areas with a combined population of 5 million or more. A megapolitan is characterized by interlocking economic systems, shared natural resources and ecosystems, and common transportation systems. The U.S. megapolitan areas contain most of the nation's major ports and international airports, and their assets give them a large presence in world trade (Nelson and Lang 2011).

Efficient mobility is a major competitive advantage in the global playing field, where time savings create value. Our competitors in Asia and Europe are creating Global Integration Zones by linking specialized economic functions across vast geographic areas and national boundaries with high-speed rail and dedicated goods movement systems. The increased mobility of workers, business travelers, and goods between the cities of these megapolitans enables greater collaboration, flexibility, and innovation.

Figure 1-3. Megapolitan Areas in the Continental United States and Southern Canada




*Source: Regional Plan Association 2005*

The Southwest Triangle Megaregion and the Intermountain West have an opportunity to mirror the successes of the Texas Triangle and the NASCO Corridor.

In many respects, the Southwest Triangle is larger than the Texas Triangle—in both area and population—yet it lacks an Interstate highway system and rail connecting all three legs.

Improving and maintaining megapolitan infrastructure is an important national priority, especially for the Southwest, which seeks more trade and exports as a way to diversify its economy from consumption and real estate toward technology, innovation, and high-value manufacturing. The megapolitan capacity for trade is a key element in this economic transition. Failure to establish adequate infrastructure to move people and goods around the country and the region would significantly constrain future economic growth.

The old notion of urban rivalry among proximate cities and metropolitan areas is giving way to a new concept that such regions share significant business linkages and are now part of a larger economic system. Linking the economies of several large megapolitan areas into larger megaregions (also referred to as megapolitan clusters) seems like a huge undertaking; however, one need not look far for successful examples: the Texas Triangle megaregion and the larger North America's SuperCorridor Coalition (NASCO) corridor.

Fifty years ago, Dallas and Fort Worth were considered competitors. They now form the key anchors in the Dallas-Fort Worth Metroplex. On a larger scale, a similar convergence has occurred among the metropolitan areas of Dallas-Fort Worth-Houston-San Antonio-Austin in the so-called Texas Triangle. This megaregion specializes in sectors such as energy, technology, and

Figure 1-4. Evolution of Dallas-Fort Worth Metroplex – Texas Triangle – NASCO Corridor


*Source: NASCO 2012*

trade/logistics, where shared producer services among the major metropolitan areas generate a critical mass and competitive advantage that lifts the combined regions to the top of the global hierarchy in these sectors.

The Texas Triangle megaregion has merged with other cities in the Great Plains to form NASCO (Figure 1-4). The mission of NASCO is to increase development along a north-south trade corridor through promotion of a sustainable, secure, and efficient trade and transportation system. The corridor runs from Pacific ports in Mexico, through Texas and the U.S. Great Plains, through Winnipeg, Manitoba, and points farther north in Canada. It includes various highways and rail lines; inland ports such as Alliance, Texas, and SmartPort in Kansas City; and deep-water ports such as Lazaro Cardenas and Manzanillo in Mexico. This multimodal transportation network connects 71 million people and supports the movement of approximately $1 trillion in annual commerce between the three nations.

## Southwest Triangle Megaregion

The emerging Southwest Triangle, with a population approaching 30 million (Figure 1-5), consists of three main centers of growth:

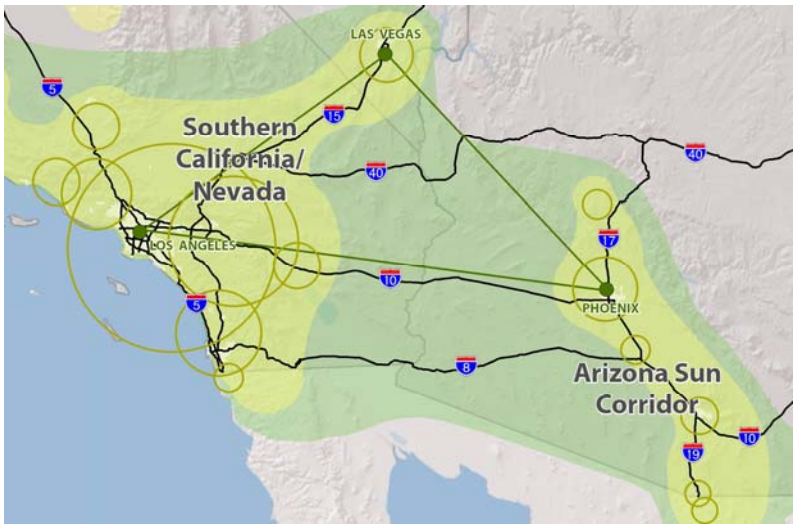
- Southern California, which includes more than 20 million residents from San Diego to Santa Barbara
- The Sun Corridor, which is the combined Phoenix and Tucson metropolitan areas and home to nearly 6 million people
- The Greater Mojave Region includes Las Vegas (Clark County) and the surrounding counties of Nye, Nevada, and Mohave, Arizona, which include more than 2.2 million people

This megaregion is linked by transportation, economy, and environment. Major international airports anchor each of the three subregions. Ground-based transportation includes several major Interstates but no passenger rail capacity. A proposed high-speed rail link that would connect Southern California to Las Vegas is under study. Various other infrastructure improvements (such as aviation, highway, and freight rail) are underway throughout the megaregion.

The major regions in this Southwest Triangle share numerous economic interdependencies in sectors such as logistics, healthcare, entertainment, tourism, and

technology. Surrounded by deserts, Las Vegas and the Sun Corridor are actively engaged in research and development, equipment manufacturing, and green energy production (wind and solar, as well as geothermal energy production).

Figure 1-5. The Southwest Triangle: Expanding Megapolitans




The Southwest Triangle is on a trajectory to be the strongest American region that maintains linkages to the world's fastest emerging economies in both Asia and Latin America.

The Southwest Triangle is on a trajectory to be the strongest American region that maintains linkages to the world's fastest emerging economies in both Asia and Latin America. For the last half century, Southern California has built America's most significant connections to Asia, displacing San Francisco as the nation's leading region for this trade. Southern California is now hyperlinked to Asia, and Las Vegas and the Sun Corridor are actively engaged in establishing new trade with Latin America.

The key issue now is to determine what infrastructure improvements would facilitate greater economic integration of this megaregion. This area already has one of the most densely linked air systems of any region in the country, with 2 of the 10 ten busiest air corridors, including Los Angeles-Las Vegas and Los Angeles-Phoenix (Brookings Institution 2009a).

This region has the weakest ground-based transportation connectivity of any U.S. megapolitan cluster, especially between Phoenix and Las Vegas.

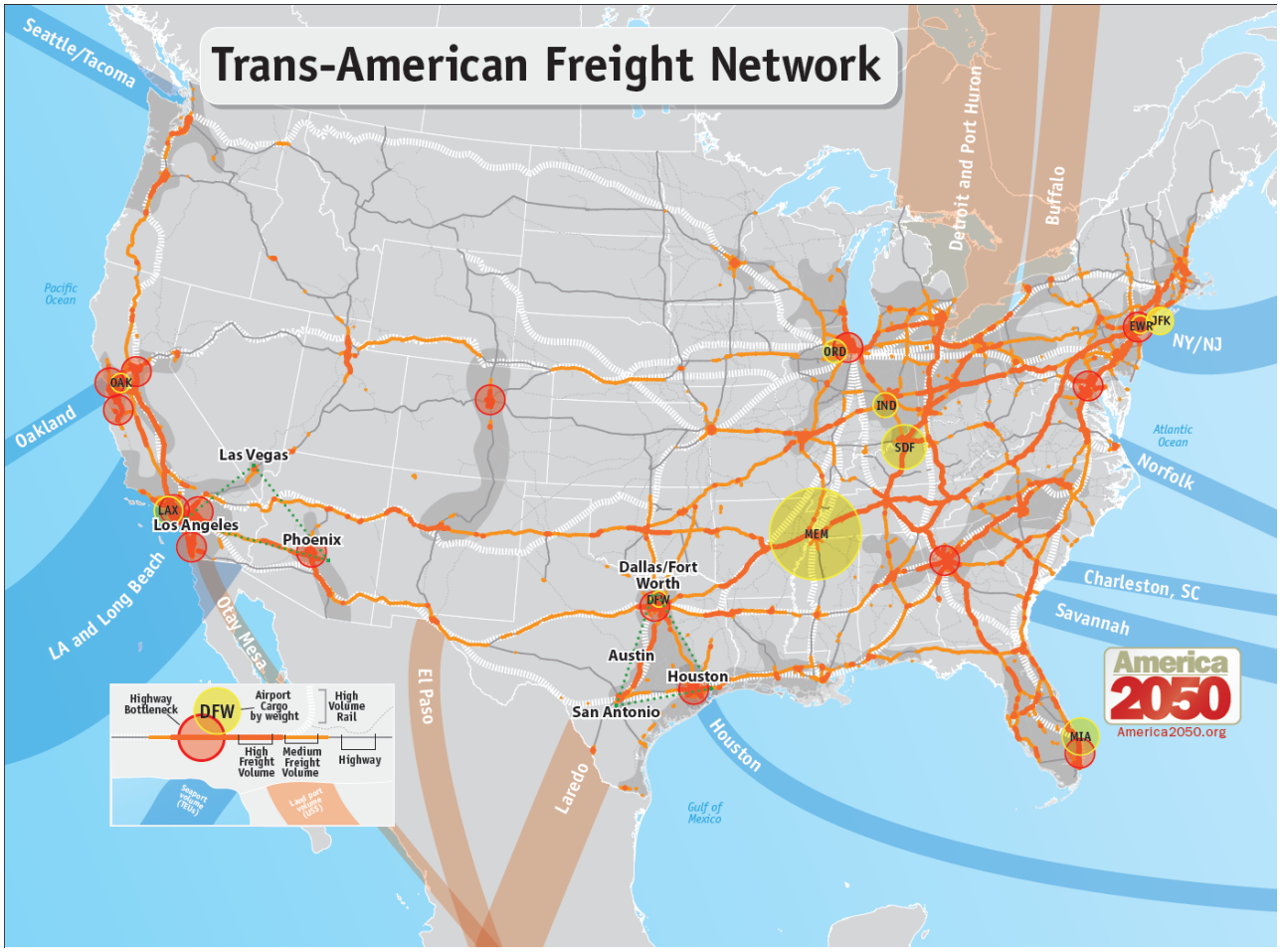
This region also has the weakest ground-based transportation connectivity of any U.S. megaregion. The Southwest Triangle, especially Phoenix and Las Vegas, has an underdeveloped Interstate network that does not meet current demand—which is expected to double between these cities by 2040.

This is the only megaregion where there is a gap in the Interstate system between megapolitan anchors. The Texas Triangle megaregion maintains full Interstate connections between its major metropolitan areas, with I-10, I-35, and I-45 framing out the triangle. By contrast, the Southwest Triangle is missing a key Interstate (the proposed I-11) between Las Vegas and Phoenix. In addition, the lane miles between the key megapolitans is also limited compared to peer megaregions. Consider that the Piedmont region in the East extends from Raleigh, North Carolina, to Atlanta, Georgia, with large stretches

of I-85 that exceed four lanes lining these metropolitan areas. By contrast, most of I-10 linking the Sun Corridor to Southern California and I-15 linking Las Vegas to Southern California are mostly four-lane standard Interstate-gauge roads. With no direct rail service between the two metropolitan areas, and only minimal intercity bus service, the region has not kept pace with evolving needs.

Figure 1-6 shows key freight corridors, major transportation and rail connections, key bottlenecks in metropolitan areas, and the nation's global gateways. This map is useful for comparing the infrastructure and connections between the major megaregions for both the Texas Triangle and Southwest Triangle (outlined in green).

Figure 1-6. North American Freight Network




Source: America2050.org

The Texas Triangle is well connected with freight rail corridors (owned by BNSF Railway and the Union Pacific Railroad [UPRR]) between each of the four major cities and three Interstate highways delineating the triangle (I-35, I-45, and I-10). The three legs of this triangle carry medium to high freight volumes on both the Interstate highway and rail networks. As shown on the map, these connections attract more international trade through flows from Houston and Laredo.

I-11 and the Intermountain West Corridor completes the Southwest Triangle—providing an ideal trade corridor with Mexico (bypassing the congested corridors of Southern California) and linking it to the largest international trade ports in the country: Los Angeles and Long Beach.

The Southwest Triangle, with a population larger than that of the Texas Triangle (Table 1-1), has significant international connections. The international trade through Los Angeles and Long Beach is the largest in the country, and the majority of goods are handled on the congested California freeways, including I-5 for goods traveling north-south. Most of these goods are moving north or east for distribution throughout the U.S.—traveling throughout the Southwest Triangle and on to other points. Shifting trade trends from Asia to Latin America increase the demand for north-south travel corridors.

Table 1-1. Southwest Triangle Population

| | Texas Triangle (Austin, Dallas, Houston, San Antonio MSAs*) | Southwest Triangle (13 Counties) |
|---|---|---|
| Population (2010) | 16,205,427 | 28,715,328 |
| Population (2040) | 32,397,713 | 37,138,853 |

*Sources: Arizona Department of Administration, Office of Employment and Population Statistics 2012a, Texas State Data Center 2012*

**An MSA (Metropolitan Statistical Area) is used by the U.S. Census Bureau as a statistical measure, defined as a geographical region with a relatively high population density and close economic ties throughout the area. Such regions are generally an agglomeration of nearby cities and towns (sometimes the political units within a metropolitan area).*

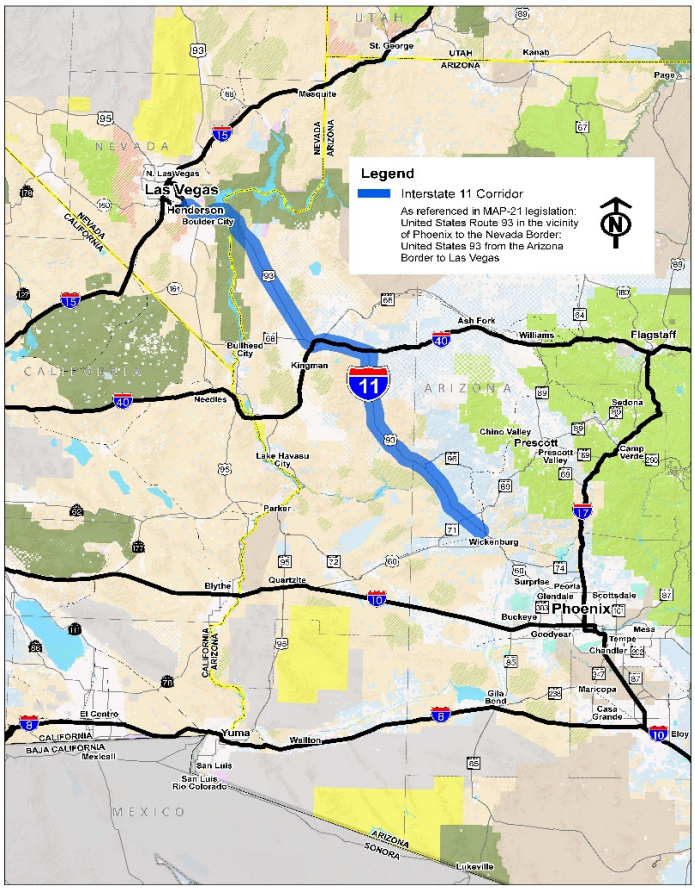
The lack of connections and transportation infrastructure in the Southwest Triangle makes freight flows from and to Mexico more attractive through Texas border crossings than through Arizona border crossings such as Nogales. Figure 1-6 highlights the lack of both rail and Interstate highway connections between the major cities in the Southwest Triangle.

The I-11 and Intermountain West Corridor will allow Phoenix and Las Vegas to emerge as major logistics centers in the Southwest and facilitate trade and tourist travel between Arizona and Nevada, which would enable this region to better compete in the global economy.

Providing an alternate north-south connection in the western U.S. is crucial to ensure timely, efficient, and competitive trade. The Corridor provides an opportunity to fill this transportation gap in terms of efficient high-speed, domestic north-south travel. It also provides potential expeditious linkages between existing and future foreign ports and critical east-west, high-speed transportation corridors in the U.S., the junctions of which can provide significant regional economic development opportunities. The Corridor has the potential to become one of the first north-south, high-capacity routes through the Intermountain West that could greatly improve commerce, tourism, and international trade opportunities across the West.

The proposal for the I-11 Corridor to link Phoenix and Las Vegas via a direct, high-capacity, limited-access highway and/or rail facility would fix a major, longstanding deficit in the region's passenger and freight transportation network, allowing Phoenix and Las Vegas to emerge as major logistics centers in the Southwest, much like Atlanta and Dallas-Fort Worth in the South-Southeast. Additionally, this route could facilitate trade and tourist travel between Arizona and Nevada and would enable this region to better compete in the global economy.

Figure 1-7. I-11 Corridor as Identified in MAP-21 Legislation




# How the I-11 and Intermountain West Corridor Has Evolved Over the Past Two Decades

Corridor concepts for a transportation facility through the Intermountain West have been suggested and studied at various levels of detail over the past several decades. The first major study began with the 1991 Intermodal Surface Transportation Efficiency Act legislation where the Federal Highway Administration (FHWA) designated a series of High Priority Corridors for federal funding, to the more recently enacted federal transportation legislation, MAP-21, which designates I-11 as a future Interstate between the Phoenix and Las Vegas metropolitan areas (Figure 1-7).

Initiation of an approach for comprehensive corridor implementation was more recently advanced by the Maricopa Association of Governments (MAG), the Phoenix area metropolitan planning organization. Beginning in 2006, MAG undertook two regional transportation framework studies for two of three major growth areas anticipated through 2050 and beyond—*I-10/Hassayampa Valley Transportation Framework Study* (MAG 2007) and *I-8 and I-10/Hidden Valley Transportation Framework Study* (MAG 2009a)—that proposed a westerly bypass around the Phoenix metropolitan area, tentatively named the Hassayampa Freeway, with the intention to connect farther north and south.

Numerous projects, studies, and initiatives over the past two decades have led to the development of the Corridor.

The concept for this proposed transportation facility was reinforced within a statewide context, expanded, and solidified in *bqAZ Statewide Transportation Planning Framework Program* (ADOT 2010a), a 40-year vision for multimodal transportation in Arizona, coordinated with all neighboring state departments of transportation. Generally using the existing US 93 corridor northwest from Wickenburg, bqAZ extended the Hassayampa Freeway corridor beyond the MAG framework study boundaries to the Arizona-Nevada state line, as well as southward to Mexico, noting this corridor as a "proposed Interstate."

As part of these framework studies, MAG and ADOT worked closely with several major public and private stakeholders (including a number of large-scale master planned community developers) throughout the Hassayampa and Hidden Valleys. Realizing the benefit that the Hassayampa Freeway (and ultimately I-11) could provide to their developing communities, the private sector banded together with public sector entities, non-profit organizations, and other individuals to create the CAN-DO Coalition

(Connecting Arizona and Nevada–Delivering Opportunities), a non-profit corporation. This coalition was developed to promote the bold vision of connecting the two major southwestern metropolitan regions of Phoenix and Las Vegas with an Interstate highway, in turn providing accessibility to commerce centers and seaports along the nation's Pacific coast and completing an international trade route from Canada to Mexico. Coalition leaders played a strong role in lobbying for the designation of this corridor as "Interstate 11" in MAP-21.

Figure 1-8. Mike O'Callaghan-Pat Tillman Memorial Bridge- A Crucial Link in Corridor Connectivity

Nevada has been an equal partner with Arizona since the early 1990s, planning for a regional corridor with improved access from Las Vegas south to Phoenix and a potential northern extension to Reno, seeking to create a better connected Intermountain West with greater economic opportunities. Four key projects forwarded this concept. The Boulder City Bypass fast-tracked design and construction of a corridor anticipated to serve as one segment of the greater I-11 Corridor, and has environmental clearance in place. The Hoover Dam Bypass and Mike O'Callaghan-Pat Tillman Memorial Bridge (Figure 1-8) completed a critical link in the I-11 Corridor. The *I-15 Corridor System Master Plan* and Connecting Nevada have prioritized this Corridor as high importance and have begun to draft conceptual alignment alternatives.

Appendix A, Past Planning Studies and Strategies, includes summaries of regional, statewide, and local projects and planning studies with implications or recommendations relevant to the I-11 and Intermountain West Corridor.

## Report Purpose

The purpose of this report is to determine whether sufficient justification exists for a new high-speed transportation corridor, and if so, to establish and characterize the likely range of future transportation demand in the region that would give rise to the need for a new I-11 and Intermountain West Corridor.

A unique element of this study is the development of a Corridor Business Case to help determine the potential value of the project.

The work program is presented in three phases. During the initial phases, a review and inventory of existing and future conditions was conducted to provide a foundation for further study, and the economic context for the Corridor was established.

A unique element of this study is the development of a Corridor Business Case to help determine the potential value of the project. In addition, benefits and costs of the proposed Corridor to different parties and stakeholders (for example, private investors, freight carriers and shippers, state and local governments, and residents) will be estimated using various assumptions about funding scenarios and planning options (such as alignment and project type). The Corridor Business Case will identify and describe projects and public policy initiatives impacting decisions, validate existing estimates of capital costs and other life cycle costs, and identify benefit and cost metrics based on a set of core objectives.

During the next study phase, Corridor Concept Development, the data analysis presented in this Corridor Justification Report will be used to develop and evaluate alternatives for the separate Corridor segments and sections. This high-level evaluation will narrow the connectivity area options. A detailed feasibility assessment of the priority Corridor sections will then be conducted. The Corridor's final purpose and need will be developed, the Business Case finalized, and generalized implementation steps outlined.

A "corridor" implies the use of different modes of transportation. Depending on the purpose and need of each Corridor segment, different transportation modes or infrastructure facilities (for example, transfer of information technology) may be recommended for implementation, either in the same right-of-way envelope or on different alignments.

For the future connectivity segments north of Las Vegas and south of Phoenix, a series of possible corridors will be identified, evaluated, and prioritized, with potentially different trigger points that could allow the choice of one corridor or mode over another, dependent on external factors that might be unknown or undetermined at the conclusion of this study.

This report also outlines the characteristics affecting the Corridor—such as population, employment, economic diversity, and freight movement—that will be needed in the next phase to evaluate the location and type of enhanced transportation facility. In addition to using accepted projections about the future, alternative scenarios are presented. These scenarios describe probable trends that could affect the region in the future and that may influence the need for the I-11 Corridor.

## Report Organization

The following sections of the Corridor Justification Report provide summary-level data of attributes impacting the purpose and need for justifying the Corridor and describe issues and opportunities related to its planning:

- Chapter 2: Population and Economic Development Trends
- Chapter 3: Existing and Future Transport Characteristics
- Chapter 4: Preliminary Business Case Foundation
- Chapter 5: Stakeholder and Community Input
- Chapter 6: Next Steps

A wealth of information was gathered during the inventory and data collection phase of this project. Detailed technical information, data, and maps are included as comprehensive appendices to this report. The following appendices include the supporting data and analysis that contributed to the findings presented in this report:

- Appendix A: Past Planning Studies and Strategies
- Appendix B: Economic Development and Demographic Trends
- Appendix C: Existing and Future Transport Characteristics

# 2. Population and Economic Development Trends

## Summary of Key Findings

- Population and economic growth in Arizona and Nevada will continue to outpace not only the U.S. average but also the capacity of the regional transportation network.
- Manufacturing growth in both states exceeded the U.S. average, indicating a strengthening economic sector that is strongly linked with transportation demand.
- State economic development departments are focused on diversifying the Arizona and Nevada economies to target industry clusters that rely heavily on interconnected and efficient transportation.

## Population Trends

The Interstate highway system opened up new routes to the west, creating an enormous surge in population in both Arizona and Nevada.

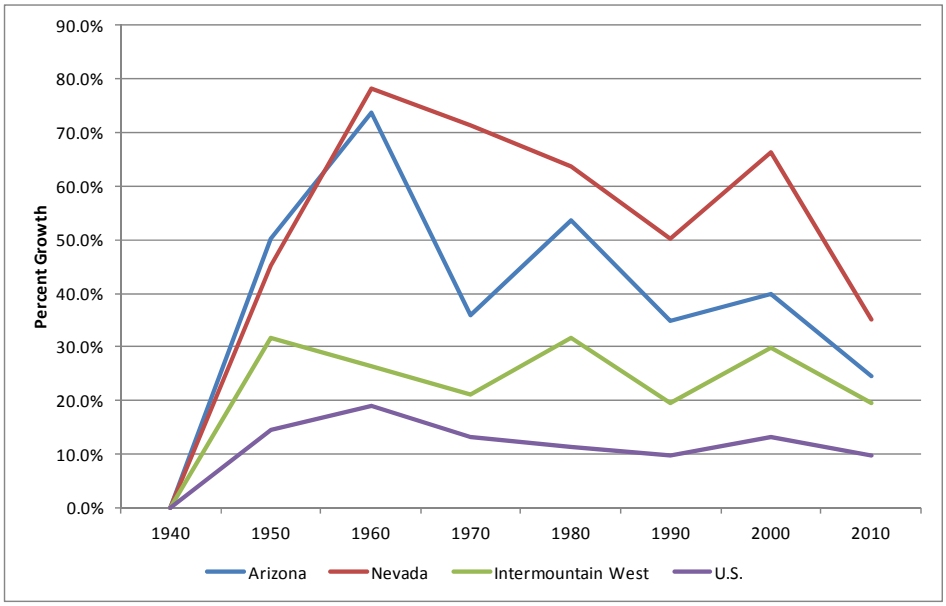
The population growth of the Intermountain West states—particularly Arizona and Nevada—is outpacing growth of the U.S. and the capacity of the regional transportation network. In addition, regional economic development trends are creating demands for new transportation links.

This section provides an overview of current and forecasted demographic and economic conditions in Arizona and Nevada and examines population growth and projections in the Intermountain West. More detailed information about the topics discussed in this section is in Appendix B, Economic Development and Demographic Trends.

The Intermountain West states have also surpassed growth rates of the U.S. by growing more than two and one-half times as fast.

The Interstate Highway System, authorized by the Federal Aid Highway Act of 1956, opened up new routes to the West, which fostered the migration of people and commerce. The original intent of the Interstate Highway System was to improve the mobility of military troops to and from airports, seaports, rail terminals, and other military installations. Coincident to this goal was an enormous surge in population in both Arizona and Nevada (Figure 2-1). In the 10 years between 1950 and 1960, the population grew by 74 percent in Arizona and 78 percent in Nevada, compared to the U.S. as a whole which grew by 19 percent during the same period. The Intermountain West states have also surpassed U.S. rates by growing more than two and one-half times as fast.

Figure 2-1. Historical Population Growth (1940-2010) for Arizona, Nevada, Intermountain West, and United States



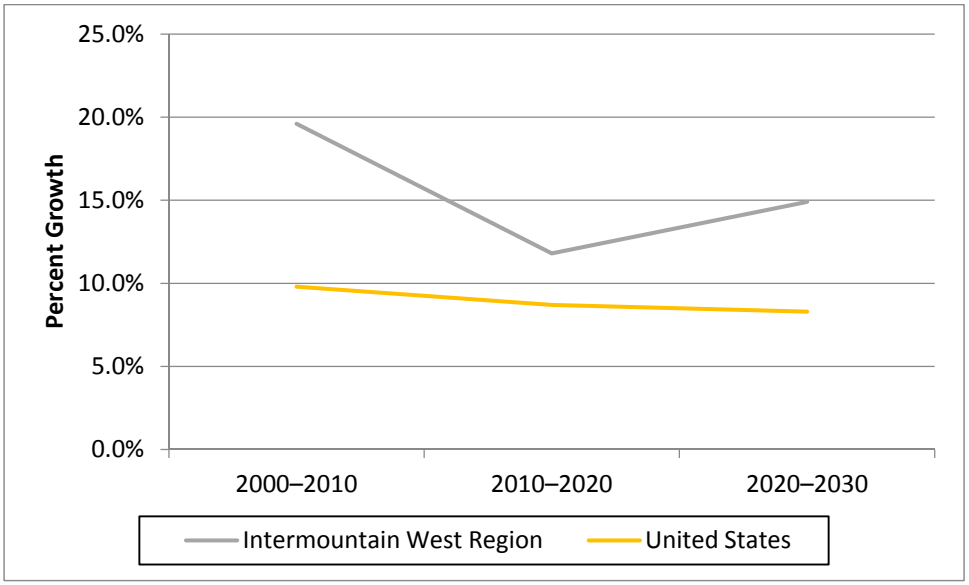

*Source: U.S. Census Bureau 2002*

Between 2000 and 2010, the rate of growth for the Intermountain West states was 19.6 percent—double that of the U.S. as a whole, which grew at a rate of 9.8 percent. According to the U.S. Census, between 2010 and 2030, the Intermountain West is projected to grow by 28.5 percent, to 32.1 million people, which exceeds the forecasted U.S. growth rate of 17.7 percent over the same period. Over the next two decades (2010-2030), the projected growth in the Intermountain West is expected to slow, but will still exceed that of the U.S. (Figures 2-2 and 2-3). Of the Intermountain West states, the highest projected growth rate during this same period (2010 to 2030) is expected in Arizona.

Considering the explosive growth over the last seven decades and the projected future growth, development of the I-11 and Intermountain West Corridor could greatly improve commerce, tourism, and international trade opportunities across the West.

The population growth rate of the Intermountain West exceeds that of the U.S., even though the rate is declining slightly.

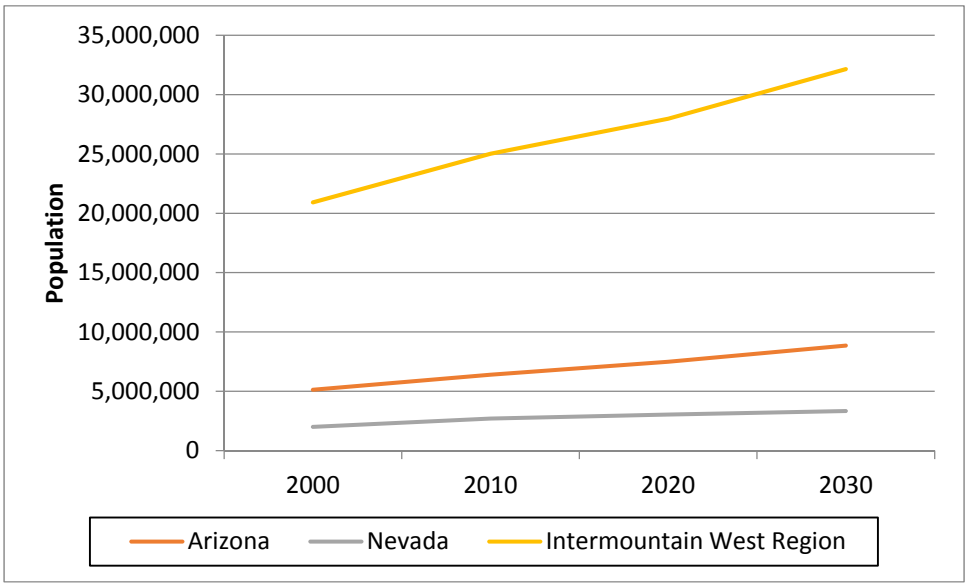
Figure 2-2. Population Growth Rate of the Intermountain West Exceeds That of the United States




*Sources: Arizona Department of Administration 2012b, Nevada State Demographer's Office 2012, U.S. Census Bureau 2011*

The population of Arizona, Nevada, and the Intermountain West is expected to grow significantly.

Figure 2-3. Population Growth and Projections (2000–2030) for Arizona, Nevada, and the Intermountain West




*Sources: Arizona Department of Administration 2012b, Nevada State Demographer's Office 2012, U.S. Census Bureau 2011*

# Economic Development Trends

The economies of Arizona and Nevada are expected to continue to outpace the U.S. average.

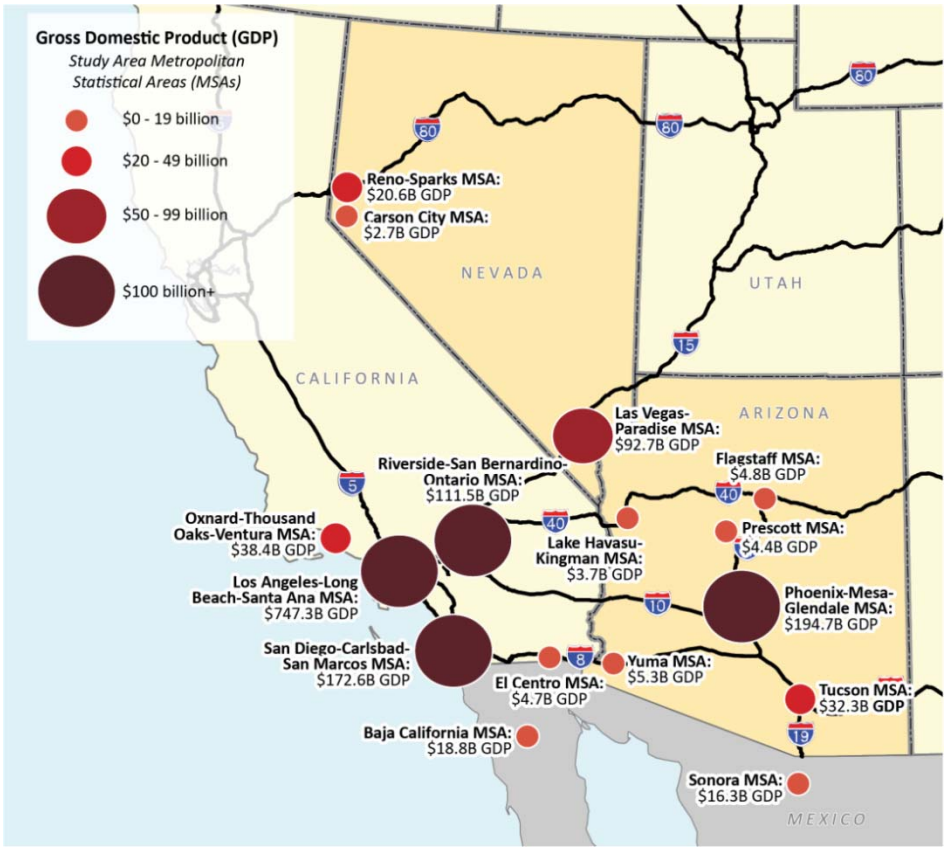
The analysis of current economic development trends suggests likely continued growth in transportation demand. Economic growth is strongly and positively correlated with overall transportation demand, both for freight and personal vehicles. This review of development trends in Arizona and Nevada indicates that the economies of both states are expected to continue to outpace the U.S. average, but that the rate of growth will not be as robust as during the 1990s and early 2000s; however, several transportation-intensive sectors are demonstrating above-average growth. Both states have development plans focused on transportation-intensive sectors.

## Gross Domestic Product by State

The Phoenix and Las Vegas Metropolitan Statistical Areas are the largest contributors to the economy within the states of Arizona and Nevada, and yet no Interstate connection exists between them.

Gross domestic product (GDP) is a principal indicator of the health of an economy or industry. GDP measures the value of final goods and services produced during a given period. According to the U.S. Bureau of Economic Analysis, the GDP for Arizona is $255.9 billion and for Nevada is $129.4 billion. Figure 2-4 shows the GDP by metropolitan statistical area within the two states. The Phoenix and Las Vegas metropolitan statistical areas are the largest contributors to the economy, followed by Tucson and Reno.

Figure 2-4. Arizona and Nevada Gross Domestic Product (2011)




*Source: U.S. Bureau of Economic Analysis 2012*

The majority of the sectors within Arizona and Nevada experienced growth in GDP from 2010 to 2011, including manufacturing, wholesale trade, and transportation and warehousing. Both states had negative GDP growth in the areas of agriculture and forestry; utilities; and real estate, rental, and leasing. Mining showed the highest GDP percentage growth for both states; Nevada's GDP grew by 26.8 percent, and Arizona's GDP grew by 13.3 percent. Construction GDP in Arizona saw a very modest 0.9 percent increase, while Nevada experienced a 16.8 percent decrease. This side effect of the housing bust hurt both the Phoenix and Las Vegas metropolitan areas, but Phoenix is recovering more quickly. These markets are just beginning to rebound after 5 years of depressed home prices; as a result, homebuilding, rental, and real estate activity is increasing. More detailed information is in Appendix B.

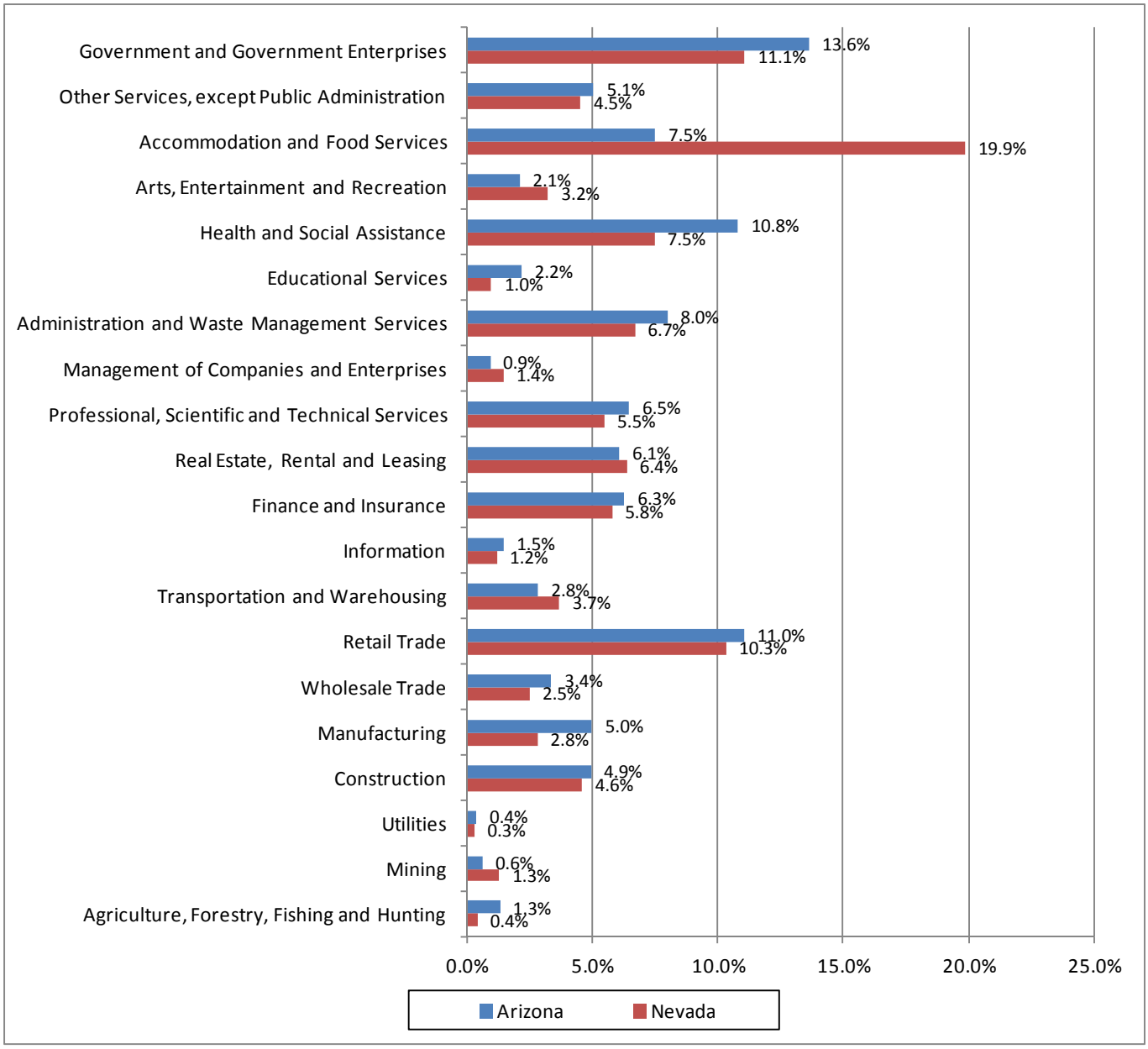
## Employment by Industry

Fifty-one percent of employees in Nevada and 43 percent of employees in Arizona work in industries that depend on a reliable regional transportation network for transporting goods and tourists.

The total concentration of jobs by industry reflects the economic diversity within a market. Figure 2-5 shows the 2011 employment in both Arizona and Nevada by industry. Fifty-one percent of employees in Nevada and 43 percent of employees in Arizona work in industries that depend on a reliable regional transportation network for transporting goods and tourists. While manufacturing jobs represent only 5.0 percent of all jobs in Arizona and 2.8 percent of all jobs in Nevada, the growth of manufacturing in both states exceeded the U.S. GDP of 1.5 percent, with Arizona at 8.9 percent and Nevada at 3.7 percent, indicating growing manufacturing sectors in both states.

When examining employment projections by industry, Arizona is expected to see gains in transportation and logistics, manufacturing, healthcare, and professional services. Likewise, Nevada is projecting job growth in mining, transportation and logistics, and manufacturing—most of which rely on an efficient regional transportation network.

Figure 2-5. Arizona and Nevada Employment, 2011




*Sources: Arizona Department of Administration 2012b, Nevada Department of Employment 2012*

A focus on economic development recognizes the importance of creating high-wage jobs, leveraging statewide assets, and improving the foundations that support economic development.

## Industry Clusters/Targets

Over the last 2 years, Arizona and Nevada have renewed their focus on economic development, and both states recognize the importance of creating high-wage jobs, leveraging existing statewide assets, and improving the foundations that support economic development, such as the construction of I-11 and an Intermountain West Corridor. This Corridor would link the metropolitan areas of Phoenix and Las Vegas and ultimately provide connectivity to the international markets of Mexico and Canada.

Both Arizona and Nevada recognize that to be successful in their economic development endeavors, many simultaneous strategies—including developing the transportation systems that these industry clusters require—must be implemented.

In support of this renewed emphasis, both states have undergone significant changes in their statewide economic development service delivery systems. Arizona created the Arizona Commerce Authority as the designated statewide economic development entity responsible for business recruitment and international trade. The Nevada Legislature introduced an economic development bill that was signed into law by the Governor, creating a Cabinet-level economic development position.

To compete nationally and globally, each state has developed an economic development plan focused on building its economy and targeting specific industry clusters. Table 2-1 summarizes the industry targets and clusters that are the subject of each state's economic development goals. Arizona and Nevada have similar industry targets relative to their business recruitment and retention programs. In some cases, these targets represent an existing concentration or industry cluster within the state. In other cases, the industry target is the subject of a concerted effort to grow the economic activity, such as renewable energy.

Table 2-1. Arizona and Nevada Industry Targets and Clusters

| Industry Targets | Arizona | Nevada | Requires Regional Transportation Network |
|---|---|---|---|
| Advanced Manufacturing | • | | • |
| Aerospace, Aviation, Defense | • | • | • |
| Optics | • | | • |
| Biotechnology | • | | • |
| Healthcare | • | • | |
| Information and Computer Technology | • | • | |
| Life Sciences | • | | • |
| Mining, Materials, and Manufacturing | | • | • |
| Renewable Energy | • | • | • |
| Science and Technology | • | | • |
| Tourism, Gaming, and Entertainment | | • | • |
| Transportation and Logistics | • | • | • |

*Sources: Arizona Commerce Authority 2013, Brookings Institution 2011, Greater Phoenix Economic Council 2013, Tucson Regional Economic Opportunities 2006*

To enhance the region's competitiveness, a robust transportation system is needed to facilitate the growth of business and its attraction to the area and to offer a means to connect to other markets. Industry targets such as aerospace, aviation, and defense; advanced manufacturing; mining, materials, and manufacturing; transportation and logistics; and tourism, gaming, and entertainment are critically dependent upon their supply chain and the regional movement of people and finished goods. Both states recognize that to be successful in their economic development endeavors, many simultaneous strategies–including developing the transportation systems that these industry clusters require–must be implemented. The next phase of this

study will provide greater insight into the specific components of this investment (such as modality, alignments, scale, priorities, and timing). However, at a minimum, this investment will need to include system-wide investments with emphasis on urbanized areas, focused investments in infrastructure to support the efficient movement of truck freight and enhanced north-south system capacity to address anticipated growth in demand.

## Major Economic Activity Centers

Connecting the major economic activity centers with a reliable regional transportation network will strengthen each individually and make the region as a whole more competitive.

Connecting the major economic activity centers with a reliable regional transportation network will strengthen each individually and make the region as a whole more competitive. When examining the geographic concentration of population and employment in the two states, it is apparent that the two major metropolitan areas of Phoenix and Las Vegas contain the majority of all economic activity. However, in addition to these two economic hubs are submarkets that contribute to the economy in a number of ways; these submarkets have a concentration of military installations, locations near land ports of entry (LPOEs), proximity to transportation and railroad facilities, and robust tourism and recreational resources.

The two largest counties in Arizona and Nevada—Maricopa and Clark (Table 2-2)—have the two largest metropolitan areas, Phoenix and Las Vegas, in both states. Santa Cruz County in Arizona, with a population of 47,420, shares the border with Mexico. However, Arizona's sister state of Sonora, Mexico, has a population of nearly 2.7 million, making this region a significant binational economic activity center.

Table 2-2. County Population and Employment for Arizona and Nevada, 2010 and 2011

| County | Population (2010) | Employment (2011) |
|---|---|---|
| **Arizona** | | |
| Maricopa | 3,817,117 | 1,730,915 |
| Pima | 980,263 | 406,591 |
| Pinal | 375,770 | 120,439 |
| Yavapai | 211,033 | 79,773 |
| Mohave | 200,186 | 69,033 |
| Yuma | 195,751 | 65,587 |
| Coconino | 134,421 | 64,200 |
| Cochise | 131,346 | 44,460 |
| Navajo | 107,449 | 32,108 |
| Apache | 71,518 | 19,975 |
| Gila | 53,597 | 18,480 |
| Santa Cruz | 47,420 | 16,492 |
| Graham | 37,220 | 12,280 |
| La Paz | 20,489 | 6,275 |

Table 2-2. County Population and Employment for Arizona and Nevada, 2010 and 2011

| County | Population (2010) | Employment (2011) |
|---|---|---|
| Greenlee | 8,437 | 3,490 |
| **Nevada** | | |
| Clark | 1,951,269 | 869,376 |
| Washoe | 421,407 | 200,977 |
| Carson City | 55,274 | 25,013 |
| Elko | 48,818 | 24,479 |
| Douglas | 46,997 | 20,425 |
| Lyon | 51,980 | 19,193 |
| Nye | 43,946 | 13,638 |
| Churchill | 24,877 | 10,288 |
| Humboldt | 16,528 | 7,479 |
| White Pine | 10,030 | 4,122 |
| Lander | 5,775 | 2,438 |
| Pershing | 6,753 | 2,082 |
| Mineral | 4,772 | 1,968 |
| Storey | 4,010 | 1,961 |
| Lincoln | 5,345 | 1,834 |
| Eureka | 1,987 | 859 |
| Esmeralda | 783 | 383 |

*Source: U.S. Census Bureau 2010a*

A preliminary overview of population and economic development trends of the region suggests that continuing investment in the transportation system will be required over the time frame of this study to address growth in population and economic activity. This investment will be defined more fully in the next study phase, but it is anticipated to include:

- System-wide investment, with emphasis on the urbanized areas, to address observed system congestion, which can only increase over time given the historical trends and economic development aspirations of both states
- Focused investments in infrastructure to support the efficient movement of truck freight within and between major urban centers, in light of the states' economic development emphasis on high-value manufactured goods which are likely to move by truck
- Enhanced north-south system capacity to address anticipated growth in demand for north-south goods movement associated with increasing trade with Mexico

# 3. Existing and Future Transport Characteristics

## Summary of Key Findings

***Moving People***

- Population growth has outpaced transportation infrastructure. Failure to establish adequate infrastructure to move people and goods could significantly constrain future economic growth for Arizona and Nevada. Additional capacity will also be needed on some non-Interstate highways serving north-south travel to accommodate future growth.
- Congestion on US 93 is expected to increase in the future, with hot spots in and around Phoenix, Wickenburg, Kingman, Boulder City, and Las Vegas.
- Some of the more than 2.5 million air passengers who travel between Arizona and Nevada might elect to drive or take a train if those options were available, safe, and affordable.
- Demand for passenger rail is expected to grow as highway and aviation systems reach their capacities. The corridor between Phoenix and Las Vegas is within the 100- to 600-mile range in which high-speed rail is competitive with other transportation modes such as highway and air travel.

***Moving Goods***

- The reliability of freight movement will play a major role in deciding how goods are moved from international manufacturers to markets throughout North America.
- Trucks transport about 75 percent of freight by value in Arizona and Nevada. Both states import more goods from California than from any other state.

Failure to establish adequate infrastructure to move people and goods throughout the Southwest Triangle as part of national and global supply chains could significantly constrain future economic growth in Arizona and Nevada.

Transportation networks provide vital connections that join urban areas; however, the Intermountain West has an underdeveloped network. Improving and expanding existing infrastructure is an important priority for the Intermountain West as it seeks to expand global trade and support a growing population. Failure to establish adequate infrastructure to move people and goods throughout the Southwest Triangle as part of national and global supply chains could significantly constrain future economic growth.

The section is organized into two major topics, Moving People and Moving Goods, and provides an overview of the existing and future transport characteristics of the corridor in both Arizona and Nevada; detailed information is in Appendix C, Existing and Future Transport Characteristics.

## Moving People

The population of the Intermountain West is currently 25 million, and the area includes some of the nation's most densely populated and fastest growing counties. The rate of growth for the Intermountain West was double that of

The rate of growth for the Intermountain West was double that of the U.S. as a whole over the last 10 years.

the U.S. as a whole over the last 10 years. Arizona and Nevada were the nation's fastest growing states in 2009. It is anticipated that over the next 20 years, Arizona will grow by 38 percent and Nevada by 24 percent, to a combined population of more than 12 million (Appendix C). By 2050, populations in the Phoenix and Las Vegas regions are expected to almost double. This section describes opportunities and challenges of moving people between these major population centers via car, airplane, and rail/transit.

By 2050, populations in Phoenix and Las Vegas are expected to nearly double.

## Highways

Arizona and Nevada are served by seven Interstate highways with primary travel being east-west movements (Figure 3-1). I-8, I-10, I-40, and I-80 all serve east-west travel. I-10, I-40, and I-80 are transcontinental routes stretching from California to the Atlantic coast. As shown in Figure 3-1, a lack of Interstates serves north-south travel in these two states. I-15 serves travel across 124 miles through southern Nevada. I-17 connects I-10 and I-40 in Arizona between Phoenix and Flagstaff, and I-19 connects Nogales, Arizona, on the Mexican border to I-10 in Tucson.

MAP-21 legislation recently named US 93 between Wickenburg and Las Vegas an "NHS High Priority Corridor designated as a future Interstate," otherwise known as I-11.

Several routes in these two states are considered National Highway System (NHS) routes designated by FHWA as roadways important to the nation's economy, defense, and mobility. For the non-Interstate highways, these corridors tend to be highways that provide access to a major port, airport, public transportation facility, or other intermodal transportation facility (FHWA 2012). FHWA High Priority Corridors—including the CANAMEX Corridor—are also located in Arizona and Nevada. As identified by the North American Free Trade Agreement (NAFTA), these include:

- I-19 from Nogales to Tucson (Arizona)
- I-10 from Tucson to Phoenix (Arizona)
- US 93 from Wickenburg to Las Vegas (Arizona/Nevada)
- I-15 from Las Vegas to the Canadian border (Nevada and beyond)

With the lack of north-south Interstate highways and no direct connection between Phoenix and Las Vegas, several non-Interstate highways are used to move both goods and people between Arizona and Nevada. US 93 is the primary route for travel between Arizona and Nevada connecting the Phoenix and Tucson metropolitan areas with the Las Vegas metropolitan area. The segment of US 93 between Wickenburg and Las Vegas has recently been named an "NHS High Priority Corridor designated as a future Interstate," otherwise known as I-11, through the MAP-21 legislation (FHWA 2012).

Figure 3-1. Arizona and Nevada Interstates


With the lack of north-south Interstate highways and no direct connection between Phoenix and Las Vegas, several non-Interstate highways are used to move both goods and people between Arizona and Nevada.

Other major north-south highways linking Arizona and Nevada are US 95, State Route (SR) 62, and US 395. While US 95 is mostly an alternate route for travel between Arizona and Nevada, it is a significant route for north-south travel in Nevada and is the primary route between Las Vegas and Reno. SR 62 is a popular route for truck traffic connecting to US 95 in California from SR 95 in Arizona. US 395 begins in California at I-15 and runs along the east side of the Sierra Nevada through California, Nevada, Oregon, and Washington, ending at the US/Canadian Border.

It is the long-term vision of ADOT and NDOT to transform US 93 into a higher-capacity roadway. NDOT and ADOT worked together to construct the Hoover Dam Bypass and conduct US 93 corridor improvements on both sides of the bridge. The Mike O'Callaghan-Pat Tillman Memorial Bridge opened to traffic in late 2010. ADOT has dedicated nearly half a billion dollars to widening and improving US 93 from Wickenburg to Hoover Dam over the last

several years and is in the process of converting the existing corridor into a four-lane divided highway through the entire 200-mile stretch. Only five highway improvement projects remain, leaving approximately 45 miles of highway to be widened to at least four lanes. NDOT fast-tracked the design and construction of a project to widen US 93 to two lanes in each direction, including some operational and safety improvements between the bridge and Boulder City. South of Boulder City, US 95 was widened to four lanes from the US 93 interchange south to the California state line.

The West in general and the Southwest megaregion in particular is underserved by north-south Interstate capacity. I-5 and I-15 originate in Southern California (in the San Diego metropolitan area) but then separate for more than 500 miles throughout much of the West. I-11 would fill in a critical gap in that it would provide a direct Interstate link between the two largest regions in the interior Southwest—Phoenix and Las Vegas—and provide a backup capacity to the I-5 Pacific route within the interior West. By contrast, I-85 and I-81 in the East serve as a critical redundancy to the I-95 coastal Interstate. This capacity has enabled a logistics, supply chain, manufacturing capacity to emerge along these routes that includes a wide array of products including auto parts, furniture, and technology. These roads are also critical to logistics and trade flows in the East and allow a more efficient use of I-95 for passenger travel. Adding a similar capacity to the West via I-11 would create similar supply chain and trade links between the interior West and Mexico. It also would help relieve the heavy burden of both logistics and passenger travel along I-5 in California. Finally, the I-5 route is vulnerable to both earthquakes and flooding (especially in Sacramento). A back-up interior I-11 could be used as insurance against a major disruption in commerce if I-5 were lost for an extended period due to a natural disaster.

### Congestion

Five locations in Arizona and Nevada appear in FHWA's annual report on congestion at freight-significant highway locations.

Congestion has impacts on both commuters and truckers, affecting businesses, suppliers, manufacturers, and the overall economy. If congestion affects truck productivity and delivery times, costs are passed on to consumers in the form of higher prices, affecting areas far from the region where the congestion occurs. Congestion can result in unreliable trip times and missed deliveries, both of which cause major business implications. If the infrastructure supporting freight traffic is reliable, manufacturing and retail firms can carry less inventory because they can rely on goods being delivered on time. Severe congestion also has the potential to impact shipping patterns whereby freight flows are diverted to less congested routes.

Five locations in Arizona and Nevada appear in FHWA's annual report on congestion at freight-significant highway locations. The majority of locations currently monitored are urban Interstate interchanges, and they are ranked according to the impact of congestion on freight (American Transportation Research Institute 2011):

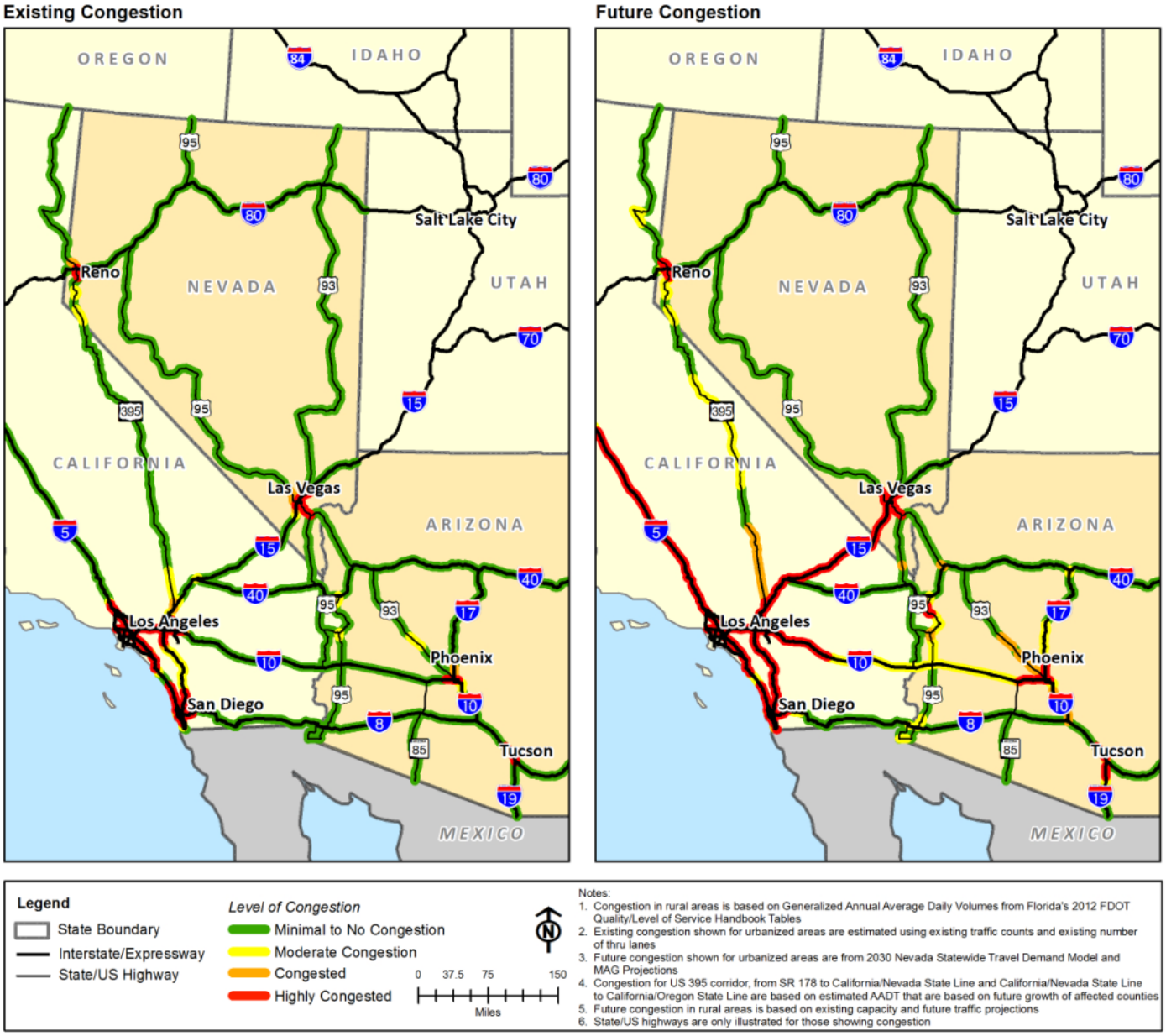
- I-15 at I-515 in Las Vegas
- I-10 at I-19 in Tucson
- I-10 at SR 51/SR 202 in Phoenix
- I-17 at I-40 in Flagstaff
- I-80 at US 395 in Reno

Currently, there is congestion through the urban areas (Tucson, Phoenix, Las Vegas, and Reno), and the segment of US 93 near Wickenburg is approaching capacity. Figure 3-2 shows the existing and future (2040) congestion on the major highways in Arizona and Nevada.

Increasing congestion on California's roads could shift greater amounts of trade into the Intermountain West.

Future 2040 forecasts show that in the Las Vegas area, new capacity may be needed to accommodate growth because US 93 and US 95 will continue to be congested. In Phoenix, all major highways will be congested, and portions of US 93 and US 95/SR 95 in Arizona will need additional capacity. The majority of US 395 in California is projected to be approaching capacity with continued congestion through Reno in northern Nevada. As traffic congestion continues to increase on California highways, long-distance passenger vehicle and commercial truck trips greater than 50 miles may shift to parallel routes east of the Sierra Nevada such as US 395, US 95, or an I-11 and Intermountain West Corridor. Nearly all of the major freeways in Southern California are projected to be congested in 2040.

Figure 3-2. Arizona and Nevada Existing and Future Congestion



### Safety

In addition to the damage done to lives and property, traffic incidents contribute to significant delays for passenger and freight travel and costs to the public. Not only are the lives of those involved in crashes affected, so too are the lives of relatives and emergency responders. The comprehensive costs of crashes are estimated to be $4,008,885 for a fatality and $216,059 for a debilitating injury (FHWA 2005). Information about fatality rates and crash types can be used to analyze roadway conditions and driver performance.

Each state's *Five Percent Report*, a report submitted annually to FHWA describing the top 5 percent of locations with the most severe safety needs, was reviewed to determine whether any segments on the major north-south highways in Arizona and Nevada were identified as top crash locations. In Nevada, these locations include segments of US 95 in Clark County surrounding the Las Vegas metropolitan area and a few segments along US 93 in Clark, White Pine, and Elko Counties. In Arizona, the locations with severe safety needs include segments of I-40 near Kingman and I-10 in Phoenix.

The Interstate Highway System is the nation's safest road system, with a fatality rate of 0.8, compared with 1.46 for all roads in 2004.

A primary reason for building the Interstate Highway System was to improve the safety of the drivers, passengers, and pedestrians. Over the past 50 years, the system has made highway travel safer and more efficient. Safety is measured by the fatalities per 100 million vehicle miles traveled, a measure used so that data can be compared as traffic volumes change. The Interstate Highway System is the nation's safest road system, with a fatality rate of 0.8, compared with 1.46 for all roads in 2004.

When the Interstate Construction Program began in 1956, the national fatality rate was 6.05. Safety improvements have resulted from many factors such as the shifting of traffic onto safer Interstate highways and technological advances such as wider shoulders; slide-resistant pavements; better guardrail, signs, and markings; clearer sight distances; and breakaway sign posts and utility poles.

The Highway Safety Improvement Program is a core federal-aid program, and each state is required by the FHWA to have a Strategic Highway Safety Plan that is regularly updated and evaluated. MAP-21 provides an Interim Guidance document that clarifies the Strategic Highway Safety Plan requirements, including performance measures to be addressed. Safety-related measures include injuries and fatalities occurring in motor vehicle crashes. Most states are also implementing the recently published *Highway Safety Manual*, which will standardize how roadway safety related projects are evaluated.

## Aviation

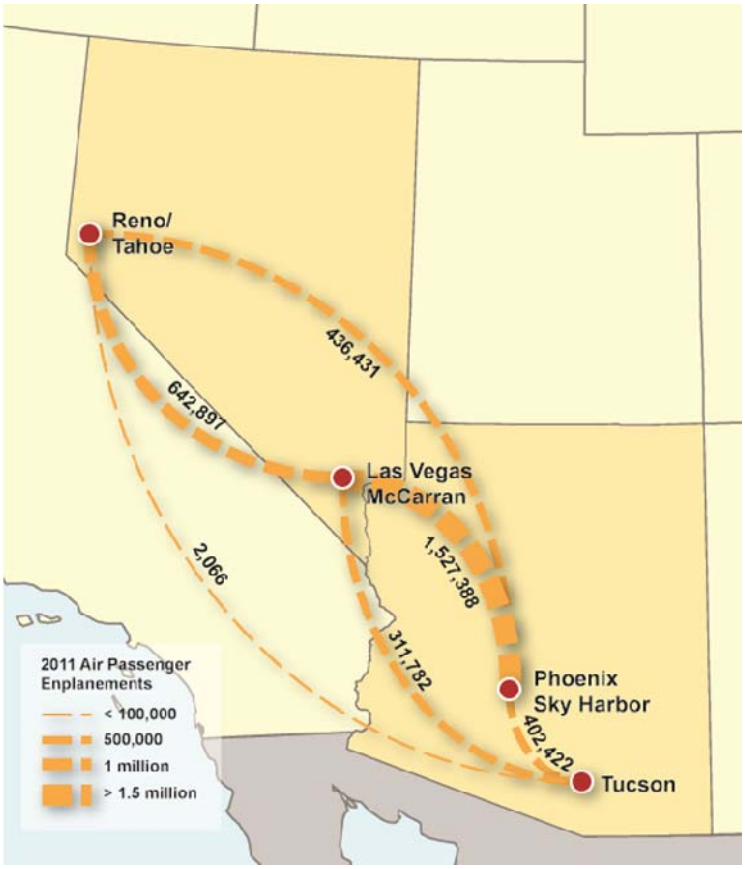
Because it is currently the most efficient option for trips of 500 miles or more, aviation is vital to the nation's transportation system. However, half of the flights in the U.S. are routes of fewer than 500 miles. According to the Brookings Institution, 3 of the 10 busiest air travel corridors are fewer than

Many of the more than 2.5 million air passengers that traveled between Arizona and Nevada in 2011 might have used alternative modes of transportation if reliable and safe options existed.

500 miles apart: between Los Angeles and San Francisco (347 miles), Los Angeles and Las Vegas (229 miles), and Los Angeles and Phoenix (358 miles). The lack of investment in alternative modes of transportation makes air travel the mode of choice for several short-haul air travel corridors (flights less than 500 miles). Continued growth in these short-haul routes presents logistical and economic challenges at airports as well as significant environmental impacts (Brookings Institution 2009b).

Arizona and Nevada have 2 of the top 10 busiest airports in North America (Las Vegas McCarran International Airport at 8th and Phoenix Sky Harbor International Airport at 9th) and the top 25 busiest airports in the world (Federal Aviation Administration 2012b, Airports Council International 2012a). Travel through these two airports accounts for more than 5 percent of the passengers traveling through U.S. airports. In 2011, Arizona had 2,373,000 flights into and out of its airports and Nevada had 860,000 flights (Federal Aviation Administration n.d.). In 2011, Las Vegas McCarran and Phoenix Sky Harbor had 19.9 million and 19.8 million enplanements, respectively. Between 2010 and 2011, these two airports saw 4.61 percent and 4.46 percent increases in enplanements for Las Vegas McCarran and Phoenix Sky Harbor (Federal Aviation Administration 2012b).

Figure 3-3. 2011 Air Passenger Enplanements between Major Airports in Arizona and Nevada




*Source: Bureau of Transportation Statistics 2012b*

More than 2.5 million air passengers traveled between Arizona and Nevada in 2011. The Phoenix to Las Vegas air corridor (256 miles) is ranked in the nation's top 100 most traveled air corridors (Brookings Institution 2009b). Las Vegas McCarran and Phoenix Sky Harbor are also among the top 10 destinations from the four major metropolitan areas in Arizona and Nevada: Tucson, Phoenix, Las Vegas, and Reno. Figure 3-3 shows the total number of passengers that traveled between these airports in 2011.

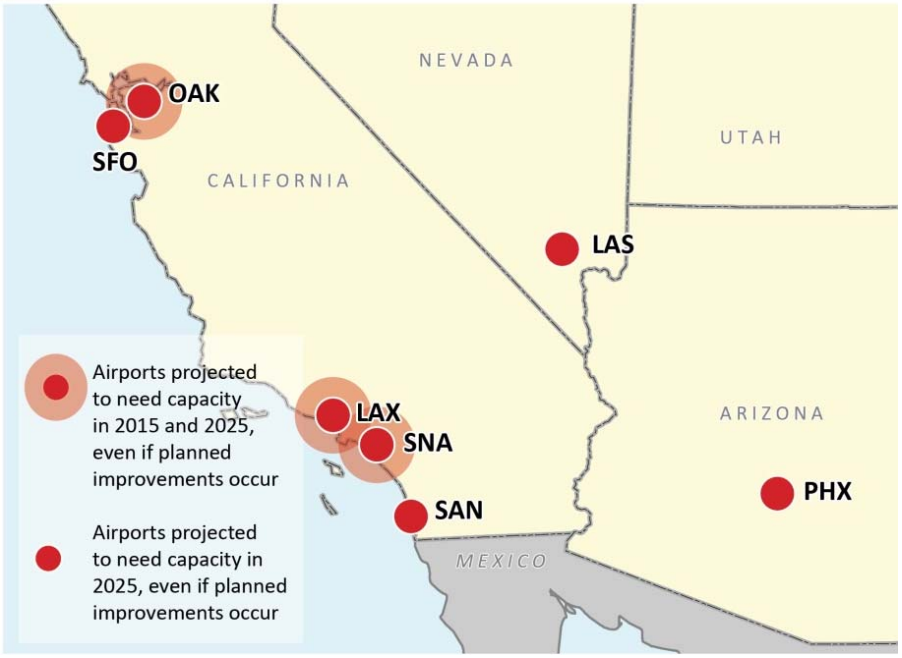
The 2012 Federal Aviation Administration Aerospace Forecast shows commercial air passenger and air cargo activity increasing over the next 20 years. Air passenger system enplanements are projected to increase an average of more than 2 percent domestically and 4 percent internationally per year. In Arizona and Nevada, this national aviation growth, coupled with the projected population and employment increases, will translate into new demand for commercial air travel and air cargo (Federal Aviation Administration 2012d).

Alternative modes of travel between Phoenix and Las Vegas, such as I-11, will help relieve the demand for airport capacity, expected to peak by 2025 at both Phoenix Sky Harbor and Las Vegas McCarran airports, triggering the need for additional capacity—even with planned airport improvements.

Airports in Arizona and Nevada are already planning for additional capacity, both in airside and landside facilities.

Planned airport improvements will help accommodate the rapid growth in the number of enplanements and flights. However, even with these improvements, both Phoenix Sky Harbor and Las Vegas McCarran will need additional capacity in 2025 (Figure 3-4). Without the planned improvements, Las Vegas McCarran and Tucson International will need additional capacity in 2015. Secondary airports, such as Phoenix-Mesa Gateway in the Sun Corridor and the proposed Southern Nevada Supplemental Airport (also known as Ivanpah Airport) in greater Las Vegas, may provide some relief.

Figure 3-4. Airports Needing Capacity in 2015 and 2025, Even If Planned Improvements Occur




*Source: Government Accountability Office 2009*

## Passenger Rail and Transit

Similar to highways, intercity and interstate passenger rail is restricted to east-west travel in Arizona and Nevada; therefore, public transportation between Arizona and Nevada is served exclusively by buses.

New passenger rail routes are currently under study to improve north-south passenger rail connectivity between Arizona, Nevada, and California. Similar to highways, intercity and Interstate passenger rail is restricted to east-west travel in Arizona and Nevada. These rail routes started with the development of transcontinental railroads that linked the railway network in the East with the rapidly growing West. Intercity and Interstate public transportation between Arizona and Nevada is currently served exclusively by buses.

With 21,000 route miles, Amtrak provides intercity passenger rail service in the U.S. Three Amtrak routes serve Arizona and Nevada:

- California Zephyr (Chicago-Denver-Glenwood Springs-Emeryville), including Reno, Sparks, Winnemucca, and Elko

- Southwest Chief (Chicago-Albuquerque-Los Angeles), including Kingman, Williams Junction, Flagstaff, and Winslow
- Texas Eagle/Sunset Limited (Chicago-St. Louis-Dallas-San Antonio-Los Angeles)/(New Orleans-San Antonio-Los Angeles), including Benson, Tucson, Maricopa, and Yuma

Demand for passenger rail is expected to grow as highway and aviation systems reach their capacities. The corridor between Phoenix and Las Vegas is within the 100- to 600-mile range in which high-speed rail is competitive with other transportation modes such as highway and air travel.

Passenger rail service in Arizona is limited to Amtrak and tourist railway services. Amtrak has two routes that travel on freight mainlines through Arizona. Amtrak uses the BNSF Transcon mainline in northern Arizona and the UPRR Sunset Limited Route in southern Arizona. Amtrak has one route, the California Zephyr, which travels on freight mainlines across northern Nevada. This Amtrak route operates with one trip daily in both directions between Chicago, Illinois, and Emeryville, California, on 427 miles of UPRR-owned track in Nevada. Since passenger service on the South Central Route (UPRR) was discontinued in 1997, southern Nevada has had no passenger rail service. Nevada lacks north-south through rail; thus, Las Vegas is not connected to Reno to the north or to Phoenix to the southeast via passenger rail.

Demand for passenger rail is expected to grow as highway and aviation systems reach their capacities. Because passenger and freight rail share tracks, the current passenger rail system is faced with the challenge of limited track capacity. Passenger rail performance is impacted by congestion on shared-use corridors, reducing the efficiency and reliability of passenger rail. One solution to this challenge is the potential for new high-speed rail corridors on dedicated track. Metropolitan areas with busy air markets and congested highways are prime candidates for high-speed rail. The corridor between Phoenix and Las Vegas is within the 100- to 600-mile range in which high-speed rail is competitive with other transportation modes such as highway and air travel.

The State Rail Plans for both Arizona and Nevada identify a high-speed rail corridor linking Phoenix and Las Vegas.

The State Rail Plans for both Arizona and Nevada assess the statewide rail needs and identify opportunity rail corridors for investment. Both states identify a high-speed rail corridor linking Phoenix and Las Vegas.

In 2008, Congress created the High-Speed Intercity Passenger Rail Program (Figure 3-5) to make strategic investments in advancing regional networks of passenger rail corridors and to improve connectivity. While capital funding for the Southwest region has primarily been concentrated in California, the Federal Railroad Administration has also supported the development of a "pipeline" of future projects through investments in state and corridor planning and environmental studies.

As part of this effort, the Federal Railroad Administration is also leading a multi-state rail planning study focused primarily on connectivity between Arizona, California, Nevada, and Utah. This study, one of the first of its kind in the U.S., will result in a better understanding of the market need for passenger rail within the region's multimodal transportation network.

Figure 3-5. High-Speed Intercity Passenger Rail Program

Federal Railroad Administration planning studies are underway for potential high-speed rail routes between Arizona, Nevada, and California (Los Angeles) as part of a program to identify strategic investments needed to create an efficient network of passenger rail corridors and to improve connectivity. However, there is not a specific corridor study looking at connecting California to Arizona or Arizona to Nevada.


## Moving Goods

Businesses in Arizona and Nevada could use an I-11 and Intermountain West Corridor to attract investments and increase activity. This activity will ripple through the economies of the two states, creating jobs and boosting economic growth.

Businesses in Arizona and Nevada could use an I-11 and Intermountain West Corridor to attract investment and boost activity to create value that will ripple through the two states' economies, creating jobs and boosting economic growth. Transportation infrastructure facilitates the transport of both goods and people. Freight flows passing through the region (those that neither originate in nor have a destination in Arizona or Nevada) can benefit from reduced congestion and enhanced safety but will likely have minimal lasting economic effects on the region.

To see how the I-11 and Intermountain West Corridor might influence how goods move throughout the region, it is useful to understand current and projected trends in freight flows. Figure 3-6 shows the current and future top freight commodities by value in Arizona and Nevada. Precision instruments are expected to be the largest category of goods transported by value in 2040. The precision instruments category includes photographic machines, medical equipment, navigational instruments, and other instruments used in measurement or testing. This high-value commodity will likely rely on air and truck transportation.

Precision instruments are expected to be the largest category of goods transported by value in 2040. This high-value commodity will likely rely on air and truck transportation.

Figure 3-6. Top Arizona and Nevada Freight Commodities Categories, 2007 and 2040

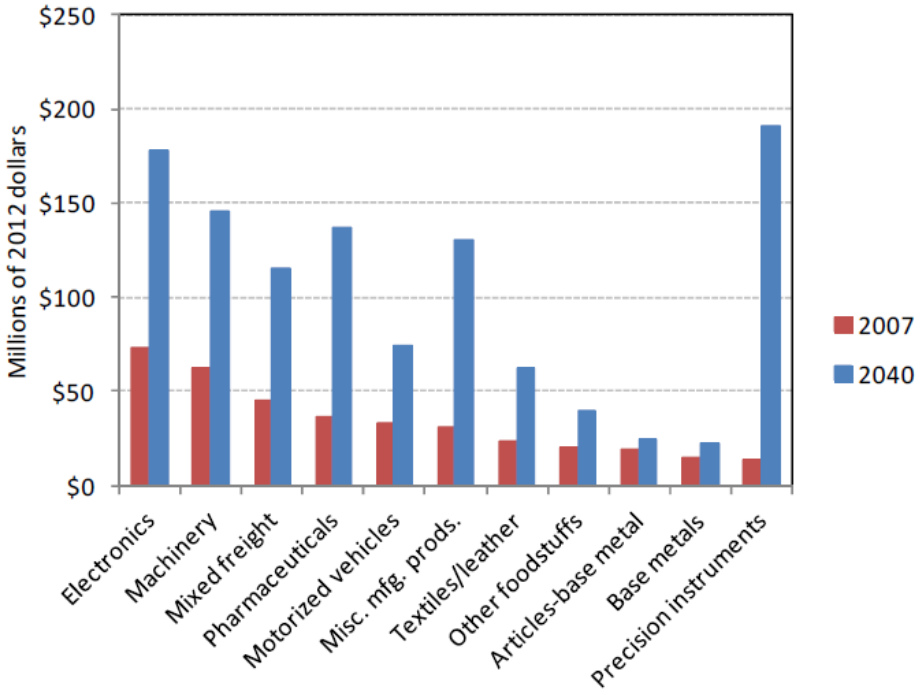
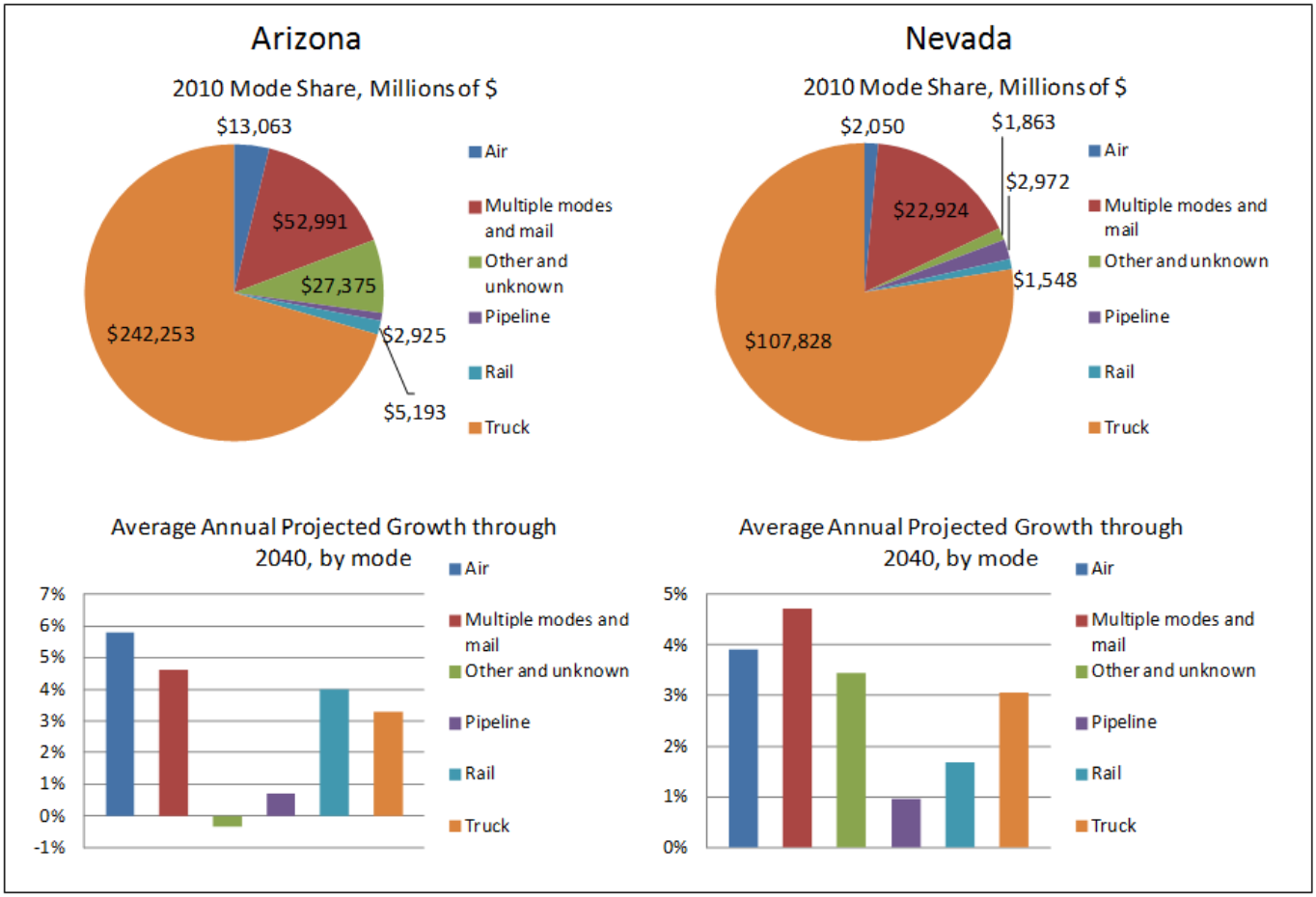



Figure 3-7 shows the freight share by mode in Arizona and Nevada and the projected annual growth rate of the various modes through 2040. Trucks transport about 75 percent of freight by value, with about 15 percent using multiple modes and the rest moving by rail and air. Multiple modes and air transport are projected to grow the most rapidly over the next 25 years.

Figure 3-7. Mode Share by Value and Average Annual Projected Growth

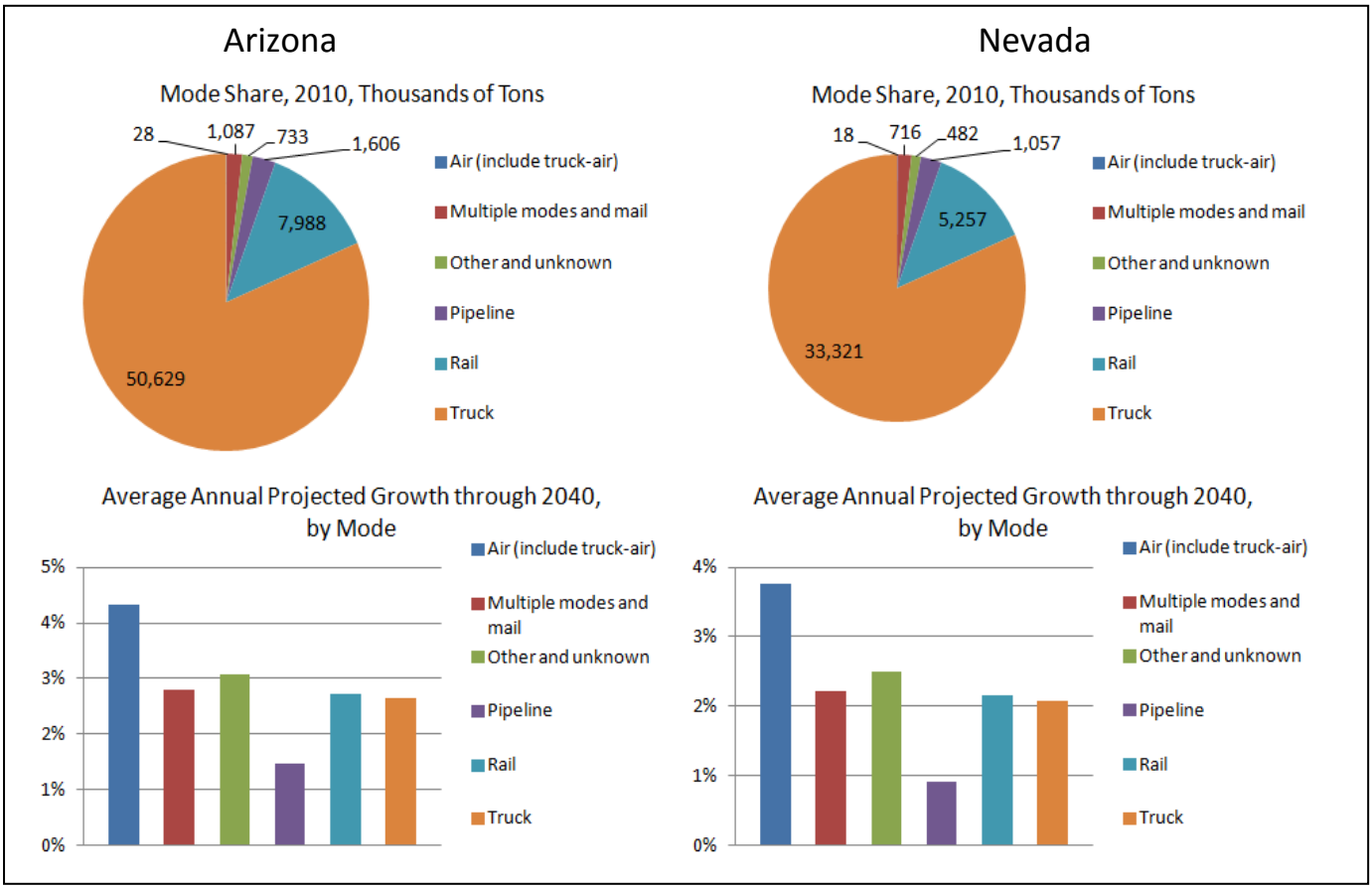



*Source: FHWA 2013*

Note: 2010 data inflated to 2012 by Consumer Price Index inflation factor provided by Bureau of Labor Statistics Consumer Price Index inflation calculator.

Figure 3-8 shows the freight share by mode in terms of volume. Both rail and truck transport a significantly larger share of goods as measured by volume, while the share of goods transported by pipeline, multiple modes and mail, and air modes decline. Less expensive, heavier, or more durable goods tend to travel by rail, while perishable, fragile, lighter, or more expensive goods are more likely to travel by air. Each of the six modes of transit are expected to grow in terms of the number of tons transported, with the volume of goods transported by air projected to grow the most rapidly in both Arizona and Nevada through 2040.

Figure 3-8. Mode Share by Volume and Average Annual Projected Growth




*Source: FHWA 2013*

Note: 2010 data inflated to 2012 by Consumer Price Index inflation factor provided by Bureau of Labor Statistics Consumer Price Index inflation calculator.

The multiple modes and mail category includes truck-rail, truck-water, and rail-water intermodal shipments that change modes at least once between origin and destination.

Keeping pace with intra-regional growth means continuing to invest for sustained competitiveness.

The following sections focus on the three main modes for transporting goods: highways, aviation, and freight rail. Also discussed are land and water ports of entry—the two major avenues by which international goods enter the region.

## Highways

Strong flows exist between Arizona and southern Nevada; however, the dominant freight flows on Interstate highways in Arizona and Nevada follow the existing east-to-west infrastructure between California and the population centers in the Midwest and Atlantic Coast regions. These flows are reflected in both personal vehicles and commercial trucks.

The significant freight flows between Arizona and Nevada are expected to grow.

Freight traveling by truck is of primary interest because it represents about three-quarters of total freight by value. Table 3-1 shows 2010 commodity flows by value moving by truck between six western states and the rest of the U.S. Table 3-1 shows that most truck traffic occurs within state boundaries. California is the biggest individual trading partner state for both Arizona and Nevada. Reflecting the dominant east-to-west movement of commodities, north-to-south truck freight volumes between Arizona and Nevada and Idaho and Oregon are lower compared with Arizona's and Nevada's interaction with California.

Table 3-1. Freight Movement by Truck between Selected States, 2010

| | Origin/Destination | Arizona | California | Idaho | Nevada | Oregon | Washington | Rest of U.S. |
|---|---|---|---|---|---|---|---|---|
| Value ($millions in 2010 dollars) | Arizona | 136,800 | 13,500 | 100 | 3,400 | 700 | 1,300 | 27,900 |
| | California | 25,200 | 1,101,500 | 2,200 | 18,200 | 10,600 | 17,400 | 286,400 |
| | Idaho | 200 | 1,500 | 26,700 | 200 | 1,500 | 2,500 | 9,200 |
| | Nevada | 1,500 | 9,300 | 400 | 41,900 | 1,100 | 2,400 | 8,700 |
| | Oregon | 1,000 | 14,500 | 2,400 | 600 | 78,000 | 21,400 | 17,800 |
| | Washington | 1,100 | 14,500 | 4,200 | 1,400 | 15,800 | 142,900 | 39,300 |
| | Rest of U.S. | 40,600 | 206,600 | 12,500 | 18,500 | 19,500 | 39,200 | 9,416,600 |

*Source: FHWA 2013*

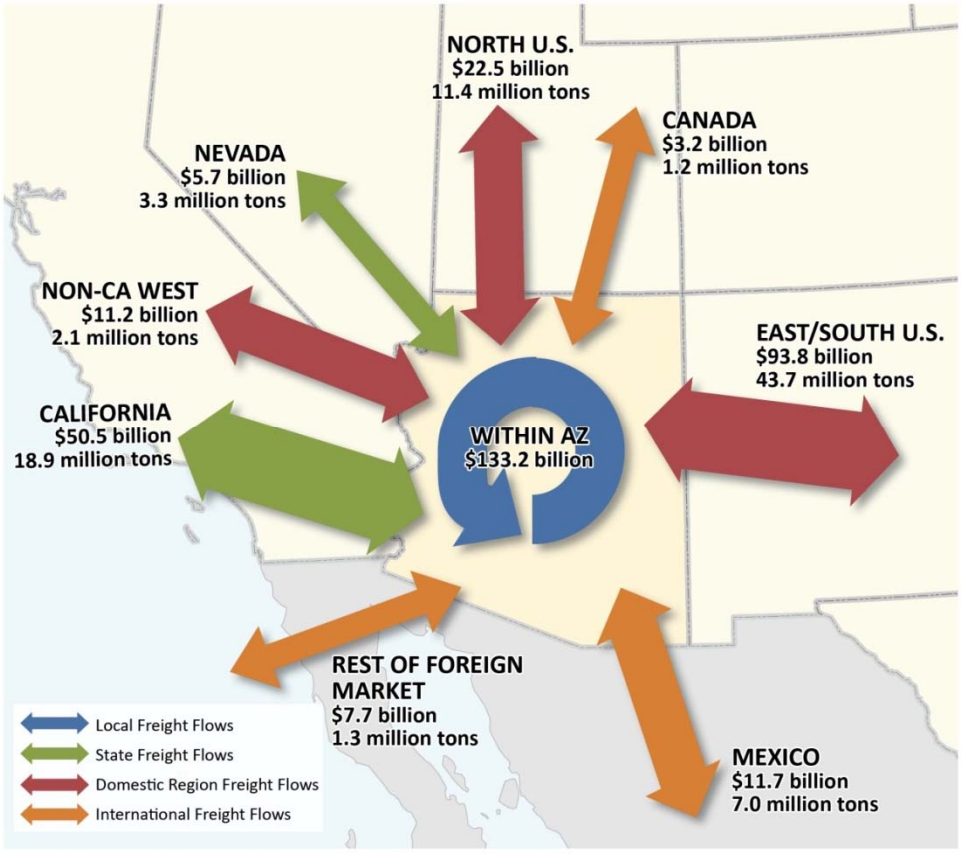
Exports to Mexico are projected to be the fastest-growing freight sector over the next 25 years in both states and are expected to grow 5.2 percent annually in Nevada and 5 percent annually in Arizona.

Exports to Mexico are projected to be the fastest-growing freight sector over the next 25 years in both states.

Directional analysis of freight flows (Figures 3-9 and 3-10) illustrates how goods move to and from Arizona and Nevada. In this analysis, the rest of the states were grouped by geographical location relative to the study area. For example, a state located to the east of the study area was grouped as East. Any freight flow to/from that state would be counted as freight flow to/from the East. The freight flow between California and the study area was estimated separately from other western states because flows to/from California constitute a significant share of total freight flow to/from the region. Therefore, the West category includes only Washington and Oregon.

To sustain economic competitiveness, it is essential to maintain strong economic growth in the region.

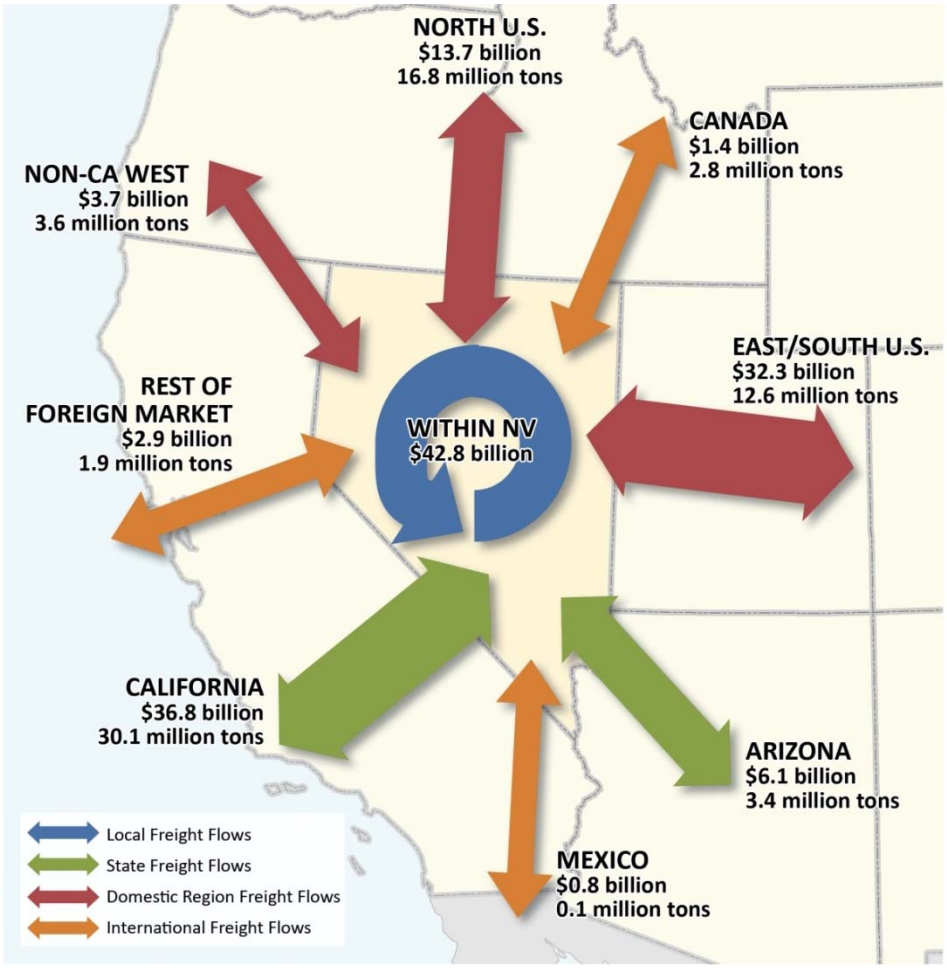
Figure 3-9. 2010 Arizona Inbound and Outbound Freight Volume by Direction, 2012 Dollars




*Source: FHWA 2013*

Note: 2010 data inflated to 2012 by Consumer Price Index inflation factor provided by Bureau of Labor Statistics Consumer Price Index inflation calculator. Values reflect all modes of transportation collected by FAF including truck, rail, air, multiple modes and mail, pipeline, and other and unknown.

Figure 3-10. 2010 Nevada Inbound and Outbound Freight Volume by Direction, 2012 Dollars




*Source: FHWA 2013*

*Note:* 2010 data inflated to 2012 by Consumer Price Index inflation factor provided by Bureau of Labor Statistics Consumer Price Index inflation calculator. Values reflect all modes of transportation collected by FAF including truck, rail, air, multiple modes and mail, pipeline, and other and unknown.

Canada and Mexico are among Arizona's and Nevada's top five foreign trading partners. A future I-11 and Intermountain West Corridor would provide a new north-south trade corridor through Nevada and Arizona providing *essential freight linkages between the new and expanding ports in Mexico and Canada.*

Canada and Mexico are among Arizona's and Nevada's top five foreign trading partners. Barriers to trade, which may be tariff-based or nontariff-based (that is, geographical distance or language), impede international trade flows. However, NAFTA and proximity—particularly between Mexico and Arizona—encourage these flows of goods.

Mexico is Arizona's largest foreign trading partner in both import and export terms. About 35 percent of Arizona's total imports come from Mexico, while an almost equal proportion (36 percent) is exported to Mexico. With the exception of 2008 and 2009, Arizona's trade volume has steadily increased, and trade with Mexico today is nearly in equilibrium, with $5.7 million in exports and $6.1 million in imports.

## Aviation

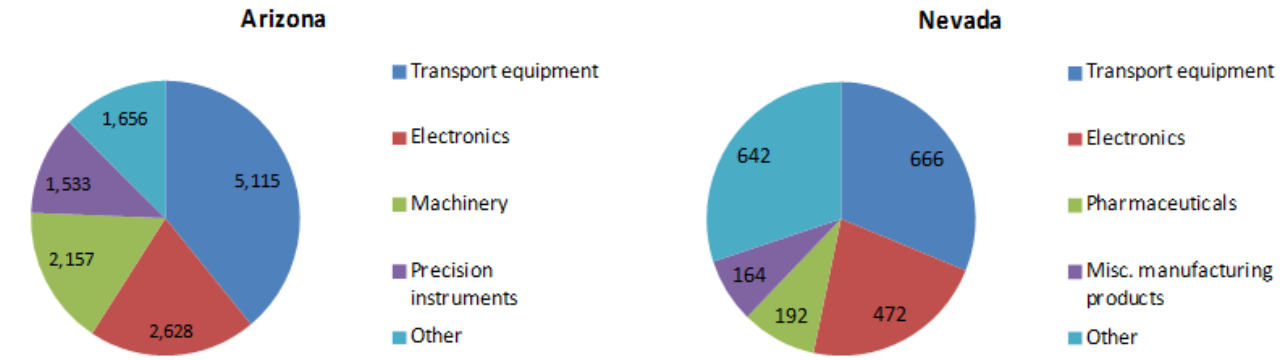
Both Arizona and Nevada have airports with cargo facilities that are considered inland ports of entry.

The equivalent of about 36,800 truckloads of air cargo landed at Arizona airports, and about 18,900 truckloads landed at Nevada airports in 2011.

The Intermountain West states transported a total of 5.7 million tons of air cargo in 2011, for a total value of nearly $394 billion (FHWA 2013). Most air cargo has a high value and is transferred to trucks for quick delivery to its final destination, with a direct impact to the highway network. Both Arizona and Nevada have airports with cargo facilities that are considered inland ports of entry. Complete customs services at both airports allow foreign goods to clear customs. These air cargo facilities have positioned both cities as major West Coast air-truck distribution centers.

Nearly 700,000 tons of air cargo landed at Arizona airports, while 360,000 tons of air cargo landed at Nevada airports in 2011 (Federal Aviation Administration 2012f); this is equivalent to about 36,800 truckloads and 18,900 truckloads, respectively.[1] As Figure 3-11 shows, sectors with fragile or expensive freight are most likely to use air transportation, both in Arizona and Nevada. Of note, air transport use is concentrated in just a few sectors of the economy.

Figure 3-11. Air Cargo by Sector, Millions of 2010 Dollars




*Source: FHWA 2013*

Projections of air freight demand in the Intermountain West region forecast nearly a threefold increase in air cargo tonnage by 2040 (Table 3-2).

[1] The standard load capacity for a truck trailer is 25 tons, and for a railcar 110 tons. Taking 75 percent as average load factor, the truck equivalent tonnage is 19 tons, and the railcar equivalent tonnage is 83 tons. Source: Texas Transportation Institute 2009.

Table 3-2. 2040 Total Tonnage of Air Cargo (Including Truck-Air Mode) by Origin and Destination (1000s Tons)

| Origin/ Destination | Arizona | California | Idaho | Nevada | Oregon | Washington | Rest of U.S. | Total |
|---|---|---|---|---|---|---|---|---|
| Arizona | — | 33.002 | 14.468 | 10.298 | 0.308 | 1.735 | 182.525 | 242.335 |
| California | 61.261 | 304.436 | 0.168 | 108.601 | 45.429 | 82.341 | 1,726.186 | 2,328.423 |
| Idaho | 0.462 | 0.330 | 0.008 | 0.006 | 0.267 | 0.096 | 6.075 | 7.244 |
| Nevada | 0.025 | 0.366 | 0.002 | 43.625 | 0.006 | 0.882 | 50.296 | 95.202 |
| Oregon | 1.902 | 2.488 | 0.100 | 0.028 | — | 0.008 | 27.079 | 31.604 |
| Washington | 44.836 | 29.031 | 0.255 | 2.050 | 0.137 | 0.053 | 127.796 | 204.157 |
| Rest of U.S. | 161.828 | 2,493.790 | 15.091 | 35.239 | 152.654 | 256.595 | 10,724.310 | 1,3839.507 |
| Total | 270.313 | 2,863.442 | 30.092 | 199.846 | 198.799 | 341.710 | 12,844.267 | 16,748.471 |

*Source: FHWA 2013*

## Freight Rail

Transporting goods via rail between Phoenix and Las Vegas is currently not an available option.

In both Arizona and Nevada, cheaper, heavier goods transported in bulk are more likely to be transported by rail. As Figure 3-7 shows, rail-only transport is rare; about 1 percent of goods by value move through Arizona and Nevada solely by rail. Rail transport does carry a significantly larger share of total freight by volume, about 22 percent.

Multiple modes and mail includes rail-to-truck intermodal transport. Intermodal transport is popular at water ports such as the Port of Los Angeles/Port of Long Beach (POLA/POLB), where goods are moved inland by rail from port docks to reload facilities, bypassing urban traffic. These reload facilities sort goods and load them onto trucks for regional delivery. Multiple modes and mail have a mode share of about 15 percent of goods by value in both Arizona and Nevada. By 2040, intermodal transport is projected to have a 21.4 percent share in Arizona and a 24.4 percent share in Nevada. This increase in intermodal transport may increase the demand for reload facilities located in Arizona and Nevada. These statistics include only freight that has an origin or destination in Arizona or Nevada and do not account for freight that passes through the region. Through freight does not generally have a lasting economic effect.

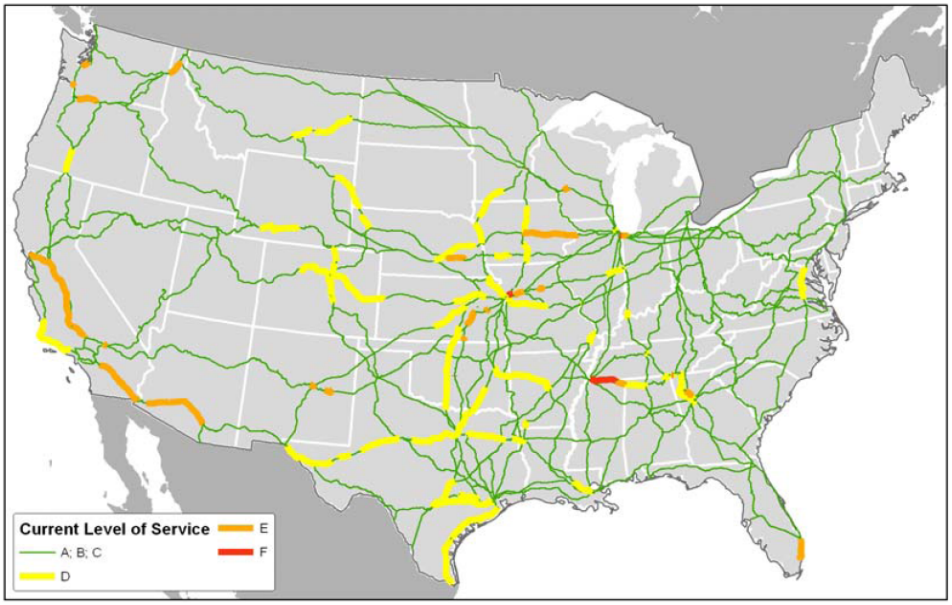
Continuous north-south rail corridors are non-existent throughout the Intermountain West and are found only on the West Coast and in the Midwest and East.

The demand in the U.S. to move freight by rail is expected to exceed track capacity by 2035. Figure 3-12 shows the 2007 primary rail corridor volumes and track capacity, and Figure 3-13 shows the future (2035) primary rail corridor volumes and track capacity without improvements. Figure 3-13 shows that most of the rail corridors would be over capacity and congested without any planned improvements.

Without improvements, the U.S. rail system will not have enough capacity to haul the projected freight.

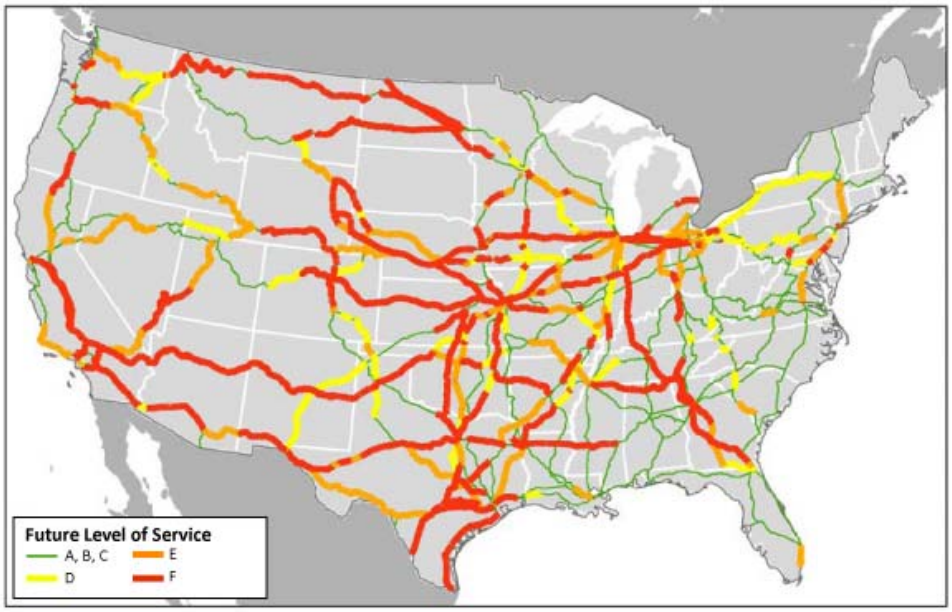
58 percent of Arizona's rail freight by value was motorized vehicles, nearly all of which originated in Mexico and stopped in Arizona before proceeding to auto manufacturing plants in the U.S.

Figure 3-12. Existing (2007) Corridor Volumes Compared to Current Capacity




*Source: Cambridge Systematics, Inc. 2007*

Figure 3-13. Future (2035) Corridor Volumes Compared to Current Capacity (Without Improvements)




*Source: Cambridge Systematics, Inc. 2007*

## Arizona

Arizona has 1,683 miles of freight rail on more than 10 corridors (mainlines, branches, and short lines). About $2.9 billion worth of goods was moved to or from Arizona by rail in 2010. Of note, 58 percent of Arizona's rail freight by value was motorized vehicles, nearly all of which originated in Mexico and stopped in Arizona before proceeding to auto manufacturing plants in the U.S. In 2010, 68 percent of Arizona's rail freight by volume was coal. Coal freight destined for Arizona generally originates in Texas, Colorado, and Utah.

While many of the routes run east-to-west, mirroring the existing highway system (UPRR and BNSF transcontinental mainlines), UPRR operates a north-south branch route from Tucson to Nogales, the Nogales Branch, which connects to Ferrocarril Mexicano (Ferromex) in Mexico, heavily used for accessing numerous auto assembly plants and industries in Hermosillo, Mexico. BNSF runs a north-south branch line that connects the Transcon mainline route, running approximately parallel to I-40 in northern Arizona, to Phoenix, connecting to the Mobest Yard, Glendale Intermodal Facility, and other transloading facilities. Additional branch lines and short line railroad corridors serve other freight-related destinations, especially mining operations in the northern and eastern portions of the state. Both Class I major transcontinental rail lines are undergoing corridor improvements; double-tracking the UPRR Sunset Route through southern Arizona and triple-tracking portions of the BNSF Transcon in northern Arizona.

The Port of Tucson, an inland port rail facility that is also a foreign trade zone bonded warehouse district, serves NAFTA and CANAMEX Corridor markets.

The Port of Tucson, an inland port rail facility, is also a foreign trade zone bonded warehouse district that serves NAFTA and CANAMEX Corridor markets. UPRR is in the process of developing a classification yard at Red Rock (located between Phoenix and Tucson) that may be expanded to include intermodal facilities. ADOT and the Arizona Department of Commerce are studying the feasibility of inland port development in Yuma that would function as an interface between the UPRR Sunset Route and the potential railroad connecting the proposed Port at Punta Colonet, Mexico.

### Nevada

Nevada transported about $1.5 billion worth of goods by rail in 2010, with coal accounting for half of the freight by volume. Most rail freight is inbound with a destination in Nevada; however, Nevada does send a significant amount of metallic ores to Detroit. Nevada has two primary rail corridors, both of which run generally east-to-west across the state, one in the north and one in the south. UPRR owns and operates all 1,085 mainline route miles in the state. The Northern Corridor connects Reno to Salt Lake City and Denver to the east and Sacramento and San Francisco to the west. The Southern Corridor connects Los Angeles to Las Vegas to Salt Lake City, generally paralleling the I-15 route.

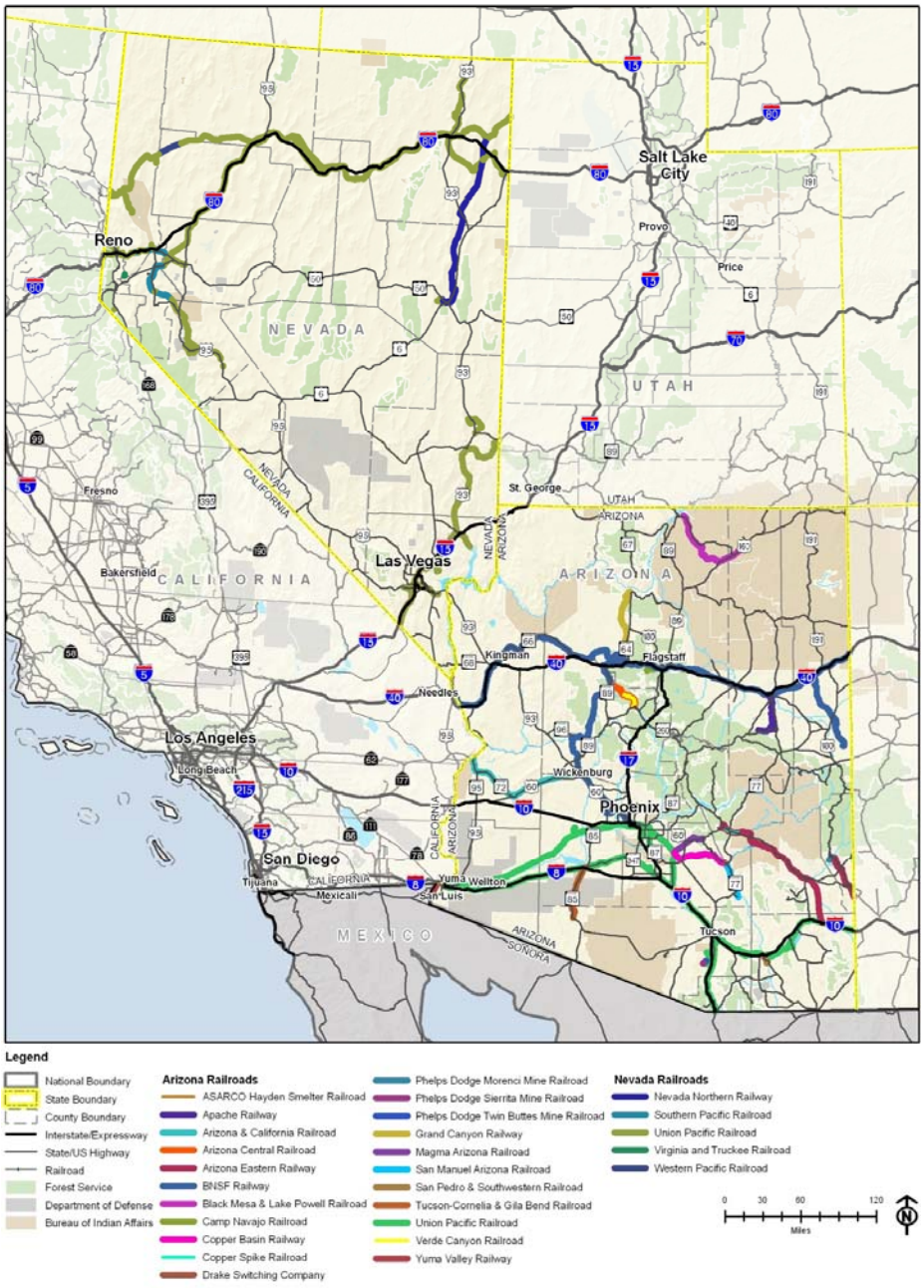
Nevada has two freight intermodal facilities where trailer on flat car or container on flat car can be transferred between railcars and/or trucks.

Nevada has two freight intermodal facilities where trailer on flat car or container on flat car can be transferred between railcars and/or trucks. The facilities include the UPRR Sparks Intermodal Facility in northern Nevada and the UPRR Las Vegas Intermodal Facility.

### Rail Freight between Arizona and Nevada

Similar to the highway system in the region, the freight railroad network in Arizona and Nevada is dominated by east-west infrastructure (Figure 3-14). To transport goods via train between Phoenix and Las Vegas, goods must travel a circuitous route that uses short lines in Arizona and California. At this point, rail routing is possible between the two metropolitan areas but it is not attractive for most shippers.

Figure 3-14. Arizona and Nevada Rail Networks




LPOEs are a key aspect of freight movement through the Intermountain West Corridor, with about 75 percent of U.S.-Mexico bilateral trade by value crossing through land ports in 2011.

## Ports

### Land Ports of Entry

**Southern Border Ports of Entry**

LPOEs are a key aspect of freight movement through the Intermountain West Corridor, with about 75 percent of U.S.-Mexico bilateral trade by value crossing through land ports in 2011. The U.S. LPOEs are generally net importers of goods, and about 60 percent of goods by volume are destined for Texas, the Intermountain West, California, and the Pacific Northwest. Figure 3-15 shows the five largest LPOEs that handle U.S. and Mexico trade, by value.

Figure 3-15. Top Five Southern United States Land Ports of Entry, 2011


*Source: Bureau of Transportation Statistics 2012c*

Less than 10 percent of land freight between the U.S. and Mexico flowed through Arizona, and approximately 90 percent of goods that flowed through Arizona crossed at Nogales.

The top three LPOEs constituted 65 percent of trade between the U.S. and Mexico that flows through land ports. Less than 10 percent of land freight between the U.S. and Mexico flowed through Arizona, and approximately 90 percent of goods that flowed through Arizona crossed at Nogales. As Figure 3-15 shows, the volume of freight transported through land ports in Texas and California currently dwarfs freight that is transported through Arizona land ports. However, depending on the destination, goods that enter through land ports in Texas, New Mexico, and California may be more efficiently transported via I-11. Approximately 12 percent of U.S. imports from Mexico by volume could potentially use I-11 as a more efficient route.[2]

U.S. imports from Mexico could potentially use the I-11 and Intermountain West Corridor as a more efficient route.

Continued investments in LPOEs are key to mitigating congestion and encouraging the use of an I-11 and Intermountain West Corridor by making crossing times shorter and more predictable. The *Arizona-Sonora Border Master Plan* (ADOT 2013b) analyzed planned LPOEs and related multimodal transportation improvements along the Arizona-Sonora border in each state, working with stakeholders in both states to prioritize and coordinate implementation of projects to ensure consistency in infrastructure development and improve the efficiency and effectiveness of Arizona-Sonora transportation facilities. Modernization and expansion programs are planned at several LPOEs, as well as the addition of new rail lines, freight processing facilities, and improved roadway connections.

The function and capacity of Arizona's LPOEs are likely to affect the viability of I-11.

The San Diego Association of Governments in 2006 estimated that border congestion cost California $6 billion; as a result, a dedicated freight crossing at Otay Mesa is being developed to capture that economic activity. There is good reason to believe that congestion at Arizona's LPOEs also has a significant effect on the state's economy. California, Texas, New Mexico, and Arizona each have scheduled LPOE improvements; however, approximately 95 percent

[2] Approximately 2.8 million tons of the 24.4 million tons imported in 2011 through an LPOE had origin-destination pairs that suggest a potential usage of I-11. Bureau of Transportation Statistics 2012c.

of vehicular border crossings are personal vehicles, rather than freight vehicles, and demand for personal trips is more responsive to improvements in LPOEs.

**Arizona Ports of Entry**

The function and capacity of Arizona's LPOEs are likely to affect the viability of the I-11 Corridor. On its international border with Mexico, Arizona has six LPOEs that provide controlled entry into or departure from the U.S. for both people and goods. More than 40 percent of the fresh produce imported through all U.S.-to-Mexico LPOEs was processed through Arizona's LPOEs in 2008 (ADOT 2012b). Some Arizona LPOEs have multiple crossings. Most border crossings from Mexico into Arizona occur through three LPOEs: Nogales, San Luis, and Douglas. As Arizona's only rail crossing into Mexico, all rail freight shipments move through the Nogales DeConcini LPOE.

By 2040, imports from Mexico through Arizona border crossings are expected to more than double to more than 13.4 million tons. Exports are expected to more than quadruple to 18.6 million tons.

Approximately half of the bilateral trade flows by value and volume through Arizona LPOEs were multimodal, about one-third were by truck only, and about one-sixth were by rail only. Multimodal flows refer to freight shipments that changed transport mode between origin and destination; they include truck-rail, water-rail, and water-truck flows (FHWA 2012).

By 2040, imports from Mexico through Arizona border crossings are expected to more than double to more than 13.4 million tons. Exports are expected to more than quadruple to 18.6 million tons.

By 2040, imports from Mexico through Arizona border crossings are expected to more than double to more than 13.4 million tons. Exports are expected to more than quadruple to 18.6 million tons, for a total value of $66.2 billion. The primary destinations and origins for imports and exports entering through Arizona LPOEs in 2040 are projected to be Arizona, California, Michigan, and Texas. Eighty-eight percent of the value of both imports and exports is projected to cross the border by truck, with 12 percent by rail (FHWA 2012).

The U.S. is the world's top importer of containerized cargo, much of which enters on the West Coast, where it is then shipped to destinations across the country through Arizona and Nevada.

## Water Ports of Entry

The U.S. is the top importer of containerized cargo, much of which enters the country on the West Coast and is shipped to destinations across the country. This section discusses the water ports that are significant to the I-11 Corridor study area (see Figure 3-16).

**Ports of Los Angeles and Long Beach**

Because POLA/POLB in Southern California are the primary gateways of manufactured goods from the Asian markets, and are typically the most cost-effective way to deliver goods to North American markets, their function and capacity have a significant impact on the direction and volume of freight flows in the study area. These ports are the busiest in the U.S.; combined, they are the 7th busiest in the world for containerized cargo (World Shipping Council 2011). Most goods entering POLA/POLB today are destined for the Midwest and Texas (FHWA 2012).

Figure 3-16. Major West Coast Water Ports of Entry


Increasing congestion on California's road and rail systems could have the effect of shifting greater amounts of trade into the Intermountain West. About 41 percent of imported goods leave Los Angeles by truck, while another 14 percent use multiple modes (generally, short-haul rail movements to locations where railcars are offloaded into trucks). These percentages are projected to increase to 56 percent and 21 percent, respectively, by 2040 (FHWA 2012).

While both POLA/POLB experienced a decline in volumes as a result of the economic downturn in 2008 and 2009, both are expected to reach capacity in the coming years. In fact, POLB reduced capacity as a cost-saving measure in 2009 following the global economic slowdown and domestic recession, which will cause them to reach capacity sooner than expected unless improvements are implemented. Based on the business plan at POLA/POLB, container volumes through these ports are projected to nearly triple from 14 million 20-foot equivalent units (TEUs) in 2011 to approximately 43 million TEUs by 2035 (Southern California Association of Governments 2012). TEU is a standard unit of measurement for containerized cargo that describes the volumetric capacity of a 20-foot-long cargo container. The current combined existing capacity is approximately 28.5 million TEUs, and POLA/POLB are expected to exceed this by 2027 (Southern California National Freight Gateway Collaboration 2011). These projections are supported by the fact that many Pacific Rim countries have relatively booming growth and have oriented their economies toward exports. Other factors that will influence when these ports reach capacity include the pace of global economic growth, the relative strength of U.S. manufacturing, and the impact of the Panama Canal improvements on shifting waterborne freight to Atlantic ports. To avoid major congestion issues, both ports will need to expand their capacity; otherwise, freight traffic will have to re-route to alternative destinations.

Northwestern ports could potentially use the I-11 and Intermountain West Corridor to transport goods south, bypassing the congested I-5 Corridor.

**Other U.S. West Coast Ports**

The ports of Seattle, Tacoma, and Oakland could potentially use an I-11 and Intermountain West Corridor. These three ports handled a combined total of approximately 6 million TEUs in 2010, representing 61 percent of their total capacity. Economists at IHS Global Insight predict that Oakland will handle 3.4 million TEUs in 2020 and 5.1 million TEUs in 2030. Currently, the Port of Oakland can accommodate only 3.3 million TEUs. Unless it expands its

acreage, the Port of Oakland could experience a capacity shortfall well before 2020.

**Gulf of Mexico Ports**

Freight flows diverted through the Panama Canal to Gulf of Mexico ports are not expected to have a significant economic impact on Arizona and Nevada. The majority of those goods, which currently pass through Arizona and Nevada via rail, will continue to bypass these states, only via the Canal. As the Panama Canal is adding a new, deeper-access channel that will allow for expansion of its capacity, freight flows from Asia that would have previously landed at the increasingly congested POLA/POLB may be diverted through the Canal and to ports in Louisiana, Alabama, and Texas. As a result of the improvements, scheduled for 2015 completion, cargo volume through the Panama Canal is expected to double from 2005 levels by 2025. Container volumes in the Gulf Coast will rise to 3.6 million TEUs in 2020 from 2.3 million TEUs in 2006.

**Western Canada Ports**

The Canadian ports of Vancouver and Prince Rupert are a viable alternative to the congested POLA/POLB complex. In 2011, Vancouver transported 2.5 million TEUs and Prince Rupert handled 410,000 TEUs. Those volumes made them the 5th and 26th largest ports in North America, respectively.

The metro port of Vancouver is essentially located at the north end of the I-5 Corridor and has committed to improvements to meet the growing demand for capacity expected over the next 25 years. Prince Rupert has a geographically advantageous location; due to its high latitude, it is 3 days closer to China than POLA/POLB. It is located in an area with little congestion, and goods that land in Prince Rupert can be transported to Chicago via road or rail within 4 days.

New and expanded Mexican ports have the potential to serve as reliever ports for the congested POLA/POLB, and could increase I-11 and Intermountain West Corridor demand, particularly if rail freight were offloaded to trucks.

**Mexican Ports**

The growth and use of the Port of Guaymas and the growth in demand at other Mexican ports is strongly related to potential capacity increases at POLA/POLB. With existing available capacity at POLA/POLB, it is anticipated that ships will continue to carry to these ports until volumes reach or surpass the 2007 levels. At that time, the Mexican ports are expected to gain in traffic as reliever or alternative ports for foreign goods to enter North American markets. They will also have an advantage because expansions at POLA/POLB are continually constrained by adjacent urban development, labor unrest, and environmental regulations.

The Port of Guaymas is located on the Gulf of California in the state of Sonora, approximately 250 miles from the nearest border crossing point in Nogales. This deep-water seaport is part of the CANAMEX Corridor. In 2006 the Port of Guaymas processed more than 3.3 million tons of cargo. Most freight from Guaymas enters the U.S. by rail through Nogales, and the goods are targeted for markets in the southeastern U.S. (CH2M HILL and Wilbur Smith Associates

Inc. 2011). The Port of Guaymas has the potential to serve as a reliever port for the congested POLA/POLB due to its geographical proximity to the U.S. over the larger Pacific ports of Manzanillo and Lazaro Cardenas. Moreover, unlike Ensenada, Guaymas is also connected to the Ferromex Rail System and could increase I-11 and the Intermountain West Corridor demand, particularly if rail freight were offloaded to trucks. This is anticipated to occur only if growth in Pacific trade continues, accompanied by continuing congestion in the POLA/POLB complex, which is not relieved by other mechanisms (such as construction of other West Coast ports or diversion of freight via Panama Canal).

The Mexican government had proposed to build a large container port at Punta Colonet in Baja California, 150 miles south of San Diego. The project was envisioned to have capacity to handle between 4 and 7 million TEUs per year, with potential for a new rail line and possibly a new border crossing location. However, until the port is actually designed and financing is secured, its capacity is highly speculative. The project was delayed numerous times over the past several years. At the end of 2012, Mexico's Ministry of Communications and Transportation cancelled construction of this deep-water seaport and its rail line connecting with the U.S. border. The project is not considered feasible at this time due to the recent economic downturn and U.S. West Coast ports reducing their levels of saturation and congestion.

The current study does not explicitly address the potential future construction of the port at Punta Colonet, although this possibility cannot be ruled out over the time frame of this study, which would further reinforce north-south trade-related travel demand in the I-11 and Intermountain West Corridor. As such, it is assumed that this project is offline for the purposes of this analysis. However, if this port were built in the future, it could increase demand for an I-11 and Intermountain West Corridor.

# 4. Preliminary Business Case Foundation

## Summary of Key Findings

- The Intermountain West, under several alternative future scenarios considered, will experience significant sustained growth in the regional economy and will be accompanied by corresponding growth in travel demand.
- I-11 and the Intermountain West Corridor will be needed to accommodate this increased demand, thereby preventing possible gridlock that could thwart the projected economic growth.
- By strategically enhancing transportation infrastructure, the region may also have the opportunity to enjoy incremental and significantly enhanced economic growth related to important trends in regional and national trade.
- The increasing importance of Mexico as a trading partner, and the emergence of nearshoring as an important and strongly growing structural feature of U.S. commerce, is a significant trend.
- 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.

## Introduction

The I-11 and Intermountain West Corridor has the potential to play a transformative role for both the Intermountain West and the nation in facilitating and shaping trade patterns and related economic growth in the Southwest.

To help understand the nature and scale of the economic returns to a potential I-11 and Intermountain West Corridor investment, this section describes the relationship between goods movement, economic activity, and transportation infrastructure for the Corridor. While continued infrastructure investment in response to economic growth is essential for continued competitiveness, it is also a key enabler to help ensure the region's continued economic success as it participates strongly in the nation's emerging economy. Specifically, three important trends currently shaping the regional economy are considered, and three separate scenarios are constructed to model the effects of each in terms of travel demand, GDP, population, and employment in the region. The results provide some indication of the scale of economic activity and of travel demand that each scenario may produce.

In addition to playing an important regional role in linking Phoenix and Las Vegas, the US 93 Corridor has the potential, as the future I-11 route, to play a transformative role for both the Intermountain West and the nation in facilitating and shaping trade patterns and related economic growth in the Southwest. While the current trend of east-west freight flows exceeding north-south flows is expected to persist over the next 25 years, the development of an Intermountain West Corridor will support the efficient movement of goods and economic development brought about by increased

trade from NAFTA, nearshoring, and the rerouting of Asian trade through Mexico as an alternative to highly congested western U.S. ports and freeways. At the same time, for Nevada, and Las Vegas in particular, it is anticipated to facilitate continued trade, local work force and goods mobility, and continued expansion of tourism visits. Similarly, for Arizona, and Phoenix in particular, it is anticipated to facilitate continued trade, particularly with Mexico, the development of manufacturing operations integrated with corresponding Mexican establishments, and local work force and goods mobility.

During the past several decades, international trade, particularly U.S. trade with Asia, has been a key driver of economic activity in the Southwest, particularly in California, where trade is centered on the POLA/POLB complex. Under the right conditions, current developments in trade movements to and from the Southwest are anticipated to match or potentially outpace the general level of economic growth in those states.

The Business Case is intended to address a key fundamental question: Is the I-11 and Intermountain West Corridor worthy of future investment? To reflect the full range of possible future outcomes, four possible economic scenarios are examined.

The Business Case is intended to address a key fundamental question: Is the Corridor worthy of future investment? The supporting analysis necessary to address this question is being performed in a two-step process. The first step is the Preliminary Business Case Foundation that is prepared in this early phase of the study without the benefit of a detailed corridor context or definition such as modes to be considered, corridor alignment, estimated costs, and operational benefits. It aims to provide a high-level qualitative evaluation and a preliminary analysis of the potential economic impacts that the Corridor might have in the region.

To reflect the full range of possible future outcomes, four possible economic scenarios are examined; these scenarios have the potential to be reflected in the region, together or in combination, when the Corridor is completed. Reflecting important economic trends currently at work in the Southwest, these economic scenarios were selected by the Core Agency Partners during a two-day workshop held December 12-13, 2012, and have a strong likelihood of being realized, in whole or in part, together or individually, in the years ahead. This section documents the results of the initial analysis and provides some early observations regarding the role of transportation infrastructure and of the viability of the Corridor in each of these economic scenarios.

The next step, a Final Business Case, will be completed at the end of this study. The Final Business Case will provide additional analyses refinements and offer further understanding of the potential economic impacts that the Corridor could have in Arizona and Nevada. To understand potential future economic impacts, it is helpful to first look at historic impacts that transportation infrastructure have had on economic development and to recognize the future economic conditions that might exist in the region.

## Possible Future Economic Scenarios

To apply these principles to assess the potential effects of current observable trends in international and domestic trade on the Intermountain West, three

alternative scenarios were developed; each was selected to reflect an important dimension of the potential economic future for the Intermountain West. These scenarios are based on important current trends that, should they continue, will alter the needs for transportation, levels of trade, and overall development in the region. These scenarios were unconstrained; that is, the analysis assumed a strong supply of high-quality transportation and other key enabling factors.

The Growth in Asia Pacific Trade Scenario assumes that the current trends in manufacturing in the Asia Pacific region continue and that the U.S. continues to receive a growing volume of goods from Asia. The Nearshoring Scenario assumes that Asia Pacific manufacturing for the U.S. market flattens and significant production growth occurs in Mexico. The State Economic Development Plans Scenario assumes that Arizona and Nevada are able to realize their major economic development goals, including growing their economies through an industry cluster-based strategy as well as increasing trade with Mexico and Canada.

Each scenario was defined by comparison to a Baseline Scenario, which assumes that trade and freight flows, both international and domestic, grow as forecasted by the United States Department of Transportation. While the Baseline Scenario does take into account some future planned infrastructure projects such as the Panama Canal improvements already underway, it does not include this Corridor. Therefore, because the Corridor has the potential to structurally alter how goods move throughout the region, the analysis may understate the total volume of goods that would be expected to use the Corridor. Specific freight transport flows were estimated for each scenario (Table 4-1) to permit the quantification of the potential economic impacts of each scenario. This information is graphically presented in Figure 4-1.

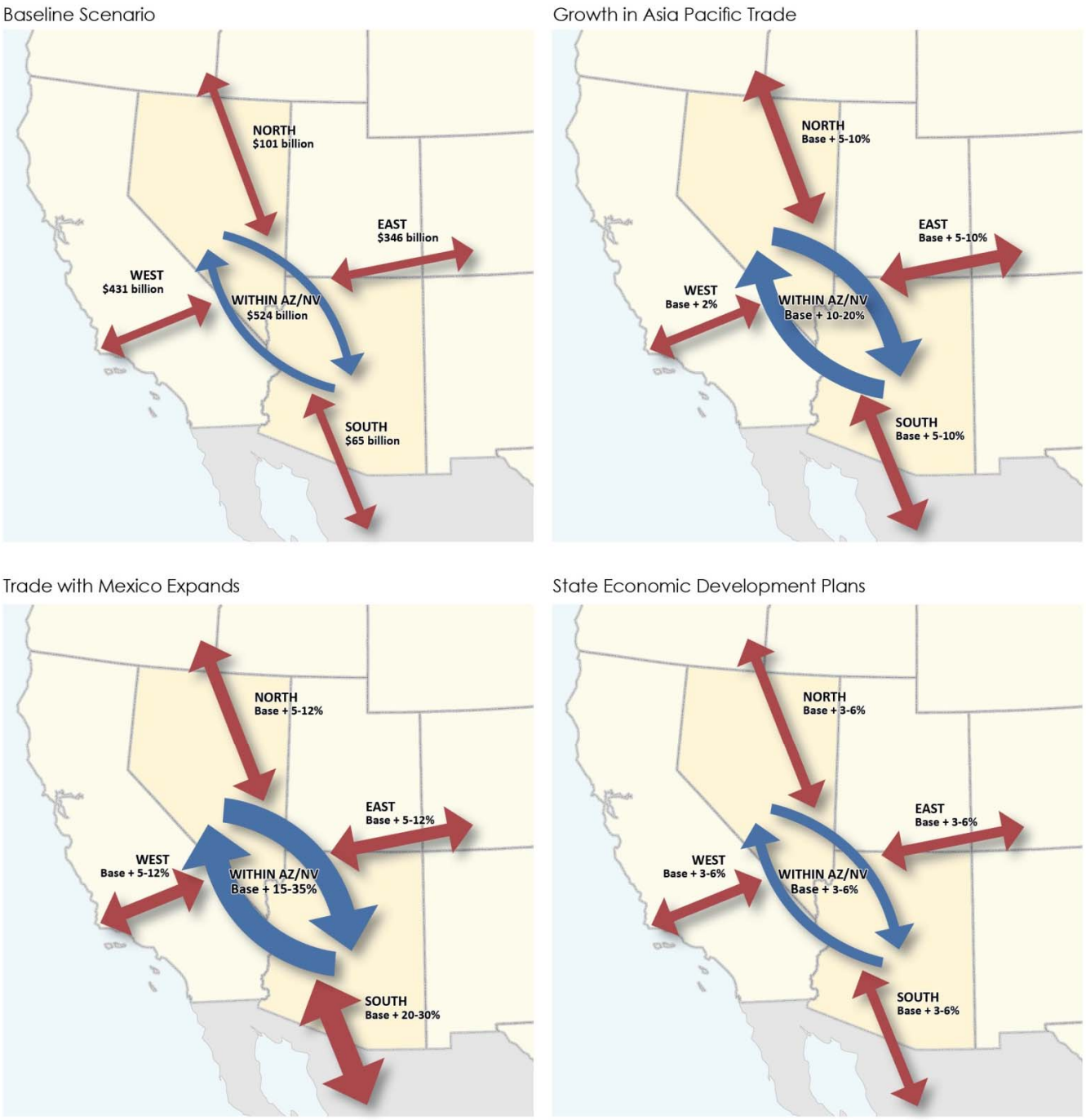
The freight flows described in Table 4-1 were estimated directly as primary inputs to the scenario analysis, using the professional judgment of the study team on the likely range of potential system response in the observed trade flows for each scenario. In this regard, the scenario freight flows are not the maximum conceivable, but are large enough to illustrate the nature and scale of the associated effects.

Table 4-1. Freight Flow Assumptions Relative to the Baseline, by Scenario

| Scenario | South In | South Out | West In | West Out | North In | North Out | East In | East Out | Within |
|---|---|---|---|---|---|---|---|---|---|
| Baseline Condition | FHWA Freight Analysis Framework 3 (FAF3) 2040 forecast | | | | | | | | |
| Growth in Asia Pacific Trade | Base + 5 - 10% | Base | Base | Base + 2% | Base | Base + 5- 10% | Base + 5 - 10% | Base + 5 - 10% | Base + 10 - 20% |
| Nearshoring | Base + 20 - 30% | Base + 20 - 30% | Base | Base + 5 - 12% | Base | Base + 5- 12% | Base | Base + 5 - 12% | Base + 15 - 35% |
| State Economic Development Plans | Base + 3 - 6% | Base + 3 - 6% | Base + 3 - 6% | Base + 3 - 6% | Base + 3 - 6% | Base + 3 - 6% | Base + 3 - 6% | Base + 3 - 6% | Base + 3 - 6% |

*Note: As Figure 4-2 shows, east-west flows are about five times the magnitude of north-south flows in the study area; therefore, while the percentage increases in the Nearshoring Scenario are larger relative to the other scenarios, the increase in terms of freight flows is comparable with the other scenarios.*

Figure 4-1. Freight Flow Assumptions Relative to the Baseline, by Scenario




*Source: FHWA FAF3 data, inflated to 2012 value by Consumer Price Index inflation factor provided by the Bureau of Labor Statistics Consumer Price Index inflation calculator. Values reflect all modes of transportation collected by FAF including truck, rail, air, multiple modes and mail, pipeline, and other and unknown.*

The study team notes that the three alternative scenarios are not mutually exclusive, and a combination of the three alternatives is possible. While the study team does not attempt to quantify the relative likelihoods of each scenario, each is subject to risks that make the realization of that scenario more or less likely. Some of these risks are identified in Table 4-2.

Table 4-2. Scenario Risk Factors

| Scenarios | Risks That Make Scenarios More Likely | Risks That Make Scenarios Less Likely |
|---|---|---|
| **Growth in Asia Pacific Trade** | • Asia Pacific labor costs stagnate, or the differential between Asia Pacific and Mexico labor persists<br>• Widening of Panama Canal results in diversion of Asia Pacific freight and relieves capacity pressures at POLA/POLB<br>• Weak Chinese yuan/strong U.S. dollar | • Transportation costs rise sharply<br>• China GDP growth slows<br>• Lack of infrastructure investments at Panama Canal, Punta Colonet, and POLA/POLB create capacity constraint for Asia Pacific goods<br>• Intellectual property concerns by U.S. firms encourage them to move/keep research and development and manufacturing in the U.S. |
| **Nearshoring** | • Transportation costs rise sharply<br>• Asia Pacific labor costs continue to grow quickly<br>• Mexico GDP growth increases<br>• Weak peso/strong U.S. dollar<br>• Arizona land ports of entry are improved/expanded | • Inadequate transportation infrastructure in Mexico<br>• Governance issues in Mexico continue<br>• Labor costs in Mexico rise<br>• Intellectual property concerns by U.S. firms encourage them to move/keep R&D and manufacturing in the U.S. |
| **State Economic Development Plans** | • Favorable business tax policy implemented in U.S.<br>• Presence of a skilled labor force in Arizona and Nevada<br>• Adequate physical facilities for businesses (offices and factories) in Arizona and Nevada<br>• Intellectual property concerns by U.S. firms encourage them to move/keep research and development and manufacturing in the U.S. | • Water shortages in Arizona and Nevada constrain growth<br>• Inadequate investment in research and development<br>• Strong U.S. dollar |

The urbanized areas of Phoenix and Las Vegas will continue to be congested. Many rural segments that are operating smoothly today begin to experience congestion by 2040.

To assess the impact of each scenario on regional highway congestion, truck traffic volumes for each were compared to the forecast values for the Baseline Scenario. For each route considered, the baseline traffic volumes were determined by:

- Adding the change in average annual daily traffic for the scenario using the scenario population growth rate
- Computing the scenario truck volume increment by using the scenario percentage increase of truck origins or destinations in the study area
- Adding the scenario truck volume increment to the baseline value on each segment evaluated

This analysis provided an estimated average annual daily traffic count for each scenario for each roadway segment analyzed. Then, level of service (LOS) (a qualitative assessment of a road's operating conditions) thresholds for rural routes were used to determine the resultant LOS. The percentage of these segments demonstrating congestion (LOS D to F) was then determined and is described in the following sections for each alternative scenario.

The discussion below provides a brief overview of the Baseline Scenario and the three alternative future scenarios, together with the corresponding modeled economic outcomes and potential traffic congestion implications.

A "no-growth" scenario was not developed or analyzed because it does not reflect long-term experience in the region and would not generate travel demand in the I-11 Corridor.

## Baseline Scenario

The Baseline Scenario indicates an increase in overall growth in transportation demand, both for direct travel consumption and to service the industries that provide goods and services to the growing population.

The Baseline Scenario serves as the background against which the results of the other scenarios are compared. Generally, this scenario reflects a continuation of recent background growth in the region and of current trends, without major structural changes. It is presented as the highly probable economic future of the region, in the absence of significant changes from the recent past.

### Description

The Baseline Scenario assumes that transport and trade continue as currently forecast; this assumption includes existing international trade forecasts, continuation of the existing trends in balance of trade, continuation of the distribution of trade between major trading partners, and continuation of the existing trade route distribution.

The Baseline Scenario also considers some transportation improvements currently underway, including the Panama Canal improvements, which will result in some shifting of transport routing. When additional Panama Canal capacity becomes available, certain goods movements that currently arrive in West Coast ports and move east primarily by rail will sail to the East via the Panama Canal. This redirecting of goods through the Canal may result in a small reduction in trucks using east-west Interstates, but is not anticipated to have adverse economic impacts in Arizona and Nevada.

### Projections

The Baseline Scenario has associated 2040 projections for Arizona and Nevada employment, labor income, value added, and population. Value added is a proxy for GDP. These projections are shown in Table 4-3. The focus is on employment, labor income, value added, and population because growth in these metrics is strongly indicative of overall growth in transportation demand, both for direct travel consumption and to service the industries that provide goods and services to the growing population.

Table 4-3. Study Area Economic Metrics, 2011 Levels and 2040 Baseline Projections

| | Arizona 2011 | Arizona Baseline 2040 | Nevada 2011 | Nevada Baseline 2040 |
|---|---|---|---|---|
| Employment | 3,192,519 | 5,791,860 | 1,518,833 | 2,179,769 |
| Labor Income | $157 billion | $269 billion | $75 billion | $104 billion |
| Value Added (State GDP) | $261 billion | $467 billion | $120 billion | $175 billion |
| Population | 6,553,255 | 10,993,641 | 2,758,931 | 4,084,473 |

*Sources: HDR, ESI Corp., and IMPLAN projections using FHWA FAF3 data, inflated to 2012 value by the Consumer Price Index inflation factor provided by the Bureau of Labor Statistics Consumer Price Index inflation calculator.*

Figure 4-2. Baseline 2040 Cumulative Freight Projections for Nevada and Arizona, 2012 Dollars


*Source: FHWA FAF3 data, inflated to 2012 value by Consumer Price Index inflation factor provided by the Bureau of Labor Statistics Consumer Price Index inflation calculator. Values reflect all modes of transportation collected by FAF including truck, rail, air, multiple modes and mail, pipeline, and other and unknown.*

The cumulative baseline freight flows mapped in Figure 4-2 are the value in 2012 dollars of the two-way (inbound and outbound) flows by direction. Figure 4-2 shows that the predominance of east-west flows currently observed are projected to continue in the future.

As Figure 4-3 shows, the urbanized areas of Phoenix and Las Vegas are already experiencing moderate to severe congestion, and even with the programmed improvements, the facilities will continue to be congested. Many rural segments that are operating smoothly today begin to experience congestion (LOS D or worse) by 2040.

The total economic output in Arizona and Nevada of the Baseline Scenario is estimated at $911 billion. Under the Baseline Scenario, approximately 28 percent of the state transportation corridors analyzed showed unacceptable congestion in 2040.

Figure 4-3. Projected Congestion under the Baseline Scenario


*Sources: ADOT 2012k, California Department of Finance 2012, Florida Department of Transportation 2012, MAG 2012b, NDOT 2012f*

Growth in China is stabilizing at close to 8 percent, and other newly industrialized Pacific Rim countries such as the Philippines and Malaysia will also show strong growth averaging 5 percent. These Pacific Rim countries have traditionally relied heavily on exports to fuel growth.

## Growth in Asia Pacific Trade

This scenario is based on the continued growth of the trade flows with Asia that have characterized West Coast trade during recent decades. This scenario is predicated on the continued growth in U.S. imports of a wide array of low-cost consumer goods from China and other low-cost Asian sources. This scenario assumes that the current trends in manufacturing in the Asia Pacific region continue and that the U.S. continues to receive a growing volume of goods from Asia.

### Description

Growth in China, despite its recent slowdown, is stabilizing at close to 8 percent. The International Monetary Fund (2012) projects this pace to be sustainable over the next 5 years. Other newly industrialized Pacific Rim countries, such as the Philippines and Malaysia, will also show strong growth averaging 5 percent. Even fully industrialized South Korea will likely outpace North America's growth. These Pacific Rim countries have traditionally relied heavily on exports to fuel growth, and corresponding growth in U.S. imports has been larger (up to 12 percent per year). The scenario uses a range of increase in freight flows that reflects a reasonable level of corresponding change in the Intermountain West region, based on professional judgment.

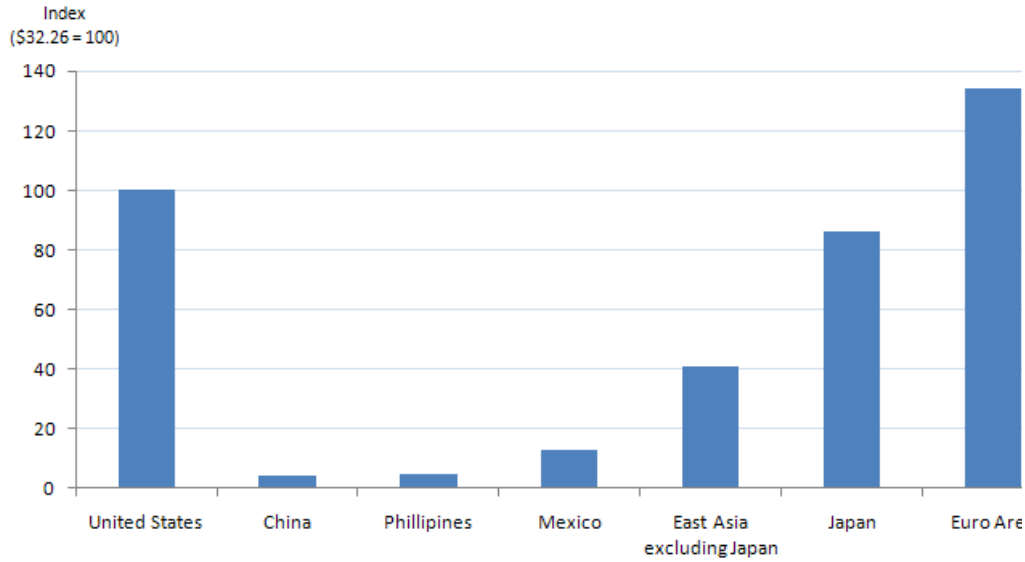
The increased economic activity associated with the Growth in Asia Pacific Trade Scenario results in a greater number of vehicles throughout the region, exacerbating the already congested urban Interstates and some regional routes.

Figure 4-4 shows comparisons of labor costs in 2008. Labor costs in China and the Philippines are markedly less expensive than those in Mexico.[3] Labor-intensive industries have tended to find it profitable to use this cheap Pacific Rim labor, either by outsourcing or offshoring (or continuing to outsource or offshore if these U.S. companies already have facilities in those locations).

The continued importance of Asia as a source of U.S. consumer goods is unlikely to diminish in the near term, although some moderation in growth rates would not be unexpected. To date, container volumes through the POLA/POLB complex since the 2008 recession suggest that this growth has resumed already, and that congestion in West Coast ports may be seen again soon.

[3] The authors note that labor costs in Asia have shown significant growth in recent years relative to labor costs in Mexico.

Figure 4-4. Hourly Compensation Costs of Manufacturing Employees in Selected Economies and Regions, 2008




*Source: U.S. Bureau of Labor Statistics 2010*

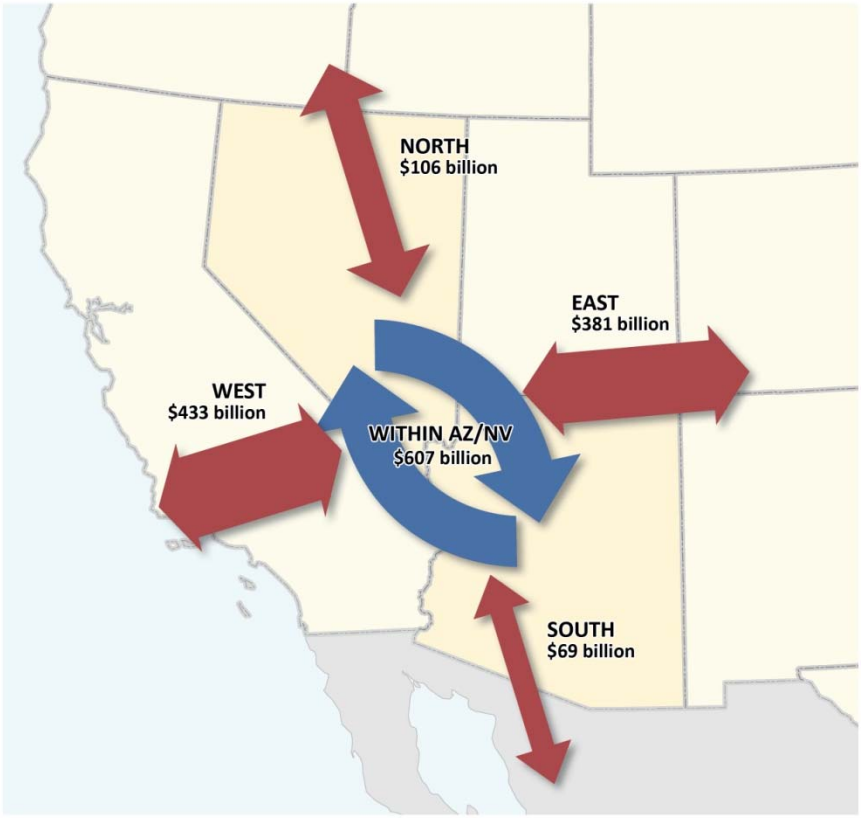
Under this scenario, West Coast ports would reach capacity by approximately 2020, requiring major additional capacity by that point. To accommodate the demand, Mexican ports are assumed to add port capacity and attract a share of traffic destined for the U.S. Some of the goods shipped to Mexican ports could be transported to the U.S. through LPOEs in Arizona and north via the Intermountain West Corridor. The current trend of trade with Mexico would continue, and the current use of U.S. facilities to carry Mexican goods and raw materials would also continue, which is consistent with the Baseline Scenario.

### Projections

Goods movement in selected corridors into, out of, and within the study area is estimated to increase by up to 20 percent (Figure 4-5).

The increased economic activity associated with this scenario results in a greater number of vehicles throughout the region. The increase will exacerbate the already congested urban Interstates and some regional routes; on a number of rural routes, this increase results in an increase in congestion (Figure 4-6).

Figure 4-5. Pacific Rim 2040 Cumulative Freight Projections for Nevada and Arizona, 2012 Dollars, High-Impact Values




*Sources: HDR projections and FHWA FAF3 data, inflated to 2012 value by Consumer Price Index inflation factor provided by the Bureau of Labor Statistics Consumer Price Index inflation calculator. Values reflect all modes of transportation collected by FAF including truck, rail, air, multiple modes and mail, pipeline, and other and unknown.*

Figure 4-6. Projected Congestion under the Growth in Asia Pacific Trade Scenario


*Sources: ADOT 2012k, California Department of Finance 2012, Florida Department of Transportation 2012, MAG 2012b, NDOT 2012f*

As anticipated, the modeled economic results (employment, labor income, output, and employment) show significant increases under this scenario, driven by the increased transportation activity within the I-11 and Intermountain West Corridor. This economic activity relates to the assumed continued expansion of inland ports and logistics/trans-shipment facilities in the study area. The total economic output in Arizona and Nevada of this scenario is estimated to increase by approximately $13 to $26 billion annually, or approximately 1.4 to 2.8 percent. Under this scenario, approximately 34 percent of the state transportation corridors analyzed indicated unacceptable congestion in 2040, an increase of 6 percent from the baseline. This 15 percent increase over the Baseline Scenario in the number of congested corridors would likely be noticeable to system users and would itself erode the economic competitiveness of the region. Construction of the I-11 and Intermountain West Corridor would alleviate this situation, although the specific level of system congestion relief would depend on the specific configurations and alignment of the Corridor, which will be analyzed more fully in the next study phase.

## Trade with Mexico Expands (Nearshoring)

This scenario assumes that Asia Pacific manufacturing for the U.S. market flattens, and significant production growth occurs in Mexico (nearshoring).

### Description

Nearshoring refers to the current trend of moving manufactured goods production, much of which was previously in Asia, to Mexico. Since the enactment of NAFTA, bilateral trade has grown exponentially and reached a record high of nearly $400 billion in 2010. Mexico's GDP growth of 5.4 percent in 2010 resulted in a $35 billion increase in Mexican purchases from the U.S. (New Policy Institute and Arizona State University North American Center for Cross-Border Studies 2012). This trend reflects the advantages of Mexico's proximity to the U.S. market, and its growing strength as the 14th largest economy in the world. In addition, China's labor cost advantage in relation to Mexico's is estimated to have shrunk to 14 percent (Thunderbird School of Global Management n.d.).

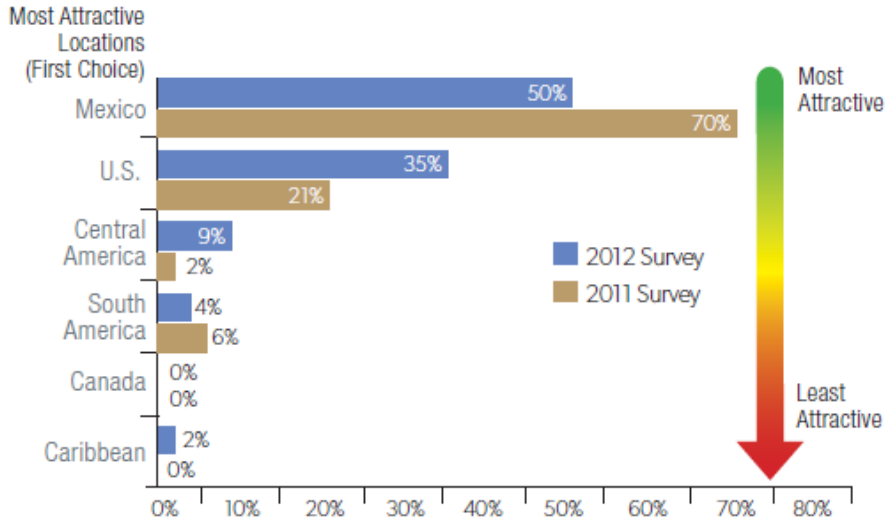
This trend reflects the advantages of Mexico's proximity to the U.S. market and its growing strength as the 14th largest economy in the world. In addition, China's labor cost advantage in relation to Mexico's is estimated to have shrunk to 14 percent.

The likelihood of this scenario materializing is supported by the strong growth of nearshoring in recent years. "After a decade of rapid globalization, economists say companies are seeing disadvantages of offshore production, including shipping costs, complicated logistics, and quality issues. Political unrest and theft of intellectual property pose additional risks" (*Wall Street Journal* 2010). Nearshoring is a natural response to this situation, one in which Arizona and Nevada have strong opportunities to play a role for the Southwest

Triangle, as compared to California with its higher costs and congestion.[4] This relatively recent, strongly growing trend has also demonstrated a strong tendency to create an economically integrated manufacturing/supply chain straddling the U.S./Mexico border. In the process, significant manufacturing employment is produced in both countries.

Figure 4-7 shows the results of a survey conducted on 116 manufacturing companies that sell to U.S. markets (Alix Partners 2012). Mexico was the most popular choice for nearshoring, where hourly compensation costs are nearly as low as China (Figure 4-4), and it is much closer to U.S. markets. Of note, the U.S. is catching up with Mexico in terms of favorability for nearshoring.

Figure 4-7. Mexico Attractive as Nearshoring Destination



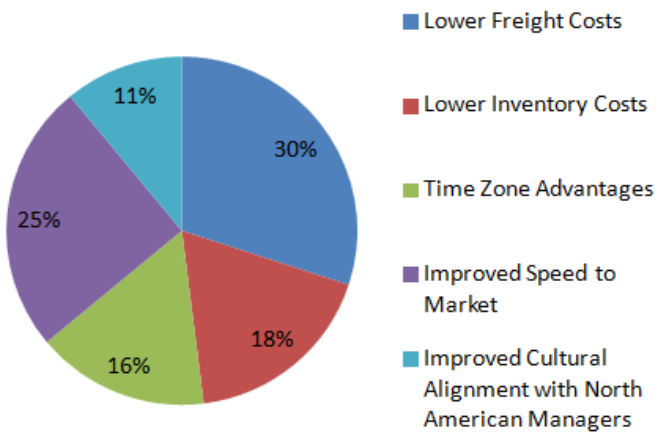

*Source: Alix Partners 2012*

Nearshoring lowers transportation costs. Analysis from JP Morgan estimates that the cost to transport a container via truck from Mexico is $3,000, while the cost to ship a container from China is $5,000 (Schwartz 2012). Nearshoring also reduces exposure to commodity price uncertainty because nearshoring requires less fuel. Although oil prices, like nearly all goods, are predicted to rise over time, short-term oil prices are volatile.

[4] The authors note that this scenario assumes north-south freight flows that show additional growth above the baseline 2040 levels. This would increase demand for north-south transportation facilities; however, based on railway and roadway infrastructure in Mexico as well as the locations of population centers in the western United States and the level of congestion on I-5, it seems likely that an Intermountain West Corridor would be a desirable alternative.

While lower transportation costs are a major argument for nearshoring, moving production closer to market provides additional benefits (Figure 4-8). It takes approximately 6 weeks to ship from China to U.S. consumers, while it takes only about 1 week from Mexico. Holding all else equal, U.S. retailers would prefer to receive inputs more quickly, and companies would choose not to have funds tied up in inventory for 5 extra weeks.

Figure 4-8. Top Reasons for Nearshoring, Survey of Producers

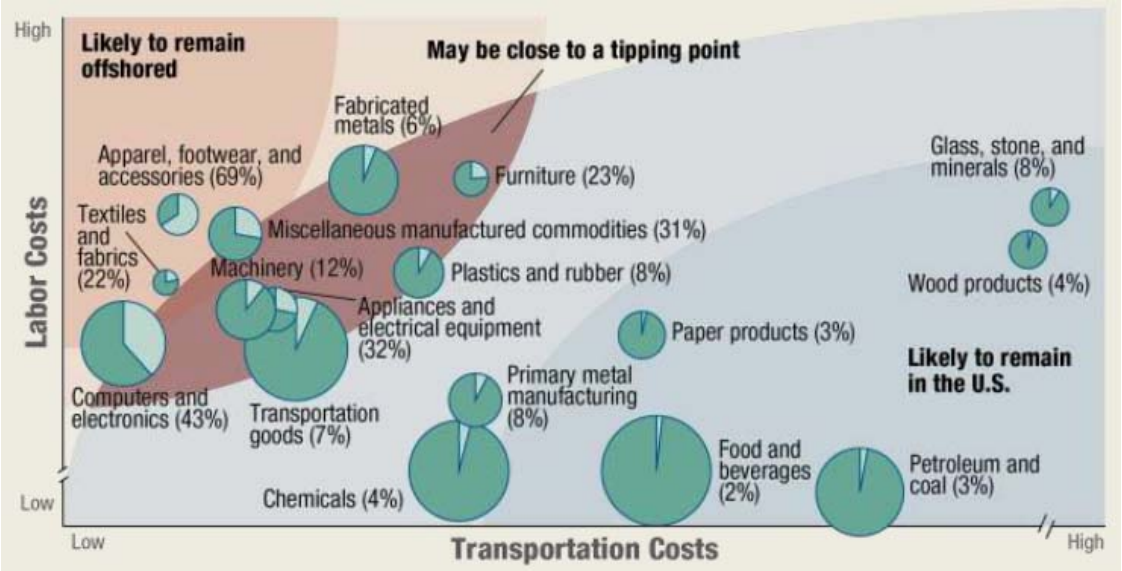



*Source: Alix Partners 2012*

Moreover, while labor costs are still lower in China and the Philippines relative to Mexico, wages are rising more quickly in the Asian markets. China has experienced real annual wage growth of close to 8 percent since 2000 (*The Economist* 2013). The Boston Consulting Group (2012) is forecasting that wages will equalize between China and Mexico by 2015. Thus, one of the major rationales for offshoring will likely become less relevant. One caveat: U.S. firms that already have invested in production facilities in China might find it cost prohibitive to nearshore until labor costs in China are significantly more expensive than nearshoring options.

Because inputs vary among industries, it is intuitive that some industries might be more likely than others to consider nearshoring. Figure 4-9 shows how different sectors might react. Unsurprisingly, goods that are lightweight (thus relatively cheap to transport) and labor-intensive, such as clothes and footwear, will likely remain overseas. Heavier goods, such as furniture or capital-intensive goods such as machinery, are leading candidates for nearshoring.

Figure 4-9. Nearshoring Likelihood Differs on Inputs




*Source: Joint Planning and Advisory Council 2012*

This scenario would add demand for north-to-south transportation facilities, including the I-11 and Intermountain West Corridor as a result of significant production growth occurring in Mexico.

Many firms have found it beneficial to have research and development occur within the production facility (PricewaterhouseCoopers 2012). At the same time, lax intellectual property laws are the norm in the Pacific Rim region. Some American firms are hesitant to conduct research and development in China because the intellectual property theft risk is so high and minimal recourse is available. From 2004 to 2009, three-quarters of foreign counterfeit goods seized in the U.S., by dollar value, originated in China (Senate Joint Economic Committee 2012). Large U.S. companies find it costly to prove intellectual property theft and to prevent future incidents, while small U.S. businesses often do not even attempt to bring charges. These fears can be partially mitigated by nearshoring.

### Projections

The modeled economic output in Arizona and Nevada, and resulting congestion, are greatest with this scenario.

This scenario assumes that Asia Pacific manufacturing for the U.S. market flattens and significant production growth occurs in Mexico while other major features of the Baseline Scenario remain unchanged. This scenario would add demand for north-to-south transportation facilities, including this Corridor. Figure 4-10 shows the relative importance of southbound flows as additional goods flow into the study area. A range of changes in trade flows corresponding to this scenario has been estimated using professional judgment. Thus, the scenario includes goods movement in selected corridors into, out of, and within the study area increases by up to 30 percent over the Baseline Scenario, as industries such as logistics, processing, and finishing facilities are supported in Arizona and Nevada.

Figure 4-10. Nearshoring 2040 Cumulative Freight Projections for Nevada and Arizona, 2012 Dollars, High-Impact Values


*Sources: HDR projections and FHWA FAF3 data, inflated to 2012 value by Consumer Price Index inflation factor provided by the Bureau of Labor Statistics Consumer Price Index inflation calculator. Values reflect all modes of transportation collected by FAF including truck, rail, air, multiple modes and mail, pipeline, and other and unknown.*

Under this scenario, the total economic output in Arizona and Nevada is estimated to be in the range of $928 billion to $953 billion, an increase of approximately $17 to $42 billion annually, or approximately 1.8 to 4.3 percent. The modeled outputs for this scenario, all of which are significantly higher than for the Asia Pacific scenario, reflect the scale of the incremental goods movements postulated for this scenario. This scenario is unconstrained by transportation capacity and so will require incremental transportation investment to realize the gains indicated. Because of the scale of land transportation associated with this development, the assumed economic activity will not occur to the extent indicated if transportation congestion, including border congestion, is a limiting factor.

Not surprisingly, this scenario has the greatest effect on congestion, with even the low range of the alternative causing many segments of rural roadway to have unacceptable levels of congestion, and the high range of the alternative (Figure 4-11) resulting in highly congested (LOS F) segments of I-10 toward the California border and I-19 south to Mexico. Analysis suggests that for this scenario, up to 43 percent of the state transportation corridors analyzed indicated unacceptable congestion in 2040, an increase of 15 percent from the Baseline Scenario.

This increase in the number of congested corridors is a significant change that would be noticeable to system users and, without investment, would erode the economic competitiveness of the region. This congestion would also serve as a relative disincentive to attracting nearshoring operations to the Intermountain West Corridor, as they would naturally be attracted to more competitive regions benefiting from lower levels of highway congestion. Construction of the I-11 and Intermountain West Corridor would alleviate this, although the specific level of system congestion relief would depend on the specific configurations and alignment of the I-11 corridor, which will be analyzed more fully in the next study phase.

Figure 4-11. Projected Congestion under the Nearshoring Scenario


*Sources: ADOT 2012k, California Department of Finance 2012, Florida Department of Transportation 2012, MAG 2012b, NDOT 2012f*

## State Economic Development Plans are Fully Realized

This scenario assumes that Arizona and Nevada are able to realize their major economic development goals, including growing their economies through an industry cluster-based strategy as well as increasing trade with Mexico and Canada.

### Description

Arizona and Nevada have developed an industry cluster-based approach to foster economic sustainability by stimulating growth in key sectors.

During the economic downturn, both states suffered devastating job losses, particularly in the construction industry. With the recovery, each state has emphasized the importance of economic development. Each state has reorganized their statewide economic development agencies and created aggressive economic development strategy plans to diversify and enhance their economies, restore lost jobs, create new jobs, and improve the foundations that support and sustain economic vitality.

A cornerstone of these plans is the implementation of an industry cluster-based approach to foster economic sustainability by stimulating growth in key sectors. An industry cluster is a geographic concentration of interconnected businesses, suppliers, and associated institutions in a particular field. Identification of these clusters included an analysis of industries, their growth trends, job quality, ability to be a trading sector, and finally an assessment of the state's ability to grow the cluster. The end result is a group of industry clusters that has the ability to generate economic growth both in the short and long term.

Tables 4-4 and 4-5 identify each state's industry clusters, the current employment within that cluster, the average wage, and the baseline predicted job growth. Some of the selected industries take advantage of local natural resources, with both states focusing on renewable energy and Nevada targeting mining.

Table 4-4. Arizona Industry Clusters

| Industries | Advanced Manufacturing | Aerospace & Defense | Healthcare | Information & Computer Technology |
|---|---|---|---|---|
| Direct Employment 2011 | 101,279 | 162,507 | 276,681 | 63,700 |
| Establishments | 1,907 | 11,849 | 12,742 | 5,302 |
| Average Wage | $63,014 | $71,518 | $53,385 | $92,341 |
| Average Annual Predicted Job Growth 2011-2016 | -0.92% | 2.63% | 3.39% | 3.01% |
| **Industries** | **Life Sciences/ Biotechnology** | **Optics** | **Renewable Energy[a]** | **Transportation & Logistics** |
| Direct Employment 2011 | 31,047 | 34,943 | 3,519 | 63,311 |
| Establishments | 2,408 | 3,626 | 164 | 3,191 |
| Average Wage | $71,820 | $73,807 | n/a | $49,001 |
| Average Annual Predicted Job Growth 2011-2016 | 3.44% | 1.58% | n/a | 0.56% |

[a] Data for average wage and job growth were not available (n/a).

*Sources: Battelle 2010, Economic Modeling Specialists Intl. 2013*

Table 4-5. Nevada Industry Clusters

| Industries | Aerospace & Defense | Arts, Entertainment, Recreation & Visitor Industries | Healthcare | Information Technology |
|---|---|---|---|---|
| Direct Employment 2011 | 15,655 | 357,638 | 86,710 | 52,597 |
| Establishments | 21 | 8,675 | 5,645 | 3,857 |
| Average Wage | $78,764 | $34,704 | $67,969 | $40,437 |
| Average Annual Predicted Job Growth 2011-2016 | 0.43% | 0.69% | 2.36% | 2.04% |
| **Industries** | **Manufacturing** | **Mining & Materials** | **Renewable Energy[a]** | **Transportation & Logistics** |
| Direct Employment 2011 | 23,429 | 23,914 | 1,701 | 85,653 |
| Establishments | 1,135 | 746 | 33 | 6,848 |
| Average Wage | $69,152 | $79,794 | $45,671 | $56,974 |
| Average Annual Predicted Job Growth 2011-2016 | 2.04% | 1.65% | 16.82% | 1.61% |

[a] Energy data are from Brookings Institution and include the year 2010 with growth rate 2007 to 2010.
*Source: SRI International 2011*

Many of the industry clusters rely on a robust transportation infrastructure for the movement of goods and access to customers.

Many of the industry clusters rely on a robust transportation infrastructure for the movement of goods and access to customers. Specifically, because most of the targeted industries are in high-value manufacturing, most of the goods would be likely to be transported by truck. Each state's initiative to boost strategic infrastructure investments is aimed at increasing competitiveness in global trade and promoting job creation and economic vitality.[5] If these measures to raise competitiveness are successful, production could shift to Arizona and Nevada. Rather than nearshoring to Mexico, firms may consider reshoring (U.S. firms moving foreign facilities back to the U.S.) or onshoring (foreign firms moving their facilities to the region).

### Results

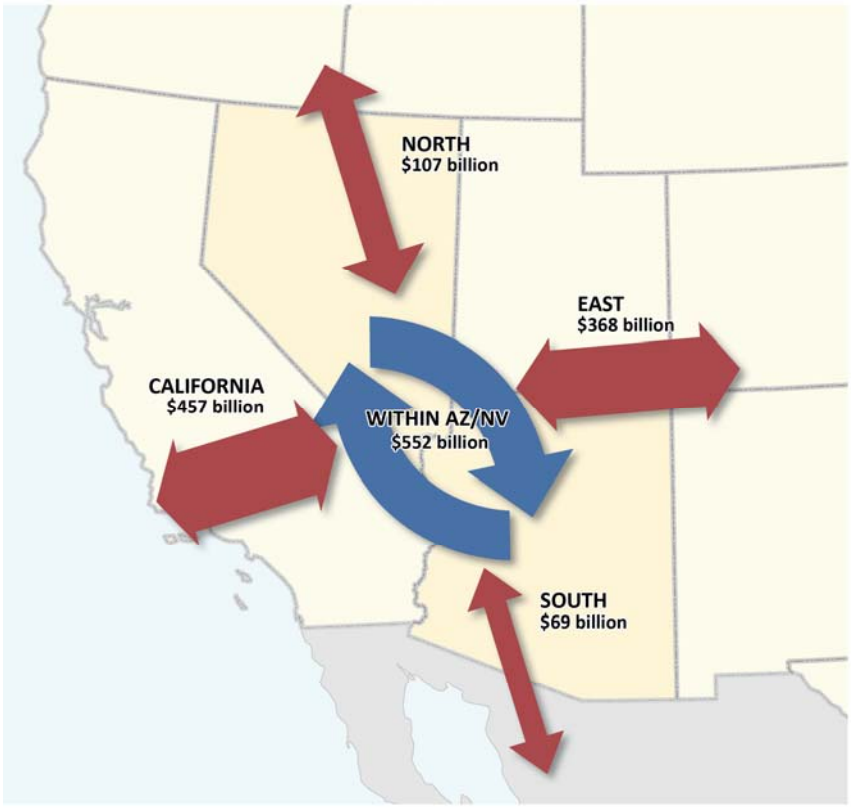
In terms of the effect of the scenario on freight movements, the resulting shift of production to Arizona and Nevada may result in a shifting of balance of trade by state and a significant growth in export movements. This scenario would likely be accompanied by a less significant growth in import movements to support the growing manufacturing sector. The cumulative effects are shown in Figure 4-12.

The achievement of state economic development goals will be enhanced by increasing transportation infrastructure capacity. Both Arizona and Nevada have adopted economic development targets. For Arizona, gains are expected in transportation and logistics, manufacturing, healthcare, and professional services; for Nevada, gains are expected in mining, transportation and

[5] Other factors such as a skilled labor force, favorable corporate tax policies, physical infrastructure such as office buildings and factories, adequate financial capital, and incentives that support research and development also contribute to the success of the cluster strategy.

logistics, and manufacturing. The current level of focused energy and resources being applied by both Arizona and Nevada suggests that significant progress on these plans is likely to be realized over the period of this analysis.

Figure 4-12. State Economic Development Plans 2040 Cumulative Freight Projections for Nevada and Arizona, 2012 Dollars, High-Impact Values




*Sources: HDR projections and FHWA FAF3 data, inflated to 2012 value by CPI inflation factor provided by the BLS CPI inflation calculator. Values reflect all modes of transportation collected by FAF including truck, rail, air, multiple modes and mail, pipeline, and other and unknown.*

This scenario postulates substantial achievement of these goals, while other features of the Baseline Scenario remain largely unchanged. The analysis used to examine this scenario comprises uniformly distributed increases in transportation demand for goods movement into, out of, and within the Intermountain West region, which were estimated using professional judgment. The increased economic activity associated with this scenario results in a greater number of vehicles throughout the region. The increase will exacerbate the already congested urban Interstates and some of the regional routes, and on a number of rural routes, this increase results in unacceptable congestion (Figure 4-13).

Figure 4-13 Projected Congestion under the Scenario where State Economic Development Plans are Fully Realized


*Sources: ADOT 2012k, California Department of Finance 2012,* Florida Department of Transportation *2012, MAG 2012b, NDOT 2012f*

While the economic effects of this scenario are more modest than indicated for the preceding scenarios, they will increase the level of economic integration in the region, placing additional demands on the transportation network. It is also true that the extent to which these goals might be realized will be significantly influenced by the availability of high-quality, uncongested transportation facilities, both for movement of goods related to the investments and to facilitate commuter flows. Under this scenario, the total economic output in Arizona and Nevada is estimated to be in the range of $919 billion to $927 billion. Analysis suggests that for this scenario, 34 percent of the state transportation corridors analyzed indicated unacceptable congestion in 2040, an increase of 6 percent from the baseline. Construction of the I-11 and Intermountain West Corridor would alleviate this, although the specific level of system congestion relief would depend on the specific configurations and alignment of the I-11 corridor, which will be analyzed more fully in the next study phase.

# Transportation Investment as an Enabling Factor in Economic Development

Major port activity has necessitated infrastructure investment, provided direct employment in port activity, and spawned large, robust logistics hubs in the surrounding regions.

Potential benefits to the regional economy associated with the three scenarios discussed above can be realized only if the region maintains its current relative competitiveness and is able to attract the level of activity described above. Transportation is a key and necessary enabler of economic development.

Achieving the right conditions to maximize the benefits to the study area from current trade developments includes addressing the key enabling factor of transportation capacity. This analysis examines the macro-level relationships linking trade, transportation, and economic activity to understand the role the Corridor might play in facilitating economic growth in the Intermountain West. To illustrate these relationships, this section includes a number of examples drawn from U.S. experience during the past three decades. These examples are related to the growth of Asia Pacific trade and its impacts on West Coast port cities, supporting transportation corridors, and the U.S. economy.

## The Role of Trade in Growing the U.S. Economy

During the past 25 years, the increasing significance of import trade volumes from Asia has been a defining reality for POLA/POLB and the ports of Oakland and Seattle, as well as the cities in which they are located. These goods movements, largely composed of finished consumer products, have necessitated infrastructure investment, provided direct employment in port activity, and spawned large, robust logistics hubs in each of these locations. By far the largest of these hubs, the POLA/POLB complex has invested in numerous large-scale infrastructure projects to facilitate this trade.

This economic activity was attracted to these locations because of the access to tidewater provided by the ports, and, at least initially, the availability of convenient rail and highway transportation to convey cargoes to inland destinations.

POLB alone moves more than $140 billion worth of goods each year, supporting more than 316,000 Southern California jobs (POLB 2013). Taken together, the linkage between Asia Pacific trade and its derivative U.S. West Coast ports, logistics, and transportation activities has become a multibillion dollar industry responsible for hundreds of thousands of jobs. The benefits of this trade to the U.S. economy have been large and persistent over many years.

## The Role of Transportation Corridors in Attracting Trade Flows

The availability of capacity on high-quality transportation facilities suitable for shippers' needs will attract new trade flows and related economic growth.

The I-11 and Intermountain West Corridor would play a key enabling role in attracting trade flows to the Intermountain West region, particularly for those scenarios (described above), with a strong link to international trade. With the continuing growth of the U.S. economy, the availability of capacity on high-quality transportation facilities suitable for shippers' needs will attract new trade flows and related economic growth. Transportation corridors and the supply chains through which goods move are generally structured to minimize transportation cost. To illustrate, Asia Pacific import trade flows typically enter the U.S. through West Coast ports, with the POLA/POLB complex being dominant among them. Much of the U.S. West Coast trade growth (beyond that related to the local market) has been focused on Chicago as a key intermediate destination where major inland U.S. rail interchanges are focused. Cost minimization has generally been achieved by minimizing shipping distance.

Deepening of the Port of Oakland resulted in a jump in demand in the Reno area for the development of logistics facilities—as a trans-shipment point east of the Sierra Nevada along I-80 with high-quality transportation links, low taxes, and inexpensive land.

Since the early 2000s, congestion in the POLA/POLB complex has emerged as a significant secondary determinant to cost and travel time. The result has been some adjustment to the logistics network, including the shifting of logistics functions east to so-called "inland ports" that are remote from the congestion of the POLA/POLB complex. This adjustment has in turn shifted economic activity further east in California and to points beyond, where the presence of high-quality transportation corridors makes this feasible.

A similar example of this phenomenon, with particular application to this study, relates to the boom in the logistics industry in the Reno area, which has been linked by the Brookings Institution to the deepening of the Port of Oakland. This investment, which enabled larger container vessels to dock at Oakland, took pressure off the POLA/POLB complex. Reno, as a trans-shipment point east of the Sierra Nevada along I-80 with high-quality transportation links, low taxes, and inexpensive land, thus experienced a jump in demand for the development of logistics facilities.

In summary, the assignment of trade flows to specific corridors within the continental U.S. continues to illustrate strong competition between facilities to lower cost, reduce congestion-related delays, and handle volume growth. In the face of strong demand growth, trade flows will be attracted to corridors with available low-cost, high-quality transportation capacity that serve the appropriate origins and destinations.

## The Role of Transportation Corridors in Catalyzing Regional Economic Growth

All along the corridors linking West Coast ports to cargo destinations, economic activity has sprung up to support the needs of the supply chain. Initially within the ports themselves, then in inland ports, logistics and warehousing centers have been built to support the efficient movement, storage, and, in some cases, finishing of consumer goods.

Supported by toll roads and other private and public funding, strong investment was made in infrastructure to mitigate border-crossing delays and enhance capacity at LPOEs at the border between Texas and Mexico. As a result, Texas today enjoys trade flows to and from Mexico that are approximately 10 times greater than those between Arizona and Mexico.

Strong evidence indicates that domestic trade has similarly been attracted to these established trade corridors because of the critical mass of low-cost supply chain facilities located along uncongested transportation routes. When the necessary improvements in transcontinental rail and truck-freight corridors and support facilities are added, the investment, and associated economic activity, is large. However, it is also true that this activity has generally occurred incrementally along existing corridors.

The structuring of U.S. supply chains has occurred organically within the context of existing infrastructure patterns. The benefits of economic activity associated with Asia Pacific trade have accrued to those jurisdictions that offered existing transportation networks with available capacity and low operating costs.

A good example of this phenomenon can be seen at the LPOEs at the border between Texas and Mexico. Supported by toll roads and other private and public funding, strong investment was made in infrastructure to mitigate border-crossing delays and enhance capacity (Thunderbird School of Global Management n.d.). As a result, Texas today enjoys trade flows to and from Mexico that are approximately 10 times greater than those between Arizona and Mexico.

## Key Findings

Each of the scenarios examined has the potential to make a major contribution to the economic well-being of the region's residents, bringing up to an additional half a million people and 240,000 employees to the region over the next 25 years. The specifics of the modeled increases in economic output, population, and employment are shown in Table 4-6.

Table 4-6. Key Modeled Results Corresponding to Each Scenario

| Scenario | Economic Output ($ billions) | Population (high range) | Employment (high range) | Unacceptably Congested Highways (%) |
|---|---|---|---|---|
| Current Conditions (2011) | 381 | 9,253,806 | 4,711,352 | 9 |
| Projected Baseline Conditions (2040) | 642 | 15,078,114 | 7,971,629 | 28 |
| Growth in Asia Pacific Trade | 649-666 | 15,361,219 (1.9%) | 8,121,168 (1.9%) | 34 |
| Trade with Mexico Expands (Nearshoring) | 651-664 | 15,535,411 (3.0%) | 8,213,079 (3.0%) | Up to 43 |
| State Economic Development Plans are Fully Realized | 646-650 | 15,247,957 (1.1%) | 8,061,322 (1.1%) | 34 |

The region will, under the entire range of alternative future scenarios considered, experience significant sustained growth in the regional economy, accompanied by corresponding growth in travel demand.

A brief consideration of the range of current and anticipated trends in U.S. trade, together with the natural geographic advantages of the Intermountain West region, suggests that the region will, under the entire range of alternative future scenarios considered, experience significant sustained growth in the regional economy, accompanied by corresponding growth in travel demand. The level of highway congestion associated with some of these possible economic futures suggests that additional investment in transportation infrastructure is likely required to realize the full extent of these benefits. In fact, the levels of system congestion for the scenarios examined suggests that without additional system capacity such as the I-11 and Intermountain West Corridor, even the most conservative growth scenarios may not be realized due to the constraining factor of transportation congestion. By strategically enhancing regional transportation infrastructure, the region has the opportunity to enjoy full access to the significant incremental and economic growth related to important trends in regional and national trade.

By strategically enhancing regional transportation infrastructure, the region has the opportunity to enjoy full access to the significant incremental and economic growth related to important trends in regional and national trade.

The increasing importance of Mexico as a trading partner, the emergence of nearshoring as an important and strongly growing structural feature of U.S. commerce, and the continuation of the historic strong growth of the region all suggest that during the next few decades the Intermountain West region's demands on its transportation infrastructure will grow strongly. This trend will be reinforced as the various binational initiatives seeking to improve Arizona/Sonora border crossing efficiency and capacity advance their objectives (for example, Arizona-Mexico Commission, Transportation and Trade Corridor Alliance, *Arizona-Sonora Border Master Plan*, *Freight Transportation Framework Study*, *Arizona Multimodal Logistics Complex Analysis*, and the Joint Planning Advisory Council for the Arizona Sun Corridor). In particular, the high levels of congestion in Southern California suggest that a high-quality, north-south corridor in the Intermountain West such as I-11 has the potential to become the corridor of choice for trade-related traffic to and from Mexico, particularly should the nearshoring phenomenon continue to grow. When the current preference for supply chain reliability and resilience

to support just-in-time delivery in integrated manufacturing and distribution systems is factored in, the potential attractiveness of the I-11 corridor is further strengthened. Further analysis in the next project phase will further examine the implications of these insights.

The scenarios examined in this study are not mutually exclusive and were not analyzed with the goal of selecting a preferred outcome. Rather, they illustrate the types of influences on goods movement, transportation demand, economic activity, population, and employment to be expected in the region if certain key economic trends were enabled to play a strong role in the regional economic future. Accordingly, under strong economic leadership, the trends underlying each of the scenarios examined will contribute to the region's future economic prosperity. The extent to which any individual scenario is realized will depend on a host of factors, many of which are beyond the control of economic policy. However, the range of features includes the potential for significant to very large growth in the economy and in transportation demand. Planning for the system capacity increases required to enable this growth is prudent and timely.

## Next Steps

The economic scenarios and analyses presented in this section outline the potential shape and magnitude of the trade and economic benefits that might be achieved in the I-11 and Intermountain West Corridor under a coordinated program to improve north-south mobility on selected surface transportation corridors (notionally by upgrading US 93). To focus on a defined, implementable program, in the next study phase significant work will be carried out to confirm and refine the insights developed through this preliminary work.

The next study phase will include further analysis to validate the scenarios presented while developing estimates for the range of associated transportation demand. Travel demand will then be assigned to the regional transportation corridors based on mode, origins and destinations, system capacity, and performance. This effort will permit a Corridor-specific understanding of transportation demand over time and the implications for congestion and capacity, while simultaneously providing a detailed understanding of Corridor operating characteristics, user benefits, travel time, and safety implications of potential investments. In parallel, program-level estimates of the capital costs of Corridor improvements will allow the development of a rudimentary understanding of the range of potential benefit and cost ratios for proposed programs of corridor investment.

With this improved understanding of transportation demand and the potential need to respond with system investment, it will be possible to consider the level of potential effects related to having a significantly higher-quality transportation facility in place. This will include the potential to capture more

discretionary domestic and internationally originating traffic (in concert with assumed binational progress on border crossing issues). This understanding will permit the development of a comprehensive Business Case for a demand-responsive program of Corridor investments to support the continued growth of the region's economy, while including explicit consideration of the potential for these same investments to induce significant increases in trade flows and associated economic activity in the region. The goal of this Business Case will be to support the establishment of a Corridor program investment strategy including the timing, scope, triggers, benefits, and costs for a notional investment program.

# 5. Stakeholder and Community Input

## Summary of Key Findings

- The project's interactive Website has helped grow the project database of key stakeholders to nearly 2,300 individuals.
- To date, 10 formal stakeholder and public meetings have been held in various locations and via Webinar to encourage participation; these meetings have resulted in hundreds of pages of comments and ideas.
- Key themes derived from these outreach efforts are related to Corridor opportunities, safety and mobility, funding and financing, environmental impacts, land use and development, design, alignments, and constraints.

The I-11 and Intermountain West Corridor is expected to increase the movement of people, goods, and services through local communities and from state to state, connecting them to a broader region. The study therefore involves a discussion of multiple stakeholders and individuals to accurately reflect regional needs. The study team is using a variety of venues to communicate and solicit feedback from stakeholders and the public. Using traditional meeting methods, along with virtual technologies to bridge the challenging Corridor length, opportunities to learn about and discuss the project have been offered. At the project outset, the team launched an interactive Website to communicate information about the project and to provide a venue to solicit feedback. To date, more than 75 comments have been received electronically by the project team. This tool has been useful in growing the database of key stakeholders and interests; to date, the database includes the names of nearly 2,300 individuals.

*Phoenix Public Meeting*

Several focused meeting opportunities were arranged. To encourage participation, meetings were held in varied locations and often offered the opportunity to participate via Webinar. Table 5-1 lists the formal meetings held with stakeholders and the public.

In addition to these meetings, the study team held meetings with the Core Agency Partners, stakeholder groups, and other interests, and responded to several requests for presentations to entities, including the Inter-Tribal Council of Arizona and Inter-Tribal Council of Nevada, regional transportation commissions, councils of governments, and metropolitan planning organizations, municipalities, and organizations.

While the engagement efforts with stakeholders and the public have produced hundreds of pages of comments and ideas, the sections below summarize key themes derived from outreach efforts to date.

Table 5-1. Stakeholder and Public Meetings

| Date | Meeting | Location(s) | Attendees |
|---|---|---|---|
| 9/26/12 | Stakeholder Partners Meeting | Surprise, Kingman, Las Vegas, Carson City, Webinar | 205 |
| 10/18/12 | Public Information Meeting | Henderson | 51 |
| 10/23/12 | Public Information Meeting | Phoenix | 142 |
| 1/8/13 | Utility/Energy Focus Group | Phoenix, Las Vegas, Carson City, Webinar | 59 |
| 1/22/13 | Economic Development Focus Group | Surprise, Las Vegas, Reno, Webinar | 67 |
| 1/29/13 | Freight Users Focus Group | Surprise, Las Vegas, Carson City, Webinar | 40 |
| 2/5/13 | Environment and Sustainability Focus Group | Surprise, Las Vegas, Carson City, Webinar | 50 |
| 2/12/13 | Land Use and Community Development Focus Group | Surprise, Las Vegas, Carson City, Webinar | 55 |
| 2/19/13 | Corridor Operations Focus Group | Surprise, Las Vegas, Carson City, Webinar | 30 |
| 2/26/13 | Alternative Delivery and Finance Focus Group | Surprise, Las Vegas, Carson City, Webinar | 34 |

## Corridor Opportunities

*Carson City Focus Group*

Feedback often cited the immense economic development opportunities the Corridor could facilitate for Arizona, Nevada, and the Intermountain West. Support for tourism activities, including connecting recreational assets, gaming, and entertainment venues could prove valuable to the states' economies. Many of the comments concentrated on how the Corridor could increase trade by supporting the existing economies of mining, energy (solar, nuclear, alternative, and renewable fuels), construction, agriculture, and military activities, as well as expansions to manufacturing, aerospace/high tech, and transportation logistics throughout the Southwest Triangle. As manufacturing and labor activities in the Pacific Rim, Central and South America, and Mexico evolve and nearshoring/onshoring opportunities grow, market access through the Intermountain West to Canada would be served by the Corridor, providing relief to already congested Southern California and Mexican ports.

## Safety and Mobility

Concerns regarding the safety of existing routes US 93 and US 95 were often cited. Because the mix of passenger and freight activities may not always be adequately accommodated by current infrastructure, respondents indicated that an I-11 Corridor could provide a more efficient and reliable transportation linkage for this underserved region. Freight stakeholders encouraged careful planning and placement of truck stops and rest areas to support long-haul operations and hours-of-service regulations. While many comments focused on safety concerns of using the existing/future infrastructure, several individuals asked that the study consider security issues related to the movement of hazardous materials or the potential for increased threats related to immigration, border security, terrorist activities, and illegal drug trade.

## Funding and Financing

Considerable feedback focused on concerns related to the availability or potential sources of Corridor funding. While tolling was the tool most frequently discussed—with some in favor and others against—appreciation for unique and alternative Corridor delivery options was acknowledged. While some dismissed the Corridor because of the potential capital cost alone, others underscored the importance of having an informed dialogue about the financial implications of designing, building, and maintaining a future I-11 and Intermountain West Corridor. A variety of funding, financing, and alternative delivery options were suggested.

## Environmental Impacts

Consideration for environmental disturbances and impacts was emphasized. Research for, and subsequent protection of, wildlife habitat and migration corridors, waterways and wetlands, and cultural sites is critical, as is consideration of key species found within the study area (including the desert tortoise, bighorn sheep, and pronghorn antelope). While some comments noted that the environmental and climate impacts of the Corridor outweigh any possible benefit, and disapproval of the Corridor was noted, various strategies and mitigation tactics were recommended for potential use.

## Land Use and Development

Emphasis was placed on the importance of connecting land use and transportation decisions to build the nation's first "smart" corridor. Working with local jurisdictions to identify a future I-11 and Intermountain West Corridor in land use plans is a good first step, but facilitating compatible uses adjacent to the Corridor is equally important to maximizing the benefits of the asset. Zoning, right-of-way designation, and establishing easements are tools communities can use for these purposes. Some parties, however, noted that

communities bypassed by the Corridor could experience negative impacts; others worried that it might promote urban sprawl. Focusing on using existing corridors to the maximum extent possible and connecting existing activity centers and employment hubs was offered as a sustainable planning strategy.

## Corridor Design

There is considerable support for the study of a multifunctional Corridor that not only provides multimodal transportation opportunities but also houses assets that require similar rights-of-way. Considerations ranging from biking/cycling, pedestrian and equestrian movements, and transit alternatives were offered, but high-speed passenger and freight rail were the most frequently suggested modes to consider, along with traditional vehicle movements. Utility (including transmission lines and telecommunications) and energy (including liquid/natural gas, fiber/dark fiber, wind, and solar) options and other emerging/future opportunities were offered as potential candidates for shared or combined rights-of-way or easements. While using a coordinated corridor for the movement of people, goods, and utilities was supported, some questioned whether this type of "combination facility" would increase national security concerns. Any effort, however, would necessitate the consideration of separate requirements, size of footprint, asset compatibility, and cost. The Corridor could be the opportunity to build a smart or "green" corridor of the future, serving as a new model for the movement of goods and people by learning from the best practices of previous corridor development. In addition to support for a multimodal, multifunctional corridor, many specific features and amenities were suggested for consideration.

## Corridor Alignments

*Surprise Stakeholder Partners Meeting*

While this phase did not study potential corridor alignments for a future I-11 and Intermountain West Corridor, the public and stakeholders still desired to propose "lines on a map." Their ideas for existing corridors, including US 93, were routinely recommended. Additionally, many commenters wanted assurance that a no build alternative would be considered, with several questioning whether the results of this study would indeed identify a need for a future I-11 (or *any* new roadway). Others questioned whether future evaluation of potential corridors was even warranted, and they were concerned that a preferred alignment was predetermined. For those who supported a future Corridor, connecting key activity centers, including inland ports, airports, and other logistical assets, was recommended. Connections beyond the Priority Corridor Segment (Phoenix to Las Vegas metropolitan areas) were also advised, with individuals stressing the importance of the Corridor being a true Intermountain West route, connecting Mexico and Canada. While destinations south of Phoenix often focused on the Sun Corridor, potential connection points to the north ranged from Vancouver,

Seattle, and Reno in the west, to locations such as Ely (Nevada) and Salt Lake City to the east.

## Constraints

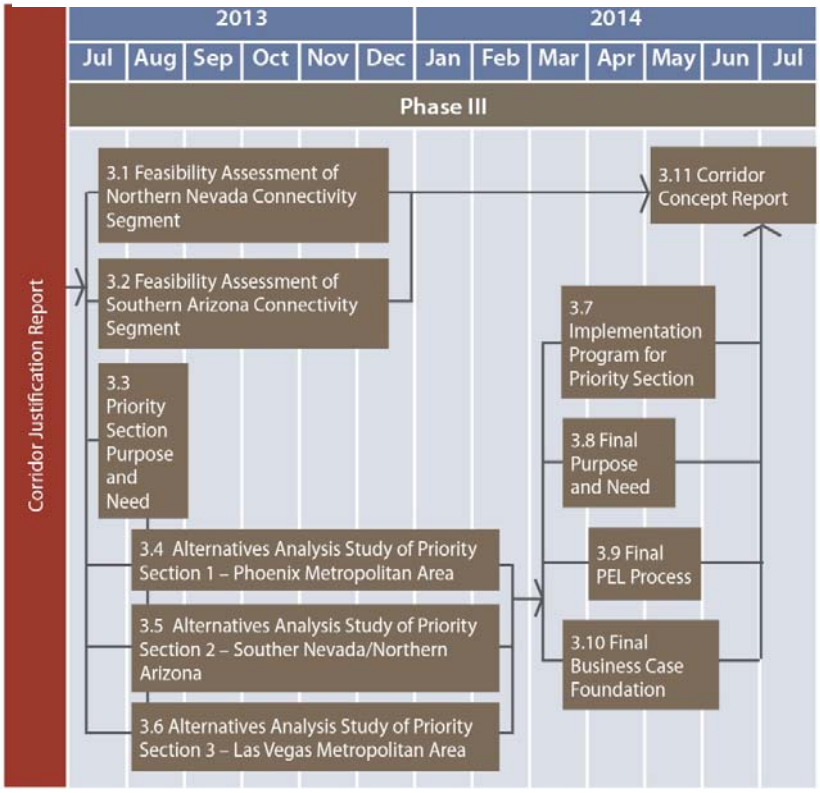
Several key constraints were noted, most notably funding challenges and environmental considerations. Many commenters emphasized the challenge of building consensus for a future Corridor and the need for long-term political will and the commitment necessary to implement a project of this magnitude. Other constraints cited include the locations of many decentralized population and employment centers throughout the study area, as well as the significant cost and complications of right-of-way acquisition.

# 6. Next Steps

This Corridor Justification Report summarizes the findings of the first half of the study and describes the characteristics affecting the corridor—such as existing and future population and employment, economic diversity, freight movement, and environmental conditions—that will be needed in the second half of the study to evaluate the location and type of an enhanced transportation facility.

The second half of the study (Figure 6-1) will be dedicated to preparing the Corridor Concept Report, which will identify and evaluate alternatives, and ultimately recommend a preferred corridor(s) for further consideration. Detailed alternative alignment and mode analyses will be conducted for the priority segment areas between and including the Phoenix and Las Vegas metropolitan areas. An implementation plan will delineate future actions needed to develop the Corridor and will assign timeframes and responsibilities for accomplishing those actions. A purpose and need statement will be prepared to fulfill important National Environmental Policy Act requirements needed for the next phase (environmental study) of the project development process.

Figure 6-1. Corridor Concept Report Timeline and Process




PEL = Planning and Environmental Linkages

A high-level feasibility assessment will be conducted for the future connectivity areas of southern Arizona and northern Nevada that will narrow alignment and mode options to only those that are feasible and meet the draft purpose and need. More detailed analyses will be required in subsequent studies to advance these segments through the National Environmental Policy Act process.

In addition to this Corridor Justification Report, at the conclusion of the study, two additional primary documents will be produced: the Corridor Concept Report, which will include a series of decisions and working papers presented during this phase, and the Final Business Case Foundation. The objective of the Business Case is to provide an understanding of the potential economic impact that corridor development would have on Arizona and Nevada. Applying the economic scenarios

identified in Chapter 4 of this report to the alignments developed during the Corridor Concept phase of the study, a high-level economic impact analysis and a benefit cost analysis will be conducted. The Business Case will promote the economic value of the project to government agencies, other stakeholders, taxpayers, and potentially interested private partners.

Before construction commences on any transportation project, a number of traditional steps must be taken. The process begins with planning and is followed by environmental analyses, design, and possibly right-of-way acquisitions. This study, the first step in that process, is implementing new guidelines for streamlining the National Environmental Policy Act requirements by advancing some of them into the planning process, referred to as Planning and Environmental Linkages.

An ongoing element of this corridor study, the Planning and Environmental Linkages process will help streamline the entire environmental review process, allowing this study to provide the foundation and minimize the need for re-evaluation as the project progresses into the environmental phase

ADOT and NDOT have both worked with FHWA to adapt the federal guidance into state-led processes, which include a series of checklists to be completed throughout a study's process. The Planning and Environmental Linkages procedures of the two states are very similar and will be carried forth throughout this study to identify important issues early, so that agencies, stakeholders, and the public can make informed and timely decisions.

# 7. Acronyms and Abbreviations

| | |
|---|---|
| ADOT | Arizona Department of Transportation |
| bqAZ | Building a Quality Arizona |
| CANAMEX | Transportation corridor connecting Canada and Mexico through the United States |
| FAF3 | [FHWA] Freight Analysis Framework |
| FHWA | Federal Highway Administration |
| GDP | gross domestic product |
| I | Interstate |
| LOS | level of service |
| LPOE | land port of entry |
| MAG | Maricopa Association of Governments |
| MAP-21 | Moving Ahead for Progress in the 21st Century |
| NAFTA | North American Free Trade Agreement |
| NASCO | North America's SuperCorridor Coalition |
| n.d. | no date |
| NDOT | Nevada Department of Transportation |
| NHS | National Highway System |
| POLA | Port of Los Angeles |
| POLB | Port of Long Beach |
| SR | State Route |
| TEU | 20-foot equivalent unit |
| UPRR | Union Pacific Railroad |
| U.S. | United States |

# 8. References


Airports Council International. 2012. *North American Airport Passenger Traffic Up 1.8 Percent*. Available at: http://www.aci-na.org/newsroom/press-releases/north-american-airport-passenger-traffic-18-percent. Accessed November 27, 2012.

Alix Partners. 2012. "Executive Perspectives on Near-Shoring." October.

America2050.org. Available at: http://www.america2050.org/.

American Transportation Research Institute. 2011. *FPM Congestion Monitoring at 250 Freight Significant Highway Locations.* Available at: http://atri-online.org/2011/10/01/fpm-congestion-monitoring-at-250-freight-significant-highway-locations/.

Arizona Commerce Authority. 2013. *Job by Industry Report for Arizona, EMSI.*

Arizona Department of Administration, Office of Employment and Population Statistics. 2012a. Available at: http://www.workforce.az.gov/population-projections.aspx.

Accessed May 20, 2013

Arizona Department of Administration. 2012b. *State Demographers Office Population Projections.* Available at: http://www.azstats.gov/population-projections.aspx. Accessed September 25, 2012.

Arizona Department of Transportation (ADOT). 2010a. *bqAZ Statewide Transportation Planning Framework Program*. Available at: http://www.bqaz.gov/ Accessed September 20, 2012.

Arizona Department of Transportation (ADOT). 2012b. *Arizona-Sonora Border Master Plan*. Available at: http://www.azdot.gov/highways/projects/Arizona-Sonora_Border/index.asp. Accessed October 9, 2012.

Arizona Department of Transportation (ADOT). 2012k. *Arizona Statewide Travel Demand Model*.

Arizona Department of Transportation (ADOT). 2013b. *Arizona-Sonora Border Master Plan*. Available at: http://www.azdot.gov/highways/projects/Arizona-Sonora_Border/index.asp.

Battelle Technology Partnership in collaboration with C2ER. 2010. "Emerging Green Industries in Arizona: Definitions, Industry Base, and Opportunity Areas."

Boston Consulting Group. 2012. *More Than a Third of Large Manufacturers are Considering Reshoring from China to the U.S.*

Brookings Institution. 2009a. *Expect Delays: An Analysis of Air Travel Trends in the United States.* Available at: http://www.brookings.edu/reports/2009/1008_air_travel_tomer_puentes.aspx.

Brookings Institution. 2009b. *An Analysis of Air Traffic Patterns in the Intermountain West.* Available at: http://www.brookings.edu/~/media/Research/Files/Reports/2009/10/08%20air%20travel%20tomer%20puentes/1008_air_travel_imw_report.PDF.

Brookings Institution. 2011. *An Economic Development Agenda for Nevada.* Available at: http://www.brookings.edu/~/media/research/files/papers/2011/11/14%20nevada%20economy/1114_nevada_economy.pdf.

Bureau of Transportation Statistics (BTS). 2012b. Airport Summary Data (U.S. Flights Only) – August 2011 to July 2012b. Available at: http://www.transtats.bts.gov/airports.asp?pn=1. Accessed November 5, 2012.

Bureau of Transportation Statistics. 2012c. *Transborder Freight Data*. Available at: http://transborder.bts.gov/programs/international/transborder TBDR_QA.html.

California Department of Finance. 2012. *State and County Population Projections*. Available at: www.dof.ca.gov/research.

Cambridge Systematics, Inc. 2007. *National Rail Freight Infrastructure Capacity and Investment Study*. Available at: www.camsys.com/pubs/AAR_Nat_%20Rail_Cap_Study.pdf.

CH2M HILL and Wilbur Smith Associates Inc. 2011. *I-15 Corridor Characteristics: Intelligent Transportation Systems.* Available at: http://www.i15alliance.org/pdfs/tech_memos/corridor_system_characteristics/I-15CSMP_CorrChar_ITS_FINAL.pdf.

Economic Modeling Specialists Intl. 2013. "Jobs by Industry Report" for Arizona. January.

Federal Aviation Administration. n.d. Air Traffic Activity System – Airport Operations. Available at: http://aspm.faa.gov/opsnet/sys/Airport.asp. Accessed November 27, 2012.

Federal Aviation Administration. 2012b. *Enplanements at Primary Airports by Rank*. Available at: http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/index.cfm?year=2011. Accessed November 27, 2012.

Federal Aviation Administration. 2012d. *FAA Aerospace Forecasts FY2012-2032: Full Forecast Document and Tables*. Available at: http://www.faa.gov/about/office_org/headquarters_offices/apl/aviation_forecasts/aerospace_forecasts/2012-2032/. Accessed December 3, 2012.

Federal Aviation Administration. 2012f. *All-Cargo Data for U.S. Airports*. Available at: http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/.

Federal Highway Administration (FHWA). 2005. *Crash Cost Estimates by Maximum Police-Reported Injury Severity Within Selected Crash Geometries (FHWA-HRT-05-051).* Available at: http://www.fhwa.dot.gov/publications/research/safety/05051/05051.pdf.

Federal Highway Administration (FHWA). 2012. *Freight Analysis Framework Version 3 (FAF3)*. Accessed November 2012.

Federal Highway Administration (FHWA). 2013. *Freight Analysis Framework Version 3.4 (FAF3)*. Released January 10, 2013. Accessed February 2013.

Florida Department of Transportation. 2012. *2012 FDOT Quality/Level of Service Handbook Tables*. Available at: www.dot.state.fl.us.

Government Accountability Office. 2009. National Airspace System: Regional Airport Planning Could Help Address Congestion If Plans Were Integrated with FAA and Airport Decision Making. Available at: http://www.gao.gov/products/GAO-10-120. Accessed December 3, 2012.

Greater Phoenix Economic Council. 2013. Available at: http://www.gpec.org/home. Accessed January 30, 2013.

International Monetary Fund. 2012. *World Economic Outlook Database October 2012.* Available at: http://www.imf.org/external/pubs/ft/weo/2012/02/weodata/index.aspx.

Joint Planning and Advisory Council. 2012. Freight Transportation Framework Study: Examining Freight and Multimodal Opportunities in the Sun Corridor. Available at: http://www.jpacaz.org/pdf/2012-10-30/JPAC_2012-10-30_Sun-Corridor-Freight-Transportation-Framework-Study-Presentation.pdf.

Maricopa Association of Governments (MAG). 2007. *I-10/Hassayampa Valley Transportation Framework Study*. Available at: http://www.bqaz.org/hasOverview.asp?mS=m3. Accessed October 9, 2012.

Maricopa Association of Governments (MAG). 2009a. *I-8 and I-10/Hidden Valley Transportation Framework Study*. Available at: http://www.bqaz.org/hiddReports.asp?mS=m4. Accessed October 9, 2012.

Maricopa Association of Governments (MAG). 2012b. *Maricopa Association of Governments Regional Travel Demand Model.*

North America's Corridor Coalition (NASCO), August 1, 2012. *The NASCO Report, Vol. IV, Issue 15*.

Nelson, Arthur C. and Robert E. Lang. 2011. *Megapolitan America: A New Vision for Understanding America's Metropolitan Geography*.

Nevada Department of Employment. 2012. *Nevada Long-Term Industrial Employment Projections.* Available at: http://www.nevadaworkforce.com/?PAGEID=67&SUBID=197.

Nevada Department of Transportation (NDOT). 2012f. *Nevada Statewide Travel Demand Model*.

Nevada State Demographer's Office. 2012. Available at: http://nvdemography.org. Accessed September 25, 2012.

New Policy Institute and Arizona State University North American Center for Cross-Border Studies. 2012. *Realizing the Full Value of Crossborder Trade with Mexico*. Available at: http://21stcenturyborder.files.wordpress.com/2011/12/realizing-the-value-of-crossborder-trade-with-mexico1.pdf.

North America's Corridor Coalition (NASCO), August 1, 2012. *The NASCO Report, Vol. IV, Issue 15*.

Port of Long Beach (POLB). 2013. Biography of Larry Cottrill, Director of Master Planning, Port of Long Beach, California. Available at: http://www.polb.com/contact/staff/directors/cottrill.asp.

PricewaterhouseCoopers. 2012. "A Homecoming for U.S. Manufacturing?" September. Available at: https://www.pwc.com/en_US/us/industrial-products/publications/assets/pwc-us-manufacturing-resurgence.pdf.

Regional Plan Association, 2005. *America Megaregions*. Available at: http://www.america2050.org/megaregions.html.

Schwartz, Shelley. 2012. "What's the Next Global Manufacturing Superpower?" September 18. Available at: http://www.cnbc.com/id/49007307/What039s_the_Next_Global_Manufacturing_Superpower. Accessed January 2013.

Senate Joint Economic Committee. 2012. "The Impact of Intellectual Property Theft on the Economy." August. Available at: http://www.jec.senate.gov/public/index.cfm?a=Files.Serve&File_id=aa0183d4-8ad9-488f-9e38-7150a3bb62be.

Southern California Association of Governments. 2012. *2012-2035 Regional Transportation Plan*. Available at: http://rtpscs.scag.ca.gov/Pages/2012-2035-RTP-SCS.aspx. Accessed October 2012.

Southern California National Freight Gateway Collaboration. 2011. *On the Move Southern California Delivers the Goods*. Available at: http://freightcollaboration.org/docManager/1000000072/Freight%20Brochure_Final_May5-2011_small.pdf.

SRI International. 2011. "Nevada Industry and Competitiveness Analysis, Identification of Industry Opportunities." November 14.

Texas State Data Center. Available at: http://txsdc.utsa.edu/Data/TPEPP/Projections/Data.aspxtate. Data Center, 2012. Accessed May 20, 2013.

Texas Transportation Institute. 2009. *A Model Comparison of Domestic Freight Transportation Effects on the General Public*. Available at: http://www.americanwaterways.com/press_room/news_releases/NWFSTudy.pdf.

*The Economist*. 2013. "Reshoring Manufacturing: Coming Home." *The Economist*. January 13. Available at: http://www.economist.com/news/special-report/21569570-growing-number-american-companies-are-moving-their-manufacturing-back-united.

Thunderbird School of Global Management. n.d. *Arizona-Mexico Supply Chain Landscape Analysis: A Nearshoring Study*. Available at: http://www.azmag.gov/Documents/EDC_2012-04-03_Arizona-Mexico-Supply-Chain-Landscape-Analysis-Nearshore-Study.pdf.

Tucson Regional Economic Opportunities. 2006. *Tucson Economic Blueprint Strategic Analysis Report.*

U.S. Bureau of Economic Analysis. 2012. *Regional Economic Accounts*. Available at: http://www.bea.gov/regional/. Accessed September 25, 2012.

U.S. Bureau of Labor Statistics. 2010. International Labor Comparisons. Available at: http://www.bls.gov.fls/china.htm. Accessed January 2013.

U.S. Census Bureau. 2002. *Demographic Trends in the 20th Century*. Available at: http://www.census.gov/prod/2002pubs/censr-4.pdf.

U.S. Census Bureau. 2010a. *2010 Census; 2006–2011 American Community Survey*. Available at: http://www.census.gov/acs/www/guidance_for_data_users/comparing_2011. Accessed September 25, 2012.

U.S. Census Bureau. 2011. *American Community Survey. 2011, 2009-2011, 2006-2011*. Available at: http://factfinder2.census.gov. Accessed September 25, 2012.

*Wall Street Journal*. 2010. March 12.

World Shipping Council. 2011. Available at: http://www.worldshipping.org/about-the-industry/global-trade/top-50-world-container-ports. Accessed August 2012.

# Appendix A
# Past Planning Studies and Strategies

Prepared for

Nevada Department of Transportation

Arizona Department of Transportation

June 2013

CH2M HILL
AECOM
HDR
ESI

# Contents



**Figures**

# 1.0 Past Planning Studies and Strategies

## 1.1 Planning History

Corridor concepts for a transportation facility through the Intermountain West have been suggested and studied at various times and levels of detail over the past several decades. Beginning with the 1991 Intermodal Surface Transportation Efficiency Act legislation, the Federal Highway Administration (FHWA) designated a series of corridors as High Priority Corridors for federal funding. The 1995 Transportation Equity Act for the 21st Century legislation added the CANAMEX route (No. 26), which is envisioned to use existing Interstate and state highway corridors traversing Arizona, Nevada, Utah, Idaho, and Montana to form a north-south connection between Canada and Mexico through the Intermountain West (Figure 1-1). (It should be noted that the CANAMEX Corridor is slightly discontinuous due to a gap in corridor designation between I-10 and US 93.)

Initiation of an approach for comprehensive corridor implementation was more recently furthered by the Maricopa Association of Governments (MAG) and the Phoenix metropolitan area Metropolitan Planning Organization. Beginning in 2006, MAG undertook two regional transportation framework studies, the *I-10/Hassayampa Valley Transportation Framework Study* and *I-8 and I-10/Hidden Valley Transportation Framework Study*, that proposed a bypass around the Phoenix metropolitan area, tentatively named the "Hassayampa Freeway," with the intention to connect further north and south.

FIGURE 1-1
**Federal Highway Administration High Priority Corridors**


The importance of and support for the Hassayampa Freeway concept was further strengthened in the *Building a Quality Arizona (bqAZ) Statewide Mobility Reconnaissance Study*, which began the statewide visioning process for Arizona's future multimodal transportation network, including an extensive consultation process with all councils of government and metropolitan planning organizations.

The concept for this transportation corridor was formalized, expanded, and solidified in the *Building a Quality Arizona* (*bqAZ) Statewide Transportation Planning Framework Program*, a 40-year vision for multimodal transportation in Arizona, coordinated with all neighboring state Departments of Transportation. Generally using the existing US 93 corridor northwest from Wickenburg, bqAZ extended the corridor beyond the MAG framework study boundaries to the Arizona/Nevada state line, noting this corridor as a "proposed Interstate."

Nevada has been an equal partner with Arizona since the early 1990s, planning for a regional corridor with improved access from Las Vegas south to Phoenix and a potential northern extension to Reno, creating a better connected Intermountain West with greater economic opportunities. Two key projects that forwarded this concept are the Hoover Dam Bypass and the Boulder City Bypass.

### 1.1.1 Potential Contributing Arizona Improvements

Elements for this Corridor have developed over time. In Arizona, the Arizona Department of Transportation (ADOT) has invested nearly half a billion dollars to upgrade the US 93 corridor to a four-lane divided highway, seeking to expand the approximately 200-mile stretch between Wickenburg and the Hoover Dam to a safer and more efficient facility for commercial trucks and passenger vehicles. The segment between the Mike O'Callaghan-Pat Tillman Memorial Bridge and I-40 is complete, as are many segment improvements south of I-40. Two projects are still underway near Wikieup, and the segment south of the Santa Maria River remains to be completed, leaving less than 45 miles of highway to be widened to at least four lanes.

In Arizona's most recent update of the *Long Range Transportation Plan* (2011), the Hassayampa Freeway, from I-10 to US 93, is designated as an "example of a significant transportation infrastructure project," a facility that could qualify as a new roadway under the recommended funding scheme.

Several ideas have been conceptualized for a southern extension to Mexico, including using the existing I-10 and I-19 corridors, although many capacity and environmental constraints are present in the Tucson metropolitan area and near the Arizona-Sonora border. Passenger rail and freight rail have been recommended as components of this new corridor, either in the same right-of-way envelope, closely parallel, or diverging to connect to alternate destinations (for example, rail and highway may cross the international border at different locations).

Additionally, the *Arizona-Sonora Border Master Plan*, led by ADOT and in coordination with the Arizona-Mexico Commission, is studying the border transportation network to improve connectivity and efficiency. The location of potential new high-capacity roadway or railroad corridors will be considered and coordinated with both jurisdictions and agencies on both sides of the border.

Parallel to the ongoing infrastructure improvements in Arizona, a key focus of the Arizona Governor's Border Trade Alliance has been the need to improve trade movement in Arizona, specifically recognizing the importance of creating better north-south connections. I-11 and the expanded Intermountain West Corridor has been a focal point of discussion.

### 1.1.2 Potential Contributing Nevada Improvements

In Nevada, the Nevada Department of Transportation (NDOT) is continuing the Connecting Nevada process, a statewide, long-range transportation plan that will guide Nevada's transportation investments for the next 40 years and establish policies for preserving transportation corridors. This effort initiated multimodal transportation discussions among stakeholders and could be the catalyst to stitch I-15, I-80, and I-11 into one transportation triangle serving the state.

NDOT also recently completed a multi-state planning effort for the I-15 corridor. The *I-15 Corridor System Master Plan* defines a long-range, multimodal transportation system vision, governance, and implementation strategy, and provides a prioritized program of projects needed to serve all modes of transportation. Defining this vision involved a unique regional partnership between government and private interests in Nevada, California, Arizona, and Utah–the I-15 Mobility Alliance.

What was, and continues to be, of most interest to Nevada is how best to route additional traffic that I-11 is envisioned to carry through Las Vegas. Currently, US 93, US 95, I-15, and I-515 converge in the city center at the Las Vegas Spaghetti Bowl, what the American Transportation Research Institute[1] has identified as one of the

[1] American Transportation Research Institute. 2010. *Bottleneck Analysis of 100 Freight Significant Highway Locations*. Available at http://www.atri-online.org/research/results/ATRI_100_Bottleneck_Report.pdf.

worst 100 U.S. interchanges for truck mobility on major Interstates. Several studies have been completed, or are currently underway, investigating options for expanding capacity, most significantly, the *I-515 Corridor Study.*

Additionally, NDOT's *Draft Southern Nevada Outerbelt Feasibility Study Part I: Initial Environmental Screening* (2012) was conducted as part of the *I-15 Corridor System Master Plan* that performed a preliminary screening of alternative routes bypassing the Las Vegas metropolitan area. Because the Outerbelt Study was not formally undertaken and was done as a cursory review at a high level, several corridor alternatives were conceptualized that will serve as I-11 alignment options around Las Vegas and will feed into this project's alternatives analysis process.

NDOT and ADOT worked together to construct the Hoover Dam Bypass and conduct US 93 corridor improvements on both sides of the bridge. When the Mike O'Callaghan-Pat Tillman Memorial Bridge opened to traffic in late 2011, it attracted many vehicles that had previously avoided, or had been prohibited from, crossing over the Hoover Dam. This resulted in significant congestion through Boulder City, especially on weekends when tourist travel to Las Vegas peaks.

NDOT fast-tracked the design and construction of a project to widen US 93 to two lanes in each direction, including some operational and safety improvements, between the bridge and Boulder City. The ultimate solution to congestion in this area is a new alignment around Boulder City, connecting US 95 to the Hoover Dam Bypass, which was initially studied by NDOT in 2001 and received a Record of Decision in 2005. This alignment for the Boulder City Bypass (locally referred to as "The 11") is currently under study by the RTCSNV and NDOT. The Regional Transportation Commission of Southern Nevada (RTCSNV) is currently exploring different project delivery methods in the use of public-private partnerships. If it is determined that the bypass is feasible as a public-private partnerships, the project could be completed as early as 2018/2019.

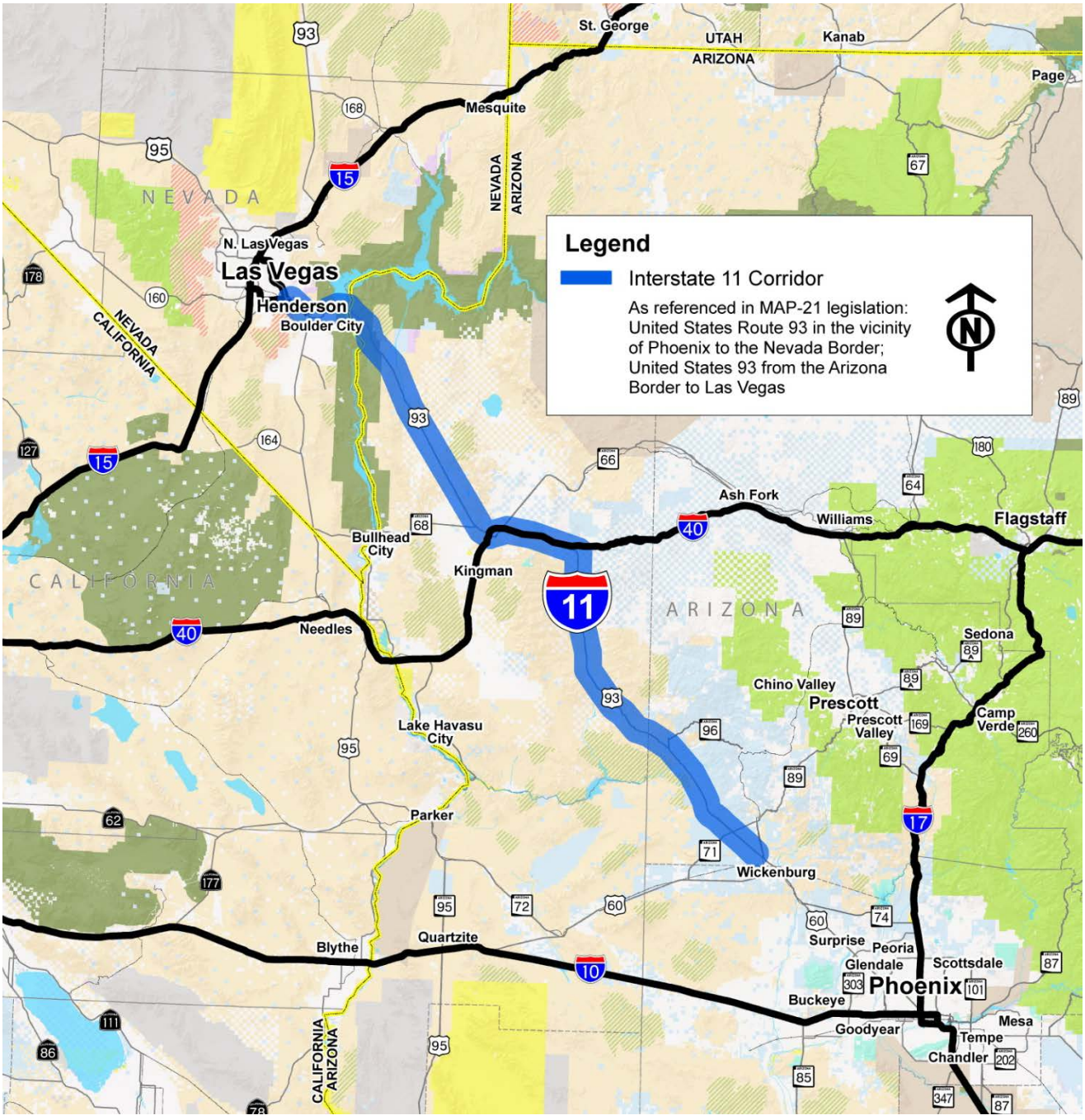
### 1.1.3 Policy Foundation

In addition to the early policy designation of the CANAMEX High Priority Corridor, the recently enacted federal transportation legislation, Moving Ahead for Progress in the 21st Century (MAP-21), designates I-11 as a future Interstate between the Phoenix and Las Vegas metropolitan areas. In approving the I-11 designation, Congress recognized the need for and importance of an Interstate link between Phoenix and Las Vegas. This designation does not guarantee funding, but elevates the importance of the proposed route, improving its chances for obtaining federal funds should the project be found to warrant further consideration. Figure 1-2 shows the designation.

### 1.1.4 Summary of Existing Studies

A number of regional and statewide studies have taken a broader look at mobility needs and possible alternative routes throughout Arizona and Nevada. This appendix summarizes regional, statewide, and local projects and planning studies with implications or recommendations relevant to the I-11 and Intermountain West Corridor. The study purpose, major findings, and relevance to this study are noted.

FIGURE 1-2
**MAP-21 Corridor Designation**



## 1.2 Multi-State Planning Studies

### 1.2.1 Hoover Dam Bypass Environmental Impact Statement (2001)

*Prepared for: Federal Highway Administration (FHWA)*
*Prepared by: CH2M HILL*
*http://www.hooverdambypass.org/feistoc.htm*

The FHWA, in cooperation with state and federal agencies, prepared a Final Environmental Impact Statement (EIS) to build a bypass around the Hoover Dam with a new bridge crossing the Colorado River. The Final EIS was issued in January 2001. The EIS analyzes three proposed alternatives from US 93 milepost 2.2 in Clark County, Nevada, to milepost 1.7 in Mohave County, Arizona. Each alternative involved construction of a four-lane highway, a new steel or concrete four-lane bridge over the Colorado River near Hoover Dam, four-lane approaches, and the approach bridges and tunnels needed for the approximately 3.5-mile-long project.

**Relevance to the I-11 and Intermountain West Corridor:** The Hoover Dam Bypass EIS provides a purpose and need indicating the significance of US 93 as a major commercial corridor for Interstate commerce between Arizona, Nevada, and Utah and as a direct link between Phoenix and Las Vegas. The US 93 corridor, in combination with other highways, creates a continuous north-to-south corridor between Canada and Mexico, which has been designated as a North American Free Trade Agreement (NAFTA) route. The EIS also provides historical data and projections of truck flows through this section of US 93.

### 1.2.2 Logistics Capacity Study of the Guaymas-Tucson Corridor (2006)

*Prepared for: Governor's CANAMEX Task Force*
*Prepared by: Arizona State University*
*http://www.canamex.org/PDF/FinalReport_LogisticsCapacity_Guaymas-TucsonCorridor.pdf*

This study was completed to inventory and assess the operations of the corridor connecting the Port of Guaymas with Tucson, to identify recommendations for required infrastructure investments, and to identify how Guaymas can serve as a strategic point of collaboration between Arizona and Sonora, assuming that regular container service is initiated at the port. Major findings include: with some infrastructure improvements (for example, quay cranes), the Port of Guaymas is capable of handling major container service; the main bottleneck for freight traffic is the Mariposa land port of entry (LPOE) and related railroad inspection procedures on the U.S. side of the border; and expected corridor capacity is 175,000 20-foot-equivalent units per year, with highway and railroad service and full operations at the Mariposa and DeConcini LPOEs.

**Relevance to the I-11 and Intermountain West Corridor:** This study provides the foundation for expected trade and freight-related traffic coming into Arizona from the Port of Guaymas. This information can serve as input for data collection and assumptions for the various economic scenarios used as part of the project's Business Case Foundation.

### 1.2.3 I-10 National Freight Corridor Study (2008)

*Prepared for: National I-10 Freight Corridor Coalition*
*http://www.i10freightstudy.org/*

I-10 is a major Interstate highway and a major economic corridor that stretches coast to coast across the southern U.S. The corridor spans eight states: California, Arizona, New Mexico, Texas, Louisiana, Mississippi, Alabama, and Florida. This study sought to gather information about freight movement, inventory the physical condition of the Interstate, identify operational problems for all motorists on I-10, and determine what improvements can be made to ease congestion, enhance safety, and identify strategic solutions to meet the continuous growth in trade traffic. Findings of the Phase I study for Arizona include: truck movements along the I-10 corridor are expected to double by 2025; automobile traffic represents the dominant share; to support the current level of travel demand between Phoenix and Tucson, three lanes are needed in each direction; and improving State Route (SR) 85

between I-8 and I-10 would improve this bypass around Phoenix, diverting through automobile and truck traffic to cut congestion and improve economic efficiency and public safety. Phase II of the study sought to create a comprehensive plan for intelligent transportation system (ITS) infrastructure across the entire corridor, intending to provide a common set of goals for multistate initiatives and projects relevant to goods movement. Project recommendations relate to institutional needs, travel and traffic management needs, commercial vehicle operations needs, and emergency management needs. During this process, FHWA developed the Corridors of the Future program to identify multistate corridors that were ready to address congestion using an integrated corridor approach.

**Relevance to the I-11 and Intermountain West Corridor:** The findings of this study set the context and help establish the need for the I-11 Corridor, which will likely intersect with I-10, as well as provide an alternate travel corridor in portions of the corridor for some freight traffic that currently use I-10 through Arizona.

### 1.2.4 West-Wide Energy Corridor Programmatic EIS (2008)

*Prepared for: U.S. Department of Energy*
*Prepared by: Argonne National Laboratory*
*http://corridoreis.anl.gov/*

The West-Wide Energy Corridor Programmatic EIS evaluates potential impacts associated with the proposed action to designate corridors on federal land in 11 western states (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming) for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities; establishes procedures to ensure that additional corridors are identified and designated as necessary; and seeks to expedite and streamline applications to construct or modify energy transmission corridors and facilities. Based on the recommendations of the Programmatic EIS, the agencies issuing the Programmatic EIS would amend their respective land use plans by designating a series of energy corridors (3,500-foot-long corridors to accommodate construction and operation of multiple projects and their supporting infrastructure, providing flexibility to route around important resources).

Arizona has 16 corridors, totaling 650 miles. Of these, 505 miles are already in authorized rights-of-way with existing utility infrastructure, while 74 miles follow or are within existing transportation rights-of-way. Nevada has 34 corridors totaling 1,622 miles, of which 973 are in authorized rights-of-way with existing utility infrastructure and 276 follow or are within existing transportation rights-of-way. Many of these corridors are "locally designated," meaning they may not have widths of 3,500 feet or may be designated for multimodal use. Some of the locally designated corridors are specified for only one type of energy transport.

**Relevance to the I-11 and Intermountain West Corridor:** Several multimodal (pipeline and transmission line) corridors have been designated in Arizona and Nevada, and many are located parallel to or alongside highway/Interstate corridors, including portions of US 93, US 95, I-8, I-10, and I-15. Opportunities exist for shared corridors (utility and transportation) with the I-11 improvement.

### 1.2.5 Mountain Megas: America's Newest Metropolitan Places and a Federal Partnership to Help Them Prosper (2008)

*Prepared for: Brookings Institution, Blueprint for American Prosperity initiative*
*http://www.brookings.edu/research/reports/2008/07/20-mountainmegas-sarzynski*

States in the southern Intermountain West (Arizona, Colorado, Nevada, New Mexico, and Utah) are experiencing some of the nation's fastest population and economic growth, often accompanied by demographic change. While the growth and change have brought many benefits, they have also posed a series of challenges, including the lack of a robust and supportive transportation infrastructure network. This report cites the lack of a critical Interstate connection between Phoenix and Las Vegas, the need for greater reliance on renewable energy resources, and the need to build out passenger and freight networks. A suggested recommendation is to tweak metropolitan planning organization (MPO) rules to encourage greater consideration of transportation and development patterns beyond MPO-specific territories to foster more effective interregional connections.

**Relevance to the I-11 and Intermountain West Corridor:** While not directly relevant to this Corridor, this study provides a foundation for growth and development needs of the Intermountain West and can contribute to development of alternate economic scenarios and support the Business Case Foundation.

### 1.2.6 America's Freight Transportation Gateways (2009)

*Prepared for: U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics*
*http://www.bts.gov/publications/americas_freight_transportation_gateways/2009/*

America's freight transportation gateways (for example, seaports, airports, and LPOEs) are vital for U.S. economic growth and international competitiveness. They are the entry and exit points for merchandise trade between the U.S. and countries around the world. While more than 400 U.S. seaports, airports, and land border crossings handle international merchandise trade, most passes through relatively few gateways. In 2008, the nation's top five freight transportation gateways handled 25 percent ($865 billion) of the total value of U.S. international merchandise trade, the top 16 handled 50 percent ($1.7 trillion), and the top 50 handled 78 percent ($2.7 trillion). Nogales, Arizona (DeConcini and Mariposa LPOEs) ranks 42nd on the list, while Los Angeles ranked 1st.

**Relevance to the I-11 and Intermountain West Corridor:** While not directly relevant to this Corridor, this study provides a foundation of freight-related data at freight transportation gateways, which can contribute to development of alternate economic scenarios and support the Business Case Foundation.

### 1.2.7 North American Opportunities and the Sun Corridor (2009)

*Prepared for: Maricopa Association of Governments (MAG), Central Arizona Governments (CAG), and Pima Association of Governments (PAG)*
*Prepared by: Arizona State University North American Center for Transborder Studies*
*http://nacts.asu.edu/projects/north-american-opportunities-and-the-sun-corridor*

This study was conducted in collaboration with MAG, CAG, and PAG to understand the role of the Sun Corridor megapolitan region (spanning between the Phoenix metropolitan area to Tucson and Nogales) in the larger North American economy. The purpose of this document was to present challenges, opportunities, and options for the Sun Corridor to become a major player in continental and international trade.

**Relevance to the I-11 and Intermountain West Corridor:** While not necessarily directly relevant to this Corridor, this study presents key opportunities and challenges related to the economic success of the Sun Corridor, to which the I-11 and Intermountain West Corridor could contribute. Key opportunities to exploit the location of the Sun Corridor to foster economic opportunities include: location along the NAFTA highway and Asia Pacific land bridge, the ability to develop inland ports and distribution centers, development of growth industry clusters, and the ability to become a renewable energy hub. Key challenges in the Sun Corridor include the need to adopt multifunctional planning (for example, transportation and land use) and sustain the quality of life. The information presented in this study can contribute to the development of alternate economic scenarios and support the Business Case Foundation.

### 1.2.8 Sun Corridor, Future Corridor: A Global Megaregion in the 21st Century (2010)

*Prepared for: Joint Planning Advisory Council (MAG, CAG, PAG)*
*Prepared by: AECOM Global Cities Institute*
*http://globalcities.aecom.com/*

The AECOM Global Cities Institute partners with cities and regions to understand their most pressing issues, bringing together expertise in a multidisciplinary laboratory that goes beyond traditional practice to develop solutions that will enhance urban quality of life. In this pilot initiative, three major issues were explored for the Sun Corridor: (1) the need for economic engines to diversify the state's economy and drive the Sun Corridor, (2) the importance of regional sustainability to the Sun Corridor's future, and (3) the rise of megaregions and the

Sun Corridor's identity and competitive position. An extensive economic analysis was completed as part of this effort to understand current and potential future economic drivers, comparing the Sun Corridor to peer megaregions to understand how to increase jobs. Major findings include the need to stimulate development of emerging economic engines appropriate to the Sun Corridor and the need to promote trade and economic cooperation with neighboring Mexican states. Development of an inland port is one mechanism to achieve this, as are other initiatives such as diversifying the economic base and taking advantage of the Sun Corridor's transportation crossroads location.

**Relevance to the I-11 and Intermountain West Corridor:** While not directly relevant to this Corridor, this study provides a foundation of economic data and recommendations to foster global competitiveness of the Sun Corridor, information that can contribute to the development of alternate economic scenarios and support the Business Case Foundation.

### 1.2.9 I-15 Corridor System Master Plan (2012)

*Prepared for: Nevada Department of Transportation (NDOT) and I-15 Mobility Alliance*
*Prepared by: CH2M HILL*
*http://www.i15alliance.org/*

The I-15 Corridor System Master Plan (CSMP) defines a long-range, multimodal transportation system vision, governance, and implementation strategy and provides a prioritized program of projects needed to serve all modes of transportation. The CSMP focuses on future transportation modes and routes that will improve system efficiency and enhance the I-15 corridor to alleviate congestion and improve safety. Defining this vision involved a unique regional partnership between government and private interests in Nevada, California, Arizona, and Utah – the I-15 Mobility Alliance.

**Relevance to the I-11 and Intermountain West Corridor:** The CSMP references the existing and future socioeconomic and transportation characteristics of Phoenix and Las Vegas. In addition to the overview of the metropolitan areas, the CSMP indicates the magnitude of the demand for moving people and goods from the southern LPOEs to the Interstate connections and beyond, including demand through Phoenix and Las Vegas. This information can provide a foundation to understanding needs within the I-11 Corridor study area. I-15 itself can complement I-11 Corridor recommendations.

### 1.2.10 Solar Energy Development Programmatic EIS (2012)

*Prepared for: Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, Bureau of Land Management (BLM), and Department of the Interior*
*http://solareis.anl.gov/index.cfm*

This Programmatic EIS was prepared to prioritize optimal locations for utility-scale solar energy development. For solar energy projects to be developed on BLM-administered lands, such activities must be provided for in their Resource Management Plans. One outcome of the Solar Programmatic EIS is to amend BLM's existing Resource Management Plans in the six-state study area (Arizona, California, Colorado, Nevada, New Mexico, and Utah) to adopt the new Solar Energy Program. This Programmatic EIS is intended to facilitate near-term, utility-scale solar energy development on public lands by minimizing negative environmental and social impacts and optimizing existing transmission infrastructure and corridors.

**Relevance to the I-11 and Intermountain West Corridor:** Under the preferred alternative, the Programmatic EIS identifies categories of land to prioritize for development of special economic zones (SEZs), lands to be excluded from utility-scale solar energy development, and lands that may be developed through a variance process. This analysis can contribute to the alternatives development of the I-11 and Intermountain West Corridor alignments. In Arizona, two SEZs have been proposed, totaling almost 6,000 acres. Gillespie is located in the Hidden Valley of Maricopa County, and Brenda is located north of I-10 near Quartzite. The US 93 and US 95 corridors both include a mix of lands for exclusion and for variance. In southern Nevada, five SEZs have been identified, totaling more than 60,000 acres, located along the US 93 and US 95 corridors. Most of the land north of US 50 is not available

for solar energy development, with the lands to the south including a mix of unavailable lands and those with variance potential.

### 1.2.11 Arizona-Sonora Border Master Plan (ongoing)

*Prepared for: Arizona Department of Transportation (ADOT) and FHWA*
*Prepared by: Stantec*
*http://www.azdot.gov/highways/projects/Arizona-Sonora_Border/index.asp*

This study, led by ADOT and FHWA in coordination with the Arizona-Mexico Commission, is studying the border transportation network to improve border crossing efficiency and safety. The locations of potential new high-capacity roadway and railroad corridors will be considered and coordinated with the federal governments of the U.S. and Mexico. Upon completion, the plan will include a prioritized list of recommended infrastructure projects.

The study has released its first working paper, Existing and Future Conditions, which summarizes socioeconomic trends, roadway and LPOE characteristics, planned infrastructure improvements, and infrastructure funding opportunities.

**Relevance to the I-11 and Intermountain West Corridor:** Corridor recommendations should be incorporated into I-11 and Intermountain West Corridor alternatives development options along the Arizona-Sonora border.

### 1.2.12 Southwest Multi-State Rail Planning Study (ongoing)

*Prepared for: Federal Railroad Administration*
*Prepared by: Parsons Brinckerhoff*

The Federal Railroad Administration is conducting a three-state, multi-corridor rail network planning study to serve as a foundation for the Southwest to develop a multi-state rail plan and inform individual state rail plans. To date, the study team has applied a national conceptual rail planning toolkit to the Southwest (Connect) to assist in development, evaluation, and identification of market potential and service needs for high speed and intercity passenger rail corridors. A series of candidate corridors have been defined and categorized as emerging, regional, core express, and potential core express. The corridor between Southern California and Las Vegas is seen as a backbone Core Express segment, with high ridership potential and a key role in connecting to potential corridors linking Northern and Southern California and Southern California with Phoenix and Tucson. Tucson to Reno and/or Salt Lake City (through a diversion at Las Vegas) are potential Core Express corridors. This route could be one mode contributing to the I-11 and Intermountain West Corridor. The Phoenix to Las Vegas corridor would have potential significant benefits even without a direct rail route if the Southern California to Las Vegas and Arizona linkages were developed as Core Express services that interconnected in the Inland Empire of Southern California. Direct Core Express rail service between Phoenix and Las Vegas has the greatest benefit if a broader multi-state rail network were already developed.

A key finding of the study is that the Southwest network itself is far greater than the sum of its parts – connections open up new markets, resulting in higher ridership network-wide. Additionally, to achieve optimal outcomes of a Southwest HSR network, multi-state coordination and network planning will be crucial.

**Relevance to the I-11 and Intermountain West Corridor:** A connection between Las Vegas and Phoenix is a key recommendation under study. Study recommendations should contribute to I-11 and Intermountain West Corridor alignment and modal alternatives development options.

### 1.2.13 US 93 Corridor Planning (ongoing)

*Prepared for: ADOT*
*Prepared by: Various*
*http://www.azdot.gov/highways/projects/us93/index.asp*

*Prepared for: NDOT*
*Prepared by: Various*

http://www.nevadadot.com/Micro-Sites/BoulderCityBypass/The_Boulder_City_Bypass.aspx

ADOT has dedicated nearly half a billion dollars to widening and improving US 93 from Wickenburg to Hoover Dam over the last several years. ADOT's long-term vision is to transform this highly traveled route into a four-lane divided highway through the entire 200-mile stretch. The US 93 series of projects is a high priority for ADOT and has significantly improved the state highway system. Nine projects have been completed on US 93 south of I-40 between Wikieup and Santa Maria, including widening the highway to four lanes and building two bridges. A continuous four-lane divided highway also extends between Kingman and the Hoover Dam Bridge. Only three segments of highway improvement projects remain to be completed, totaling no more than 10 miles.

The primary work on US 93 in Nevada relates to the Boulder City Bypass project, which involves traffic improvements to US 93 in Boulder City and Henderson, including a new alignment around Boulder City connecting US 95 to the Hoover Dam Bypass. This project will reduce congestion along US 95 by providing a bypass route for truck traffic. NDOT received a Record of Decision in support of the Boulder City Bypass in 2005, and the Regional Transportation Commission of Southern Nevada (RTCSNV) is investigating the financial feasibility of the Corridor.

**Relevance to the I-11 and Intermountain West Corridor:** Part of the US 93 corridor is designated as a "future Interstate corridor" named as I-11 in Moving Ahead for Progress in the 21st Century (MAP-21). Therefore, this corridor will provide one alignment alternative option for this study, and any improvements to date should be considered as a part of this analysis.

### 1.2.14 CANAMEX Corridor Coalition Planning (ongoing)

*Prepared for: CANAMEX Corridor Coalition*
*Prepared by: Various*

The CANAMEX Trade Corridor, as defined by Congress in the 1995 National Highway Systems Designation Act, is a High Priority Corridor from Nogales, to Las Vegas, to Salt Lake City, to Idaho Falls, to Montana, to the Canadian border. The CANAMEX Corridor uses existing Interstate and state highway corridors and is designated to generally follow I-19 from Nogales to Tucson, I-10 from Tucson to Phoenix, US 93 from the vicinity of Phoenix to Las Vegas, and I-15 from Las Vegas to the Canadian border. This is not a continuous route due to a gap in the designation between I-10 and US 93.

The CANAMEX Corridor Coalition is a group of public and private sector representatives selected by the five governors with the intention of strategically investing in infrastructure and technology to increase competitiveness in global trade, create jobs, and maximize economic potential in the five-state region. Various state and regional-specific CANAMEX studies have been undertaken to further advance CANAMEX Corridor development (for example, ADOT-MAG CANAMEX Final Report and Recommended Route).

**Relevance to the I-11 and Intermountain West Corridor:** The CANAMEX Corridor is designated as an FHWA High Priority Corridor, and a segment of CANAMEX has recently been noted as a "future Interstate corridor" named as I-11 in MAP-21. Many of the objectives of I-11 and the Intermountain West Corridor are similar to those of CANAMEX, primarily enhancing freight travel and trade between Canada and Mexico; therefore, prior CANAMEX planning should be considered as part of this study.

## 1.3 Statewide Planning Studies

### 1.3.1 Arizona

#### *Arizona Wildlife Linkages Assessment (2006)*

*Prepared for: ADOT and Arizona Game and Fish Department*
*Prepared by: Arizona Wildlife Linkages Workgroup*
http://www.azdot.gov/inside_adot/OES/AZ_Wildlife_Linkages/

This project is a collaborative effort of public and private sector organizations to address habitat fragmentation through a comprehensive, systematic approach that has identified large blocks of protected habitat, wildlife

movement corridors between and through them, and factors threatening to disrupt the 152 linkage zones identified in Arizona. A series of follow-on studies, entitled "Arizona Missing Linkages," identified and mapped high-priority linkage zones, or those with multi-species corridors, that need to be preserved to maintain wildlife movement between habitat blocks.

**Relevance to the I-11 and Intermountain West Corridor:** The study highlighted specific planning measures required to maintain wildlife connectivity in high-priority linkage corridors. Although not all detailed studies are complete, 14 high-priority linkages have been identified in Arizona, with several spanning the US 93 corridor and Hassayampa Valley (area generally between I-10 and Wickenburg, and SR 303L and Maricopa/La Paz county line). These recommendations should be consulted and accommodated during the alternatives analysis phase of this project.

### *Building a Quality Arizona (bqAZ) Statewide Mobility Reconnaissance Study (2007)*

*Prepared for: Arizona Council of Governments/MPO Association*
*Prepared by: AECOM*
*http://www.bqaz.org/reconReports.asp?mS=m2*

The purpose of this study was to develop a long-range vision for transportation infrastructure in Arizona, driven by sustainable community and economic development principles. Common themes included the following needs: a high-capacity, north-south highway connection, improved border connections with Mexico to facilitate international trade by expanding existing LPOEs, and identifying new surface crossings for rail and highway connections; expanded technological advancements from ITS activities; and expanded initiatives to weigh the impacts of land use and transportation decisions.

**Relevance to the I-11 and Intermountain West Corridor:** This study establishes the foundation of the 40-year vision for multimodal transportation in Arizona. Objectives of the I-11 Corridor fulfill elements of this vision.

### *Arizona Multimodal Freight Analysis Study (2009)*

*Prepared for: ADOT*
*Prepared by: Wilbur Smith Associates*
*http://www.azdot.gov/mpd/systems_planning/freightstudy.asp*

Commodity forecasts suggest that rail will be the fastest growing freight mode in Arizona, but most of the volume increases will come from pass-through traffic. Truck transportation will likely be the dominant mode for distributing the population-driven freight demand around Arizona's population centers. Arizona is at the crossroads of several significant regional, national, and international trade corridors. As traffic along these corridors grows, they will become more congested, affecting the efficiency and productivity of regional and national rail and highway corridors that serve Arizona.

The major gateway impacting the state will be the Port of Los Angeles/Port of Long Beach, which will impact Arizona by virtue of their proximity and connectivity on major trade routes. The challenge exists to develop a consistent statewide strategy for addressing freight transportation, with the additional challenge of coordinated freight planning and local land use planning.

**Relevance to the I-11 and Intermountain West Corridor:** This study came to several conclusions that can impact the development of economic scenarios to build the Corridor's Business Case. Specific findings include: future implementation of deep-water ports in Mexico will have a significant impact on key Arizona travel corridors; environmental restrictions in California could cause a shift to Arizona of transportation logistics centers; Class I railroads are responding to growing traffic volumes by building longer trains requiring longer sidings and more intermodal yard capacity; truck-only lanes or truckways may emerge as a new design concept to ease congestion; growing demands exist for truck parking; air cargo capacity should be expanded for high-value goods; and the CANAMEX Corridor can serve as a multi-state freight solution.

### *Building a Quality Arizona (bqAZ) Statewide Transportation Planning Framework Program (including the Statewide Rail Framework Study) (2010)*

*Prepared for: ADOT*
*Prepared by: AECOM*
*http://www.bqaz.gov/*

As a response to the growing demand for transportation infrastructure, the Arizona State Transportation Board (STB) allocated resources for a statewide collaborative process called Building a Quality Arizona, or bqAZ. The purpose of this effort was to quantify transportation needs statewide and identify the full range of multimodal options to address those needs, along with a comprehensive 2050 transportation vision that included roadway and rail capacity improvements, with new corridor recommendations.

**Relevance to the I-11 and Intermountain West Corridor:** Several corridor recommendations were made as part of the statewide multimodal transportation network vision. A new Interstate highway from I-10 south of the Phoenix metropolitan area through the Hidden and Hassayampa Valleys and using the US 93 corridor to the Nevada state line was a key recommendation. This corridor was also anticipated to be a potential Southwest Interstate HSR corridor. From the Rail Framework Study, relevant recommendations included pursuing: high-speed Interstate passenger rail connections, Sun Corridor commuter and intercity passenger rail improvements, a freight rail connection between the Union Pacific Railroad (UPRR) and BNSF Railway east-west corridors, freight corridor operations improvements, expansion of rail connections to deep-water ports, development of inland ports/logistics facilities, and expansion of short line railroads.

## Growth Sector Overview (2010)

*Prepared for: Arizona Commerce Authority (ACA)*
*http://www.azcommerce.com/*

With the inception of the ACA, this memo was created to delineate potential growth sectors for Arizona, a state that lost more than 300,000 jobs in the recent recession. To remain competitive nationally and internationally, Arizona must diversify its economy and attract higher-wage jobs. To this end, five strategic focus area committees were developed: science/technology, aerospace/defense, renewable energy, small business, and business retention. These committees analyzed each area in terms of Arizona's current competitiveness, forces to compete with (challenges), and strategies for success. Investment in infrastructure is a key strategy for successful advancement of the renewable energy industry, from the perspectives of both transportation and energy transmission.

**Relevance to the I-11 and Intermountain West Corridor:** While not directly relevant to the I-11 Corridor, the strategic focus areas of the ACA can support the economic need for I-11, useful to the Business Case Foundation.

## What Moves You Arizona: Long-Range Transportation Plan (2011)

*Prepared for: ADOT*
*Prepared by: Wilbur Smith Associates*
*http://www.whatmovesyouarizona.gov/your_home.asp*

This plan provides a 20-year capital plan for multimodal transportation improvements. A series of investment strategies is presented, along with examples of significant transportation infrastructure projects for potential implementation.

**Relevance to the I-11 and Intermountain West Corridor:** The Hassayampa Freeway from I-10 (in Buckeye) to US 93 (in or near Wickenburg) is noted as a "potential new state road."

## Arizona State Rail Plan (2011)

*Prepared for: ADOT*
*Prepared by: AECOM*
*http://www.bqaz.gov/rail_plan.asp*

This is the first comprehensive assessment of the state's rail needs and was initiated in response to the increasing involvement of ADOT in freight and passenger rail issues. It builds on the bqAZ Statewide Rail Framework Study

and provides a 20-year implementation program and capital plan for statewide rail investment in Arizona, for inclusion in the Long-Range Transportation Plan. The study identified "corridors of opportunity" for future freight and passenger rail investment, including the "CANAMEX Corridor" and an "Arizona Spine Corridor," a north-south swathe through the center of the state.

**Relevance to the I-11 and Intermountain West Corridor:** As the CANAMEX Corridor generally falls within the I-11 study area, relevant recommendations include: development of a Phoenix to Las Vegas multimodal corridor (a potential pairing of highway, freight rail, passenger rail), improved freight movements in the "Western Passage" of CANAMEX (SR 95/US 95 corridor), commuter and/or intercity passenger rail along US 60 to the Phoenix northwest valley, development of inland port/logistics centers, and other freight and passenger rail improvements. Also within the larger I-11 and Intermountain West Corridor study area, the Arizona Spine Corridor includes such opportunities as commuter and intercity passenger rail in the Sun Corridor, development of intermodal and freight logistics centers, high-priority grade separations, and other freight and passenger rail improvements.

### *Business Plan (2012)*

*Prepared for: ACA*
*http://www.azcommerce.com/about-us/business-plan/*

This plan delineates the goals, strategies, and actions to meet the ACA mission of growing and strengthening Arizona's economy and facilitating the creation of high-quality jobs by supporting and attracting businesses in targeted, high-value base sectors. Target industries that ACA hopes to advance include aerospace/defense, semiconductors, optics/photonics, bioscience, and renewable energy. A series of actions have been identified to implement the plan, including but not limited to, enhancing Arizona's competitiveness, coordinating Arizona's economic development efforts, making Arizona a preferred trading partner with Mexico and Canada, and encouraging the development of an infrastructure system that supports economic growth. As part of the last action listed, the ACA intends to build on the CANAMEX initiative to advance strategic infrastructure investments and increase competitiveness in global trade, job creation, and economic potential by facilitating completion of the CANAMEX Corridor.

**Relevance to the I-11 and Intermountain West Corridor:** While not directly relevant to the I-11 Corridor, the target industries and focus on the CANAMEX initiative can support the economic need for I-11, useful to the Business Case Foundation.

### *Arizona Passenger Rail Corridor Study (ongoing)*

*Prepared for: ADOT*
*Prepared by: Parsons Brinckerhoff with AECOM, HDR, Jacobs, and URS*
*http://www.azdot.gov/passengerrail/*

The purpose of this study is to identify a range of viable alternatives for operating passenger rail service between Phoenix and Tucson, with supporting transportation and land use strategies, and to evaluate and compare the alternatives in the context of the National Environmental Policy Act process. The completion of this project will result in an alternatives analysis and EIS, leading to a design concept report (DCR) and final design of the corridor. Current alternatives are looking at modal options that include combinations of intercity/commuter rail and bus rapid transit. Alignment options use the existing I-10 right-of-way, new greenfield rights-of-way, and/or shared UPRR rights-of-way.

**Relevance to the I-11 and Intermountain West Corridor:** Alignment options within the I-11 and Intermountain West study area could be paired with other modes (for example, highway, freight rail, energy transmission) to form a component of the multimodal corridor that is the subject of this study.

## 1.3.2 Nevada

### *Statewide Transportation Plan – Moving Nevada Through 2028 (2008)*

*Prepared for: NDOT*
*http://www.nevadadot.com/About_NDOT/NDOT_Divisions/Planning/Statewide_Transportation_Planning.aspx*

Nevada's Statewide Transportation Plan is intended to provide direction and strategies for the next 20 years. The plan describes the existing socioeconomic and transportation conditions in the state, as well as future plans. Multimodal transportation improvements include roadway, aviation, bicycle, pedestrian, rail, and transit systems. Guiding principles include mobility, accessibility, freight movement, and environmental stewardship.

**Relevance to the I-11 and Intermountain West Corridor:** The designation of the CANAMEX Corridor as an FHWA High Priority Corridor is noted. Alignment and multimodal options from this study will provide opportunities for incorporation into the I-11 and Intermountain West Corridor for both the Priority Sections in southern Nevada and the future northern Nevada connection segments.

### *Statewide Integrated Transportation Reliability Program (2010)*

*Prepared for: NDOT*
*Prepared by: Kimley-Horn & Associates*
*http://www.kimley-horn.com/projects/NevadaITRP/*

The goal of this study was to identify regional and statewide strategies to improve the reliability of travel within Nevada, including urban areas as well as interregional rural corridors. Processes, policies, and projects were developed to address previously identified gaps in the transportation system. Implementation strategies were categorized in 1- to 2-year, 3- to 5-year, and 6- to 10-year timeframes. Short-term strategies are generally high-impact and low-effort and can be implemented relatively quickly without significant modifications to exiting systems or programs. Longer-term projects require additional funding or implementation efforts to complete.

**Relevance to the I-11 and Intermountain West Corridor:** Long-term initiatives from this study will identify areas where additional resources are required to provide transportation reliability throughout the state and the I-11 and Intermountain West Corridor for both the Priority Sections in southern Nevada and the future northern Nevada connection segments.

### *Unify, Regionalize, Diversify: An Economic Development Agenda for Nevada (2011)*

*Prepared for: Governor's Office of Economic Development*
*Prepared by: The Brookings Institution (Brookings Mountain West) and SRI International*
*http://nv.diversifynevada.com/*

This paper is a response to inquiries in the Economic Development Bill passed by the Nevada legislature as a result of a pronounced economic downturn in Nevada. The goal of the report is to "define the nature of the economic challenges the state and its major regions face, identify industries and industry clusters that have the highest potential for expansion as part of an economic diversification effort, and suggest policy options that will enable the state, its regions, and the private sector to work more effectively to build a more unified, regionally vibrant, and diversified Nevada." The paper draws three main conclusions:

- Nevada possesses fundamental economic assets along with serious challenges as it seeks to build the next Nevada economy. The core strength for economic development has been and will remain its overall business-friendly environment including low taxes and relatively low costs.
- Seven major industries hold out potential for economic growth and diversification in Nevada, including tourism, gaming, and entertainment; health and medical services; business information technology systems; clean energy; mining, materials, and manufacturing; logistics and operations; and aerospace and defense.
- Nevada should take steps to diversify its economy, including unifying the statewide economic development community; regionalizing economic development activities to take advantage of top industry sectors; and strengthening innovation, global engagement, and workforce training.

**Relevance to the I-11 and Intermountain West Corridor:** This study identifies the need for Nevada to provide economic improvements by diversifying its economic base. A key element of this diversification is improved transportation and connectivity to other regions.

### *Nevada Industry and Competitiveness Analysis, Identification of Industry Opportunities (2011)*

*Prepared for: Nevada Secretary of State*
*Prepared by: SRI International*
*http://nvsos.gov/Modules/ShowDocument.aspx?documentid=2152*

This report provides an analysis of seven broad-based industry opportunities that were identified by the SRI International and Brookings research team as having strong potential to drive the state's economy, including tourism, gaming, and entertainment; health and medical services; business information technology systems; clean energy; mining, materials, and manufacturing; logistics and operations; and aerospace and defense.

**Relevance to the I-11 and Intermountain West Corridor:** The industries identified in this report rely on a robust transportation system for transporting people and goods to their destinations, connectivity to other regions, and for opening new markets.

### *Moving Nevada Forward: A Plan for Excellence in Economic Development 2012-2014 (2012)*

*Prepared for: Governor's Office of Economic Development*
*http://nv.diversifynevada.com/state_plan*

This plan is designed to improve the state's economy and provide high-quality jobs for Nevadans. Major objectives include establishing a cohesive economic development operating system, advancing targeted sectors and opportunities in the regions, expanding global engagement, catalyzing innovation in core and emerging industries, and increasing opportunity through education and workforce development. The economic diversity initiative includes reaching out across state lines and national borders to attract new Interstate and international businesses and business partners. Near-term actions include such initiatives as advancing manufacturing, especially gaming equipment, renewable components, advanced composite materials, food processing, and aerospace; warehousing, distribution, and air cargo; national defense research; and building a business case for industry expansion.

**Relevance to the I-11 and Intermountain West Corridor:** The I-11 and Intermountain West Corridor will provide additional Interstate transportation connections that were identified in this study.

### *Nevada Statewide Rail Plan (2012)*

*Prepared for: NDOT*
*Prepared by: Jacobs*
*http://nvrailplan.com/*

This plan provides an approach for implementing passenger and freight rail service improvements in the state, as well as guiding multi-state initiatives. The plan has a multimodal passenger and intermodal freight focus designed to be compatible with highway, air, and transit modes operating in and through the state.

A total of 191 million net tons of freight moved across Nevada by rail in 2009, of which 96 percent was through-traffic with origins and destinations outside the state. The recommended projects involve a combination of private- and public-sector conventional and high-speed passenger rail, freight rail, excursion rail, and rail-highway grade crossing improvements to be made in the short-, mid-, and long-term. Key projects included in the plan for the "greater-than-20-year horizon" are HSR across northern Nevada serving Reno; HSR linking Las Vegas with Los Angeles and Phoenix; and a framework study for multimodal connections between northern and southern Nevada.

**Relevance to the I-11 and Intermountain West Corridor:** This study has identified the need for rail connections between Phoenix and Las Vegas, as well as the need for rail connections between northern and southern Nevada.

### *Connecting Nevada: Planning Our Transportation Future (Phase I complete 2009; Phase II 2013)*

*Prepared for: NDOT*
*Prepared by: Jacobs (Phase I); HDR (Phase II)*
*http://www.connectingnevada.org/default.html*

Connecting Nevada is a statewide, long-range transportation plan that will guide Nevada's transportation investments for the next 40 years and establish policies for preserving transportation corridors. This effort initiated multimodal transportation discussions among stakeholders and could be the catalyst to stitch I-15, I-80, and I-11 into one transportation triangle serving the state.

The final outcome of Phase I was a conceptual framework for the Connecting Nevada plan that includes four core focus areas: structure, process, policy, and tools/resources. Phase II is evaluating existing processes and studies to identify common and complementary components that can be applied to a long-range statewide vision. Phase II will generate criteria that can be applied to transportation corridor identification and preservation processes that will balance the needs, expectations, and considerations of agencies and community stakeholders.

**Relevance to the I-11 and Intermountain West Corridor:** This study provides a long-range (40-year) plan that can be used as a framework for helping to identify corridor needs statewide.

### *A Critical Examination of Resources and Financing Sources and Development Strategies for Inland Ports (ongoing)*

*Prepared for: Governor's Office of Economic Development*
*Prepared by: RCG Economics*
*http://nv.diversifynevada.com/*

This report will explore the potential and need for developing inland ports in Nevada. Interstate connectivity to freight hubs and ports will be an essential element in developing viable facilities.

**Relevance to the I-11 and Intermountain West Corridor:** Interstate connectivity to freight hubs and ports will be an essential element in developing viable facilities.

## 1.4 Regional/Local Planning Studies

### 1.4.1 Arizona

### *I-10/Hassayampa Valley Transportation Framework Study (2007)*

*Prepared for: MAG*
*Prepared by: AECOM*
*http://www.bqaz.org/hasOverview.asp?mS=m3*

The purpose of this study was to develop a broad multimodal transportation framework plan for most of western Maricopa County west of SR 303. While most of this area is undeveloped, the best available forecasts indicate that up to approximately 3 million people will eventually live in the study area. At the project's inception, this included more than 100 master-planned communities already in the planning stages. Through an extensive outreach and coordination program, this study resulted in the recommendation of a network of arterial roadways, parkways, and freeways, as well as supporting transit services (bus rapid transit, commuter rail, and local bus).

**Relevance to the I-11 and Intermountain West Corridor:** A key recommendation of this study was the development of a new freeway (Hassayampa Freeway), potentially paired with a freight rail corridor, in a north-south alignment through the Hassayampa Valley, connecting I-10 with US 93.

### *Pinal County Corridors Definition Study (2007)*

*Prepared for: ADOT*
*Prepared by: Kimley-Horn & Associates*
*http://www.azdot.gov/mpd/systems_planning/cds_pinal.asp*

MAG, CAG, and ADOT completed the Southeast Maricopa/Northern Pinal County Area Transportation Study (SEMNPTS) in September 2003. This study was initiated to document the transportation relationships between Maricopa and Pinal Counties, examine long-range transportation needs, and identify realistic projects that address these needs. The information obtained from this effort was incorporated in the MAG 20-year Regional Transportation Plan (RTP), as well as the long-range planning processes of CAG and Pinal County.

SEMNPTS identified four corridors: East Valley Corridor (I-10 to Florence Junction), Apache Junction/Coolidge Corridor (I-10 to US 60), US 60 Freeway Extension (Baseline Road to Ray Road), and Williams Gateway Freeway (SR 202L to US 60). The study determined that development of these four corridors would improve mobility within the region for both Maricopa and Pinal Counties. A series of studies was conducted to make recommendations to the STB as to the types of future facilities, the general location of the corridors, and the jurisdictional responsibility for the facilities.

As one of these studies, the Pinal County Corridors Definition Study reviewed the first two SEMNPTS corridors and recommended facilities needed by 2030. A combined recommendation for corridor improvements was presented to the STB for near-term study, including a north-south corridor connecting US 60 with I-10, the Williams Gateway freeway, and a US 60 re-route. Potential future state highways and widening projects were also identified.

**Relevance to the I-11 and Intermountain West Corridor:** Although not necessarily directly relevant to the I-11 Corridor, this study established additional corridors to serve travel demand in the Sun Corridor, offsetting a share of the regional demand and contributing to transportation system development in the Sun Corridor.

### *Regionally Significant Routes for Safety and Mobility (2008)*

*Prepared for: Pinal County*
*Prepared by: Lima & Associates*
*http://pinalcountyaz.gov/Departments/PublicWorks/projects/Pages/PlansandStudies.aspx*

This plan was developed to ensure mobility and safety through a collaborative planning process to provide a guide to the county and other stakeholders to fund and implement regionally significant routes. This study resulted in a regionally significant route network for the county, including a corridor preservation map, priority corridors map, implementation procedures, and access management guidelines. The corridors recommended in this study were later incorporated in the MAG I-8 and I-10/Hidden Valley Transportation Framework Study recommendations, Transportation Element of the Pinal County Comprehensive Plan update, and the bqAZ Statewide Transportation Planning Framework Program.

**Relevance to the I-11 and Intermountain West Corridor:** This study established the background roadway network to support growth and development in Pinal County. This network will support high-capacity transportation investments made in the region and provide the foundation for local access needs (for example, traffic interchanges).

### *I-8 and I-10/Hidden Valley Transportation Framework Study (2009)*

*Prepared for: MAG*
*Prepared by: AECOM*
*http://www.bqaz.org/hiddReports.asp?mS=m4*

This study served the same purposes as the Hassayampa Valley Study, but for a study area twice the size, spanning southern Maricopa County and western Pinal County. The study's goal was to develop a long-range framework for locations of major roadways (freeways, parkways, and principal arterials) and transit facilities in a 2,000-square-mile study area. Study recommendations were integrated with the results of the Hassayampa Valley Study, which covered much of the area north of the Hidden Valley study area.

**Relevance to the I-11 and Intermountain West Corridor:** The study recommends an extension of the Hassayampa Freeway south and east through the Hidden Valley (south of the Gila River Indian Community), connecting with I-10 near Casa Grande and potentially extending farther east to meet the proposed North-South Freeway, under study by ADOT to connect central Pinal County with the Phoenix East Valley. Commuter rail and bus rapid transit

are potential transit options that could share the same route. Additionally, the freight rail connector proposed through the Hassayampa Valley could be extended south along SR 85 to meet the UPRR Sunset Route. All of these corridor recommendations are within the I-11 and Intermountain West study area and could contribute to the development of this north-south multimodal transportation investment.

### *Commuter Rail System Study (2010)*

*Prepared for: MAG*
*Prepared by: URS*
*http://www.azmag.gov/Projects/Project.asp?CMSID=1076*

This study evaluated a system of potential commuter rail routes and implementation options for the Phoenix metropolitan area. Three scenarios were developed: (1) implementing commuter rail in a single corridor, (2) implementing in phases in multiple corridors, and (3) implementing in multiple corridors simultaneously. Recommended corridors include the BNSF line from Phoenix to Wickenburg, the UPRR Yuma corridor from Phoenix to Buckeye, and the UPRR Phoenix Subdivision from Phoenix to the East Valley. Potential rail connectors are also proposed to form north-south linkages between east-west corridors.

**Relevance to the I-11 and Intermountain West Corridor:** The commuter rail system proposed has corridors that can contribute to the I-11 and Intermountain West multimodal transportation corridor investment, as well as provide linkages into the regional transportation system in the Phoenix metropolitan area.

### *Regional Transit Framework (2010)*

*Prepared for: MAG*
*Prepared by: HDR*
*http://www.bqaz.org/frameFinalReport.asp?mS=m12*

The MAG Regional Transit Framework identified and prioritized needs for regional transit improvements to supplement the existing RTP through 2030, meeting different transit system objectives and financial constraints, with consideration for longer-range transportation needs through 2050. Three regional transit scenarios were developed for 2030: a basic mobility option that is the continuation of the RTP; an enhanced mobility option that includes moderate service expansion in concentrated areas; and a transit choice option that includes the greatest increase in service areas, frequencies, and high-capacity options. The transit choice option was integrated into the bqAZ Statewide Transportation Planning Framework Program.

**Relevance to the I-11 and Intermountain West Corridor:** While the recommendations of this study are not directly relevant to the I-11 Corridor, the development of a robust transit network in the Phoenix metropolitan area provides transportation choices and linkage opportunities with I-11 and Intermountain West Corridor.

### *Regional Transportation Plan Update (2010)*

*Prepared for: MAG*
*http://www.azmag.gov/Projects/Project.asp?CMSID2=1126&MID=Transportation*

The RTP serves as a guide for the region's financially constrained major transportation investments through 2031. The plan covers all transportation modes, but emphasizes three: highways/freeways, arterials, and transit. Other transportation modes covered by the plan are aviation, pedestrian/bicycle, and freight. In addition to the financially constrained elements of the RTP, the plan identifies illustrative corridors for project concepts. These are potential future transportation investments that will help meet long-range transportation needs, but funding has not been identified to support their implementation. Relevant programmed multimodal projects include improvements to I-10, SR 303L, SR 85, and SR 74; a new freeway/highway around Wickenburg; bus transit on US 60 to Wickenburg; and continued growth of Phoenix Sky Harbor International Airport and Luke Air Force Base.

**Relevance to the I-11 and Intermountain West Corridor:** The socioeconomic analysis shows that population and employment in 2030 will extend north and west through the Hassayampa Valley to Wickenburg. The RTP also recommends a series of illustrative corridors that include the roadways recommended in the Hassayampa and

Hidden Valley Framework Studies, such as the Hassayampa Freeway corridor, commuter rail along the BNSF corridor to Wickenburg, and commuter rail along the UPRR corridor to Buckeye. Further development of an integrated freeway corridor management system (for example, deployment of ITS initiatives) will be pursued. Because these recommendations fall within the I-11 and Intermountain West study area, they can potentially contribute to the alternatives development and analysis phase of this study.

### *Wickenburg Bypass (2010)*

*Prepared for: ADOT*
*http://www.azdot.gov/highways/projects/I40_US93_WestKingmanTI/index.asp*

This is a two-phase project. The interim bypass, completed in 2010, seeks to relieve congestion at the US 60/US 93 intersection by constructing a new bridge over the Hassayampa River, installing two roundabouts, and creating a four-lane divided highway. The ultimate bypass will eventually create a larger loop roadway that takes traffic outside the core of Wickenburg.

As part of the MAG Hassayampa Valley Framework Study for the Wickenburg Area, preliminary alignment alternatives were explored for the ultimate bypass route, including an extension of the proposed Hassayampa Freeway corridor, which would loop around the west side of Wickenburg between Black Mountain and Twin Peaks, connecting with US 93 between SR 71 and SR 89.

**Relevance to the I-11 and Intermountain West Corridor:** These study recommendations are directly relevant to the alternatives analysis phase of this study, in which a potential alignment alternative for I-11 will likely include a corridor passing through or around Wickenburg.

### *2040 Regional Transportation Plan Update (2012)*

*Prepared for: PAG*
*http://www.pagnet.org/Programs/TransportationPlanning/RegionalTransportationPlanandStudies/tabid/168/Default.aspx*

The PAG RTP looks ahead to multimodal transportation needs through 2040. By then the region's population is expected to reach approximately 1.8 million, an increase of nearly 80 percent in 30 years, with a significant increase in older adult population growth.

**Relevance to the I-11 and Intermountain West Corridor:** While the following recommendations are for the entire PAG region, many can contribute to the I-11 and Intermountain West Corridor development and/or provide the necessary regional transportation background network and connections to/from the Corridor. Public transportation is a major priority of this plan, with such recommendations as commuter/intercity rail and bus rapid transit along I-10. No new freeways are planned, but continued investment in I-10 and I-19 is required, and capacity needs will be met with regional parkways. Because Tucson is a freight hub for both north-south and east-west movements, expanded rail facilities and new grade separations are proposed, along with the incorporation of "freight centers" in regional land use plans. Wildlife crossing corridors are prioritized to preserve biological resources, especially across major highways (I-10 and I-19).

### *Parkway Corridor Feasibility Studies (ongoing)*

*Prepared for: Maricopa County Department of Transportation*
*Prepared by: Various*
*http://www.mcdot.maricopa.gov/technical/studies/studies.htm*

The Maricopa County Department of Transportation has conducted several parkway corridor feasibility studies in the Hassayampa Valley to refine Arizona Parkway corridor recommendations that resulted from the MAG regional framework studies. These studies have assessed the need for parkway facilities and prepared specific corridor alignments and cross-sections. The Arizona Parkway is a non-freeway, restricted access facility that offers significantly greater travel capacity than an urban arterial with the same number of lanes. This design alternative eliminates left-turn movements at the intersection and accommodates them through either a strategically placed

U-turn break in the median on the far side of the main crossroad, or a series of right turns. Corridor Feasibility Studies underway or complete in the I-11 study area include:

- Turner Parkway
- Sun Valley Parkway
- Hidden Waters Parkway
- Northern/Tonopah Parkway
- McDowell Parkway
- Yuma Parkway
- Deer Valley Parkway
- Wild Rose Parkway

**Relevance to the I-11 and Intermountain West Corridor:** While the recommendations of this study are not directly relevant to the I-11 Corridor, the development of a higher-capacity roadway network in the Hassayampa Valley can complement new freeway/rail corridor development.

### *Freight Transportation Framework Study (ongoing)*

*Prepared for: MAG*
*Prepared by: Parsons Brinckerhoff*
*http://www.bqaz.org/freightStudy.asp*

This study will identify and develop freight-related economic development opportunities to increase mobility and access for freight movements throughout the Sun Corridor, collaborating with cities, counties, transportation authorities, freight entities, and businesses to protect, maximize, and expand commerce and economic development. A "five point plan" has been developed to prioritize actions to advance freight-related economic development; these points include:

1. Coordinate regionally to position the Sun Corridor for freight economic development (for example, unified marketing plan and clarification of roles of all entities involved).
2. Establish a Sun Corridor "freight development zone" land use designation (provide consistency in protecting land for freight; potentially develop incentives tied to these zones).
3. Implement strategic transportation improvements to support efficient freight distribution (for example, statewide and regional freight movement plans, prioritization of infrastructure investments, and continued investment in border infrastructure).
4. Assist municipal governments with related amendments to public plans and policies (for example, provide guidance for general plans and capital improvement plans to integrate freight-related policies; support repurposing of underutilized land for freight).
5. Prepare conceptual business plans for freight opportunities.

Based on land use context, market opportunities, and supply chain dynamics in the Sun Corridor, freight industry development opportunities have been categorized in four types (forward distribution center, manufacturing and local distribution, mixing center, and import distribution center). Sixteen locations have been identified for development opportunities. This study will continue to detail strategies and next steps, including a potential Sun Corridor governance structure for regional initiatives.

**Relevance to the I-11 and Intermountain West Corridor:** The findings of this study provide context in supporting the freight need of the I-11 and Intermountain West Corridor and can be used to develop alternative economic scenarios and support the Business Case Foundation.

### *I-10 Multimodal Corridor Profile Study (ongoing)*

*Prepared for: ADOT*
*Prepared by: HDR*
*http://www.azdot.gov/mpd/systems_planning/I-10_Phx_to_CA_Border_Multimodal_Corridor_Profile_Study.asp*

As a continuous coast-to-coast route, I-10 is a principal freight route connecting Southern California with the Phoenix and Tucson metropolitan areas, as well as major metropolitan areas in Texas and Florida. To better assess the needs of I-10 in the western half of Arizona, the intent of this study is to consolidate multiple planning documents into one and develop a clear vision of future multimodal transportation needs along I-10 from the Phoenix metropolitan area to the Arizona-California border. A review of current and future conditions has been completed, in line with the Planning and Environmental Linkages process.

**Relevance to the I-11 and Intermountain West Corridor:** While not directly relevant, I-10 is the primary existing passenger and freight transportation corridor in the Sun Corridor, to which I-11 and the Intermountain West Corridor can support and complement travel within the Sun Corridor and potentially around the Phoenix and Tucson metropolitan areas.

### *East-West Corridor Study (ongoing)*

*Prepared for: Pinal County*
*Prepared by: Jacobs*

This study will examine new east-west transportation routes that can provide connectivity through western Pinal County (Maricopa and Casa Grande), building upon the recommendations made in the MAG Hidden Valley Transportation Framework Study.

**Relevance to the I-11 and Intermountain West Corridor:** Corridor recommendations could complement or contribute to development of the I-11 and Intermountain West Corridor multimodal transportation investment.

### *North-South Corridor Study (ongoing)*

*Prepared for: ADOT*
*Prepared by: HDR*
*http://www.azdot.gov/highways/projects/NorthSouthCorridorStudy/index.asp*

Expected growth in Pinal County supports the need for new transportation routes. The purpose of this study is to identify and evaluate a possible route to provide a connection between US 60 (near Apache Junction) and I-10 (near Eloy). This is intended to provide a supplemental north-south corridor on the eastern side of the Phoenix metropolitan area. Various corridor alignment alternatives are under evaluation.

**Relevance to the I-11 and Intermountain West Corridor:** While not likely to be part of the same corridor alignment as the I-11 and Intermountain West Corridor multimodal transportation investment, development of the North-South Corridor can complement regional travel connectivity.

### *I-10 Widening Studies (ongoing)*

*Prepared for: ADOT*
*Prepared by: Various*
*http://www.azdot.gov/highways/projects/index.asp*

Various widening studies and construction projects are underway on I-10 between Phoenix and Tucson to expand corridor capacity and enhance safety. New and reconstructed traffic interchanges are proposed throughout the corridor, including the I-8/I-10 system interchange. The ultimate section of I-10 includes ten total lanes, four general purpose and one high-occupancy vehicle lane in each direction.

**Relevance to the I-11 and Intermountain West Corridor:** Travel projections show that corridor widening alone on I-10 will not satisfy expected future demand. Remaining capacity needs will have to be met in other ways, such as

with a parallel corridor or alternative modes. The I-11 and Intermountain West Corridor could contribute to this corridor solution.

### *SR 95 Realignment Study, I-40 to SR 68 DCR and EIS (ongoing)*

*Prepared for: ADOT*
*Prepared by: Jacobs*
*http://www.azdot.gov/Highways/Projects/SR95/*

The Alternative Selection Report (2008) analyzed the purpose and need and a series of alternatives for a new alignment of SR 95 between the Black Mountains to the east and the Bullhead City/Mohave Valley area to the west. As the cities along it continue to grow, SR 95 functions in some places as a high-capacity, north-south corridor and elsewhere as a local arterial with very little access control. Operationally, SR 95 does not function well, experiencing significant travel delays. The realignment of SR 95 would provide a higher-speed alternative. The DCR/EIS is further evaluating the short list of alignments to determine a recommendation. Currently, three proposed alternative alignments are located between Mohave County Highway 1 and Oatman-Topock Highway.

**Relevance to the I-11 and Intermountain West Corridor:** SR 95 provides a potential corridor alternative for contribution to the I-11 and Intermountain West Corridor alignment options.

### *I-40/US 93 System Traffic Interchange DCR and Environmental Studies (ongoing)*

*Prepared for: ADOT*
*Prepared by: Kimley-Horn & Associates*
*http://www.azdot.gov/highways/projects/I40_US93_WestKingmanTI/index.asp*

ADOT, FHWA, and BLM initiated this study to identify possible alternatives for improving traffic flow at the I-40/US 93 traffic interchange in Kingman, which currently backs up on westbound I-40 and southbound US 93. This is one of three bottleneck locations along US 93 between Phoenix and Las Vegas. Alternatives for a new traffic interchange location, including possible interim improvements, will be evaluated for providing a free-flow connection between I-40 and US 93. Ten initial corridors were evaluated, with three alignments undergoing more detailed evaluation. It is anticipated that the findings of this study will be carried forward for detailed design. The study is in the early concept stage and at this time construction funding is not available.

**Relevance to the I-11 and Intermountain West Corridor:** These study recommendations are directly relevant to the alternatives analysis phase of this study, in which a potential alignment alternative for I-11 will likely include portions of US 93, including its intersection with US 40. I-11 Corridor alternatives should also consider that the current US 93/I-40 intersection is a bottleneck and improvements are necessary, especially when potentially adding capacity.

### *SR 189: Long-Term Study, International Border to Grand Avenue DCR and Environmental Assessment (ongoing)*

*Prepared for: ADOT*
*Prepared by: HDR*
*http://www.azdot.gov/highways/projects/SR189/SR189-Long-Term-Study.asp*

This study will develop a long-range plan for future transportation improvements to SR 189, locally known as Mariposa Road, which connects the U.S./Mexico border with I-19 in Nogales. The Mariposa LPOE, one of the busiest cargo ports along the border, is undergoing expansion. ADOT anticipates that the current SR 189 roadway and I-19 Mariposa traffic interchange may need to be improved to accommodate the projected increase in traffic that will also increase as a result of development. Three alternatives have been developed and are under evaluation. The alternatives include implementation of corridor management techniques, a new freeway, and a potential connector route.

**Relevance to the I-11 and Intermountain West Corridor:** These study recommendations are directly relevant to the alternatives analysis phase of this study, in which a potential alignment alternative for I-11 and the

Intermountain West Corridor could connect with an international border crossing in Nogales. Improvements to SR 189 can complement or contribute to development of the study corridor.

## 1.4.2 Nevada

### *I-515 Corridor Study (2004)*

*Prepared for: NDOT*
*Prepared by: Louis Berger Group*
*http://www.nevadadot.com/Micro-Sites/I515/Info.aspx*

This study proposed improvements to address short- and long-term transportation needs for I-515. The study identified areas of existing and future congestion and evaluated alternatives to improve transportation system performance by increasing mobility, safety, and accessibility. It also evaluated numerous transit improvements including bus rapid transit, high-occupancy vehicle lanes, ITS, bicycle paths, and walking trails.

Following the economic downturn, subsequent population decline, and altered traffic patterns in the project area, work on the environmental document was temporarily suspended. Expected to begin in 2013, the EIS will re-evaluate options for expanding capacity in the I-515 corridor from the Foothills Road grade separation to the US 93/US 95/I-515/I-15 system interchange at the Las Vegas Spaghetti Bowl.

**Relevance to the I-11 and Intermountain West Corridor:** I-515 is a potential candidate for the I-11 Corridor, and this study will identify future congestion and constraints to improvements.

### *Boulder City Bypass Phase I and Phase II EIS (2005)*

*Prepared for: NDOT*
*Prepared by: CH2M HILL*
*http://www.nevadadot.com/Micro-Sites/BoulderCityBypass/The_Boulder_City_Bypass.aspx*

The Boulder City Bypass will connect I-515/US 95/US 93 from the Foothills Road grade separation in Henderson to the recently completed Hoover Dam Bypass at the Nevada Interchange and will pass to the south of Boulder City.

The project has been split into two phases, with Phase I connecting I-515 from the Foothills Road grade separation to a new interchange on US 95 south of the existing US 93/US 95 Railroad Pass Interchange. Phase I has been broken into four packages:

- Package 1: Right-of-way
- Package 2: Construct frontage road and utility relocations
- Package 3: Construct realigned US 93/US 95 mainline to the frontage road intersection and the new Railroad Pass interchange at US 95
- Complete the US 93/US 95 Interchange at Railroad Pass and construct the new US 95 connection, bypassing the existing US 93/US 95 interchange.

**Relevance to the I-11 and Intermountain West Corridor:** The Boulder City Bypass is a potential candidate for the I-11 Corridor, and this environmental document identified the route.

### *I-11/Boulder City Bypass Public-Private Partnership (Ongoing)*

*Prepared for: RTCSNV*
*Prepared by: Louis Berger Group*
*http://i-11bouldercitybypass.com/wordpress/documents/*

This project, sponsored by the RTCSNV, encompasses Phase II of the Boulder City Bypass Phase I and Phase II EIS. Alternative funding methods are being explored including public/private partnerships and tolling opportunities, as part of this initiative.

RTCSNV, in collaboration with NDOT and the FHWA, is holding public information meetings, conducting traffic and toll revenue forecasts, preparing financial analyses, and developing detailed engineering plans and cost estimates to establish rights-of-way for the Phase II project; they are also providing support to NDOT to update the EIS to reflect the potential development of the project as a toll facility.

After the completion of these studies, RTCSNV will evaluate various public/private partnerships arrangements and funding scenarios to determine whether the Phase II project can be feasibly constructed, operated, and/or maintained as a toll road, and if this method of project delivery provides a good value to the public.

This study is well underway and the results are expected in 2013. A draft Sketch-Level Traffic Revenue Study (September 10, 2012) has been completed and is under review.

The RTCSNV's goal is to have the project ready for construction by 2016 and completed by 2019.

**Relevance to the I-11 and Intermountain West Corridor:** The Boulder City Bypass is a potential candidate for the I-11 Corridor. This study will determine whether Phase II of the project meets the financial criteria for public-private partnership funding.

### *US 395 Southern Sierra Corridor Study (2007)*

*Prepared for: NDOT*
*Prepared by: Parsons*
*http://www.nevadadot.com/Content.aspx?id=1377*

The US 395 corridor is a critical transportation and economic link between Douglas County and the Truckee Meadows area, also acting as a major truck route connecting eastern Sierra communities in California and Nevada. US 395 is the only north-south highway that links Washoe County, Carson City, and Douglas County and is vital to these communities and for tourism.

This study evaluated the current traffic level of service on the roadway network and the need for future investments, based on the expected growth in population, employment, and visitor traffic. The resulting plan focuses primarily on the need for highway capacity and operational and safety improvements in the more congested sections of the study area.

**Relevance to the I-11 and Intermountain West Corridor:** This study covers a route for a corridor that is one of several that may be considered for I-11 as a future connection between southern and northern Nevada.

### *Draft Southern Nevada Regional Transportation Plan 2013-2035 (2012)*

*Prepared for: RTCSNV*
*http://www.rtcsnv.com/planning-engineering/transportation-planning/2013-2035-regional-transportation-plan-update/*

RTCSNV is in the process of updating the RTP. The Draft RTP was released in October 2012 and recommendations include continuing improvements to I-15, Clark County 215, and US 95; construction of the Boulder City Bypass; transit improvements; and measures for ITS deployment, complete streets, and environmental mitigation. Unfunded needs include additional improvements to I-15, Clark County 215, I-215, I-515, and US 95, among others.

**Relevance to the I-11 and Intermountain West Corridor:** The RTP covers both transportation and transit improvements in Clark County. Major improvements programmed in the current plan include highway capacity enhancements, highway/rail grade separations, high-capacity transit extensions, ITS deployment, and arterial roadway improvements.

### *Washoe County Regional Transportation Plan (2008)*

*Prepared for: Regional Transportation Commission of Washoe County*
*http://www.rtcwashoe.com/section-planning*

The RTP outlines Washoe County's long-range transportation plans to accommodate master-planned development in Reno, Sparks, and unincorporated county areas. The RTP addresses travel by all modes, including automobiles, transit, bicycles, pedestrians, aviation, rail, and goods movement, as well as transportation management strategies to make the system more efficient. The current RTP long-range transportation plan covers fiscal year 2008 to fiscal year 2030; an update is scheduled for 2013. The RTP includes improvements to I-80, US 395, and the new six-lane East Truckee Canyon/Spanish Springs Connector (connecting I-80 and US 395); transit improvements to develop a primary transit network that includes routes operating with 15-minute or less headways; and various aviation, goods movement, ITS, bicycle, and pedestrian plans and policies.

**Relevance to the I-11 and Intermountain West Corridor:** The RTP outlines Washoe County's long-range transportation plans to accommodate master-planned development in Reno, Sparks, and county areas. The RTP addresses travel by all modes, including automobiles, transit, bicycles, pedestrians, aviation, rail, and goods movement, as well as transportation management strategies to make the system more efficient.

### *West Valley North-South Critical Facilities Study – Phase 1 (2009)*

*Prepared for: RTCSNV*
*Prepared by: Wilbur Smith Associates*

The purpose of this study was to analyze transportation facilities in the western portion of the Las Vegas Valley and identify facilities needed to serve travel demand both in the horizon year (2030) and beyond if the urban boundary were to expand. Key findings include: it is possible and desirable to construct two southern connectors to connect I-15 to Clark County 215 on both the east and west; and the north-south leg of Clark County 215 has adequate right-of-way to serve travel demand even beyond the horizon year, although it will require one if not two additional lanes by 2030. General recommendations are to expand right-of-way in some locations to increase capacity, build one-way couplet systems in areas where significant demand will exist and right-of-way is limited, and pursue transit options in key corridors.

**Relevance to the I-11 and Intermountain West Corridor:** The purpose of this study was to analyze transportation facilities in the western portion of the Las Vegas Valley and identify facilities needed to serve travel demand both in the horizon year (2030) and beyond if the urban boundary were to expand.

### *Apex to Mesquite and Moapa Valley Corridor Study (2011)*

*Prepared for: NDOT and RTCSNV*
*Prepared by: CA Group with CH2M HILL*
*http://www.ammvcorridorstudy.com/*

The purpose of this study was to prioritize a range of cost-effective and workable transportation improvements to serve growth along the I-15 and US 93 corridors in northern Clark County. Short-term alternatives are based on immediate needs and deficiencies; medium- and long-term needs include roadway improvements associated with a future increase in development and traffic volume. The existing and estimated future truck traffic on I-15 and US 93 is significant and must be taken into consideration whenever improvements are planned.

**Relevance to the I-11 and Intermountain West Corridor:** This study covers routes for corridors that may be considered for I-11 as a future connection between southern and northern Nevada.

### *US395 Washoe County Study (2002)*

*Prepared for: NDOT*
*Prepared by: Parsons*
*http://www.nevadadot.com/Content.aspx?id=1381*

This study is a planning-level analysis that identifies freeway improvements needed within the Reno-Sparks metropolitan area between now and 2030. The corridor study includes both I-80 and US 395/I-580.

**Relevance to the I-11 and Intermountain West Corridor:** This study covers routes that have the potential for becoming part of the I-11 Corridor.

### *US 50 East Corridor Study (2007)*

*Prepared for: NDOT*
*Prepared by: PBS&J (now Atkins)*
*http://www.nevadadot.com/uploadedFiles/NDOT/About_NDOT/NDOT_Divisions/Planning/2007_US_50_East_Corridor_Study.pdf*

The US 50 East Corridor Study spans 52 miles, from the Carson City Freeway (US 395) in Carson City, through Lyon County, to US 50A (Leeteville Junction) in Churchill County. The study area includes adjoining lands 5 miles on either side of US 50 along the entire length.

**Relevance to the I-11 and Intermountain West Corridor:** This study covers a corridor that has the potential for becoming part of the I-11 Corridor.

### *I-80 Corridor Study (2009)*

*Prepared for: NDOT*
*Prepared by: PBS&J (now Atkins)*

I-80 is a crucial corridor for the western Nevada transportation system, conveying Interstate traffic and serving as a major urban arterial for an area that experienced unprecedented growth in recent years. The corridor's high levels of truck traffic are expected to increase with the expansion of the Port of Oakland and development of the Tahoe-Reno Industrial Center. The study addresses concerns related to the need to improve transportation along the corridor by evaluating future land use demands while protecting and using existing resources.

**Relevance to the I-11 and Intermountain West Corridor:** This study covers a corridor that has the potential for becoming part of the I-11 Corridor.

### *USA Parkway Environmental Study (ongoing)*

*Prepared for: NDOT*
*Prepared by: Jacobs*

This proposed alignment will provide a connection between US 50 and I-80 east of Reno and west of US 95A. This transportation link will enhance local and regional mobility while providing an alternate route.

**Relevance to the I-11 and Intermountain West Corridor:** This study covers a corridor that has the potential for becoming part of the I-11 Corridor.

## 1.4.3 Bureau of Land Management Resource Management Plans

Resource management plans are land use plans that describe multiple-use direction for managing public lands administered by the BLM.

The Federal Land Policy and Management Act (1976) directs the BLM to develop land use plans that provide for appropriate uses of public land. Decisions in land use plans guide future land management actions and subsequent site-specific implementation decisions. The BLM Resource Management Plans will accomplish the following:

- Encourage coordination and cooperation with other federal agencies and state and local governments.
- Establish goals and objectives for resource management and the management actions needed to achieve those goals and objectives.
- Identify lands that are open and available for certain uses, including any restrictions, and lands that are closed to certain uses.
- Provide comprehensive management direction for, and/or allocate use of, all resources.

## *Arizona*

**Arizona Strip District**

- Grand Canyon-Parashant National Monument Resource Management Plan
  http://www.blm.gov/az/st/en/info/nepa/environmental_library/arizona_resource_management/gcp_ROD.html
- Arizona Strip Field Office Resource Management Plan
  http://www.blm.gov/az/st/en/info/nepa/environmental_library/arizona_resource_management/strip_ROD.html
- Vermilion Cliffs National Monument Resource Management Plan
  http://www.blm.gov/az/st/en/info/nepa/environmental_library/arizona_resource_management/verm_ROD.html

**Colorado River District**

- Yuma Field Office Resource Management Plan
  http://www.blm.gov/az/st/en/info/nepa/environmental_library/arizona_resource_management/yuma_rod.html
- Lake Havasu Field Office Resource Management Plan
  http://www.blm.gov/az/st/en/info/nepa/environmental_library/arizona_resource_management/LHFO_ROD_07.html
- Kingman Resource Management Plan
  http://www.blm.gov/az/st/en/info/nepa/environmental_library/arizona_resource_management/kingman_prmp.html

**Gila District**

- Ironwood Forest National Monument Resource Management Plan
  http://www.blm.gov/az/st/en/prog/planning/ironwood.html
- Safford District Resource Management Plan
  http://www.blm.gov/az/st/en/info/nepa/environmental_library/arizona_resource_management/safford_rmp.html
- Las Cienegas Resource Management Plan
  http://www.blm.gov/pgdata/etc/medialib/blm/az/pdfs/nepa/library/resource_management.Par.73866.File.dat/LCROD-WEB.pdf
- Gila Box Resource Management Plan
  http://www.blm.gov/pgdata/etc/medialib/blm/az/pdfs/nepa/library/resource_management.Par.23505.File.dat/Gila_Box_MgmtPlan-EA-DR-complete.pdf
- Lower Gila Framework and Resource Management Plans
  http://www.blm.gov/pgdata/etc/medialib/blm/az/pdfs/nepa/library/resource_management.Par.23500.File.dat/LowerGilaNorthMFP.pdf

  http://www.blm.gov/pgdata/etc/medialib/blm/az/pdfs/nepa/library/resource_management.Par.22305.File.dat/lower-gila-south-complete.pdf

  http://www.blm.gov/pgdata/etc/medialib/blm/az/pdfs/nepa/library/resource_management.Par.29336.File.dat/Lower-Gila-Amendment-decision-record.pdf

**Phoenix District**

- Phoenix District Resource Management Plan
  http://www.blm.gov/pgdata/etc/medialib/blm/az/pdfs/nepa/library/resource_management.Par.88909.File.dat/PhoenixRMP-FEIS-complete.pdf
- Agua Fria National Monument Resource Management Plan
  http://www.blm.gov/az/st/en/info/nepa/environmental_library/arizona_resource_management/afria-bradshaw.html
- Sonoran Desert National Monument Resource Management Plan
  https://www.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=dispatchToPatternPage&currentPageId=21457

### *Nevada*

**Battle Mountain District**

http://www.blm.gov/nv/st/en/fo/battle_mountain_field/blm_information/rmp.html

**Carson City District**

https://www.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=renderDefaultPlanOrProjectSite&projectId=22652&dctmId=0b0003e88020e137

**Elko District**

http://www.blm.gov/nv/st/en/fo/elko_field_office/blm_programs/planning.html

**Ely District**

http://www.blm.gov/nv/st/en/fo/ely_field_office/blm_programs/planning/approved_plan_and.html

**Southern Nevada District**

https://www.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=renderDefaultPlanOrProjectSite&projectId=2900&dctmId=0b0003e88009debe

**Winnemucca District**

http://www.blm.gov/nv/st/en/fo/wfo/blm_information/rmp.html

# 2.0 Acronyms and Abbreviations

| | |
|---|---|
| ACA | Arizona Commerce Authority |
| ADOT | Arizona Department of Transportation |
| BLM | Bureau of Land Management |
| bqAZ | Building a Quality Arizona |
| CAG | Central Arizona Governments |
| CANAMEX | Transportation corridor connecting Canada and Mexico through the United States |
| DCR | design concept report |
| EIS | environmental impact statement |
| FHWA | Federal Highway Administration |
| HSR | high-speed rail |
| ITS | intelligent transportation system |
| LPOE | land port of entry |
| MAG | Maricopa Association of Governments |
| MAP-21 | Moving Ahead for Progress in the 21st Century |
| MPO | metropolitan planning organization |
| NAFTA | North American Free Trade Agreement |
| NDOT | Nevada Department of Transportation |
| PAG | Pima Association of Governments |
| RMP | resource management plan |
| RTCSNV | Regional Transportation Commission of Southern Nevada |
| RTP | Regional Transportation Plan |
| SEMNPTS | Southeast Maricopa/Northern Pinal County Area Transportation Study |
| SR | State Route |
| STB | State Transportation Board |
| SEZ | special economic zone |
| UPRR | Union Pacific Railroad |
| U.S. | United States |

# Appendix B
# Economic Development and Demographic Trends

Prepared for

Nevada Department of Transportation

Arizona Department of Transportation

June 2013

CH2M HILL
AECOM
HDR
ESI

# Contents



**Tables**



**Figures**

**Section** **Page**

# 1.0 Economic Development and Demographic Trends

## 1.1 Socioeconomic and Demographic Trends

This appendix provides an overview of the socioeconomic conditions and trends in Arizona and Nevada and examines population growth and projections in the Intermountain West. As the planning process moves forward, these findings will provide valuable background information for preparing the Preliminary Business Case Foundation.

### 1.1.1 Population Growth Trends

#### *Intermountain West*

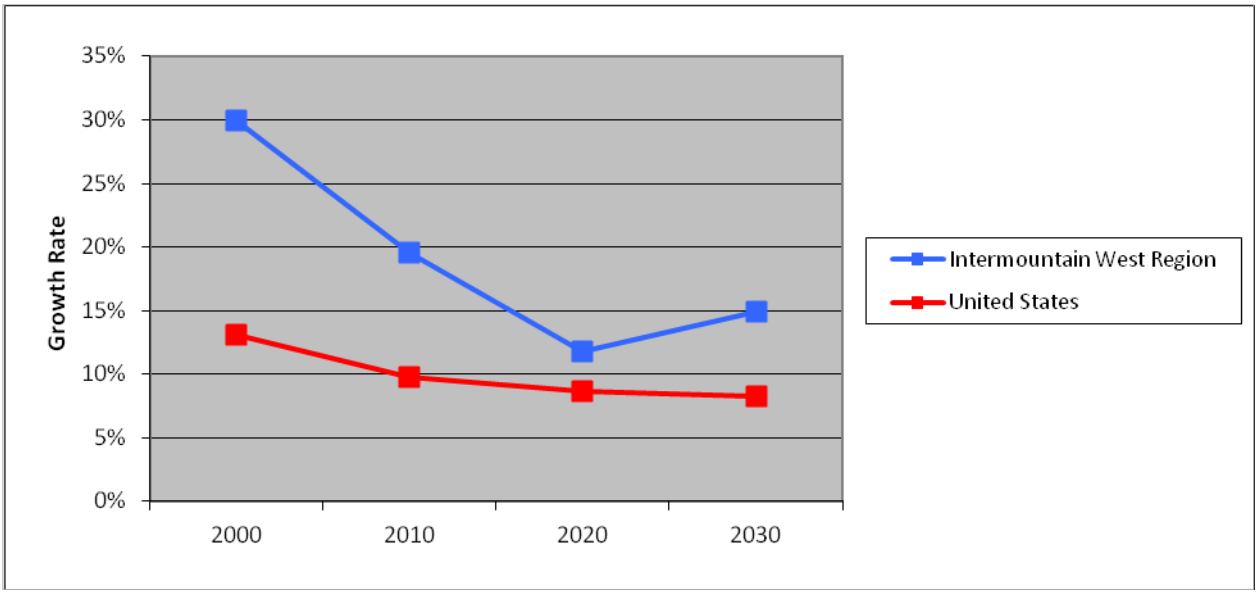
The population of the Intermountain West states (Arizona, Idaho, Montana, Nevada, Oregon, Utah, and Washington) is currently 25 million (Table 1-1). Between 2000 and 2010, the rate of growth for the Intermountain West states was 19.6 percent, double that of the United States (U.S.) as a whole, which grew at a rate of 9.8 percent). According to the U.S. Census, between 2010 and 2030, the Intermountain West is projected to grow by 28.5 percent to 32.1 million people, which exceeds the forecasted U.S. growth rate of 17.7 percent over the same time frame. Over the next two decades, growth in the Intermountain West is expected to slow, but still exceed that of the U.S. (Figure 1-1). Of the Intermountain West states, the highest growth rate is expected in Arizona. Population growth in the Intermountain West is attributable to both domestic migration and immigration.

TABLE 1-1
**Intermountain West Population and Growth Rate Projections (2000–2030)**

| State | 2000 | 2010 | % Growth 2000–2010 | 2020 | % Growth Projection 2010–2020 | 2030 | % Growth Projection 2020–2030 |
|---|---|---|---|---|---|---|---|
| Arizona | 5,130,632 | 6,392,017 | 24.6 | 7,485,000 | 17.1 | 8,852,800 | 18.3 |
| Nevada | 1,998,257 | 2,700,557 | 35.1 | 3,043,607 | 12.7 | 3,338,269 | 9.7 |
| Idaho | 1,299,430 | 1,571,450 | 20.9 | 1,741,333 | 10.8 | 1,969,624 | 13.1 |
| Montana | 903,773 | 990,898 | 9.6 | 1,022,735 | 3.2 | 1,044,898 | 2.2 |
| Oregon | 3,429,708 | 3,838,957 | 11.9 | 4,260,393 | 11.0 | 4,833,918 | 13.5 |
| Utah | 2,244,502 | 2,776,469 | 23.7 | 2,990,094 | 7.7 | 3,485,367 | 16.6 |
| Washington | 5,910,512 | 6,744,496 | 14.1 | 7,432,136 | 10.2 | 8,624,801 | 16.0 |
| Intermountain West Region | 20,916,814 | 25,014,844 | 19.6 | 27,975,298 | 11.8 | 32,149,677 | 14.9 |
| United States | 281,421,906 | 308,935,581 | 9.8 | 335,804,546 | 8.7 | 363,584,435 | 8.3 |

Sources: Arizona Department of Administration 2012; Nevada State Demographer's Office 2012; U.S. Census Bureau 2011

FIGURE 1-1
**Intermountain West Population Growth Projections (2000–2030)**




Sources: Arizona Department of Administration 2012; Nevada State Demographer's Office 2012; U.S. Census Bureau 1990, 2000 and 2010, 2005, 2010a

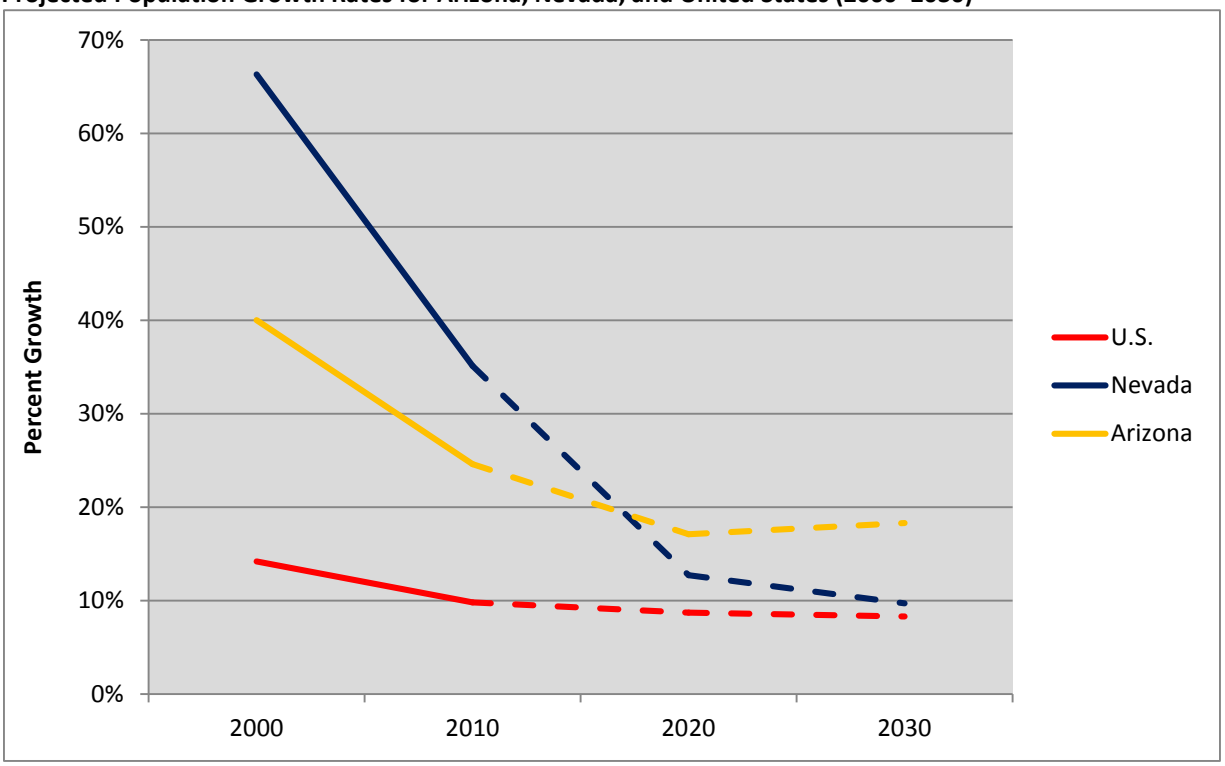
Table 1-2 and Figure 1-2 show population growth rates and growth projections for Arizona, Nevada, and the U.S. From 2000 to 2010, the population growth rates for Arizona (24.6 percent) and Nevada (35.1 percent) far exceeded the nation's growth rate of 9.8 percent. Growth projections for both states are still outpacing that of the U.S., but all three show a slowing growth pattern through 2030, a result of the aging population demographic. Over the next four decades, Nevada is expected to grow by more than 178 percent, with Arizona growing at 142 percent.

TABLE 1-2
**Projected Population Growth Rates for Arizona, Nevada, and United States (2000–2030)**

| | Arizona | | Nevada | | United States | |
|---|---|---|---|---|---|---|
| Year | Population | % Growth | Population | % Growth | Population | % Growth |
| 1990 | 3,665,339 | — | 1,201,675 | — | 246,464,000 | — |
| 2000 | 5,130,632 | 40.0 | 1,998,257 | 66.3 | 281,421,906 | 14.2 |
| 2010 | 6,392,017 | 24.6 | 2,700,551 | 35.1 | 308,935,581 | 9.8 |
| 2020 | 7,485,000 | 17.1 | 3,043,607 | 12.7 | 335,804,546 | 8.7 |
| 2030 | 8,852,800 | 18.3 | 3,338,269 | 9.7 | 363,584,435 | 8.3 |

Sources: Arizona Department of Administration 2012; Nevada State Demographer's Office 2012; U.S. Census Bureau 1990, 2000 and 2010, 2005, 2010a

FIGURE 1-2
**Projected Population Growth Rates for Arizona, Nevada, and United States (2000–2030)**



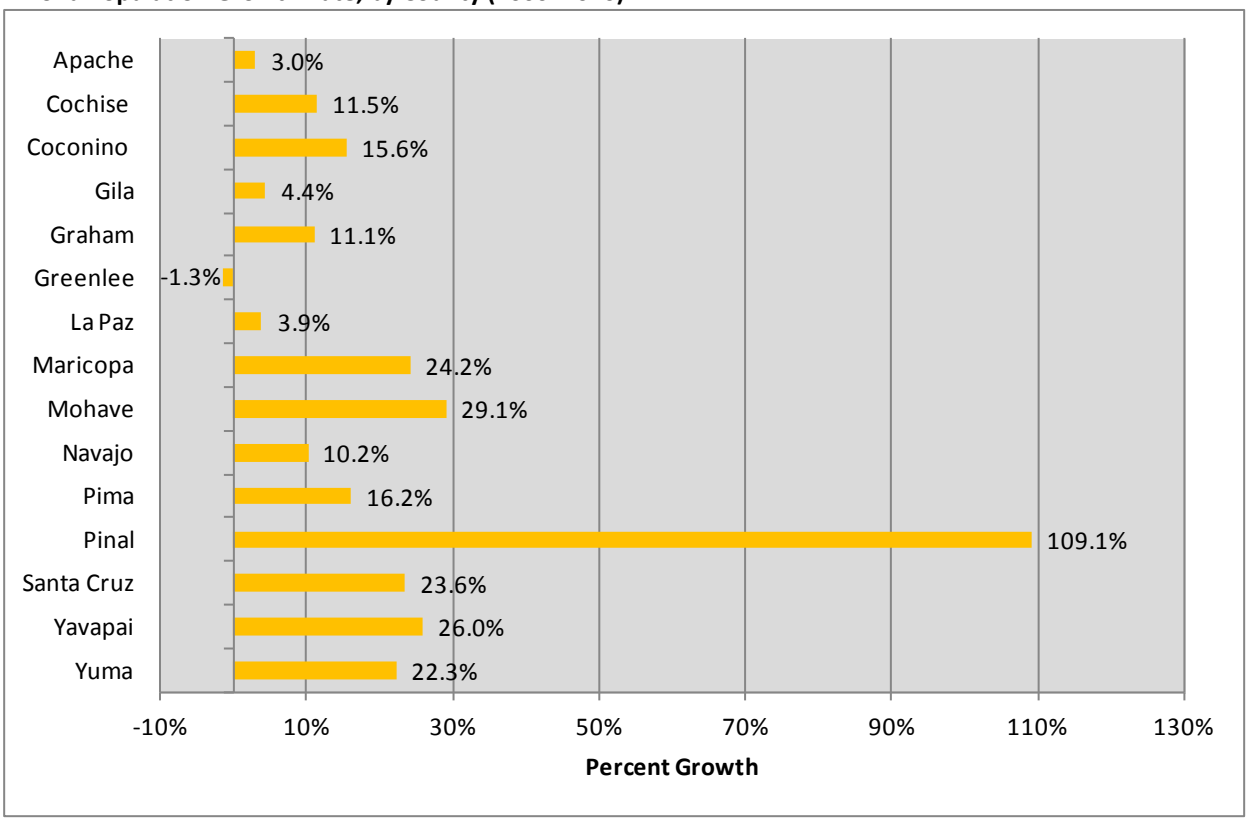

Sources: Arizona Department of Administration 2012; Nevada State Demographer's Office 2012; U.S. Census Bureau 1990, 2000 and 2010, 2005, 2010a

This strong projected pace of growth in Arizona and Nevada will likely mean increasing demand for housing, public services, and infrastructure. It is useful, however, to consider these trends at the county level to get a better sense of the future dispersion of demand within each state.

### *State and County Level*

In Arizona, Pinal County experienced the most dramatic population increase, with a 109.1 percent growth rate between 2000 and 2010, followed by Mohave County at 29.1 percent, and Maricopa County at 24.2 percent. Greenlee County is the only county in Arizona that experienced negative population growth (-1.3 percent). Figure 1-3 shows the widespread growth from 2000 to 2010.

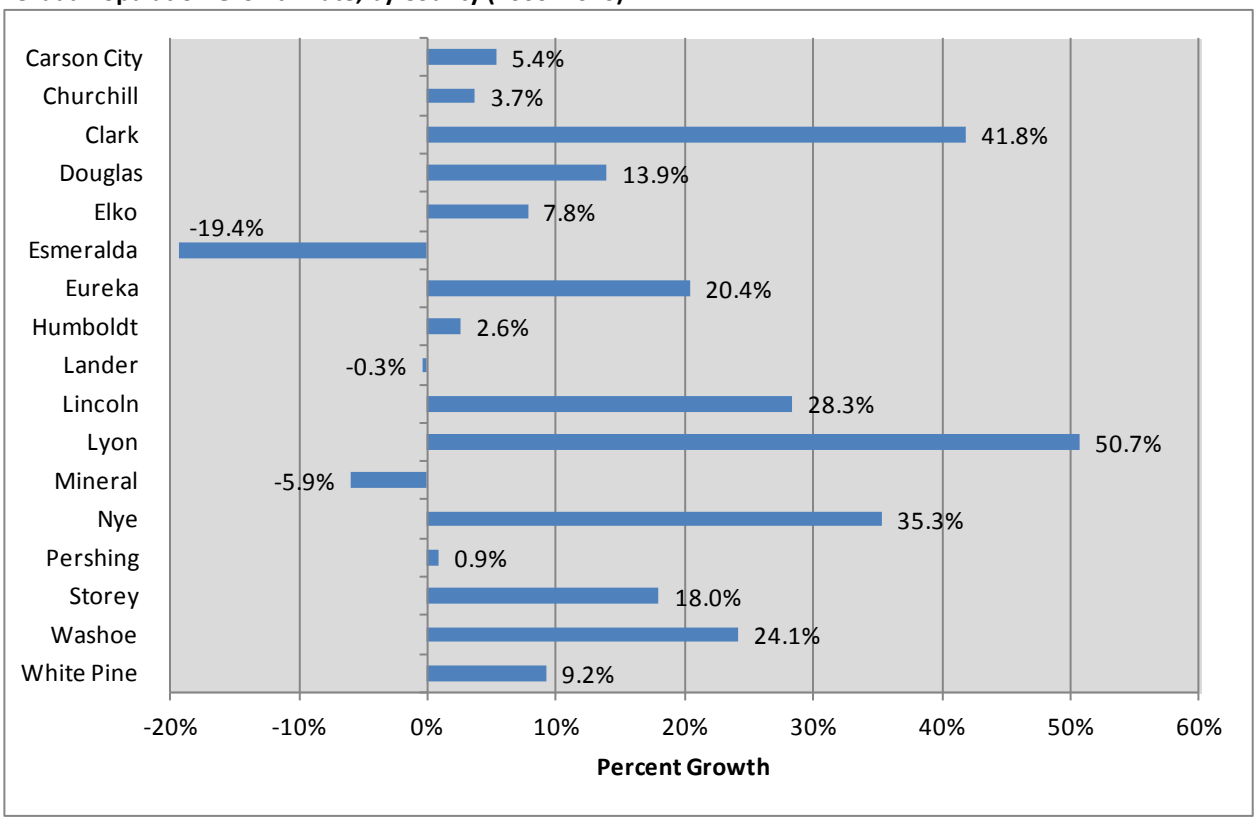
FIGURE 1-3
**Arizona Population Growth Rate, by County (2000–2010)**




Sources: U.S. Census Bureau 2000 and 2010, 2010a

Figure 1-4 shows the population growth rate by county in Nevada. The county with the largest population increase between 2000 and 2010 was Lyon, with a 50.7 percent population growth rate, followed by Clark at 41.8 percent. Three counties in Nevada, however, experienced a population decline over the decade: Esmeralda at -19.4 percent, Mineral at -5.9 percent, and Lander at -0.3 percent.

FIGURE 1-4
**Nevada Population Growth Rate, by County (2000–2010)**




Sources: U.S. Census Bureau 2000 and 2010, 2010a

Table 1-3 shows population growth projections and percentage of the total state population by county in Arizona. The state's population is heavily concentrated in Maricopa County, with 59.7 percent of the total, followed by Pima County at 15.3 percent. Phoenix is in Maricopa County and Tucson is in Pima County. With each of these counties projected to have a growth rate of over 1 percent per year between now and 2030, these metropolitan areas will continue to be among the fastest growing in the nation.

TABLE 1-3
**Population Percentages and Growth Projections for Arizona Counties (2010–2030)**

| County | % of Total Population | 2010 | 2020 | % Growth 2010–2020 | 2030 | % Growth 2020–2030 |
|---|---|---|---|---|---|---|
| Apache | 1.1 | 71,518 | 73,500 | 2.8 | 72,900 | -0.8 |
| Cochise | 2.1 | 131,346 | 142,400 | 8.4 | 157,700 | 10.7 |
| Coconino | 2.1 | 134,421 | 144,300 | 7.3 | 154,400 | 7.0 |
| Gila | 0.8 | 53,597 | 55,700 | 3.9 | 57,500 | 3.2 |
| Graham | 0.6 | 37,220 | 41,200 | 10.7 | 46,600 | 13.1 |
| Greenlee | 0.1 | 8,437 | 8,500 | 0.7 | 8,600 | 1.2 |
| La Paz | 0.3 | 20,489 | 21,600 | 5.4 | 22,600 | 4.6 |
| Maricopa | 59.7 | 3,817,117 | 4,506,900 | 18.1 | 5,359,500 | 18.9 |
| Mohave | 3.1 | 200,186 | 241,000 | 20.4 | 285,600 | 18.5 |
| Navajo | 1.7 | 107,449 | 116,800 | 8.7 | 126,000 | 7.9 |
| Pima | 15.3 | 980,263 | 1,100,000 | 12.2 | 1,243,100 | 13.0 |
| Pinal | 5.9 | 375,770 | 493,200 | 31.3 | 681,600 | 38.2 |
| Santa Cruz | 0.7 | 47,420 | 55,700 | 17.5 | 64,200 | 15.3 |
| Yavapai | 3.3 | 211,033 | 247,900 | 17.5 | 289,400 | 16.7 |
| Yuma | 3.1 | 195,751 | 236,300 | 20.7 | 283,100 | 19.8 |

Sources: Arizona Department of Administration 2012; Nevada State Demographer's Office 2012; U.S. Census Bureau 2010a

Table 1-4 shows the population growth projections and percentages of the total population for each county in Nevada. The vast majority of the population resides in Clark County, with 72.3 percent of the state's population. Washoe County has the next highest concentration of people, with 15.6 percent of the total. The remaining counties represent 1.9 percent or less of the state's total population. By 2020, Eureka and Elko Counties are projected to have the fastest growth rates—at 43.7 percent and 33.6 percent, respectively—with Clark County at 13.1 percent. Population growth rates will slow by 2030, but all counties are expected to have positive growth, with Eureka leading the way at 31.9 percent.

TABLE 1-4
**Population Percentages and Growth Projections for Nevada Counties (2010–2030)**

| County | % of Total Population | 2010 | 2020 | % Growth 2010–2020 | 2030 | % Growth 2020–2030 |
|---|---|---|---|---|---|---|
| Churchill | 0.9 | 24,877 | 29,210 | 17.4 | 32,772 | 12.2 |
| Clark | 72.3 | 1,951,269 | 2,206,753 | 13.1 | 2,415,726 | 9.5 |
| Douglas | 1.7 | 46,997 | 47,363 | 0.8 | 48,704 | 2.8 |
| Elko | 1.8 | 48,818 | 65,207 | 33.6 | 73,768 | 13.1 |
| Esmeralda | 0.0 | 783 | 827 | 5.6 | 864 | 4.5 |
| Eureka | 0.1 | 1,987 | 2,856 | 43.7 | 3,767 | 31.9 |
| Humboldt | 0.6 | 16,528 | 19,123 | 15.7 | 21,977 | 14.9 |
| Lander | 0.2 | 5,775 | 7,211 | 24.9 | 8,516 | 18.1 |
| Lincoln | 0.2 | 5,345 | 6,487 | 21.4 | 7,496 | 15.6 |
| Lyon | 1.9 | 51,980 | 61,076 | 17.5 | 68,134 | 11.6 |
| Mineral | 0.2 | 4,772 | 5,645 | 18.3 | 6,633 | 17.5 |
| Nye | 1.6 | 43,946 | 55,167 | 25.5 | 64,256 | 16.5 |
| Pershing | 0.3 | 6,753 | 7,042 | 4.3 | 7,558 | 7.3 |
| Storey | 0.1 | 4,010 | 5,457 | 36.1 | 6,725 | 23.2 |
| Washoe | 15.6 | 421,407 | 455,321 | 8.0 | 497,028 | 9.2 |
| White Pine | 0.4 | 10,030 | 13,257 | 32.2 | 14,889 | 12.3 |
| Carson City | 2.0 | 55,274 | 55,605 | 0.6 | 59,550 | 7.1 |

Sources: Nevada State Demographer's Office 2012; U.S. Census Bureau 2010a

## 1.1.2 Households and Housing Characteristics

Profiles of each county in Arizona and Nevada were prepared to more fully understand the demographics of the market. Median age helps predict population dynamics as well as demand for services, particularly in sectors such as health care, public transportation, and housing. Household size also reveals information about the level of demand for homes as well as the types of homes preferred.

Table 1-5 summarizes household characteristics in Arizona, by county. The median age of Arizona residents is 35.9, which is younger than the national median age of 37.2. The average household size is 2.6, which is the same as the U.S. La Paz and Yavapai Counties have the oldest populations, at 53.9 and 49.2, respectively, while Coconino and Graham Counties have the youngest, at 31.0 and 31.6, respectively.

TABLE 1-5
**Arizona Households and Characteristics, by County (2010)**

| County | Population | Total Households | Average Household Size | Median Age |
|---|---|---|---|---|
| Apache | 71,518 | 22,771 | 3.1 | 32.4 |
| Cochise | 131,346 | 50,865 | 2.5 | 39.7 |
| Coconino | 134,421 | 46,711 | 2.7 | 31.0 |
| Gila | 53,597 | 22,000 | 2.4 | 47.9 |
| Graham | 37,220 | 11,120 | 3.0 | 31.6 |
| Greenlee | 8,437 | 3,188 | 2.6 | 34.8 |
| La Paz | 20,489 | 9,198 | 2.2 | 53.9 |
| Maricopa | 3,817,117 | 1,411,583 | 2.7 | 34.6 |
| Mohave | 200,186 | 82,539 | 2.4 | 47.6 |
| Navajo | 107,449 | 35,658 | 3.0 | 34.7 |
| Pima | 980,263 | 388,660 | 2.5 | 37.7 |
| Pinal | 375,770 | 125,590 | 2.8 | 35.3 |
| Santa Cruz | 47,420 | 15,437 | 3.1 | 35.6 |
| Yavapai | 211,033 | 90,903 | 2.3 | 49.2 |
| Yuma | 195,751 | 64,767 | 2.9 | 33.8 |
| **Arizona** | **6,392,017** | **2,380,990** | **2.6** | **35.9** |

Source: U.S. Census Bureau 2010a

Nevada‘s median age of 36.3 is also lower than the U.S. median age of 37.2, but the state has a slightly higher household size of 2.7, compared with the national household size of 2.6 persons per household. Table 1-6 summarizes the household characteristics in Nevada, by county. The counties with the oldest populations are Esmeralda at 52.9 and Eureka at 52.4 years, with Clark having the youngest median age at 35.5.

TABLE 1-6
**Nevada Households and Characteristics, by County (2010)**

| County | Population | Total Households | Average Household Size | Median Age |
|---|---|---|---|---|
| Carson City | 55,274 | 21,427 | 2.4 | 41.7 |
| Churchill | 24,877 | 9,671 | 2.5 | 39.0 |
| Clark | 1,951,269 | 715,365 | 2.7 | 35.5 |
| Douglas | 46,997 | 19,638 | 2.4 | 47.4 |
| Elko | 48,818 | 17,442 | 2.8 | 33.4 |
| Esmeralda | 783 | 389 | 2.0 | 52.9 |
| Eureka | 1,987 | 836 | 2.4 | 52.4 |
| Humboldt | 16,528 | 6,289 | 2.6 | 36.2 |
| Lander | 5,775 | 2,213 | 2.6 | 37.1 |
| Lincoln | 5,345 | 1,988 | 2.6 | 39.9 |
| Lyon | 51,980 | 19,808 | 2.6 | 40.7 |
| Mineral | 4,772 | 2,240 | 2.1 | 49.2 |
| Nye | 43,946 | 18,032 | 2.4 | 48.4 |
| Pershing | 6,753 | 2,018 | 2.5 | 41.0 |
| Storey | 4,010 | 1,742 | 2.3 | 50.5 |
| Washoe | 421,407 | 163,445 | 2.6 | 37.0 |
| White Pine | 10,030 | 3,707 | 2.4 | 40.8 |
| **Nevada** | **2,645,277** | **1,006,250** | **2.7** | **36.3** |

Source: U.S. Census Bureau 2010a

### 1.1.3 Age Distribution

The distribution of age groups within a market can provide an understanding of the size of the working age population, which is most heavily reliant on a variety of modes of transportation. It can also illustrate the numbers of young adults who will affect the transportation system in the future. Table 1-7 and Figure 1-5 show the distribution of ages in Arizona and Nevada.

The age distribution can also reveal information about labor force, housing market, and consumer demographics and gives insight as to which industries might be best supported by the local economy. In Arizona, 39.5 percent of the population is in its prime working years, defined as ages 25 through 54. People younger than 25 years of age represent 35.3 percent of the population, while those over 54 represent 25.2 percent of the total population.

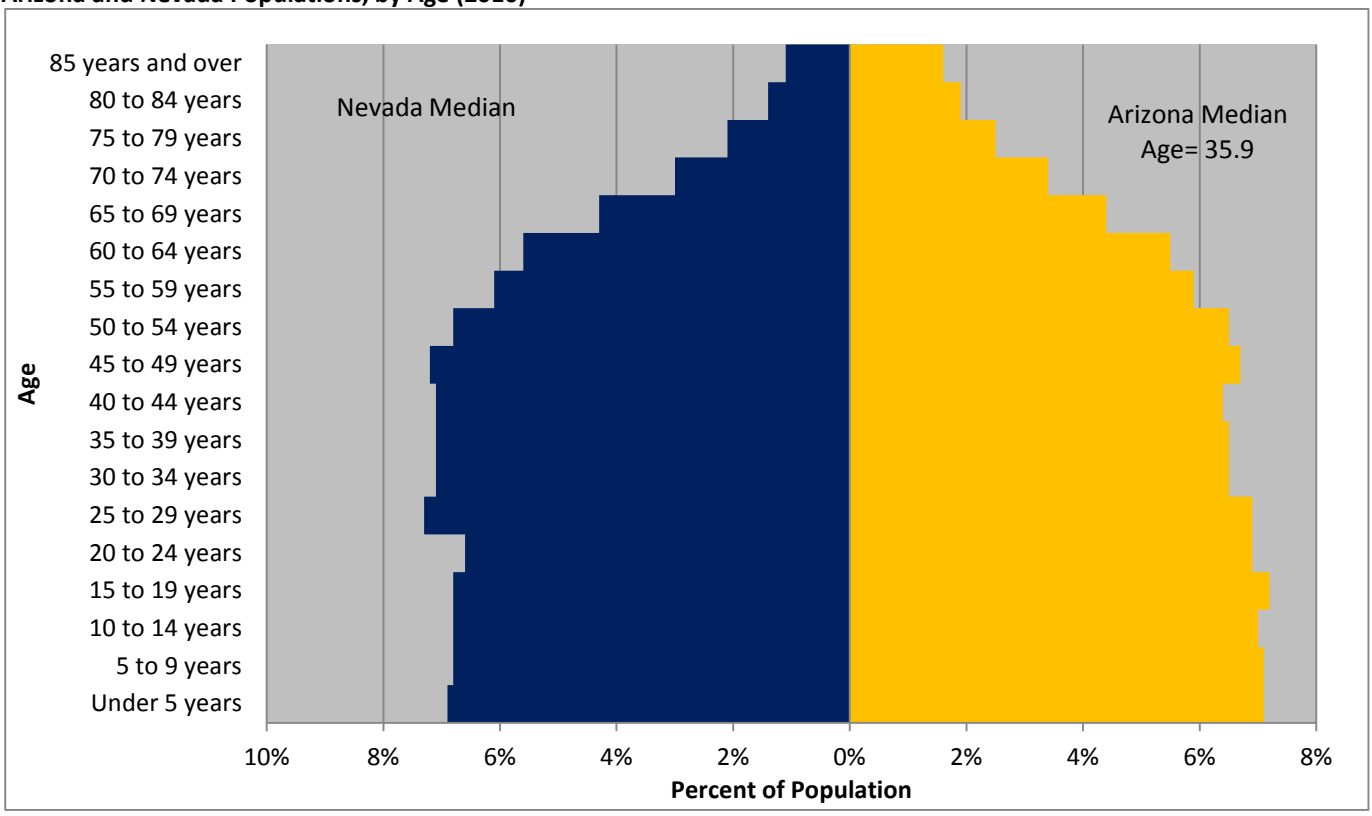
Nevada has 42.6 percent of its population in the prime working years. The percentage of the population younger than 25 represents 33.9 percent, while those older than 54 constitute 23.6 percent of the state's total population.

TABLE 1-7
**Arizona and Nevada Populations, by Age (2010)**

| Age Distribution | Arizona | | Nevada | |
|---|---|---|---|---|
| | Total | % of Total Population | Total | % of Total Population |
| Under 5 years | 455,715 | 7.1 | 187,478 | 6.9 |
| 5 to 9 years | 453,680 | 7.1 | 183,077 | 6.8 |
| 10 to 14 years | 448,664 | 7.0 | 183,173 | 6.8 |
| 15 to 19 years | 461,582 | 7.2 | 182,600 | 6.8 |
| 20 to 24 years | 442,584 | 6.9 | 177,509 | 6.6 |
| 25 to 29 years | 439,998 | 6.9 | 196,644 | 7.3 |
| 30 to 34 years | 416,695 | 6.5 | 190,642 | 7.1 |
| 35 to 39 years | 415,693 | 6.5 | 191,652 | 7.1 |
| 40 to 44 years | 406,801 | 6.4 | 191,391 | 7.1 |
| 45 to 49 years | 427,022 | 6.7 | 193,790 | 7.2 |
| 50 to 54 years | 415,524 | 6.5 | 182,737 | 6.8 |
| 55 to 59 years | 375,268 | 5.9 | 164,575 | 6.1 |
| 60 to 64 years | 350,960 | 5.5 | 150,924 | 5.6 |
| 65 to 69 years | 282,866 | 4.4 | 115,501 | 4.3 |
| 70 to 74 years | 215,026 | 3.4 | 82,280 | 3.0 |
| 75 to 79 years | 162,261 | 2.5 | 57,503 | 2.1 |
| 80 to 84 years | 118,278 | 1.9 | 38,888 | 1.4 |
| 85 years and over | 103,400 | 1.6 | 30,187 | 1.1 |
| **Total** | **6,392,017** | **100.0** | **2,700,551** | **100.0** |

Source: U.S. Census Bureau 2010a

FIGURE 1-5
**Arizona and Nevada Populations, by Age (2010)**

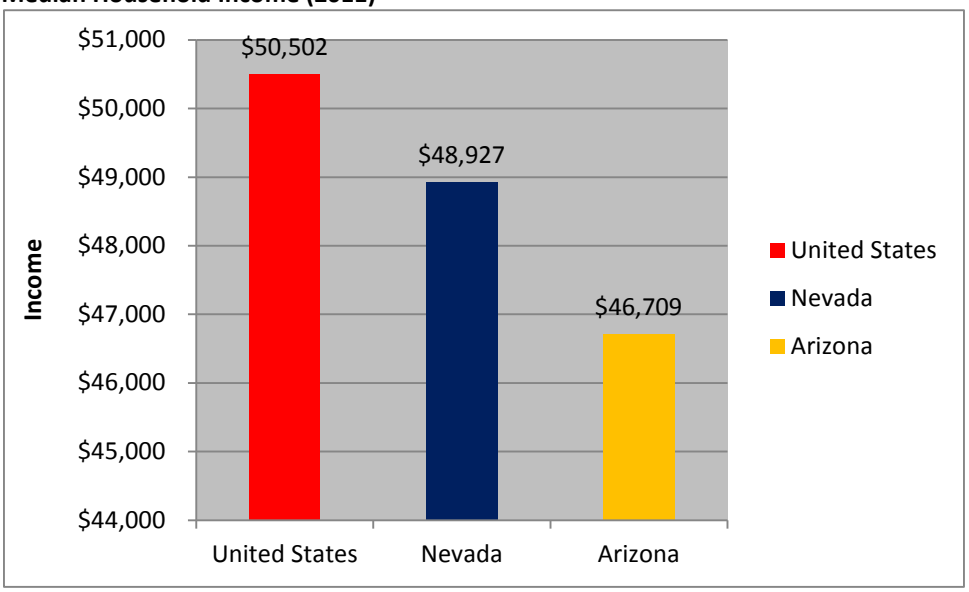



Source: U.S. Census Bureau 2010a

## 1.1.4 Household Income

Income tends to be strongly correlated with overall transportation demand levels. Figure 1-6 shows the median household income for Arizona and Nevada compared with the U.S. The median household income in both Arizona and Nevada trails the U.S. median household income of $50,502. Arizona's median household income is $46,709, while Nevada's is $48,927. However, the cost of living in the study area is about 5 percent lower than the U.S. average, which indicates that the purchasing power of the average income earner is greater than might be assumed from the below-national-average incomes.

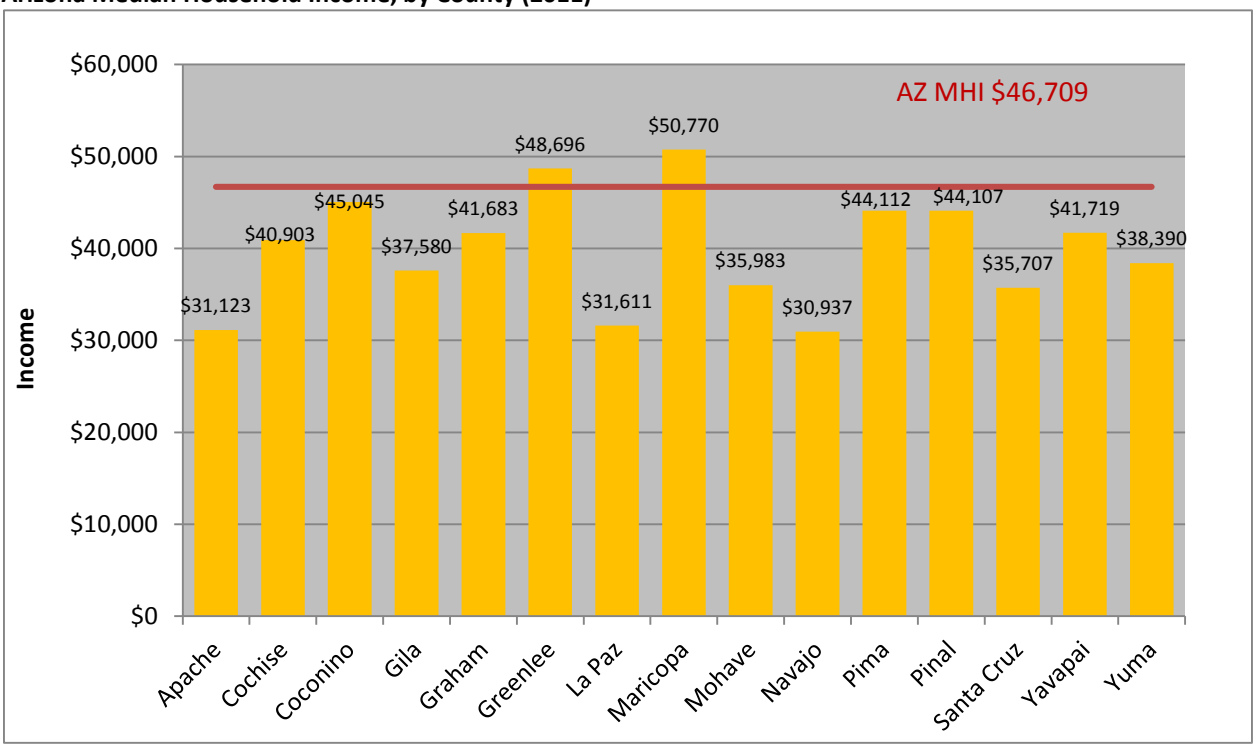
FIGURE 1-6
**Median Household Income (2011)**




Source: U.S. Census Bureau 2011

When comparing the median household income of each county against the statewide median, Figure 1-7 shows that only two counties in Arizona, Maricopa and Greenlee, have a median household income that exceeds the statewide median of $46,709. The counties in Arizona with the highest and lowest median household incomes are Maricopa and Navajo, respectively.

FIGURE 1-7
**Arizona Median Household Income, by County (2011)**

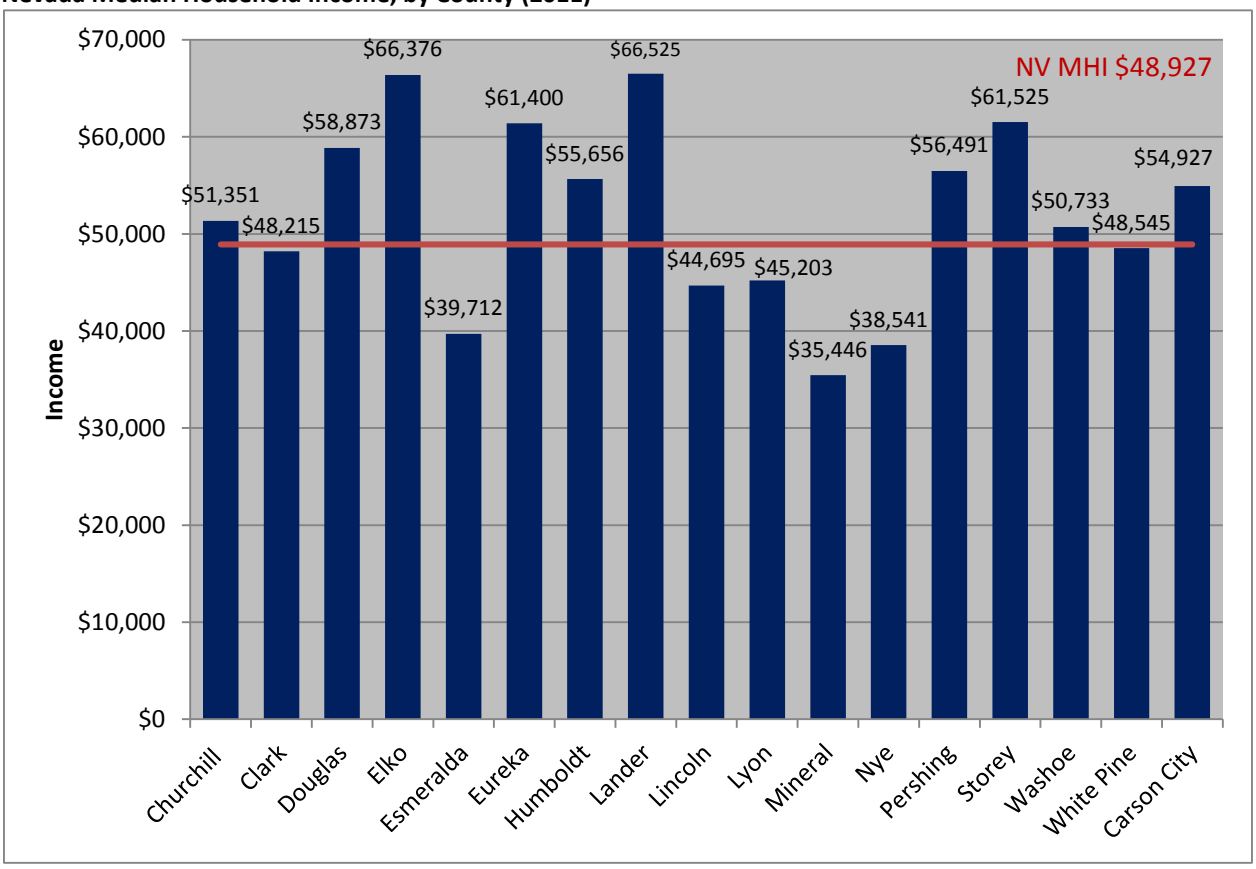



Source: U.S. Census Bureau 2011

Figure 1-8 shows the median household income by county in Nevada. Ten of the counties exceed the state's median household income of $48,927. The most affluent counties are Lander, with a median household income of

$66,525, followed by Elko, at $66,376. Clark County's median income of $48,215 is currently lower than the statewide median.

FIGURE 1-8
**Nevada Median Household Income, by County (2011)**

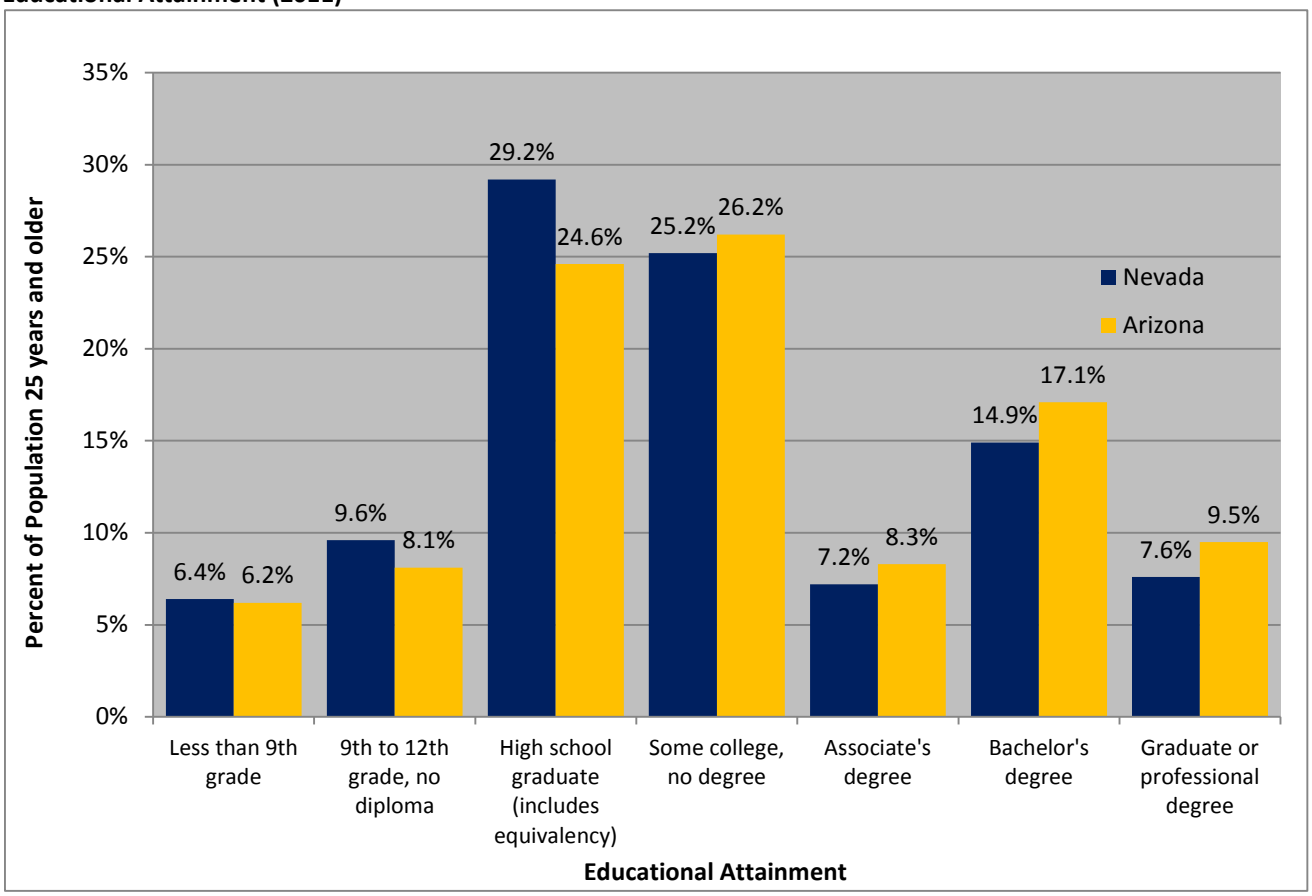



Source: U.S. Census Bureau 2011

## 1.1.5 Educational Attainment

The educational attainment of Arizonans and Nevadans is shown in Figure 1-9. Nearly 35 percent of Arizona's population, 25 years of age or older, has a college degree, including associate's degrees, bachelor's degrees, and graduate-level training. This higher level of educational attainment in Arizona reflects the state's industry sectors that require a college degree. About half of Nevada's population completed high school and obtained some college education. Nearly 30 percent of Nevadans obtained a degree (for example, associate's degrees, bachelor's degrees, and graduate-level training).

FIGURE 1-9
**Educational Attainment (2011)**




Source: U.S. Census Bureau 2011

# 1.2 Economic Development Trends

## 1.2.1 Gross Domestic Product by State and Metropolitan Area

Gross domestic product (GDP) is a principal indicator of the health of an economy or industry. It measures the value of final goods and services produced during a given period of time. Table 1-8 and Figures 1-10 and 1-11 show the real GDP growth rate by industry in Arizona and Nevada between 2010 and 2011. In Figures 1-10 and 1-11, the horizontal line represents the U.S. real GDP of 1.5 percent, and it is a comparative index to evaluate the two states against the national GDP over the same time horizon.

Both states had negative growth in agriculture and forestry; utilities; and real estate, rental, and leasing. Mining showed the highest GDP percentage growth for both states; Nevada's GDP grew by 26.8 percent and Arizona's by 13.3 percent. Construction GDP in Arizona saw a very modest 0.9 percent increase, while Nevada experienced a 16.8 percent decrease. This side effect of the housing bust hurt both the Phoenix and Las Vegas metropolitan areas. Phoenix is recovering more quickly. These markets are just beginning to rebound after 5 years of depressed home prices and, therefore, homebuilding, rental, and real estate activity is increasing.

Interesting to note is that manufacturing growth in both states exceeded the U.S. GDP of 1.5 percent, with Arizona at 8.9 percent and Nevada at 3.7 percent, indicating stronger manufacturing sectors than may be generally perceived.

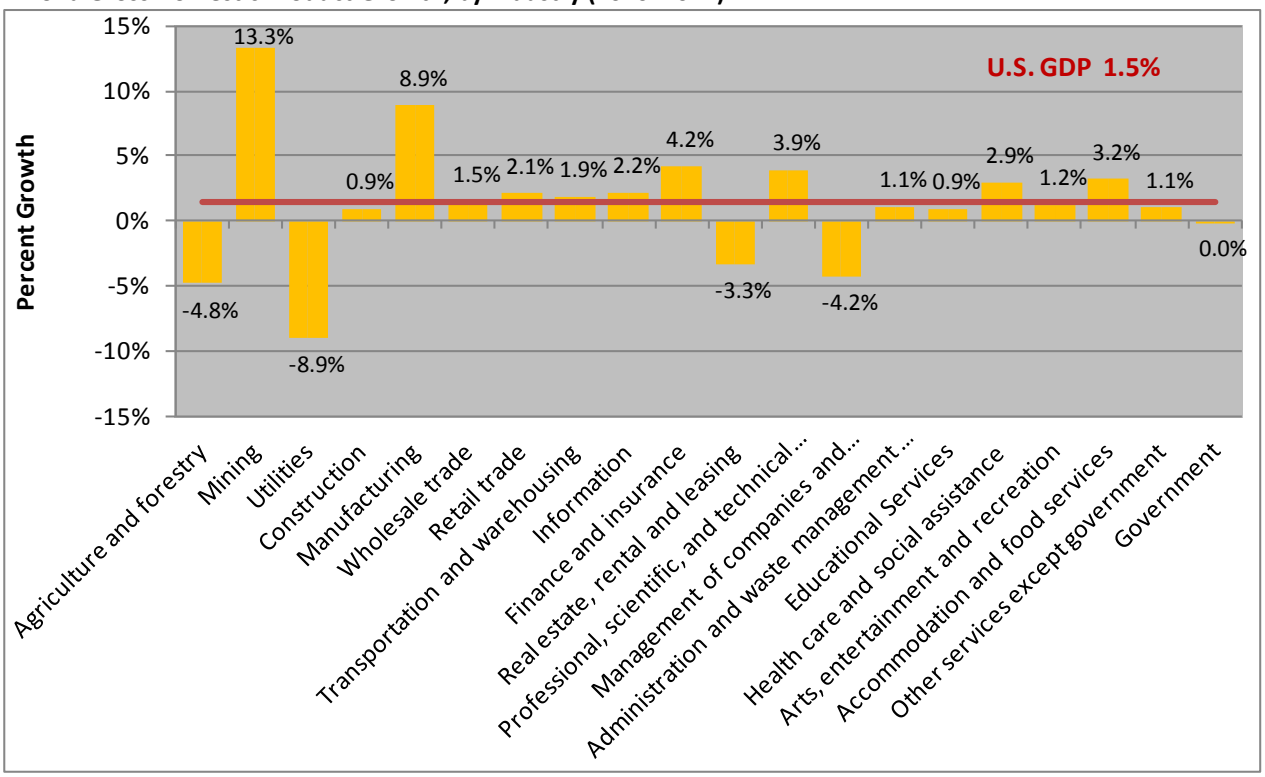
TABLE 1-8
**Real Gross Domestic Product Percentage Change, by Industry (2010–2011)**

| Industry Sector | Arizona % Growth | Nevada % Growth |
|---|---|---|
| Agriculture and forestry | -4.8 | -15.2 |
| Mining | 13.3 | 26.8 |
| Utilities | -8.9 | -4.7 |
| Construction | 0.9 | -16.8 |
| Manufacturing | 8.9 | 3.7 |
| Wholesale trade | 1.5 | 1.2 |
| Retail trade | 2.1 | 2.0 |
| Transportation and warehousing | 1.9 | 3.6 |
| Information | 2.2 | 5.2 |
| Finance and insurance | 4.2 | 1.0 |
| Real estate, rental, and leasing | -3.3 | -3.4 |
| Professional, scientific, and technical services | 3.9 | 2.2 |
| Management of companies and enterprises | -4.2 | 4.9 |
| Administration and waste management services | 1.1 | 4.3 |
| Educational services | 0.9 | -3.5 |
| Health care and social assistance | 2.9 | 3.3 |
| Arts, entertainment, and recreation | 1.2 | 8.7 |
| Accommodation and food services | 3.2 | 4.1 |
| Other services except government | 1.1 | 0.5 |
| Government | 0.0 | -2.7 |

Source: U.S. Bureau of Economic Analysis 2012

FIGURE 1-10

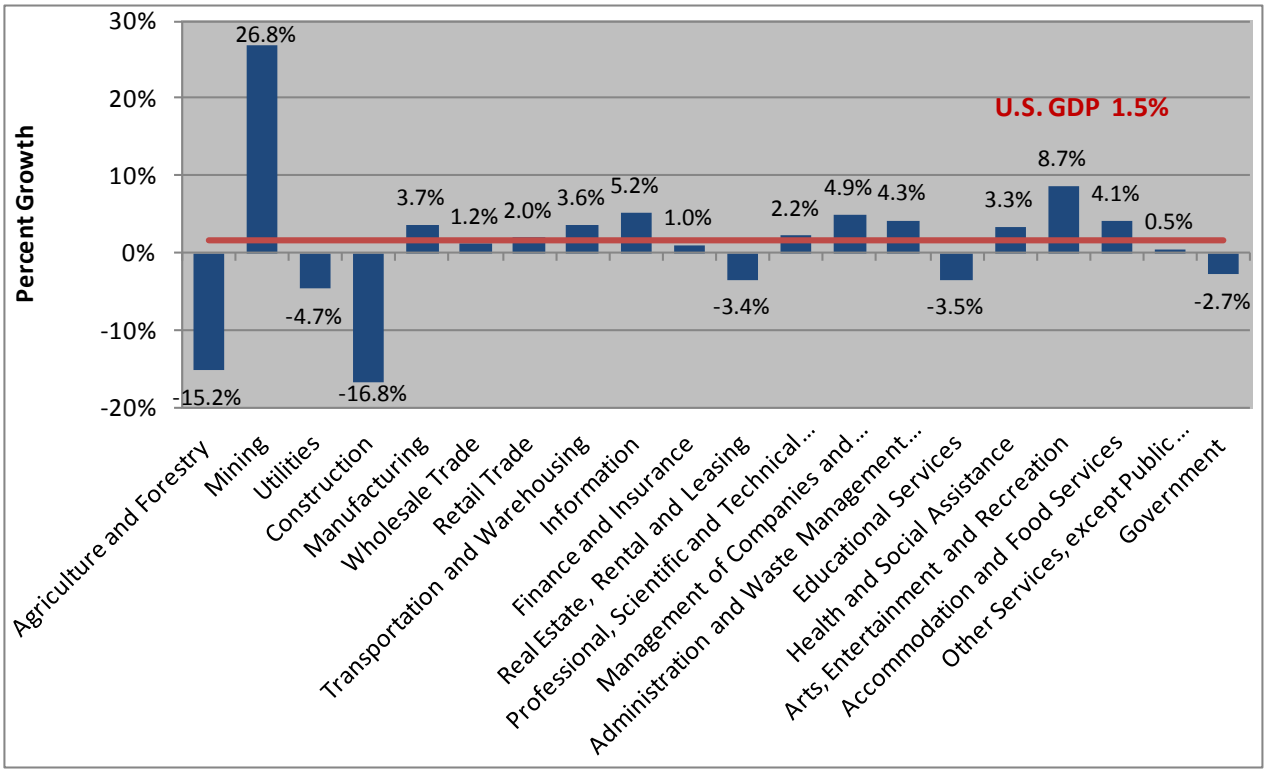
**Arizona Gross Domestic Product Growth, by Industry (2010–2011)**




Source: U.S. Bureau of Economic Analysis 2012

FIGURE 1-11

**Nevada Gross Domestic Product Growth, by Industry (2010–2011)**




Source: U.S. Bureau of Economic Analysis 2012

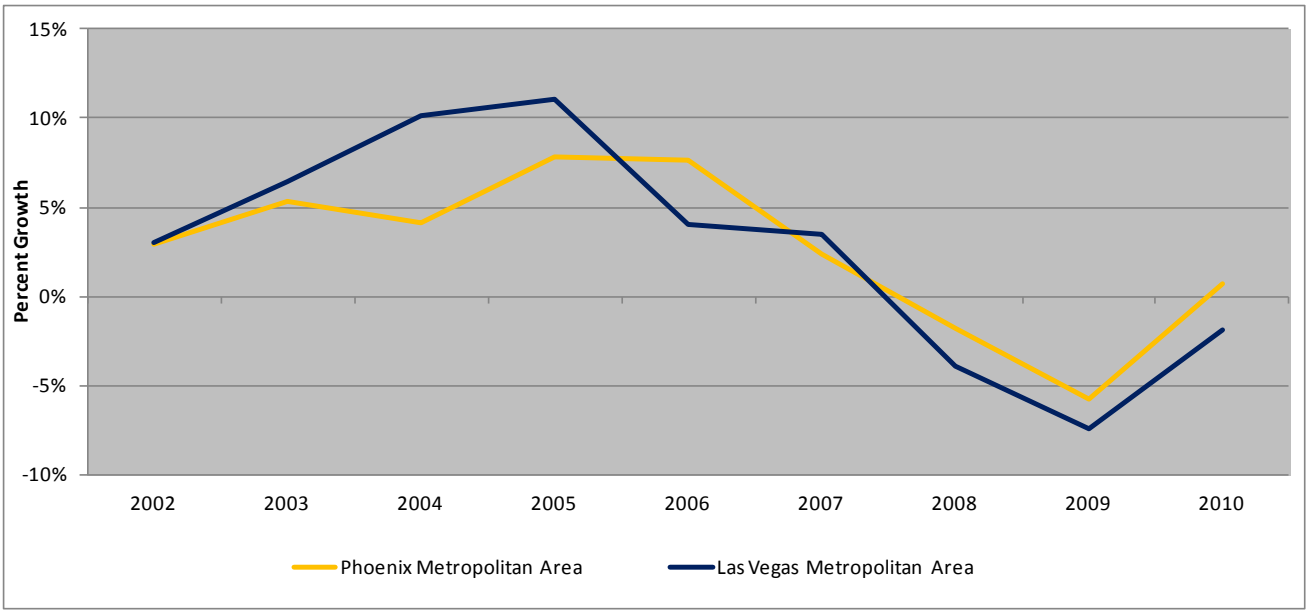
When examining the GDP of the two metropolitan areas over a longer time horizon, both the Phoenix and Las Vegas metropolitan areas had positive growth from 2002 to 2007, peaked in 2005, and suffered from the downturn in the economy beginning in 2008 (Table 1-9 and Figure 1-12). Again, this is a direct result of the housing market collapse. Advance statistics from the U.S. Bureau of Economic Analysis at the state level indicate that in 2011 Arizona experienced a 1.5 percent real GDP growth, while Nevada had a 1.2 percent increase in GDP.

TABLE 1-9
**Real Gross Domestic Product Growth, by Metropolitan Area (2002–2010)**

| Metropolitan Area | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|
| Phoenix | 2.9% | 5.3% | 4.1% | 7.8% | 7.6% | 2.4% | –1.8% | –5.8% | 0.7% |
| Las Vegas | 3.0% | 6.5% | 10.2% | 11.1% | 4.1% | 3.4% | –4.0% | –7.5% | –1.9% |

Source: U.S. Bureau of Economic Analysis 2002-2010

FIGURE 1-12
**Real Gross Domestic Product Growth, by Metropolitan Area (2002–2010)**




Source: U.S. Bureau of Economic Analysis 2012

## 1.2.2 Employment by County

Like overall economic health, employment tends to correlate positively with transportation demand. Table 1-10 shows the employment rate by county in Arizona and Nevada. As expected, the majority of jobs are located in the counties with the greatest populations. Maricopa County in Arizona has 64.3 percent of all jobs, followed by Pima County with 15.1 percent. In Nevada, the county with the greatest number of jobs is Clark, at 72.1 percent, followed by Washoe, at 19.7 percent.

TABLE 1-10
**Arizona and Nevada Employment, by County (2011)**

| Arizona | | | Nevada | | |
|---|---|---|---|---|---|
| County | Total Employment | % of Total | County | Total Employment | % of Total |
| Apache | 19,975 | 0.7 | Carson City | 25,013 | 2.1 |
| Cochise | 44,460 | 1.7 | Churchill | 10,288 | 0.9 |
| Coconino | 64,200 | 2.4 | Clark | 869,376 | 72.1 |
| Gila | 18,480 | 0.7 | Douglas | 20,425 | 1.7 |
| Graham | 12,280 | 0.5 | Elko | 24,479 | 2.0 |
| Greenlee | 3,490 | 0.1 | Esmeralda | 383 | 0.0 |
| La Paz | 6,275 | 0.2 | Eureka | 859 | 0.1 |
| Maricopa | 1,730,915 | 64.3 | Humboldt | 7,479 | 0.6 |
| Mohave | 69,033 | 2.6 | Lander | 2,438 | 0.2 |
| Navajo | 32,108 | 1.2 | Lincoln | 1,834 | 0.2 |
| Pima | 406,591 | 15.1 | Lyon | 19,193 | 1.6 |
| Pinal | 120,439 | 4.5 | Mineral | 1,968 | 0.2 |
| Santa Cruz | 16,492 | 0.6 | Nye | 13,638 | 1.1 |
| Yavapai | 79,773 | 3.0 | Pershing | 2,082 | 0.2 |
| Yuma | 65,587 | 2.4 | Storey | 1,961 | 0.2 |
| | | | Washoe | 200,977 | 16.7 |
| | | | White Pine | 4,122 | 0.3 |
| **Arizona Total** | **2,687,991** | **100.0** | **Nevada Total** | **1,204,882** | **100.0** |

Source: U.S. Census Bureau 2011

### 1.2.3 Employment by Industry

The total concentration of jobs by industry reflects the economic diversity within a market. Table 1-11 shows employment by industry sector and the percentage of jobs by industry for 2011. In Arizona, the top nongovernmental employment sectors are retail trade (11.0 percent), health and social assistance (10.8 percent), and administration and waste management companies (8.0 percent), followed by professional, scientific, and technical services (6.5 percent). Manufacturing jobs represent 5.0 percent of all jobs, with transportation and warehousing at 2.8 percent.

In Nevada, the top nongovernmental employment sectors include accommodation and food services (19.9 percent), retail trade (10.3 percent), health and social assistance (7.5 percent), and administration and waste management services (6.7 percent). Transportation and warehousing represent 3.7 percent of all jobs, while manufacturing jobs provide 2.8 percent of all employment.

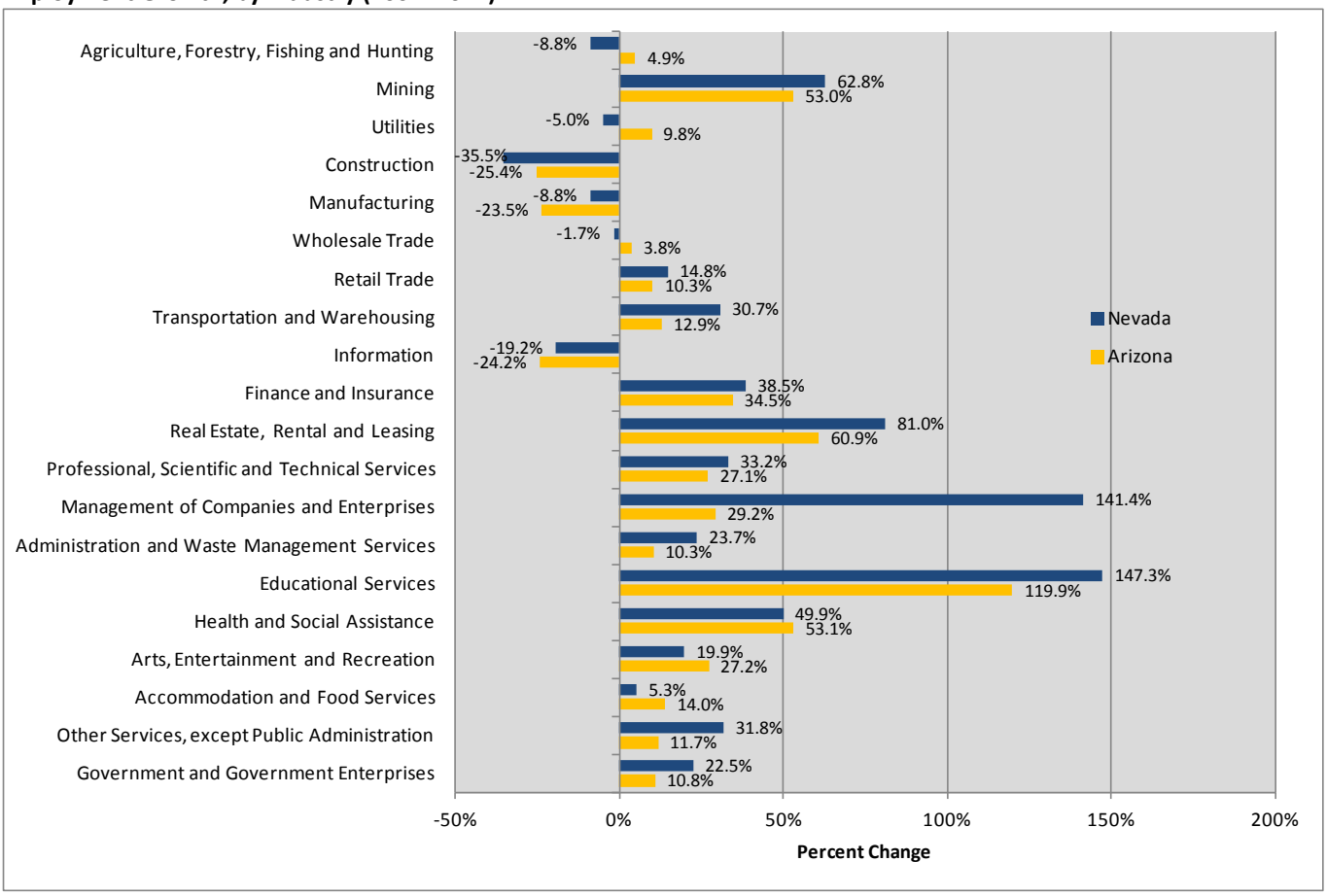
TABLE 1-11
**Arizona and Nevada Employment, by Industry (2011)**

| Industry Sector | Arizona | | Nevada | |
|---|---|---|---|---|
| | Number of Jobs | % of Total | Number of Jobs | % of Total |
| Agriculture, forestry, fishing, and hunting | 42,323 | 1.3 | 6,060 | 0.4 |
| Mining | 19,669 | 0.6 | 19,326 | 1.3 |
| Utilities | 12,334 | 0.4 | 4,365 | 0.3 |
| Construction | 159,470 | 4.9 | 68,728 | 4.6 |
| Manufacturing | 161,153 | 5.0 | 42,089 | 2.8 |
| Wholesale trade | 108,870 | 3.4 | 37,341 | 2.5 |
| Retail trade | 356,468 | 11.0 | 154,710 | 10.3 |
| Transportation and warehousing | 91,514 | 2.8 | 55,172 | 3.7 |
| Information | 47,181 | 1.5 | 17,683 | 1.2 |
| Finance and insurance | 202,900 | 6.3 | 86,601 | 5.8 |
| Real estate, rental, and leasing | 195,975 | 6.1 | 95,320 | 6.4 |
| Professional, scientific, and technical services | 208,951 | 6.5 | 82,026 | 5.5 |
| Management of companies and enterprises | 29,653 | 0.9 | 21,639 | 1.4 |
| Administration and waste management services | 257,926 | 8.0 | 100,281 | 6.7 |
| Educational services | 70,274 | 2.2 | 14,653 | 1.0 |
| Health and social assistance | 348,927 | 10.8 | 111,961 | 7.5 |
| Arts, entertainment, and recreation | 67,767 | 2.1 | 48,565 | 3.2 |
| Accommodation and food services | 242,710 | 7.5 | 297,650 | 19.9 |
| Other services, except public administration | 163,177 | 5.1 | 67,953 | 4.5 |
| Government and government enterprises | 440,258 | 13.6 | 166,064 | 11.1 |
| **Total** | **3,227,500** | **100.0** | **1,498,187** | **100.0** |

Source: U.S. Census Bureau 2011

When examining the percentage change in job growth within each industry sector in Arizona, Figure 1-13 shows that the greatest increases in jobs over a 10-year time horizon were seen in educational services at a nearly 120 percent change, followed by real estate, rental, and leasing (60.9 percent), and health and social assistance (53.1 percent). Arizona lost jobs in construction (-25.4 percent), manufacturing (-23.5 percent), and information (-24.2 percent).

FIGURE 1-13
**Employment Growth, by Industry (2001–2011)**




Source: U.S. Census Bureau 2011

Nevada had strong employment growth in several industry sectors (Figure 1-13). From 2001 to 2011, jobs surged in educational services (147.3 percent) and management of companies and enterprises (141.4 percent), followed by real estate, rental, and leasing (81.0 percent) and mining (62.8 percent). The greatest job losses in Nevada occurred in construction (-35.5 percent), information (-24.2 percent), and manufacturing (-8.8 percent).

## 1.2.4 Number of Establishments by Type

Table 1-12 shows the number of establishments by industry type in Arizona and Nevada. This information is useful in understanding whether employment growth is coming from new establishments, or from a rise in the average employment per establishment, or from a combination of the two. In both states, retail trade, professional, scientific, and technical services, and health and social assistance have the highest number of establishments, representing 38 percent of all establishments within their respective states. Art, entertainment, and recreation accounts for 2.1 percent of Nevada's establishments, yet employs 26.7 percent of the workforce. In Arizona, health and social assistance represents only 1.4 percent of all establishments, but is a major employer with 21.5 percent of the jobs.

TABLE 1-12
**Arizona and Nevada Number of Business Establishments, by Industry (2010)**

| Industry Sector | Arizona | | Nevada | |
|---|---|---|---|---|
| | Number of Establishments | % of Total | Number of Establishments | % of Total |
| Agriculture, forestry, fishing, and hunting | 188 | 0.1 | 47 | 0.1 |
| Mining | 243 | 0.2 | 234 | 0.4 |
| Utilities | 265 | 0.2 | 120 | 0.2 |
| Construction | 12,091 | 9.2 | 5,003 | 8.5 |
| Manufacturing | 4,356 | 3.3 | 1,704 | 2.9 |
| Wholesale trade | 6,504 | 4.9 | 2,858 | 4.8 |
| Retail trade | 17,993 | 13.6 | 8,084 | 13.7 |
| Transportation and warehousing | 3,065 | 2.3 | 1,392 | 2.4 |
| Information | 2,060 | 1.6 | 1,119 | 1.9 |
| Finance and insurance | 9,452 | 7.2 | 4,041 | 6.8 |
| Real estate, rental, and leasing | 7,953 | 6.0 | 3,812 | 6.4 |
| Professional, scientific, and technical services | 16,263 | 12.3 | 8,147 | 13.8 |
| Management of companies and enterprises | 892 | 0.7 | 577 | 1.0 |
| Administration and waste management services | 8,219 | 6.2 | 4,051 | 6.8 |
| Educational services | 1,907 | 1.4 | 618 | 1.0 |
| Health and social assistance | 16,400 | 12.4 | 6,234 | 10.5 |
| Arts, entertainment, and recreation | 1,695 | 1.3 | 1,224 | 2.1 |
| Accommodation and food services | 11,438 | 8.7 | 5,733 | 9.7 |
| Other services, except public administration | 10,661 | 8.1 | 4,102 | 6.9 |
| Industries not classified | 204 | 0.2 | 107 | 0.2 |
| **Total** | **131,849** | **100.0** | **59,207** | **100.0** |

Source: U.S. Census Bureau 2010b

## 1.2.5 Industry Clusters/Targets

Over the last 2 years, Arizona and Nevada have undergone significant changes in their statewide economic development service delivery systems. Arizona created the Arizona Commerce Authority as the designated statewide economic development entity responsible for business recruitment and international trade. The Nevada Legislature introduced an economic development bill that was signed into law by the Governor, creating a Cabinet-level economic development position. This renewed focus on economic development recognizes the importance of creating high-wage jobs, leveraging existing statewide assets, and improving the foundations that support economic development, such as the construction of I-11, which would link the metropolitan areas of Phoenix and Las Vegas and ultimately provide connectivity to the international markets of Mexico and Canada.

To compete nationally and globally, each state has developed an economic development plan focused on building its economy and targeting specific industry clusters. Both have delineated goals to achieve certain job creation

levels by being proactive and reaching out to targeted domestic and global establishments. Arizona and Nevada have similar industry targets relative to their business recruitment and retention programs. In some cases, these targets represent an existing concentration, or industry cluster, within the state. In other cases, the industry target is the subject of a concerted effort to grow the economic activity, such a renewable energy.

To enhance the region's competitiveness, a robust transportation system is needed to facilitate the growth of business and its attraction to the area and to offer a means to connect to other markets. Table 1-13 summarizes the industry targets and clusters that are the subject of each state's economic development goals. Industry targets such as aerospace, aviation, and defense; advanced manufacturing; mining, materials, and manufacturing; and transportation and logistics are dependent upon their supply chain and the movement of finished goods.

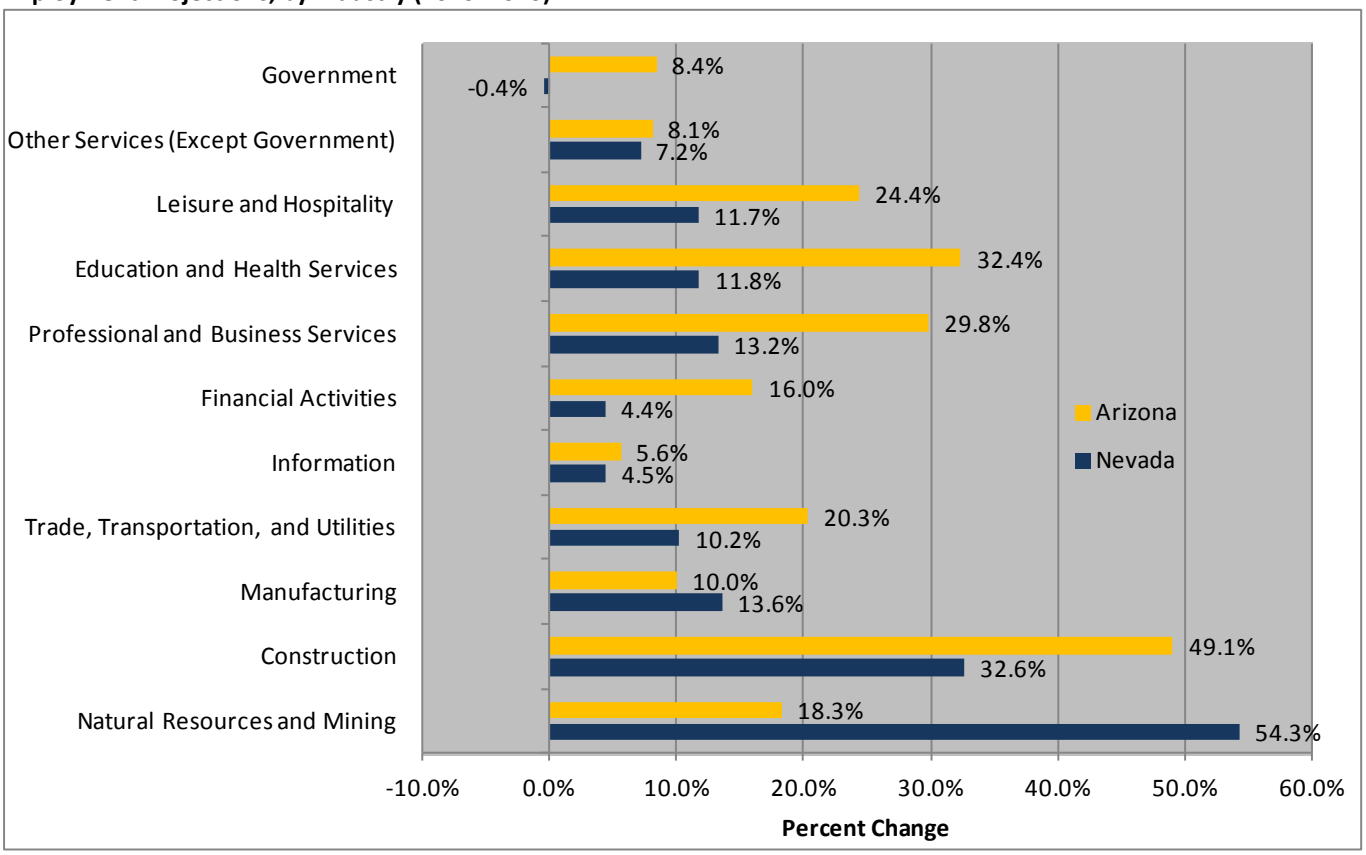
TABLE 1-13
**Arizona and Nevada Industry Targets and Clusters**

| Industry Targets | Arizona | Nevada |
|---|---|---|
| Advanced manufacturing | • | |
| Aerospace, aviation, defense | • | • |
| Optics | • | |
| Biotechnology | • | |
| Healthcare | • | • |
| Information and computer technology | • | • |
| Life sciences | • | |
| Mining, materials, and manufacturing | | • |
| Renewable energy | • | • |
| Science and technology | • | |
| Tourism, gaming, and entertainment | | • |
| Transportation and logistics | • | • |

Sources: Arizona Commerce Authority 2013; Brookings Institution 2011; Greater Phoenix Economic Council 2013; Tucson Regional Economic Opportunities 2006

When examining employment projections by industry (Figure 1-14), Arizona is expected to see gains in transportation and logistics, manufacturing, healthcare, and professional services, all of which are tied to Arizona's industry clusters. Likewise, Nevada is projecting job growth in mining, transportation and logistics, and manufacturing. Both states recognize that to be successful in their economic development endeavors, many simultaneous strategies must be implemented, including developing the workforce and the transportation systems that these industry clusters need.

FIGURE 1-14
**Employment Projections, by Industry (2010–2020)**




Sources: Arizona Department of Administration 2012; Nevada Department of Employment 2012

## 1.2.6 Economic Activity Centers

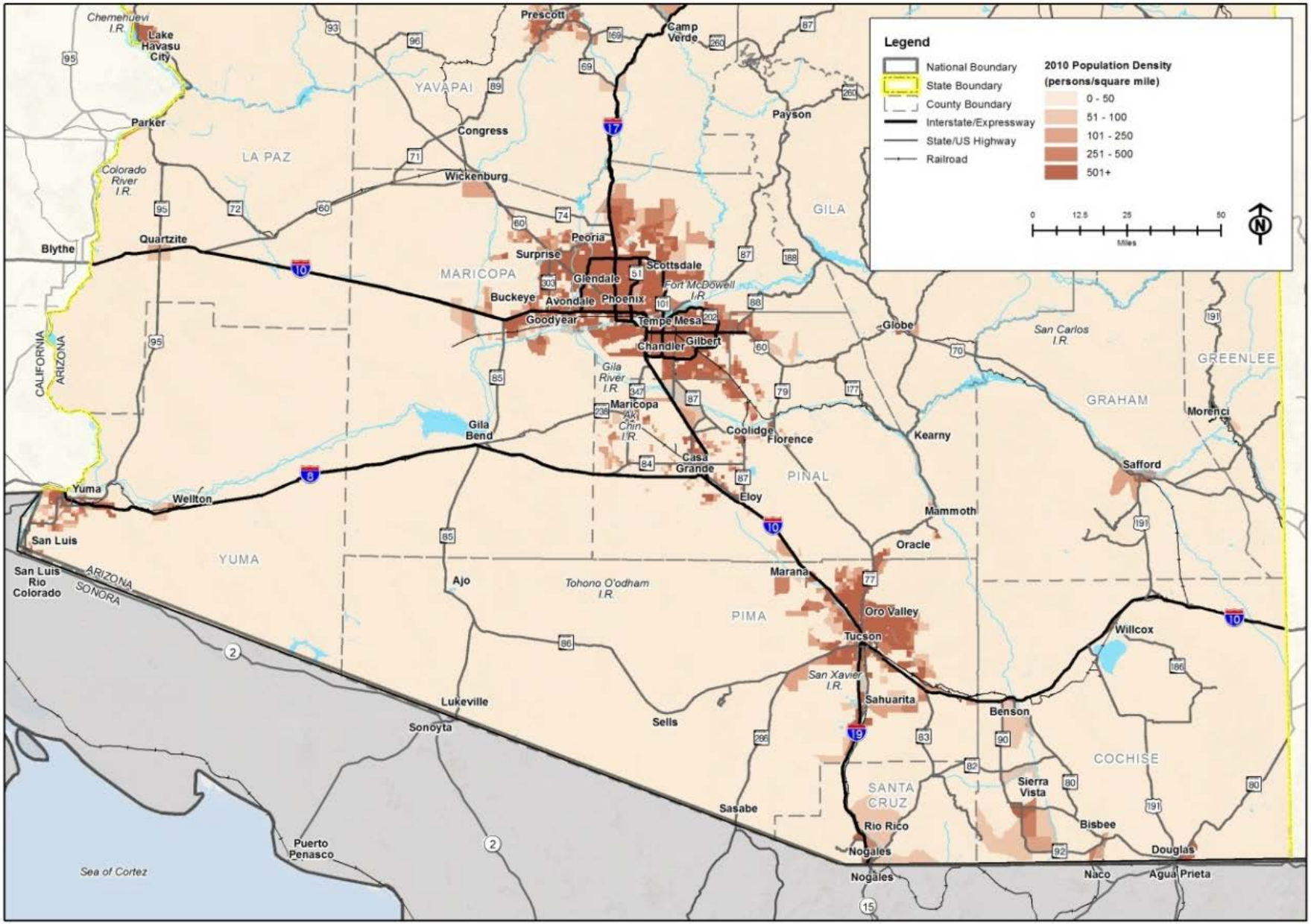
When examining the geographic concentration of population and employment within the two states, is it apparent that the two major metropolitan areas of Phoenix and Las Vegas contain the majority of all economic activity. However, in addition to these two economic activity centers are submarkets within each state that contribute to the economy in a number of ways, including the concentration of a military presence, location near land ports of entry, proximity to transportation and railroad facilities, and robust tourism and recreational resources.

### *Southern Arizona Segment*

Figures 1-15 through 1-18 show existing (2010) and future (2035) population and employment densities for the southern Arizona segment area. Projected population growth is clustered in a few major metropolitan areas and smaller communities including Tucson, Yuma, Nogales, Sierra Vista, Bisbee, and Douglas. Major employment growth will generally be confined to the Yuma and Tucson areas, although limited employment growth will occur in the other population centers noted above. A discussion of the major economic activity in key growth centers follows.

FIGURE 1-15

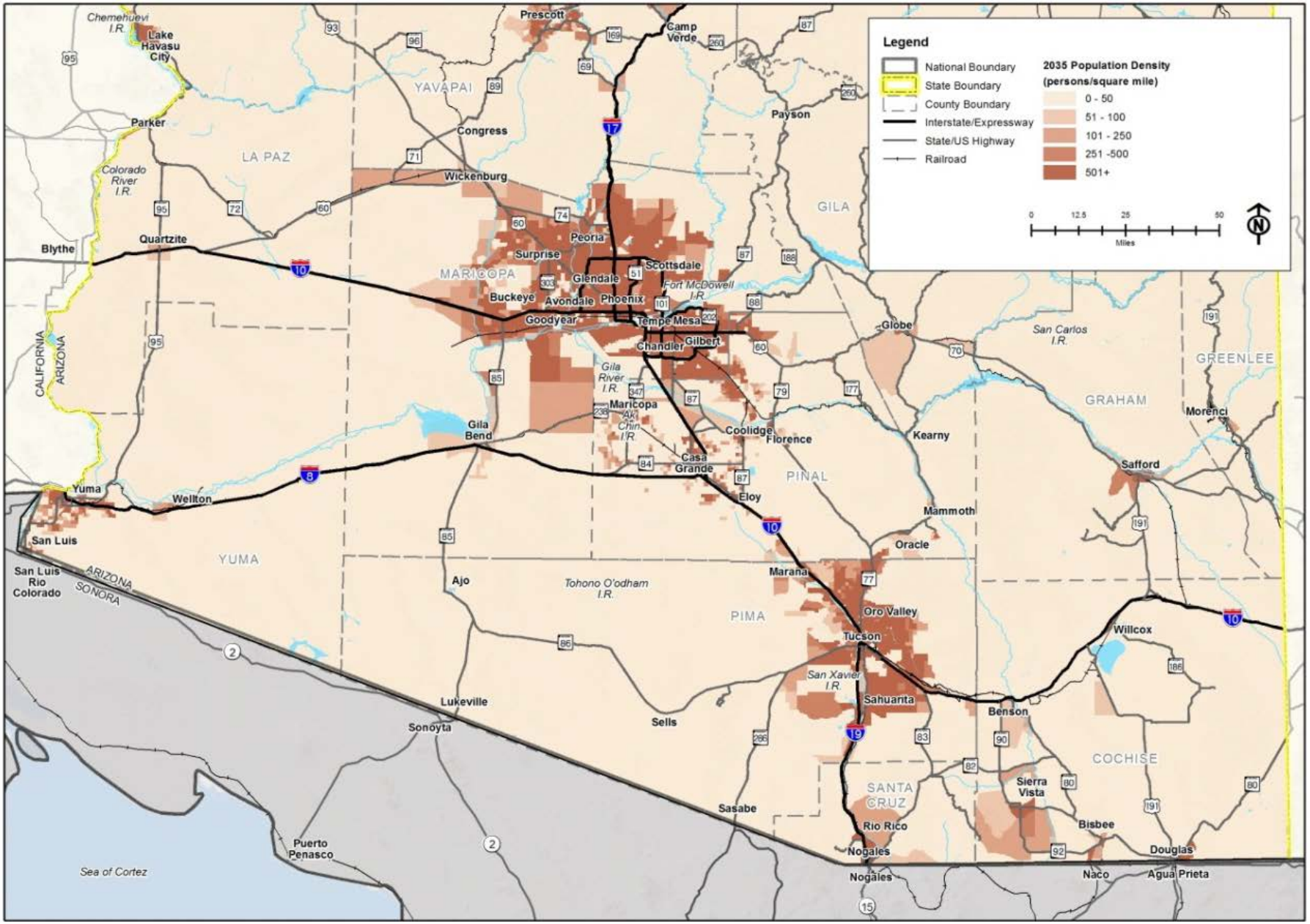
**Existing Population Density (2010) – Southern Arizona**




Source: Arizona Department of Transportation 2012k

FIGURE 1-16

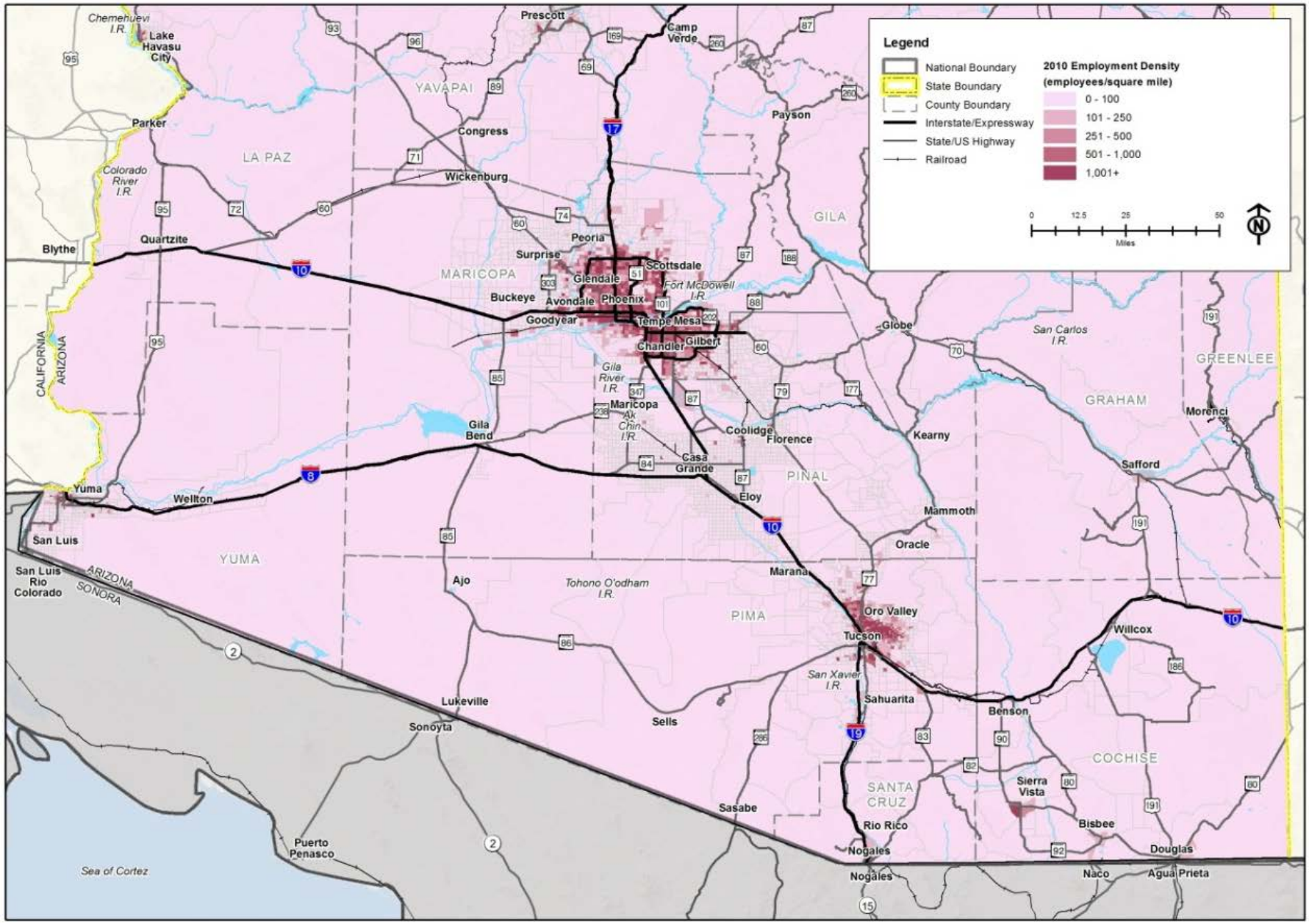
**Future Population Density (2035) – Southern Arizona**




Source: Arizona Department of Transportation 2012k

FIGURE 1-17

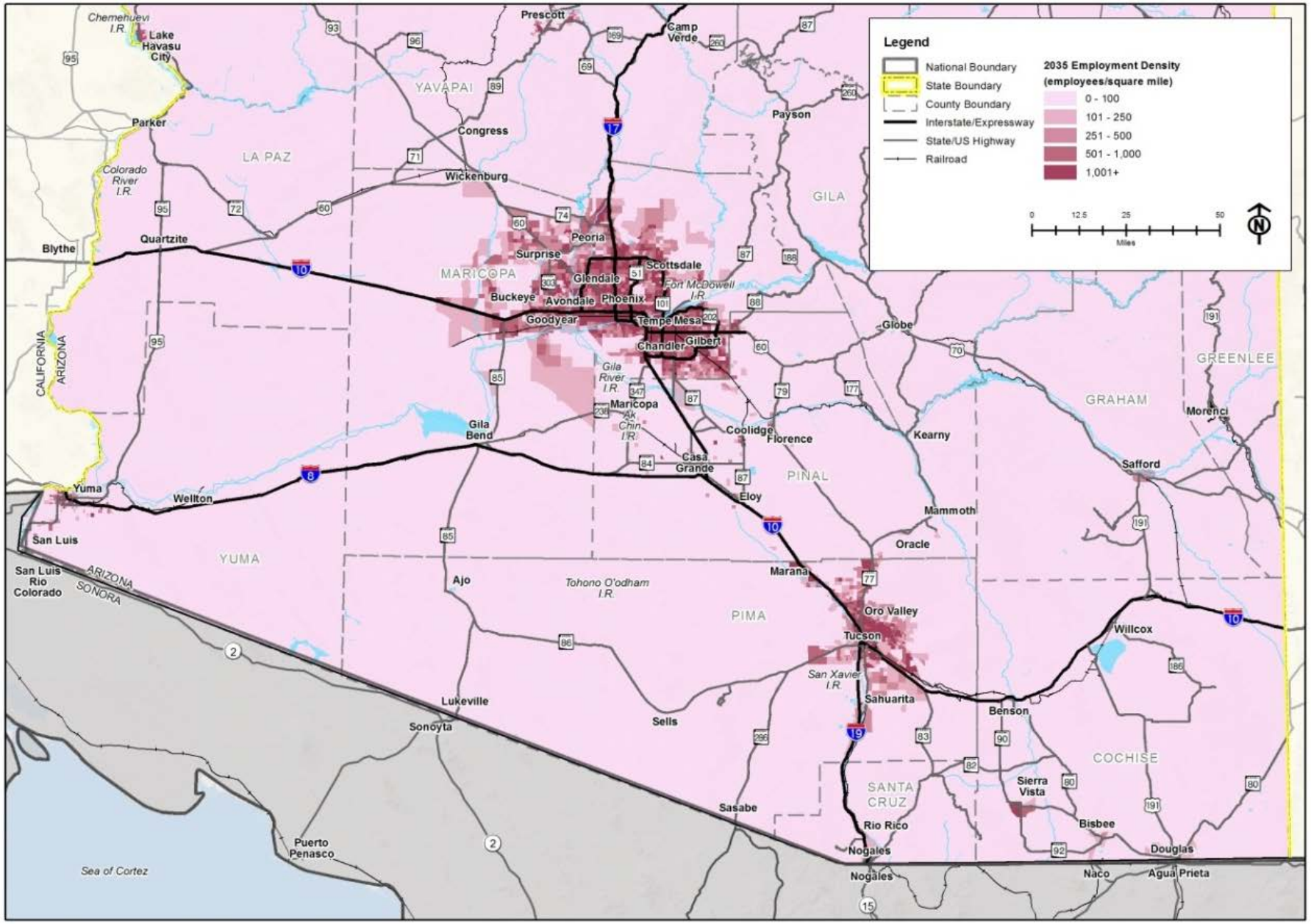
**Existing Employment Density (2010) – Southern Arizona**




Source: Arizona Department of Transportation 2012k

FIGURE 1-18

**Future Employment Density (2035) – Southern Arizona**




Source: Arizona Department of Transportation 2012k

**Yuma**

The primary economic activities of the Yuma region include military/defense (for example, Yuma Proving Ground, Yuma Marine Air Station, and Barry M. Goldwater Air Force Range), civilian agencies (such as the U.S. Border Patrol), and agriculture/food processing. Located near two land ports of entry, along a major Interstate highway, and on a transcontinental railroad, the region is also fostering trade and transportation-related industries through the Greater Yuma Port Authority and Greater Yuma Economic Development Corporation, which is exploring the potential for an inland port in the area. With its proximity to Mexico, the Yuma area is also fostering twin plants/maquiladora operations. The Yuma area includes one foreign trade zone (FTZ) composed of four commercial sites.

**Tucson**

As the second largest metropolitan area in the state, Tucson is a center of activity that boasts a variety of economic drivers, including aerospace and defense, bioscience, and research/higher education focused on the University of Arizona (Tucson Regional Economic Opportunities 2012). The city is located at a transportation crossroads that allows current and future development of the transportation and logistics industry, including the success of the Port of Tucson. The region has an FTZ and an empowerment zone to incentivize employment development. The *Freight Transportation Framework Study* (Maricopa Association of Governments 2012), which extends outside Maricopa County in targeting freight-related economic development opportunities for the Sun Corridor, has identified three freight focus areas in the greater Tucson region that could be developed as freight activity centers: Tucson International Airport as an "import center" to receive imports and redirect goods to local and global markets; north Tucson as a "mixing center" to store, consolidate, and redirect domestic and import goods for distribution; and Marana as a manufacturing and local distribution center to produce goods for global markets and distribution to local markets (Maricopa Association of Governments 2012). Criteria for identifying these activity centers include their proximity to the Mexican border, as well as to rail, highway, and aviation systems.

**Nogales**

Nogales, Arizona, paired with Nogales, Sonora, forms a major economic activity center focused around the distribution of people and goods across the U.S./Mexico border. Together, these sister cities are home to one of the largest cooperative manufacturing (maquiladora) clusters in the two countries. While the largest private sector employer is the produce industry, tourism, manufacturing, and transportation logistics services are also major economic engines (Nogales Community Development Corporation 2012).

**Others**

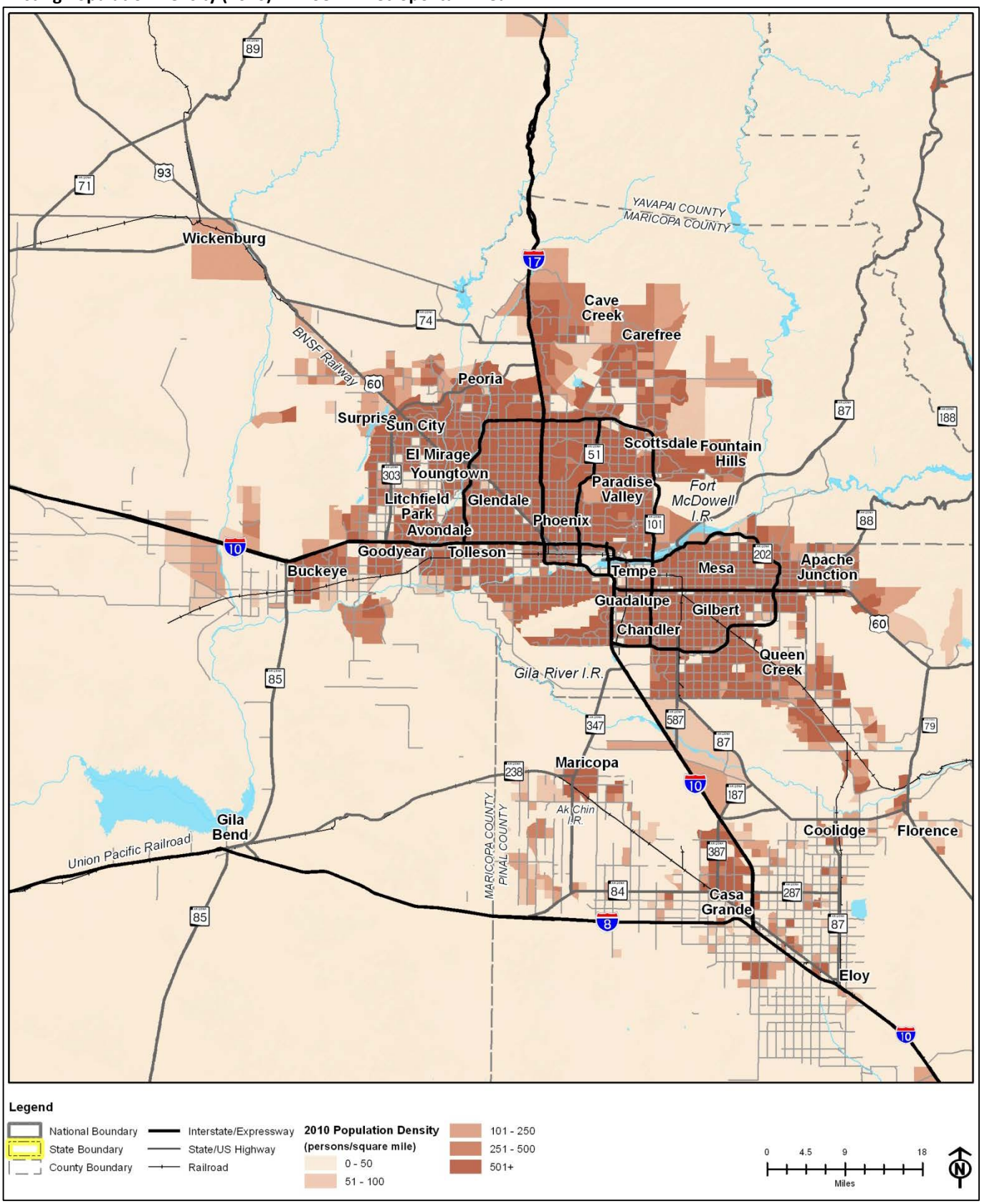
Sierra Vista, Bisbee, and Douglas are not expected to grow as much as the larger communities, but each has its own niche (for example, military, tourism, mining, and manufacturing), which fosters economic growth and relies upon a sound transportation system for its success (Arizona Commerce Authority 2010).

### *Phoenix Metropolitan Area Segment*

Figures 1-19 through 1-22 show existing (2010) and projected future (2035) population and employment densities in the Phoenix metropolitan area. Population growth will be clustered in metropolitan Phoenix, with dispersed growth in Pinal County communities in the study area such as Maricopa, Casa Grande, Eloy, Coolidge, and Florence. In the next two decades, population growth is expected to continue enlarging the Phoenix metropolitan core, extending west into the Hassayampa Valley and south into the Hidden Valley. Employment growth will be more focused in central Phoenix, with some clusters of employment concentration in the hinterlands (for example, near Phoenix-Mesa Gateway Airport in the east, at nodes throughout Buckeye in the west, and at transportation crossroad locations in the north). Corridors of higher-density economic growth will generally be located along major transportation facilities.

FIGURE 1-19

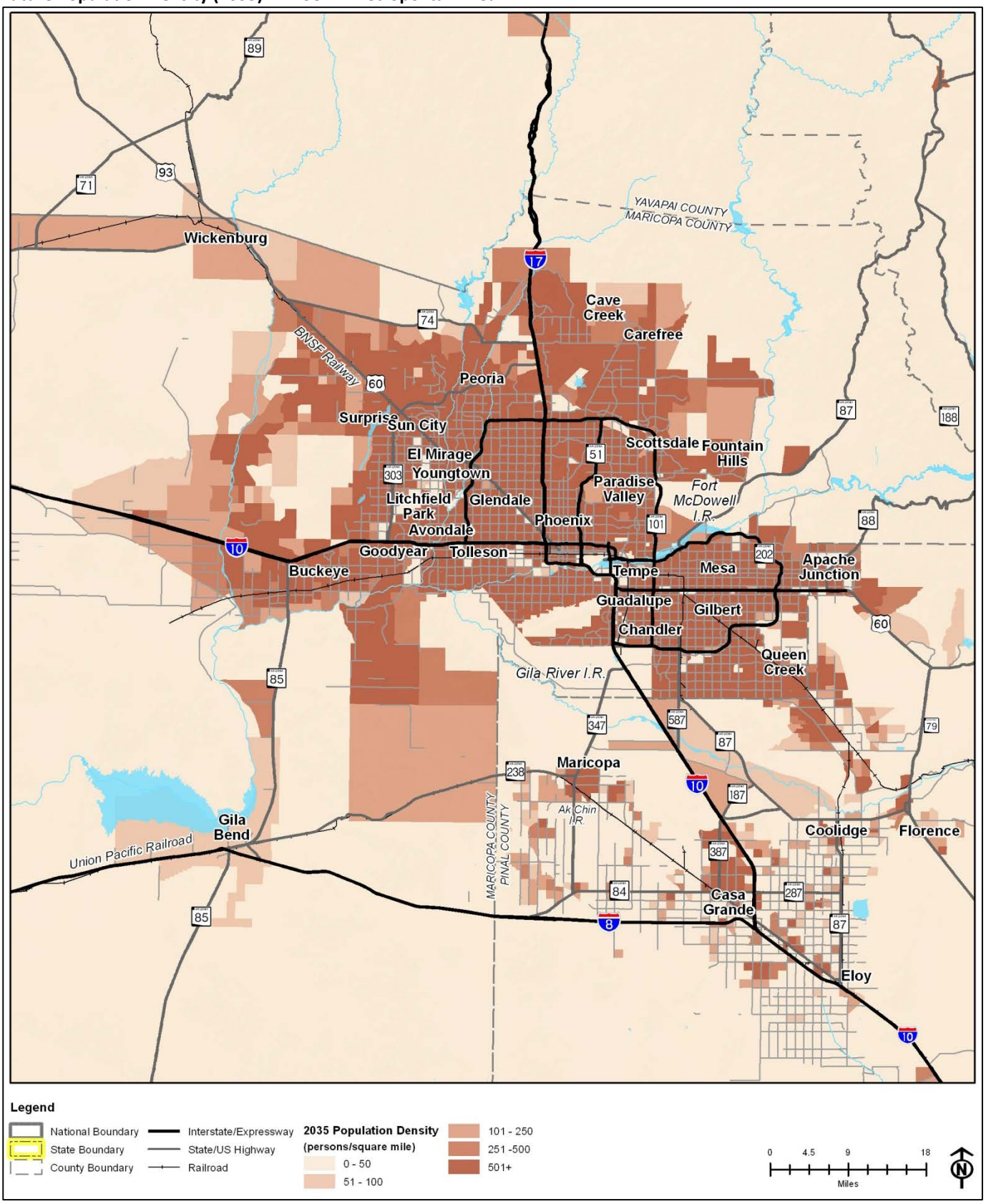
**Existing Population Density (2010) – Phoenix Metropolitan Area**




Source: Arizona Department of Transportation 2012k

FIGURE 1-20

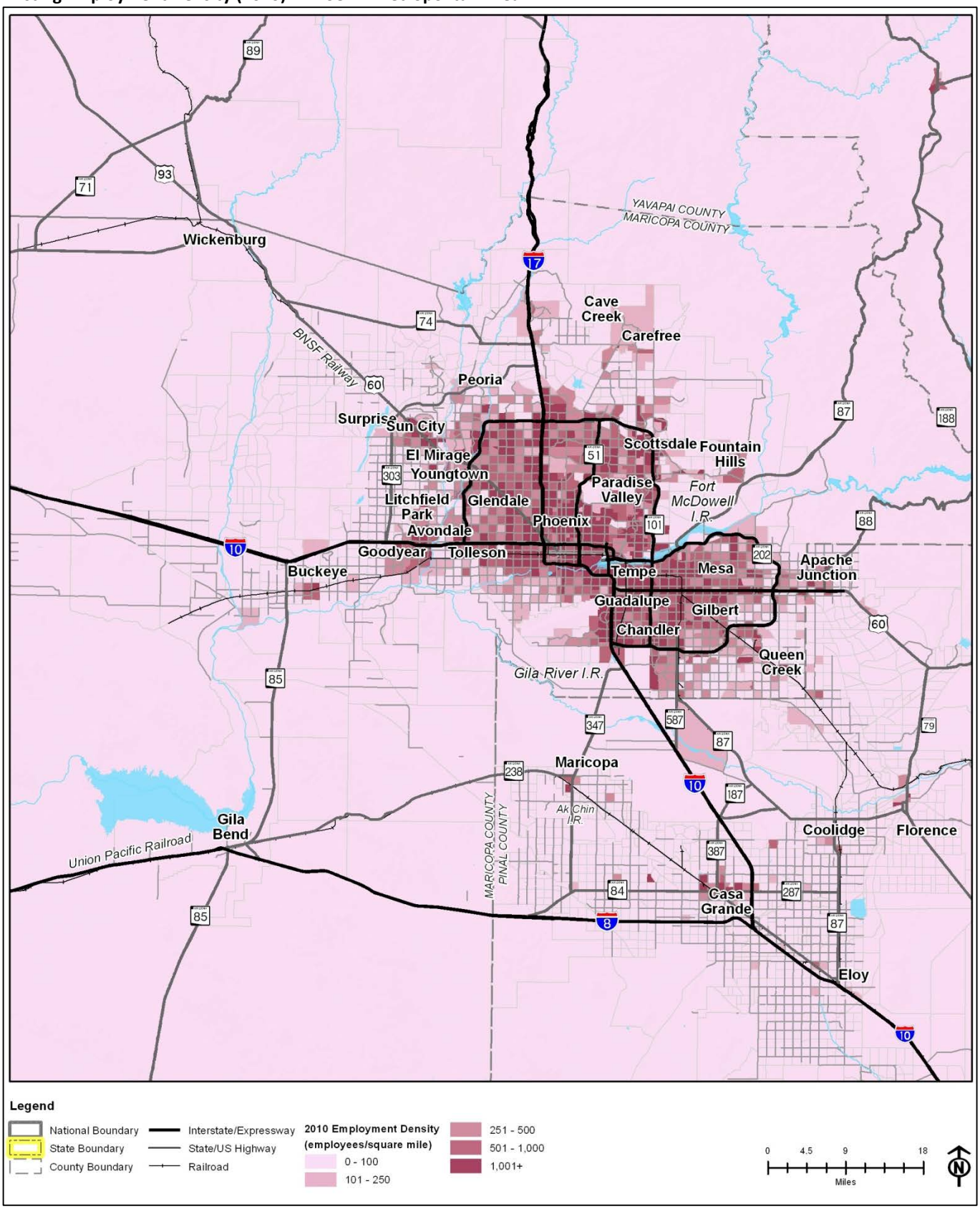
**Future Population Density (2035) – Phoenix Metropolitan Area**




Source: Arizona Department of Transportation 2012k

FIGURE 1-21

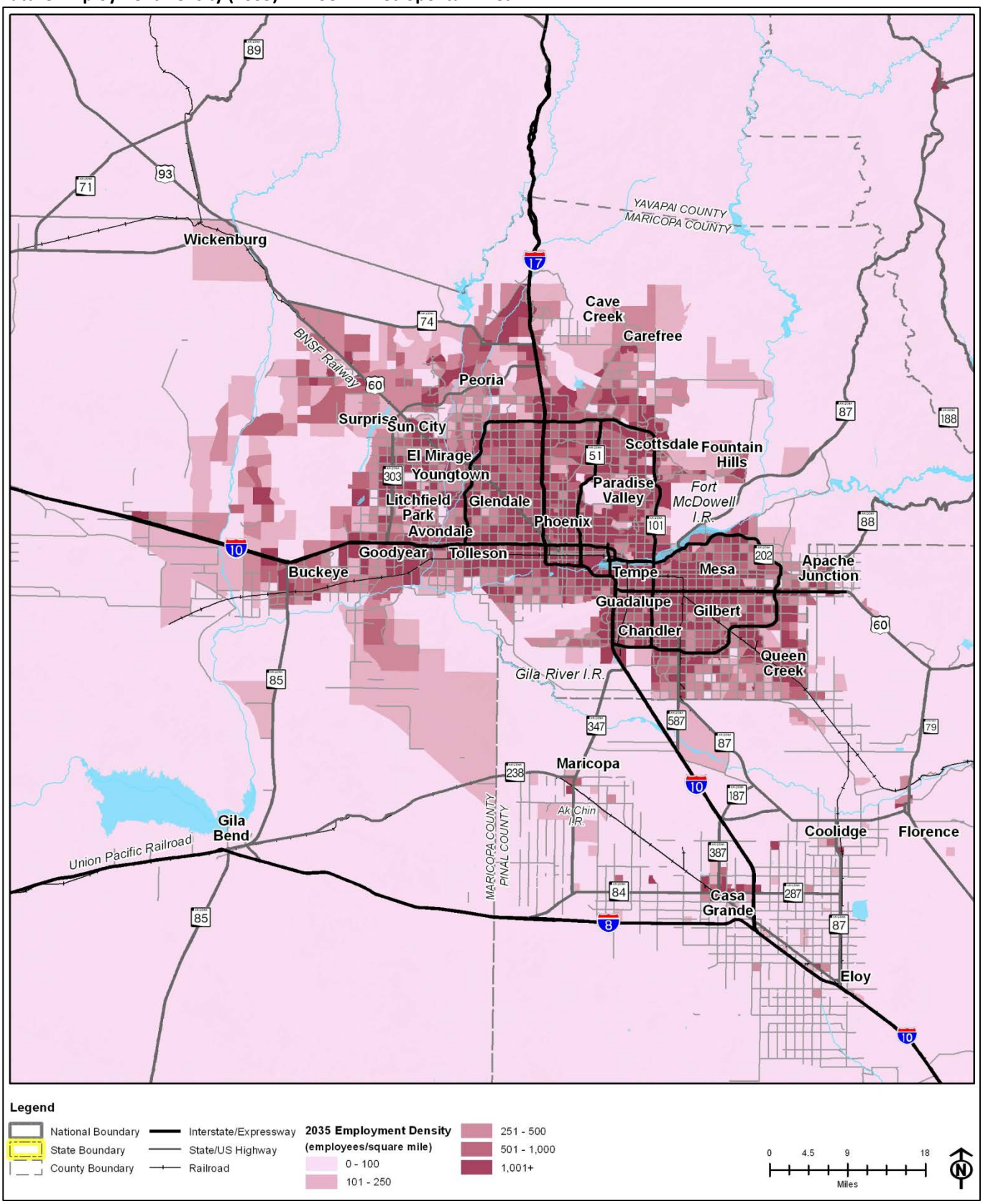
**Existing Employment Density (2010) – Phoenix Metropolitan Area**




Source: Arizona Department of Transportation 2012k

FIGURE 1-22

**Future Employment Density (2035) – Phoenix Metropolitan Area**




Source: Arizona Department of Transportation 2012k

Multiple activity centers with different economic focal points can be found throughout this large metropolitan area. For example, Sky Harbor Center and the Discovery Triangle (a 25-square-mile area centered on Phoenix Sky Harbor International Airport) are home to several industrial and office park complexes supporting the airport, whereas downtown Phoenix has become a center of biotechnology and other medical sciences (Arizona Commerce Authority 2010). Among other areas of the region, the East Valley is a center of microelectronics manufacturing and research, whereas the West Valley has focused on major warehousing and distribution centers. Three FTZs are designated in the metropolitan area, composed of multiple commercial sites (Import Administration 2012). Within Maricopa County there are various empowerment and enterprise zones to provide incentives for business development.

The *Freight Transportation Framework Study* (Maricopa Association of Governments 2012) identified 12 freight focus areas in the northern portion of the Sun Corridor that have the potential to be developed as freight activity centers. These include:

- Manufacturing and Local Distribution Centers to produce goods for global markets and distribution to local markets: Phoenix-Mesa Gateway Airport (State Route [SR] 24/SR 202L/Union Pacific Railroad [UPRR]), Coolidge area (SR 87/proposed Hassayampa Freeway/UPRR), Florence area (UPRR), Deer Valley (I-17/SR 101L), West Chandler (I-10/SR 202L/UPRR), Grand Avenue corridor (US 60/I-17/BNSF Railway), and West Phoenix (I-10/SR 101L/UPRR)
- Mixing Center to store, consolidate, and redirect domestic and import goods for distribution: I-8/I-10 junction, Maricopa/Casa Grande area, Discovery Triangle, and US 60/Surprise area
- Forward Distribution Center to serve as a gateway for distribution to other regional markets: Phoenix West Valley (I-10/SR 85 junction)

These locations benefit from their proximity to major transportation infrastructure, proximity to markets, ample land available for storage, and availability of a skilled labor force (Maricopa Association of Governments 2012).

The recent update of the Pinal County Comprehensive Plan (Pinal County 2009) also designated a series of activity centers for focusing future growth. The activity centers were organized into varying levels of intensity, with the highest intensities typically located at the junction of transportation facilities (such as I-10, I-8, SR 87, SR 79, and the UPRR) or at proposed new high-capacity transportation routes (such as SR 24, the Pinal County North-South Freeway, and the Hassayampa Freeway) (Pinal County 2009). The largest clusters of employment growth are expected at the I-8/I-10 interchange, along I-10/UPRR between Casa Grande and Eloy, along SR 87 between Coolidge and I-10 (including a proposed future regional airport in Coolidge), at Red Rock (I-10/UPRR; site of proposed UPRR classification yard), and in the proposed Superstition Vistas development (a 275-square-mile tract of Arizona State Land department land in northern Pinal County).

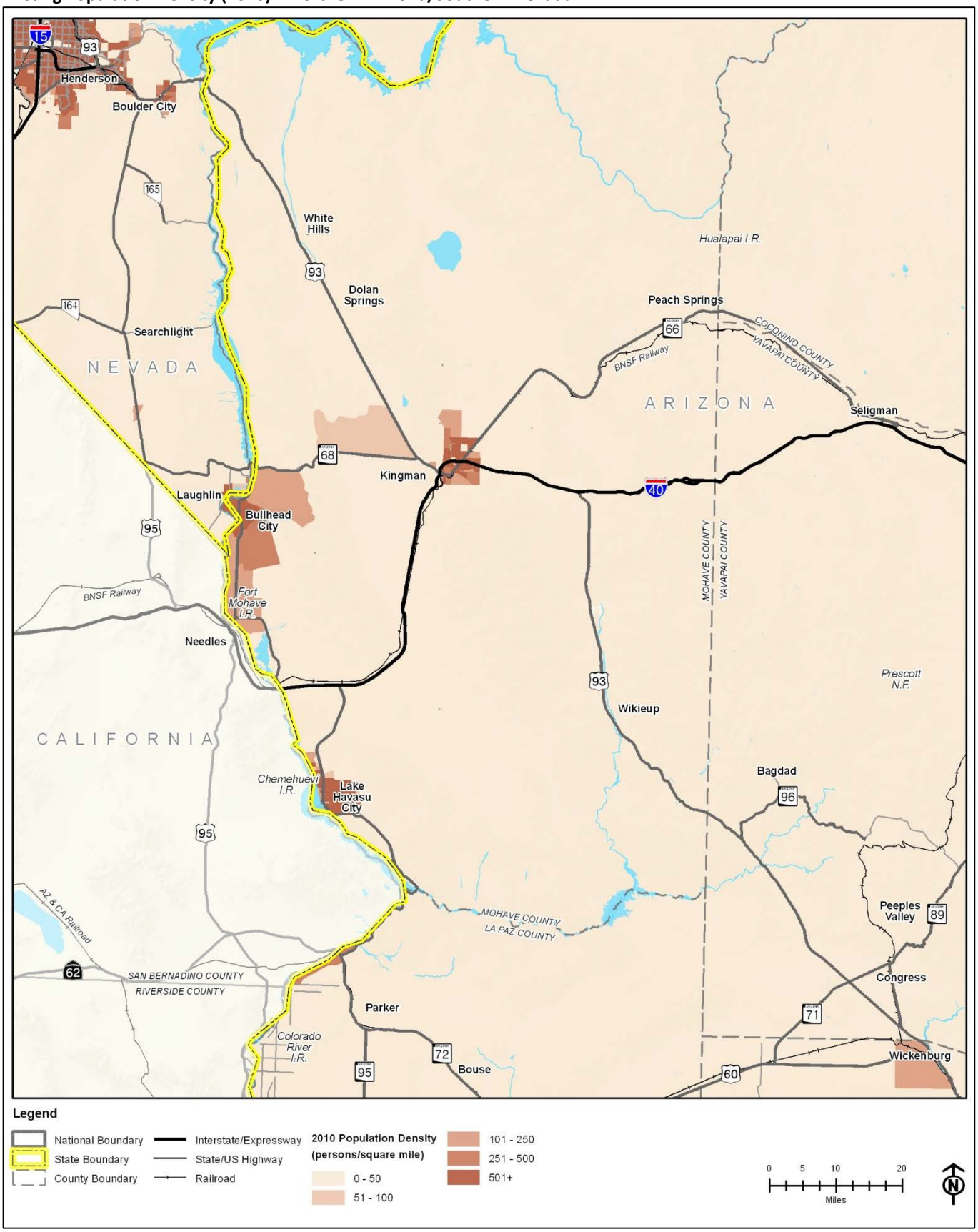
### *Northern Arizona/Southern Nevada Segment*

Figures 1-23 through 1-26 show existing (2010) and projected future (2035) population and employment densities for the northern Arizona/southern Nevada segment area. Population and employment growth is expected to cluster in a few communities such as Kingman, Bullhead City/Laughlin, Lake Havasu City, and Boulder City. Outside these communities, very little growth or development exists or is anticipated.

Boulder City has a growth control ordinance, the Controlled Growth Management Plan (Chapter 41 of Title 11), that applies to the construction of residential and hotel development to avoid rapid growth and preserve the small-town atmosphere. While Boulder City has potential for ancillary and spinoff growth from the Las Vegas metropolitan area, the city with the highest potential for growth is Kingman. Located at the intersection of I-40 and US 93 and along the BNSF Transcon rail corridor, Kingman has taken advantage of these transportation facilities to spur economic growth. The city includes port of entry facilities for commercial traffic entering Arizona. The community has an expanding industrial base composed of manufacturing, distribution, and warehousing, and has plans for the development of an intermodal trade processing center that would process rail and truck cargoes from the West Coast ports, Canada, and Mexico (Tioga Group 2006).

FIGURE 1-23

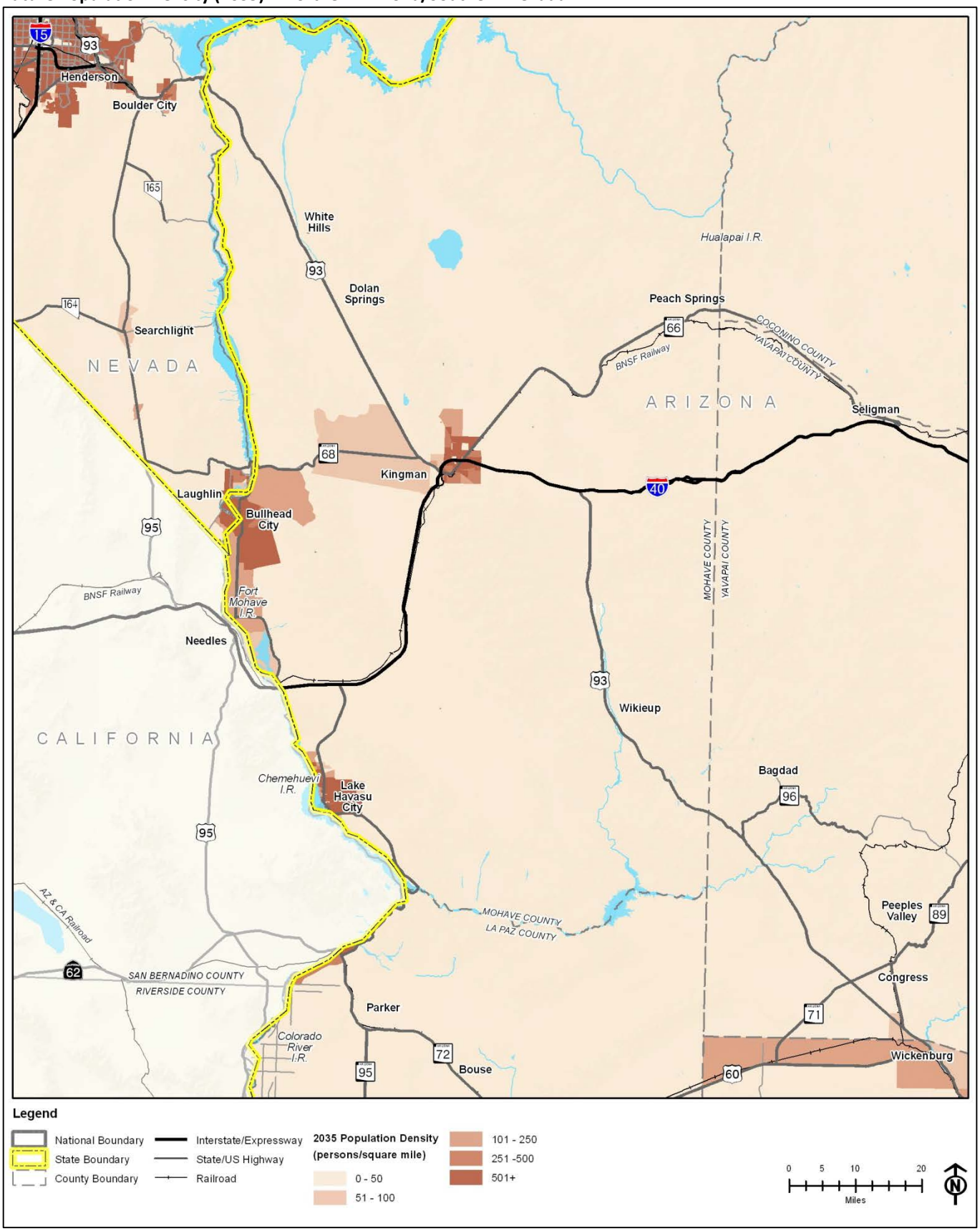
**Existing Population Density (2010) – Northern Arizona/Southern Nevada**




Source: Arizona Department of Transportation 2012k

FIGURE 1-24

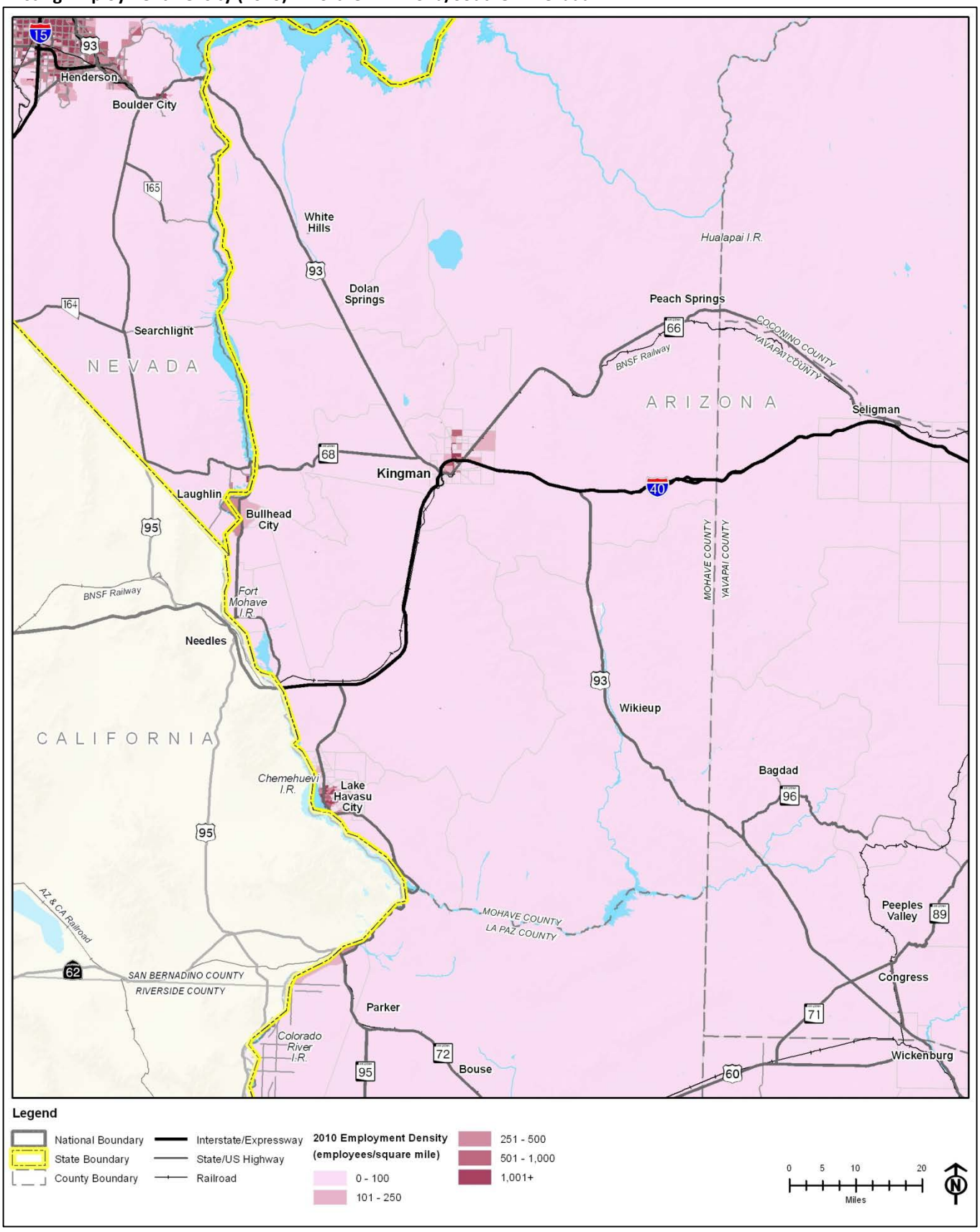
**Future Population Density (2035) – Northern Arizona/Southern Nevada**




Source: Arizona Department of Transportation 2012k

FIGURE 1-25

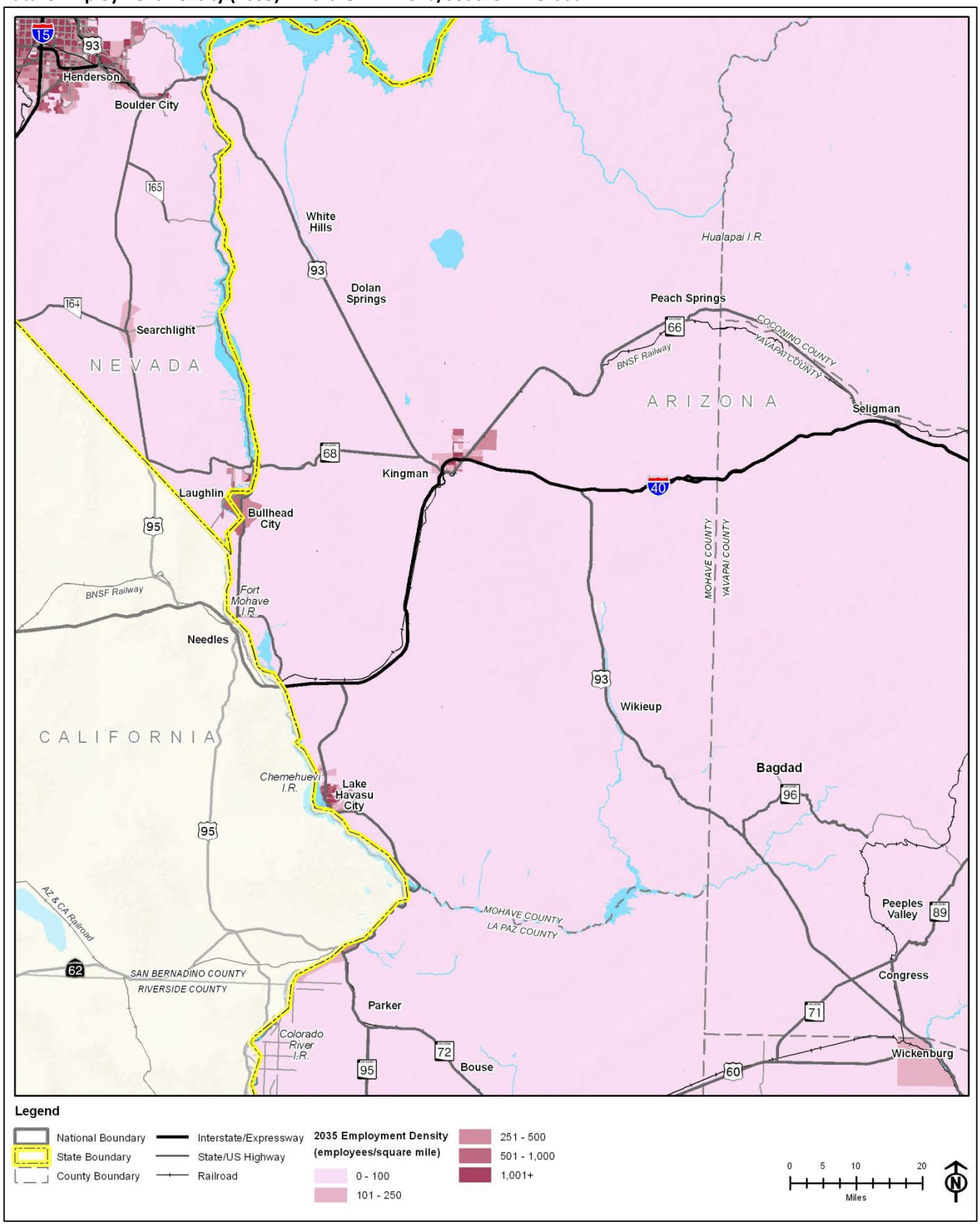
**Existing Employment Density (2010) – Northern Arizona/Southern Nevada**




Source: Arizona Department of Transportation 2012k

FIGURE 1-26

**Future Employment Density (2035) – Northern Arizona/Southern Nevada**




Source: Arizona Department of Transportation 2012k

### *Las Vegas Metropolitan Area Segment*

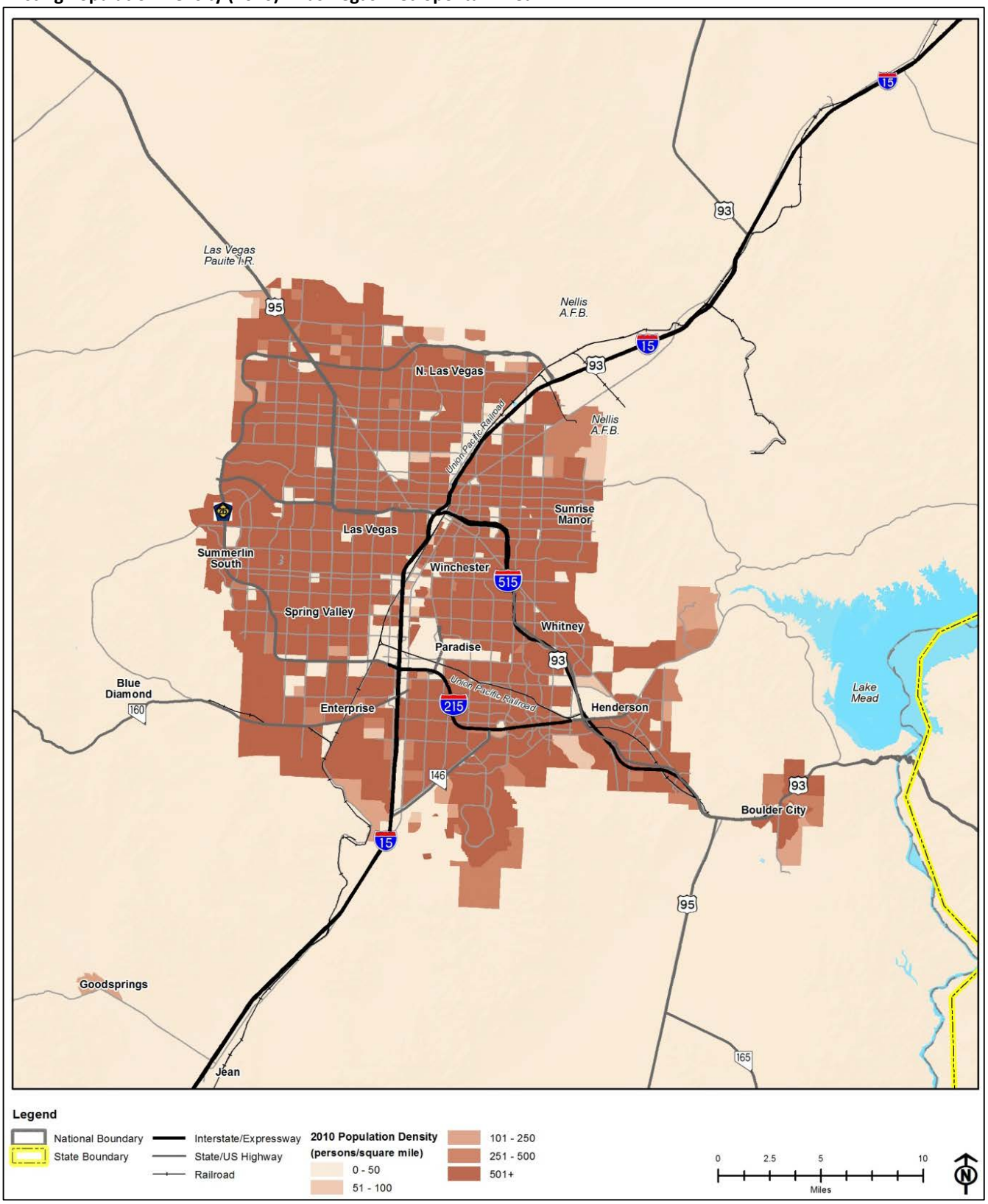
Figures 1-27 through 1-30 show existing (2010) and projected future (2035) population and employment densities in the Las Vegas metropolitan area. Population growth will be clustered in metropolitan Las Vegas area, with intensified growth near the Las Vegas Paiute Indian Reservation along I-95, near Nellis Air Force Base northeast of Las Vegas, along SR 564 toward Lake Mead, south of Las Vegas and along I-15, and northwest of Summerlin South. In addition, population growth is expected to continue increasing in the Las Vegas metropolitan core. Employment growth will be more focused near the Las Vegas Paiute Indian Reservation, Nellis Air Force Base, west of Lake Mead, Henderson, and Boulder City southeast of Las Vegas, south of Las Vegas and along I-15, Spring Valley and Enterprise townships, and Summerlin South west of Las Vegas. Higher-density economic growth will generally occur on the edges of the Las Vegas metropolitan area extending growth outward into Bureau of Land Management land.

Las Vegas has several employment hubs: the Las Vegas Strip, Downtown Las Vegas, University of Nevada at Las Vegas, Nellis Air Force Base, Town Center, and Summerlin (City of Las Vegas 2000). One FTZ is designated in the metropolitan area, comprised of eight sites strategically located throughout Clark County/Las Vegas metropolitan area (Nevada Development Authority n.d.). The City of Las Vegas adopted the largest redevelopment area of downtown Las Vegas in 1986, and three amendments have occurred since then (City of Las Vegas n.d.).

The City of Las Vegas Master Plan 2020 identifies land subject to future annexations and available Bureau of Land Management and unincorporated Clark County land available for annexation. The land subject to future annexation is north of the City of Las Vegas along I-95 (City of Las Vegas 2000). The comprehensive plans for the cities of North Las Vegas, Henderson, and Boulder City do not identify potential land for annexation.

FIGURE 1-27

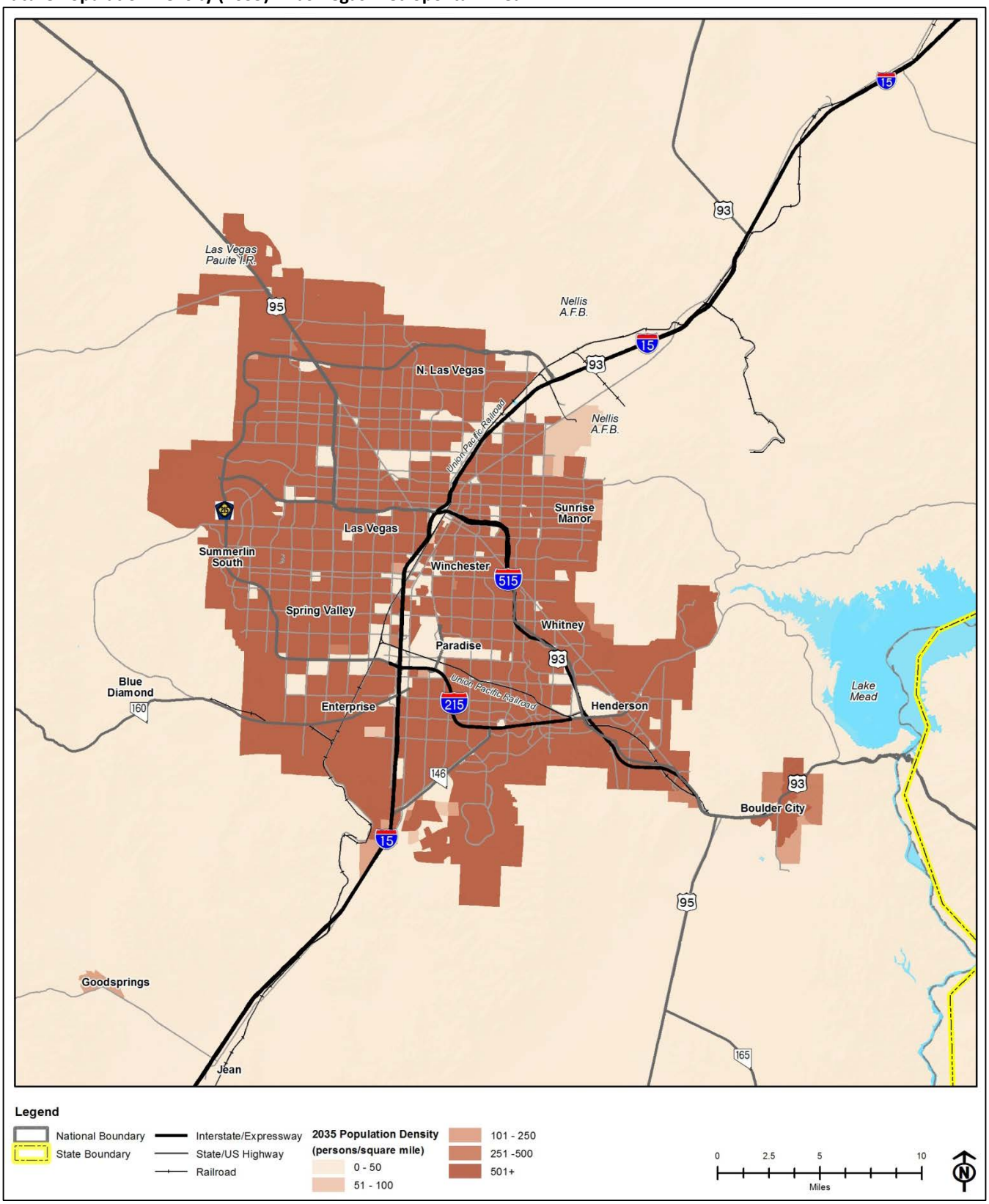
**Existing Population Density (2010) – Las Vegas Metropolitan Area**




Source: Nevada Department of Transportation 2012f

FIGURE 1-28

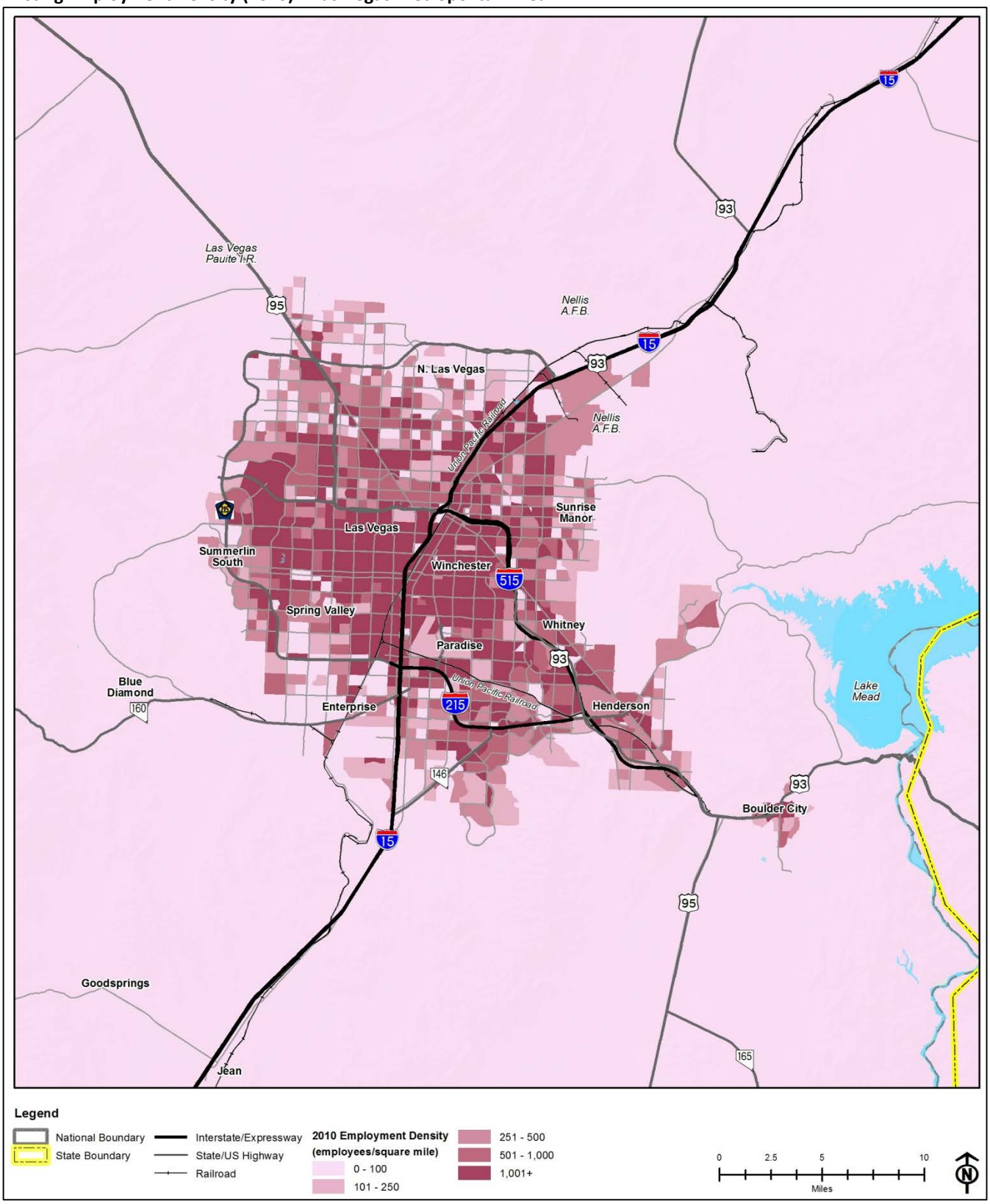
**Future Population Density (2035) – Las Vegas Metropolitan Area**




Source: Nevada Department of Transportation 2012f

FIGURE 1-29

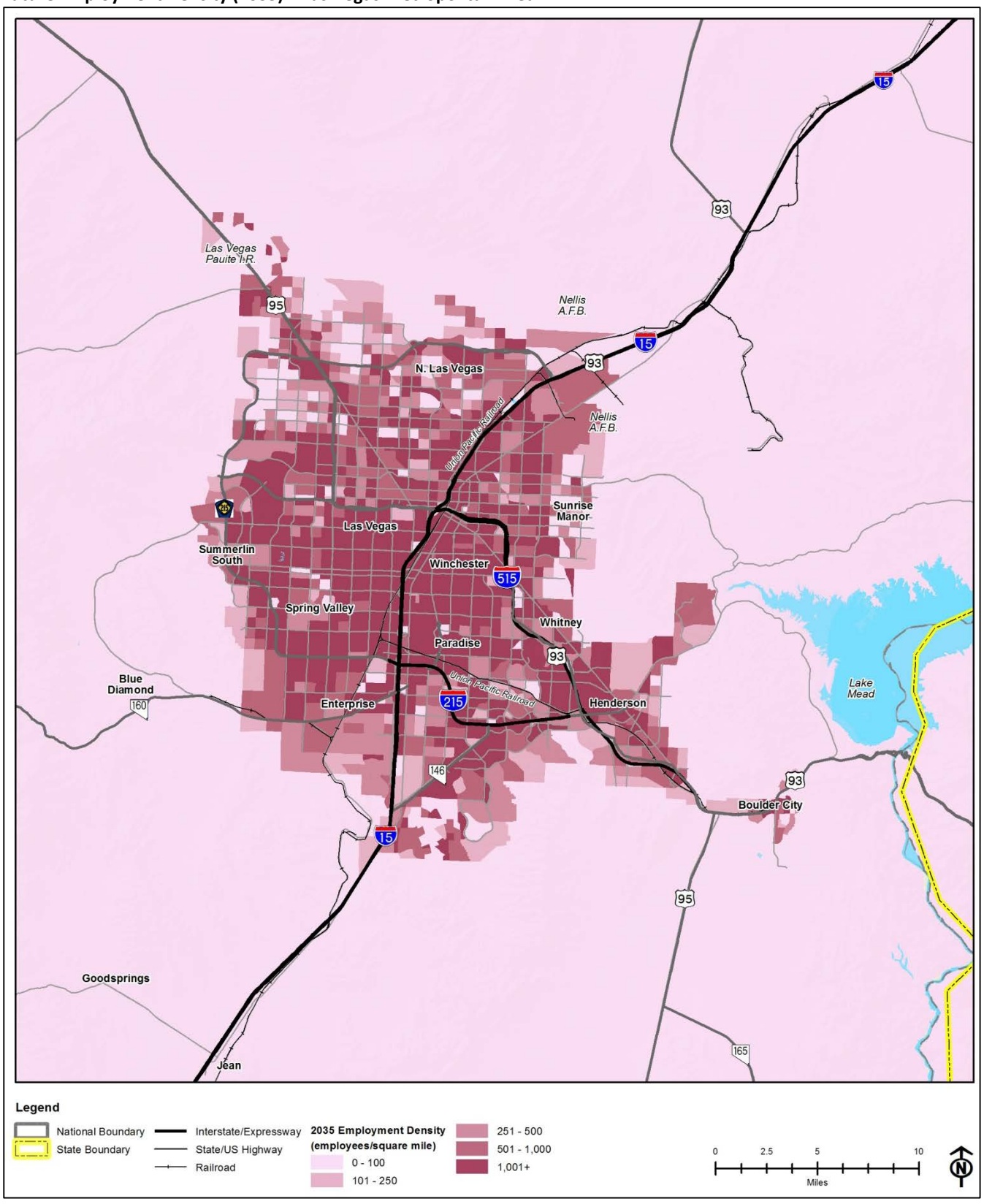
**Existing Employment Density (2010) – Las Vegas Metropolitan Area**




Source: Nevada Department of Transportation 2012f

FIGURE 1-30

**Future Employment Density (2035) – Las Vegas Metropolitan Area**




Source: Nevada Department of Transportation 2012f

## Northern Nevada Segment

Figures 1-31 through 1-34 show existing (2010) and future (2035) population and employment densities for the northern Nevada segment area. Projected population and employment growth is expected to cluster in a few communities including Carson City and Reno-Sparks as well as some smaller communities such as Elko. Outside these communities, very little growth or development exists or is anticipated.

Carson City and Reno-Sparks are located near the Nevada/California border in the high desert valley in northwest Nevada. Elko is located in northeast Nevada; each area is described below.

**Carson City**

Carson City, the capital of Nevada, is located approximately 30 miles south of Reno with city limits extending across to the California state line in the middle of Lake Tahoe. Located at the intersection of two major highway corridors (US 50 and US 395), Carson City provides convenient access for businesses and residents to major markets throughout the west. One of the City's goals is to retain and promote the expansion of major employers already established in the community such as the State of Nevada; Carson-Tahoe Hospital's Regional Medical Center and associated facilities; the Western Nevada Community College; the extensive manufacturing community; finance, real estate, and insurance industries; banking; and other knowledge-based industries. The City will also look for opportunities to promote its historic and recreational resources and overall quality of life as a means of generating tourism revenue and attracting new employers to the community (Carson City 2006).

**Reno-Sparks**

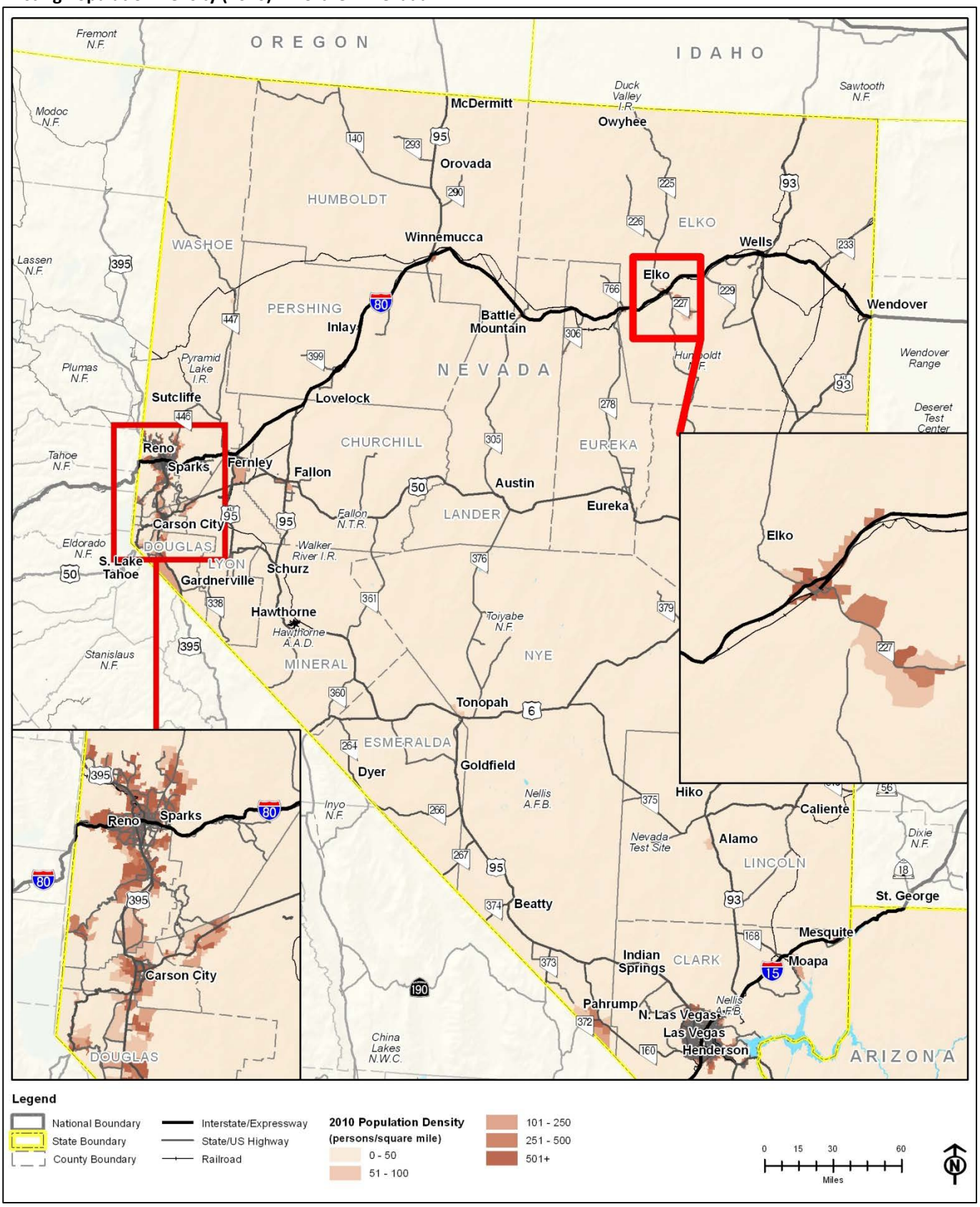
The Reno-Sparks metropolitan area has the second highest population in Nevada outside the Las Vegas metropolitan area (U.S. Census Bureau 2010) and is located at the intersection of I-80 and US 395 near the Nevada/California border with convenient rail service provided by UPRR and Amtrak. Reno's economy is principally based in the trade and service sector, although gaming and other recreational activities represent a significant portion of the growing economy. The Economic Development Authority of Western Nevada has been working with these cities to diversify the economy with the expansion of distribution, warehousing, and manufacturing facilities and recruiting more commercial business and companies in targeted industries such as renewable energy and other sustainable resources. Reno is collaborating with other local and regional agencies on a consolidated regional approach to economic development. Tourism is also vital to the area, and efforts are being focused on finding ways to attract new visitors and grow tourism (City of Reno 2011). This area also has an FTZ and empowerment zone to incentivize employment development.

**Elko**

Elko is the service hub for northeastern Nevada with easy access to I-80, US 93, and State Highway 225. Elko County is one of the fastest growing regions in Nevada, and in the next 10 years it is projected to have the second highest growth rate in Nevada. Its growing economy is driven by its primary economic activities including mining, manufacturing, ranching, gaming, and tourism. Elko is the largest gold mining region in the country. Major employers include Great Basin College and the Northeastern Nevada Regional Hospital. The Northeastern Nevada Regional Development Authority is working to diversify this region by recruiting more companies in targeted industries such as renewable energy, transportation, manufacturing, mining and industrial (Northeastern Nevada Regional Development Authority 2013).

FIGURE 1-31

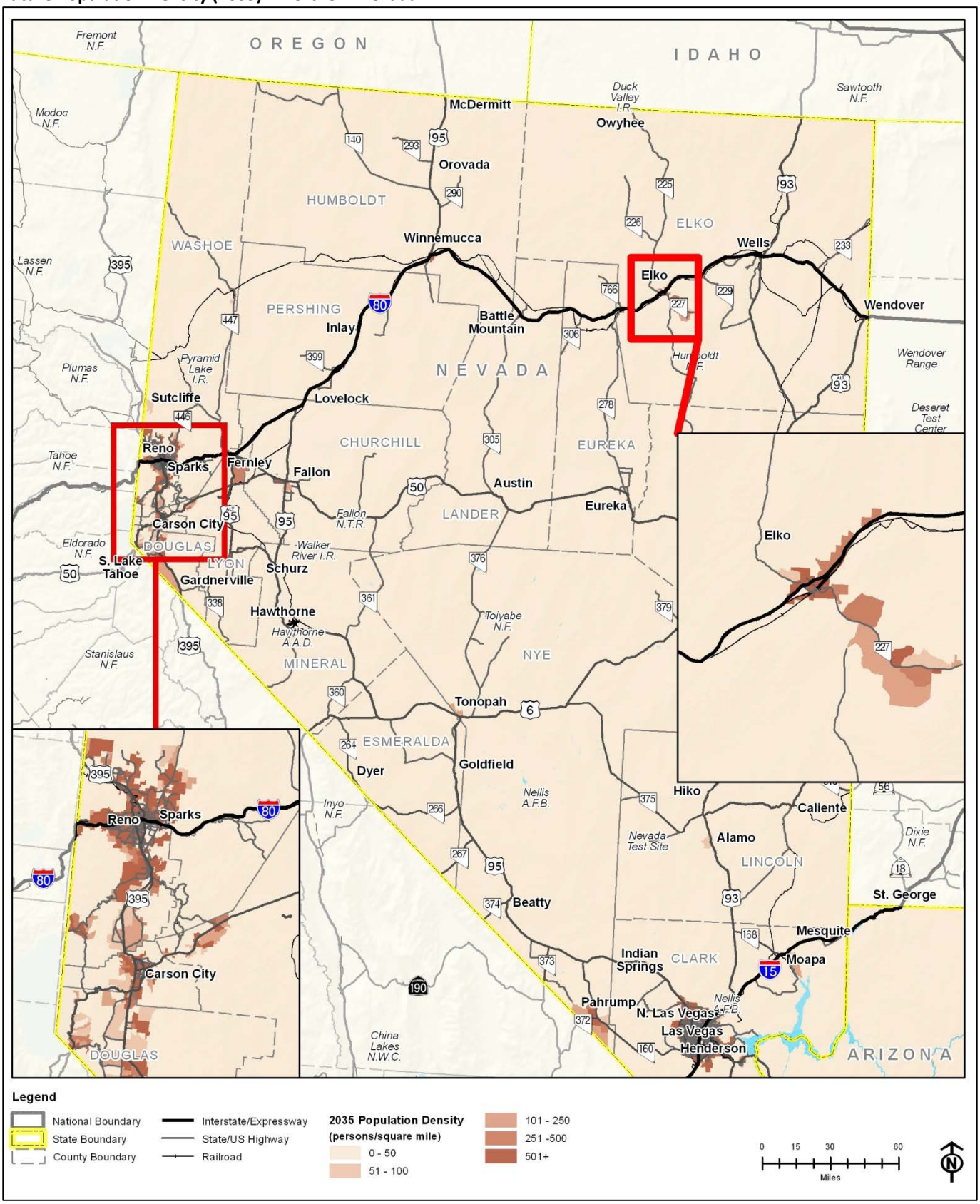
**Existing Population Density (2010) – Northern Nevada**




Source: Nevada Department of Transportation 2012f

FIGURE 1-32

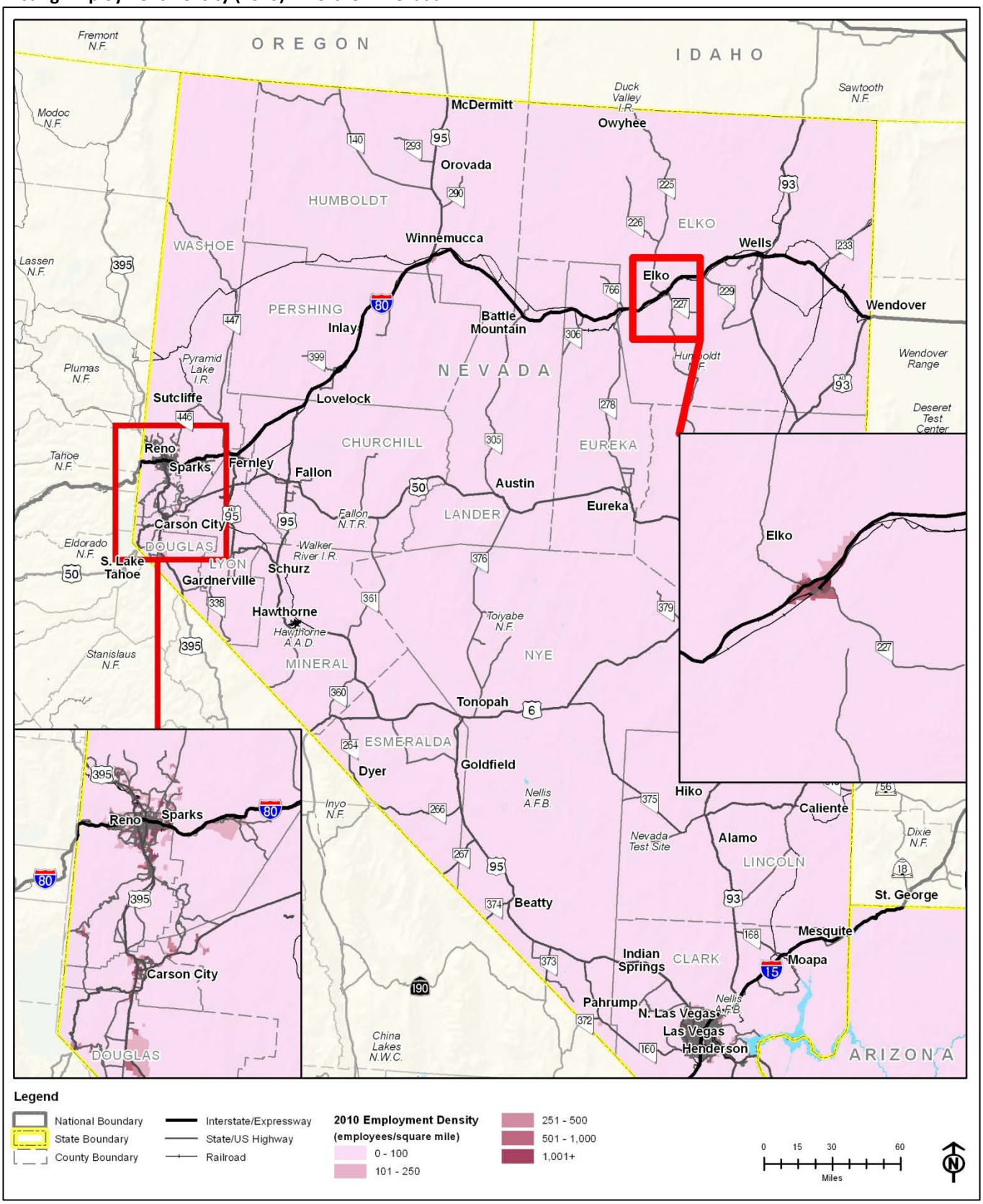
**Future Population Density (2035) – Northern Nevada**




Source: Nevada Department of Transportation 2012f

FIGURE 1-33

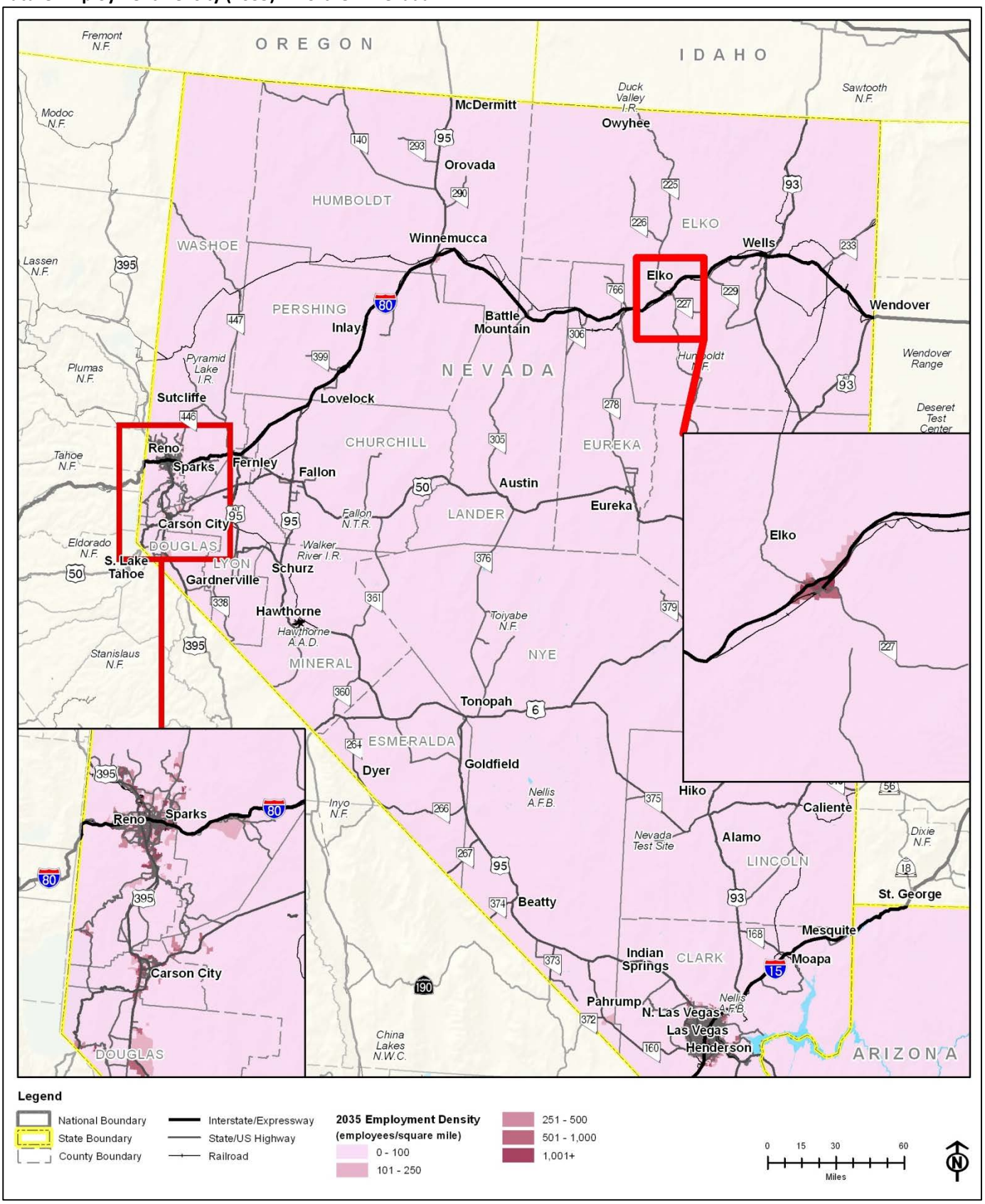
**Existing Employment Density (2010) – Northern Nevada**




Source: Nevada Department of Transportation 2012f

FIGURE 1-34

**Future Employment Density (2035) – Northern Nevada**




Source: Nevada Department of Transportation 2012f

# 1.3 Arizona and Nevada Industry Sector Location Quotient Analysis

An examination of the Metropolitan Statistical Areas (MSAs) in Arizona and Nevada was conducted to gain a deeper understanding of the major industry sectors, their growth, and their importance to the economies of each area. Several factors were used to evaluate the sector, including the relative employment concentration, known as the location quotient (LQ), the number of jobs linked to each industry sector, employment growth, and change in the LQ. Current data from the U.S. Bureau of Labor Statistics was used to conduct the analysis. The data are from the 2001 and 2011 Quarterly Census of Employment and Wages.

## 1.3.1 Location Quotient

Location quotients are used to identify the relative concentration of local employment within a given business sector. For the purposed of this analysis, the LQ for each MSA in Arizona and Nevada was examined against the U.S. The analysis was conducted at the Super Sector level for private sector employment, which included the following industries:

- Natural Resources and Mining
- Construction
- Manufacturing
- Trade, Transportation, and Utilities
- Information
- Financial Activities
- Professional and Business Services
- Education and Health Services
- Leisure and Hospitality
- Other Services

An LQ was computed for each industry, using the following mathematical formula:

$$\textbf{LQ} = \frac{\text{Employment in Industry in Region/Total Employment in Region}}{\text{Employment in Industry in U.S./Total Employment in U.S.}}$$

A sector with an LQ equal to 1.0 has the same share of total employment as the sector's share of U.S. employment. If an LQ is greater than 1.0, the sector is more concentrated within the economic region than the U.S. Likewise, if an LQ is less than 1.0, it is less concentrated than the U.S.

An industry sector graphic (Figure 1-35) was prepared for each geographic area analyzed. This graphic helps identify competitive strengths and weaknesses of the various sectors within each state and MSA. The bubble size represents industry size by number of workers. The vertical axis represents the LQ, which shows the relative concentration of that industry to the U.S. as a whole. Anything 1.0 or greater reveals a greater concentration in employment than the U.S.

The horizontal axis represents change in the LQ from 2001 to 2011. The bubbles to the right of the vertical axis are driving the region's growth. Industries above the horizontal axis are more significant to the region than to the rest of the U.S. (In terms of workers employed.)

The four quadrants of the chart shows the industry's economic position within the region. Industries with an LQ greater than 1.0 are a major source of employment growth and have a high local concentration. Each quadrant of the chart tells a story.

**Upper right quadrant**: Industries in this quadrant are more concentrated in the region and becoming more so over time. These industries, both large and small are established and growing.

**Lower right quadrant**: Industries in this quadrant are not as concentrated relative to the nation as a whole, but as they continue to emerge and grow they will contribute more to the region's economic base.

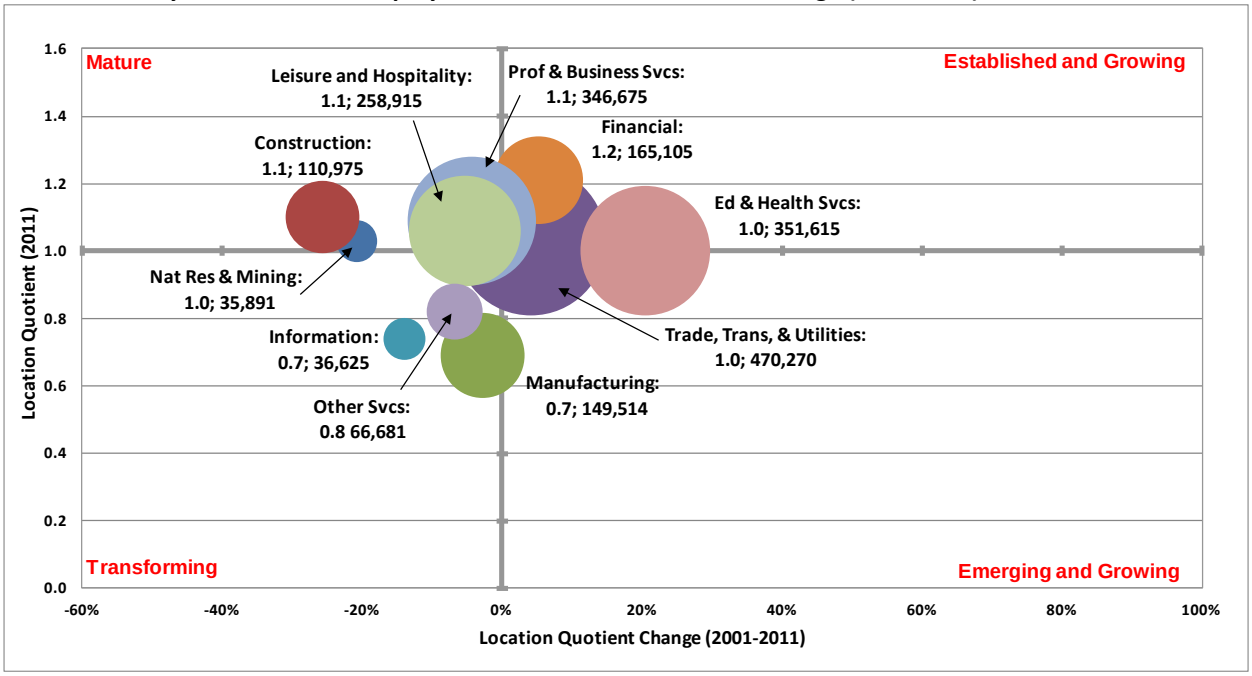
**Upper left quadrant**: Industries in this quadrant are mature and have a high concentration within the region, but their concentration is declining over time.

**Lower left quadrant**: Industries in this quadrant are less concentrated relative to the nation and are declining in employment, either due to industry-wide technological market changes or a declining competitive advantage.

## 1.3.2 State Sector Analysis

The economic base of each state was first examined to understand the significance of each industry sector to the state's economy. As shown in Figure 1-35, Arizona has significant employment in the mature and established and growing sectors of Professional and Business Services, Education and Health Services, Leisure and Hospitality and Trade, and Transportation and Utilities. Combined, these industries capture 72 percent of total employment in Arizona.

FIGURE 1-35
**Arizona Industry Concentration, Employment and Location Quotient Change (2001-2011)**



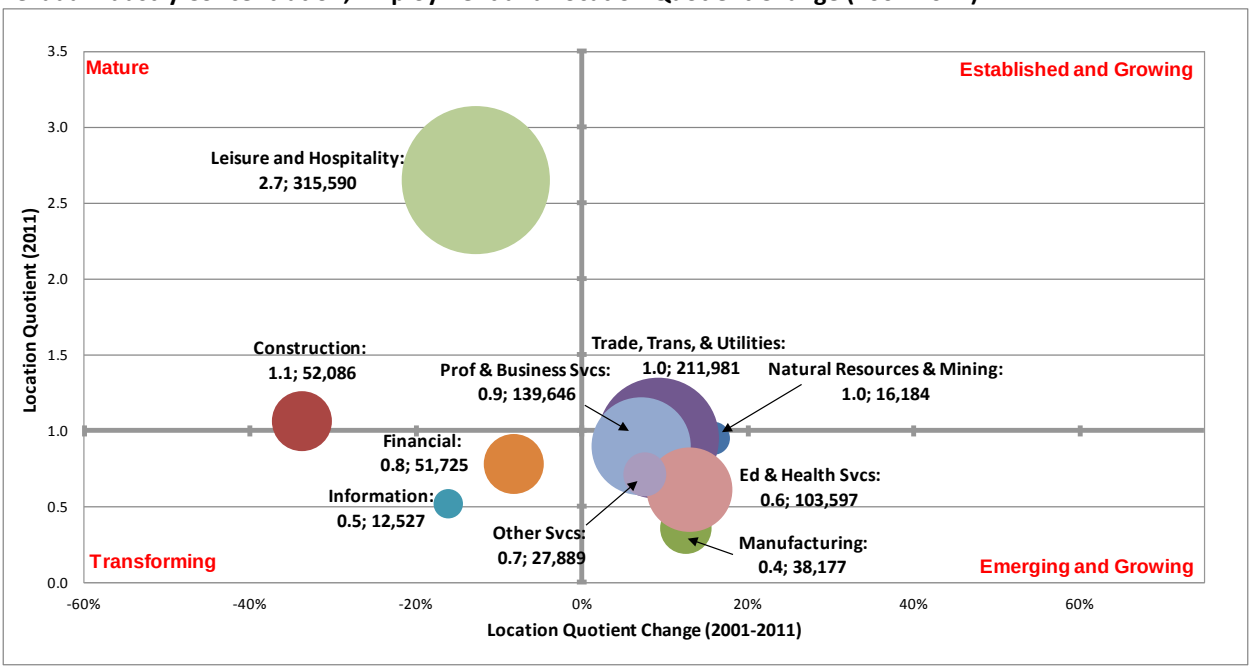

Source: U.S. Bureau of Labor Statistics 2001 and 2011

In the upper right and left quadrants are seven industries (Construction, Natural Resources and Mining, Professional and Business Services, Financial, Education and Health Services, Leisure and Hospitality and Trade, and Transportation and Utilities) with LQs above 1.0, implying that the local economy has a higher concentration of that industry than the national average and is likely exporting its products or services. The mature industries of Leisure and Hospitality, Professional Business Services, Construction and Natural Resources and Mining, in the upper left quadrant, have high LQs, yet over the last 10 years have been declining in their specialization.

The transforming industries that include Manufacturing, Information, and Other Services in the lower left quadrant have lower LQs relative to the nation, yet Manufacturing is the subject of a targeted recruitment campaign due to its export nature and higher than average wages paid.

Figure 1-36 shows that a major driver of Nevada's economic base is the mature industry of Leisure and Hospitality in the upper left quadrant, which represents 33 percent of total employment. While this industry is becoming less concentrated in the economy given a 12.8 percent decline in LQ, it did achieve a 3.8 percent job growth over the same 10-year timeframe. Construction is the other industry in Nevada that has a higher concentration and also experienced a decline in specialization.

FIGURE 1-36
**Nevada Industry Concentration, Employment and Location Quotient Change (2001-2011)**




Source: U.S. Bureau of Labor Statistics 2001 and 2011

The established and emerging industries in the upper and lower right quadrants (Trade, Transportation, and Utilities, Natural Resources and Mining, Education and Health Services, Manufacturing, Professional Business Services, and Other Services) have lower LQs, yet over the 10-year timeframe have shown growth in their specialization within Nevada's economy. With the exception of Manufacturing, all of these industries experienced an increase in job growth. The transforming industries of Financial and Information saw declines in their specialization.

## 1.3.3 Metropolitan Statistical Area Sector Analysis

Assessing the economic base of the MSAs within the two-state area provides a more granular understanding of industry concentration and employment. It pinpoints the differences in traded, resource-driven, and local industries, and sheds light on regional economic performance.

## *Carson City Metropolitan Statistical Area*

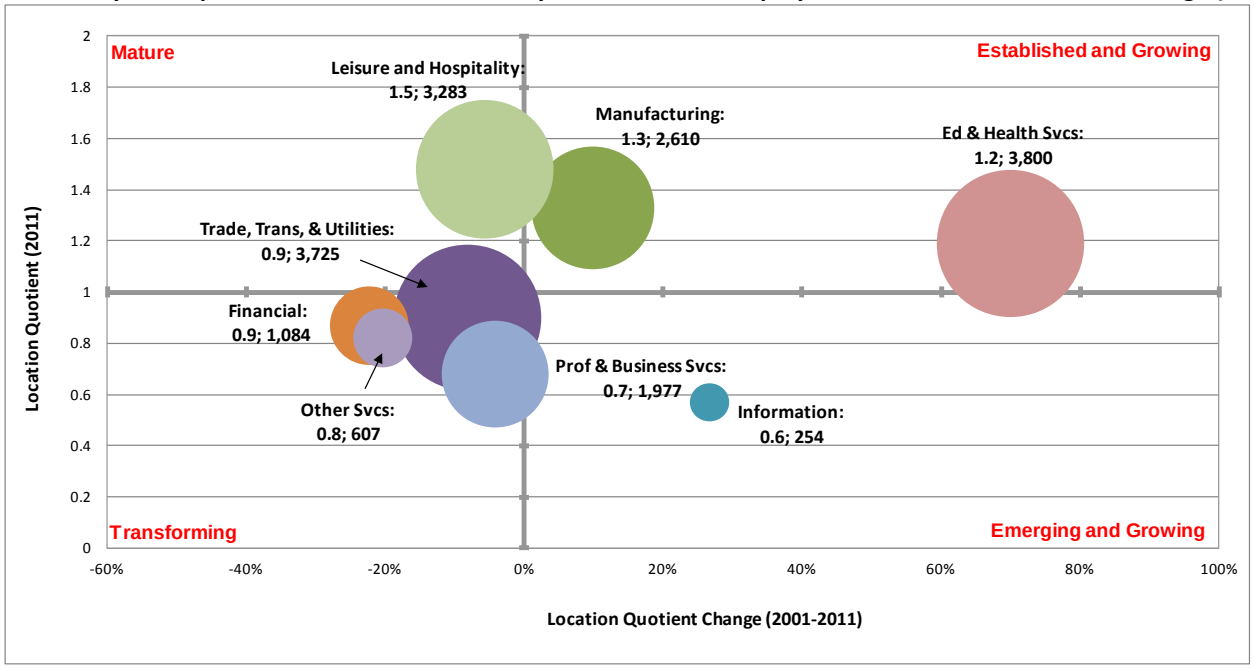
Established, emerging, and growing industries to the right of the vertical axis in Figure 1-37 include Manufacturing, Education and Health Services, and Information. These industries have become more specialized to the local economy over the 10-year time horizon; however, Information still lags the nation. Education and Health Services experienced a 70 percent gain, compared to the state at 13 percent. Manufacturing in Carson City has a significantly higher LQ at 1.3 than Nevada at 0.4.

As a mature industry, Leisure and Hospitality Services has the highest LQ of all industries, but has experienced a slight decline in specialization. Transforming industries with an LQ below 1.0 include Trade, Transportation and Utilities, Financial, Professional and Business Services, and Other Services. Over the 10-year timeframe, these industries have become less specialized in the region.

Due to non-disclosure, data for Construction and Natural Resources and Mining is not provided at the MSA level.

FIGURE 1-37

**Carson City Metropolitan Statistical Area Industry Concentration, Employment and Location Quotient Change (2001-2011)**



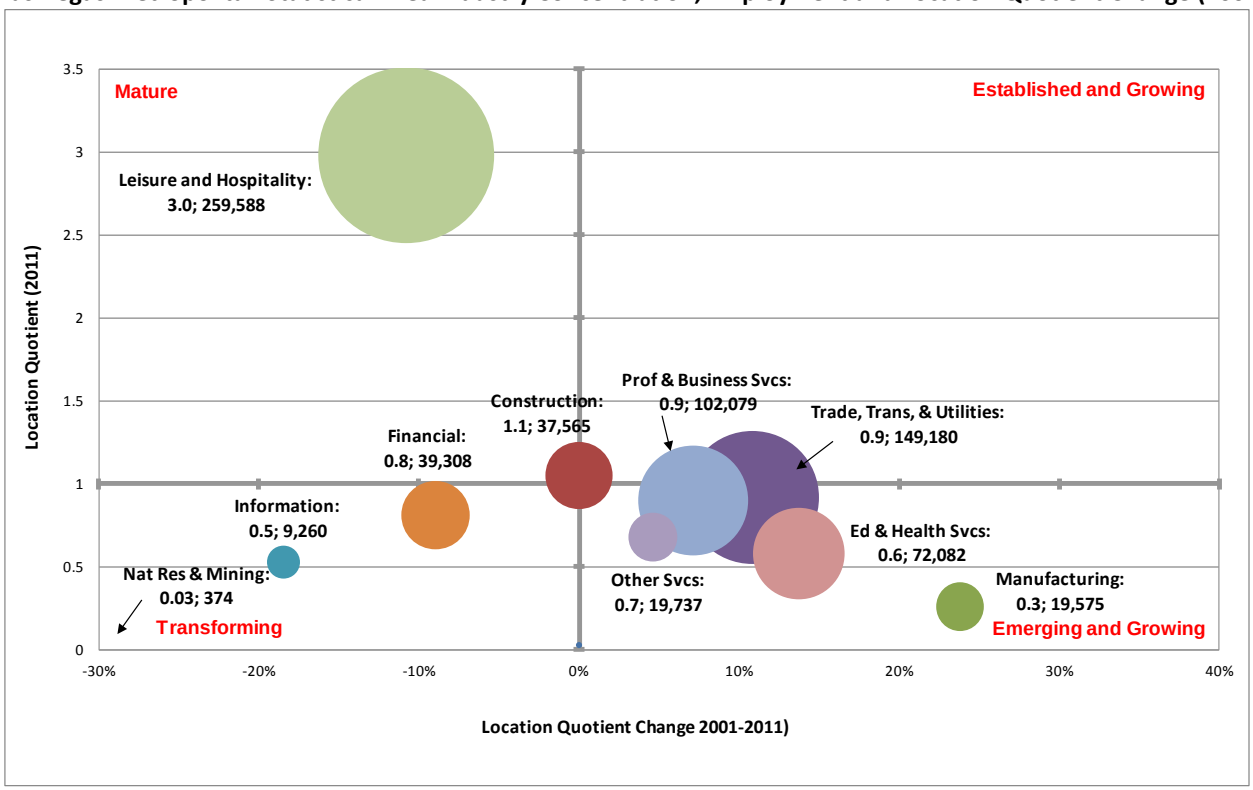

Source: U.S. Bureau of Labor Statistics 2001 and 2011

## *Las Vegas-Paradise Metropolitan Statistical Area*

Figure 1-38 shows that the Las Vegas-Paradise area has five emerging and growing industries, which include Professional and Business Services, Trade, Transportation and Utilities, Education and Health Services, and Manufacturing and Other Services; however, all five have LQs below the national level. Manufacturing experienced a 23.8 percent growth in specialization within the Las Vegas region compared to the state at 12.5 percent.

Three transforming industries decreasing in specialization are Financial, Information, and Natural Resources and Mining. The Construction industry has remained unchanged, and as a mature industry, Leisure and Hospitality has the highest LQ of all industries, but also experienced a decrease in specialization over 10 years.

FIGURE 1-38
**Las Vegas Metropolitan Statistical Area Industry Concentration, Employment and Location Quotient Change (2001-2011)**




Source: U.S. Bureau of Labor Statistics 2001 and 2011

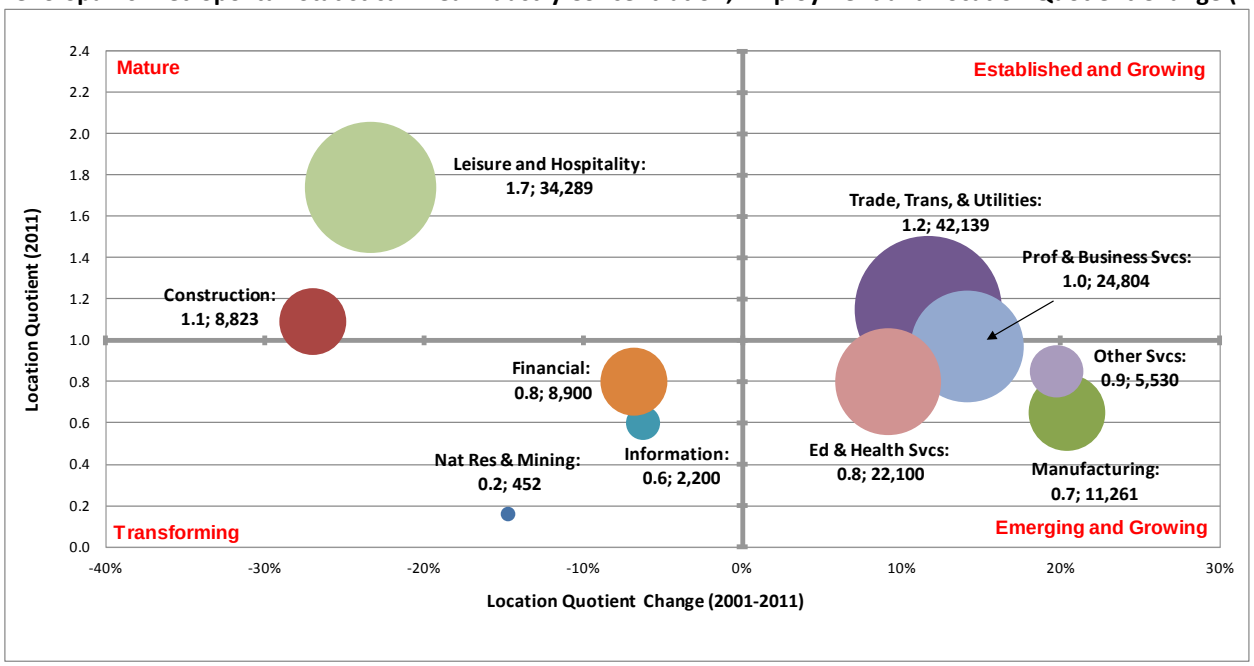
## *Reno-Sparks Metropolitan Statistical Area*

Five industries within the Reno-Sparks MSA (Figure 1-39) are established, emerging, and growing: Transportation Trade and Utilities, Professional and Business Services, Education and Health Services, Manufacturing, and Other Services. Compared to the state of Nevada, Reno-Sparks has seen a greater specialization in Manufacturing, Trade, Transportation, and Utilities, Professional and Business Services, and Other Services. Manufacturing outpaced the state at a 20.4 percent increase in specialization, compared to 12.5 percent statewide.

The mature industries of Leisure and Hospitality and Construction are highly concentrated in the MSA, and both experienced a decrease in specialization, as did the transforming industries of Financial, Information, and Natural Resources and Mining.

FIGURE 1-39

**Reno-Sparks Metropolitan Statistical Area Industry Concentration, Employment and Location Quotient Change (2001-2011)**




Source: U.S. Bureau of Labor Statistics 2001 and 2011; Nevada Workforce Informer 2001 and 2011

## *Flagstaff Metropolitan Statistical Area*

As shown in Figure 1-40, Flagstaff mature industry Leisure and Hospitality is highly concentrated in the local economy with a 2.4 LQ; however, over the 10-year time horizon, this industry is becoming less specialized in the region. The sole emerging and growing industry is Manufacturing, with a lower than average LQ.

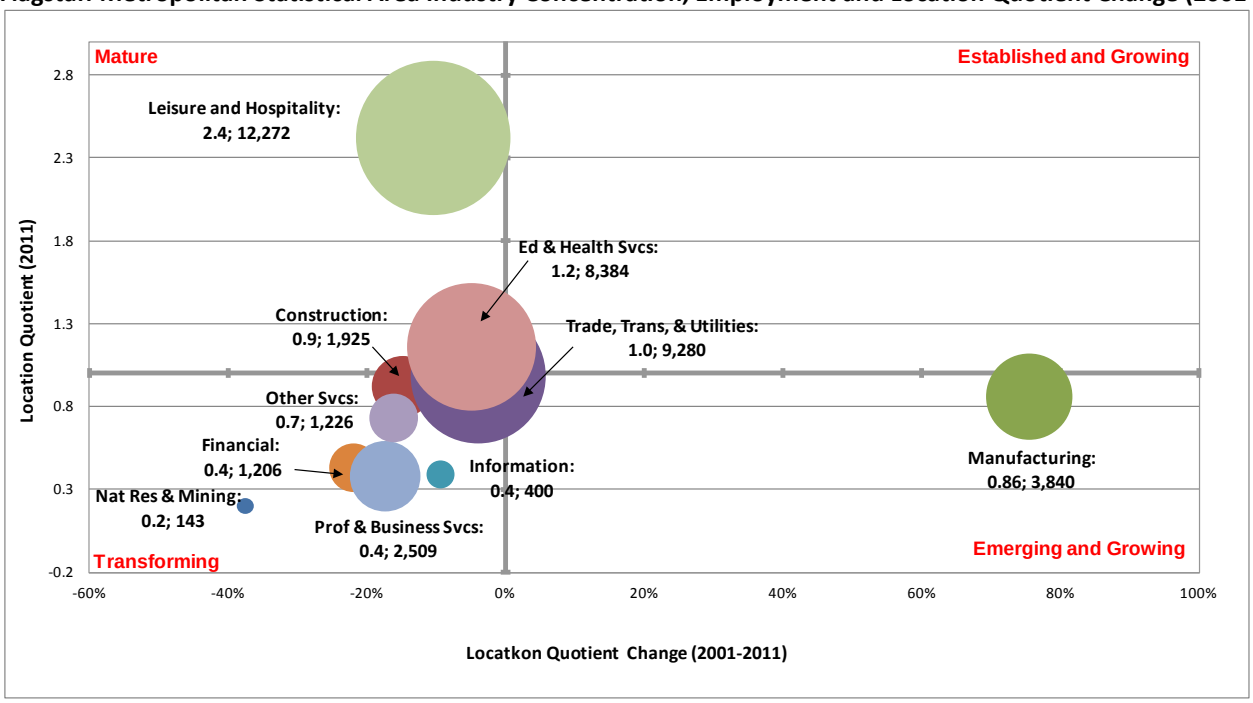
The five transforming industries, shown in the lower left hand quadrant of Figure 1-40, include Natural Resources and Mining, Financial, Professional and Business Services, Information, and Other Services, have become less concentrated and consist of the fewest number of jobs in the region.

The industries comprising Construction Education and Health Services and Trade, Transportation, and Utilities all have a high LQ, but have decreased in specialization within the regional economy.

Education and Health Services and Trade, Transportation, and Utilities are near equilibrium, but have experience a slight decline in specialization. Construction, which is also close to the national LQ average has decreased at a greater rate.

Manufacturing saw a dramatic increase with a 75.5 percent change in concentration within the Flagstaff region, compared to Arizona, which experienced a decrease of 2.8 percent.

FIGURE 1-40
**Flagstaff Metropolitan Statistical Area Industry Concentration, Employment and Location Quotient Change (2001-2011)**




Source: U.S. Bureau of Labor Statistics 2001 and 2011

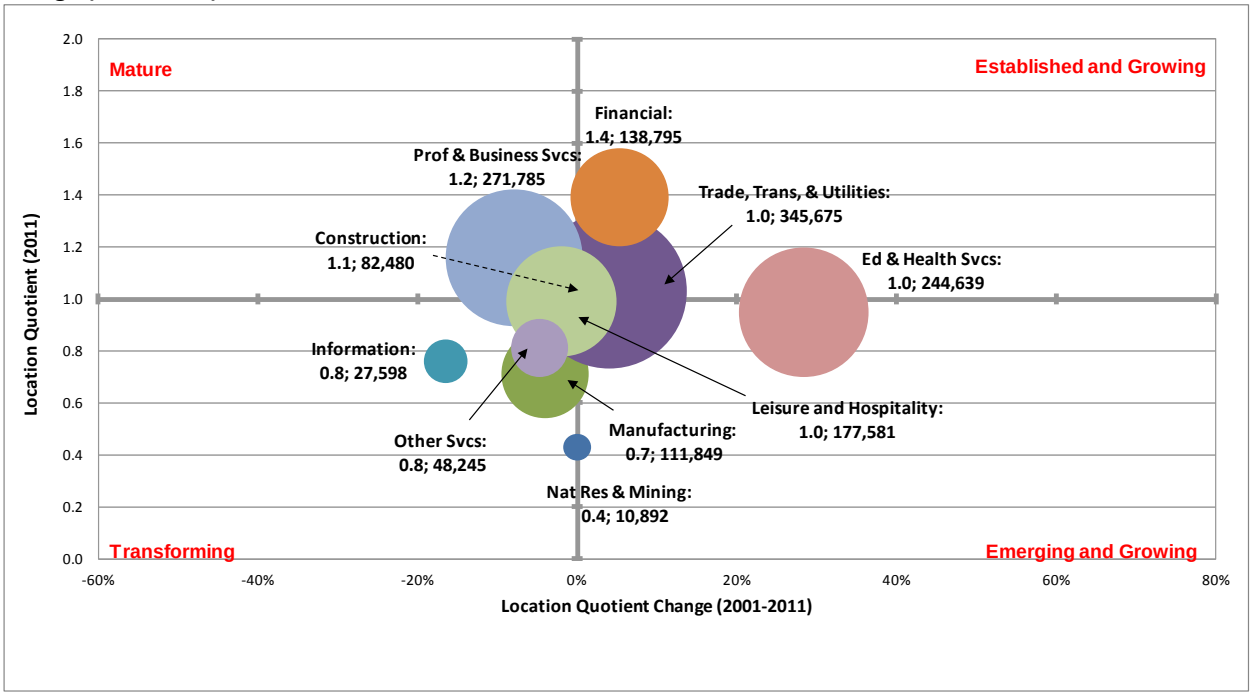
## *Phoenix-Mesa-Scottsdale Metropolitan Statistical Area*

Figure 1-41 shows that the Phoenix region has three established and growing industries that are highly concentrated: Financial, Trade, Transportation, and Utilities, and Education and Health Services. Of these, Education and Health Services experienced the largest gain at 28.4 percent, which is higher than the state at 20.5 percent.

Natural Resources and Mining and Construction had no change in their relative concentration within the region, while Information, Other Services, and Manufacturing all lost specialization in the market. The mature industry of Professional and Business Services is highly concentrated in the market, but has also lost specialization over the 10 years.

FIGURE 1-41

**Phoenix-Mesa-Scottsdale Metropolitan Statistical Area Industry Concentration, Employment and Location Quotient Change (2001-2011)**




Source: U.S. Bureau of Labor Statistics 2001 and 2011

## *Prescott Metropolitan Statistical Area*

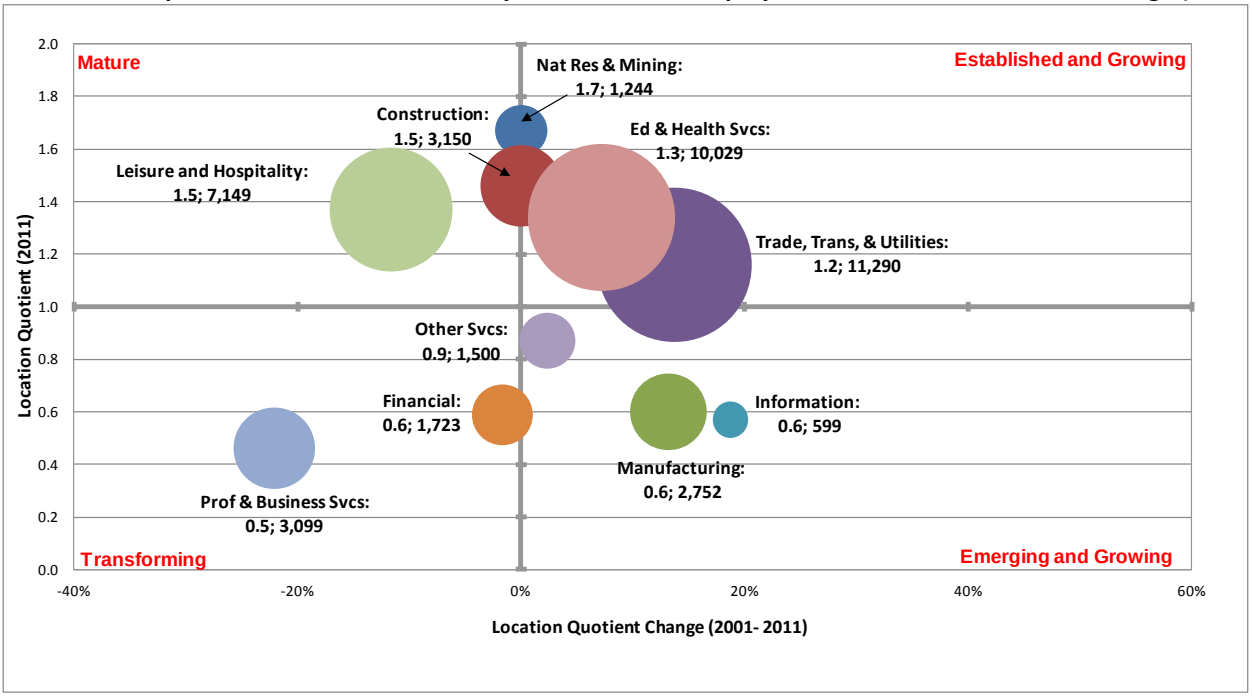
The growing economy of the Prescott MSA includes both established and emerging industries, comprised of Education and Health Services, Trade, Transportation and Utilities, Manufacturing, Information and Other Services (Figure 1-42). Of these industries, Manufacturing, Information, and Other Services are less concentrated than the national level. Manufacturing experienced a 12.2 percent increase in specialization, compared to a decrease statewide of 2.8 percent.

Construction and Natural Resources and Mining are highly specialized in the region and remained unchanged over the 10-year timeframe. The mature industry of Leisure and Hospitality Services continued to be a major employer, yet has become less concentrated.

The two transforming industries of Financial and Professional and Business Services have both lost specialization in the market.

FIGURE 1-42

**Prescott Metropolitan Statistical Area Industry Concentration, Employment and Location Quotient Change (2001-2011)**




Source: U.S. Bureau of Labor Statistics 2001 and 2011

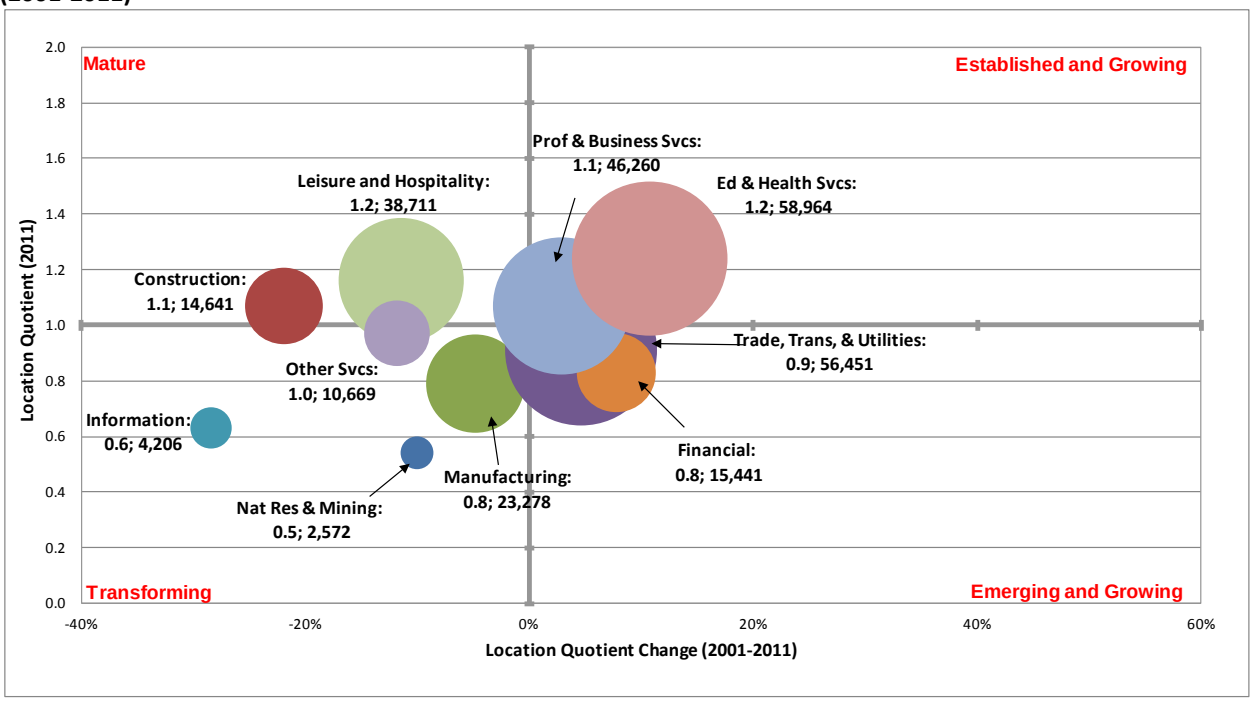
## *Tucson Metropolitan Statistical Area*

The four established, emerging, and growing industries of Professional and Business Services and Education and Health Services, Trade, Transportation, and Utilities, and Financial have become more specialized in the Tucson region (Figure 1-43). Of these, Professional and Business Services and Education and Health Services have a higher concentration in the region than the national average.

Maturing industries are Leisure and Hospitality, Construction, and Other Services, which have lost specialization in the market but maintain a concentration of 1.0 LQ or greater.

The transforming industries of Manufacturing, Information, and Natural Resources and Mining have all become less specialized in the region, and in fact have decreased at a greater rate than the state as a whole.

FIGURE 1-43
**Tucson Metropolitan Statistical Area Industry Concentration, Employment and Location Quotient Change (2001-2011)**




Source: U.S. Bureau of Labor Statistics 2001 and 2011

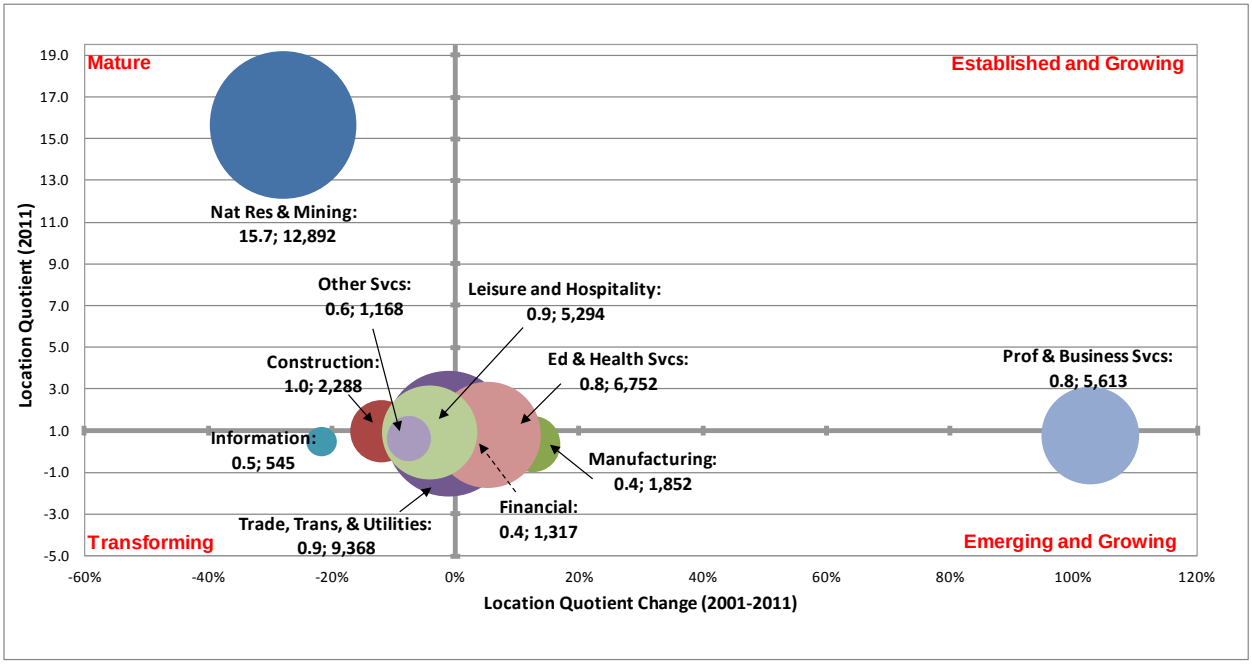
## *Yuma Metropolitan Statistical Area*

When examining the industry sectors in the Yuma MSA, it is important to note that Natural Resources and Mining is a mature industry with a 15.7 percent LQ. This industry includes agriculture, which is the predominant driver of this business sector within Yuma. Over the 10-year timeframe, however, this industry has become less specialized in the region.

Figure 1-44 shows three established, emerging, and growing industries: Education and Health Services, Manufacturing and Professional and Business Services. These three industries are becoming more specialized in the region, but still lag behind the national average of concentration with a LQ below 1.0. Professional Services achieved the greatest gain at 102.7 percent compared to Arizona with a loss of 4.4 percent. Manufacturing also outpaced the state at 12.5 percent versus a 2.8 percent decline.

Trade, Transportation, and Utilities and Leisure and Hospitality continue to play a significant role in the market. These industries are fairly concentrated with a 0.9 LQ and minimum loss of specialization. Other industries that have declined in their specialization within the region include Construction, Other Services, and Information.

FIGURE 1-44
**Yuma Metropolitan Statistical Area Industry Concentration, Employment and Location Quotient Change (2001-2011)**




Source: U.S. Bureau of Labor Statistics 2001 and 2011

# 2.0 Acronyms and Abbreviations

| | |
|---|---|
| FTZ | foreign trade zone |
| GDP | gross domestic product |
| LQ | location quotient |
| MSA | metropolitan statistical area |
| SR | State Route |
| UPRR | Union Pacific Railroad |
| U.S. | United States |

# 3.0 References


Arizona Commerce Authority. 2010. *Growth Sector Overview*. Available at: http://www.azcommerce.com/. Accessed October 25, 2012.

Arizona Commerce Authority. 2013. *Job by Industry Report for Arizona, EMSI.*

Arizona Department of Administration, State Demographers Office, Population Projections. 2012. Available at: http://www.azstats.gov/population-projections.aspx. Accessed September 25, 2012.

Arizona Department of Transportation. 2012k. *Arizona Statewide Travel Demand Model*. GIS shapefile.

Brookings Institution. 2011. *An Economic Development Agenda for Nevada.* Available at: http://www.brookings.edu/~/media/research/files/papers/2011/11/14%20nevada%20economy/1114_nevada_economy.pdf.

Carson City. 2006. *Carson City Master Plan.* Available at: http://www.carson.org/Index.aspx?page=809.

City of Las Vegas. n.d. *The City of Las Vegas Redevelopment Areas.* Available at: http://www.lasvegasnevada.gov/files/Redevelopment_Areas_Map.pdf. Accessed December 16, 2012.

City of Las Vegas. 2000. *The City of Las Vegas Master Plan 2020*. Available at: http://www.lasvegasnevada.gov/files/LV2020MasterPlan.pdf. Accessed December 16, 2012.

City of Reno. 2011. *City of Reno Comprehensive Annual Financial Report.* Available at: http://reno.gov/Modules/ShowDocument.aspx?documentid=32711.

Greater Phoenix Economic Council. 2013. Available at: http://www.gpec.org/home. Accessed January 30, 2013.

Import Administration. 2012. *U.S. Foreign Trade Zones*. Available at: http://ia.ita.doc.gov/ftzpage/letters/ftzlist-map.html#arizona. Accessed November 30, 2012.

Maricopa Association of Governments. 2012. *Freight Transportation Framework Study*. Available at: http://www.bqaz.org/freightStudy.asp. Accessed October 30, 2012.

Nevada Department of Employment. 2012. *Nevada Long-Term Industrial Employment Projections.* Available at: http://www.nevadaworkforce.com/?PAGEID=67&SUBID=197.

Nevada Department of Transportation. 2012f. *Nevada Statewide Travel Demand Model*. GIS shapefile.

Nevada Development Authority. n.d. *Southern Nevada's Foreign Trade Zone.* Available at: http://www.nevadadevelopment.org/documents/FTZBrochure1-26-10_000.pdf. Accessed December 16, 2012.

Nevada State Demographer's Office. 2012. Available at: http://nvdemography.org. Accessed September 25, 2012.

Nevada Workforce Informer. 2001 and 2011. Available at: http://www.nevadaworkforce.com/cgi/dataanalysis/AreaSelection.asp?tableName=Industry. Accessed May 17, 2013.

Nogales Community Development Corporation. 2012. *Nogales, USA Commerce*. Available at: http://www.nogalesusa.com/commerce.html Accessed November 30, 2012.

Northeastern Nevada Regional Development Authority. 2013. Available at: http://www.eceda.com/. Accessed February 2013.

Pinal County. 2009. *Comprehensive Plan*. Available at: http://pinalcountyaz.gov/Departments/PlanningDevelopment/ComprehensivePlanUpdate/Pages/Home.aspx. Accessed November 30, 2012.

Tioga Group. 2006. *Inland Port Feasibility Study*. Available at: http://floridailc.com/PDF/SCAG-InlandPortCaseStudies063006.pdf. Accessed November 30, 2012.

Tucson Regional Economic Opportunities. 2006. *Tucson Economic Blueprint Strategic Analysis Report.*

Tucson Regional Economic Opportunities. 2012. *Industry Strengths*. http://www.treoaz.org/Industry-Strengths.aspx. Accessed November 30, 2012.

U.S. Bureau of Economic Analysis. 2012. *Regional Economic Accounts*. Available at http://www.bea.gov/regional/. Accessed September 25, 2012.

U.S. Bureau of Labor Statistics. 2001 and 2011. Available at: http://data.bls.gov/location_quotient/ControllerServlet;jsessionid=56ED4468D9FE2FB3000A18F6C95EC0E1.tc_instance3. Accessed May 17, 2013.

U.S. Census Bureau, Population Division. 1990. Available at: http://www.census.gov/popest/data/historical/1990s/state.html. Accessed September 25, 2012.

U.S. Census Bureau. 2000 and 2010. *Summary File 1*. Available at: http://www.census.gov/mp/www/cat/decennial_census_1990/1990_census_of_population_and_housing_summary_tape_file_1a.html. Accessed September 25, 2012.

U.S. Census Bureau, Population Division. 2005. *Interim State Population Projections, 2005*. Available at: http://www.census.gov/population/projections/data/state/projectionsagesex.html. Accessed September 25, 2012.

U.S. Census Bureau. 2010a. *2010 Census; 2006–2011 American Community Survey*. Available at: http://factfinder2.census.gov. Accessed September 25, 2012.

U.S. Census Bureau 2010b. County Business Patterns. Available at http://www.census.gov/econ/cbp. Accessed December 2012.

U.S. Census Bureau 2011. *American Community Survey; 2011, 2009-2011, 2006-2011*. Available at: http://factfinder2.census.gov. Accessed September 25, 2012.

# Appendix C
# Existing and Future Transport Characteristics

Prepared for

Nevada Department of Transportation

Arizona Department of Transportation

June 2013

CH2M HILL
AECOM
HDR
ESI

# Contents



**Tables**

**Section** **Page**



**Figures**

# 1.0 Existing and Future Transport Characteristics

Transportation networks provide important connections that join together urban areas, but the Intermountain West has an underdeveloped network. Phoenix and Las Vegas are the two largest proximate metropolitan areas in the United States (U.S.) not directly linked by an Interstate. Improving and expanding existing infrastructure is an important priority for the Intermountain West as it seeks to expand global trade and support a growing population. Failure to establish adequate infrastructure to move people and goods around the country could significantly constrain future economic growth.

The purpose of this appendix is to provide an overview of the existing and future transport characteristics of the corridor in Arizona and Nevada. This appendix is organized into two major sections: Moving People and Moving Goods. These sections include discussions of existing and future conditions for the following:

- Moving People
  - Highways
  - Aviation
  - Passenger Rail and Transit
  - Safety
- Moving Goods
  - Trade Flow Trends
  - Ports
  - Trucking
  - Freight Rail
  - Aviation

## 1.1 Moving People

The population of the Intermountain West is currently 25 million, and it includes some of the most densely populated and fastest growing counties in the U.S. The rate of growth for the Intermountain West was double that of the U.S. as a whole over the last 10 years (see Appendix C, Economic Development and Demographic Trends, for more details). Arizona and Nevada were the fastest growing states in 2009, and both have some of the fastest growing counties in the nation. It is anticipated that over the next 20 years, Arizona will grow by 38 percent and Nevada will grow by 24 percent. This section describes some of the opportunities and challenges of moving people between these major population centers via car, airplane, and passenger rail/transit.

### 1.1.1 Highways

This section discusses roadway and traffic conditions along the major north-south highways connecting Arizona and Nevada. It also provides an overview of current and projected safety and operations along these major highways.

#### *Existing Conditions*

Interstate highway travel in Arizona and Nevada is primarily an east-west movement between California and the population centers in the Midwest and Atlantic coast regions. This is reflected both in the personal vehicle and commercial truck flows. While there are strong flows between Arizona and southern Nevada, demand for travel between Arizona, Idaho, Oregon, and Washington is weaker. This section presents the existing roadway network, existing traffic count data showing both personal vehicle and commercial truck flows on the primary north-south highways linking Arizona and Nevada, congestion data, and existing safety information. Additional data on existing commodity flows between western states moving on the highway system are discussed in Section 1.2.

## Roadway Network

Arizona and Nevada are served by seven different Interstate highways (Figure 1-1). I-8, I-10, I-40, and I-80 all serve east-west travel. I-10, I-40, and I-80 are transcontinental routes reaching across the U.S. between California and the Atlantic coast. I-8 provides a connection between San Diego County and I-10 in Arizona. I-15, I-17, and I-19 serve north-south travel. I-17 connects I-10 and I-40 in Arizona between Phoenix and Flagstaff. I-19 connects Nogales, Arizona, on the Mexican border to I-10 at Tucson. I-15 connects San Diego in California with the Canadian border in Montana.

FIGURE 1-1
**Arizona and Nevada Interstates**

Several routes in these two states are considered National Highway System (NHS) routes – designated by the Federal Highway Administration (FHWA) as roadways important to the nation's economy, defense, and mobility. These include I-8, I-10, I-15, I-17, I-19, I-80, I-215, I-515, US 50, US 60, US 93, US 95, US 395, State Route (SR) 95, SR 51, SR 101L, SR 202L, SR 303L, SR 87, SR 587, SR 659, and portions of SR 85, SR 90, and SR 80. For the non-Interstate highways, these corridors tend to be highways that provide access to a major port, airport, public transportation facility, or other intermodal transportation facility (FHWA 2012).

FHWA High Priority Corridors are also located in Arizona and Nevada. I-8 and I-10 in Arizona are part of the Alameda/Southwest Passage Corridor, and I-40 is part of the Economic Lifeline Corridor. The CANAMEX Corridor, identified by North American Free Trade Agreement (NAFTA), is designated by FHWA as a Congressional High Priority Corridor and includes:

- I-19 from Nogales to Tucson (Arizona)
- I-10 from Tucson to Phoenix (Arizona)
- US 93 from Wickenburg to Las Vegas (Arizona/Nevada)
- I-15 from Las Vegas to the Canadian border (Nevada and beyond)

The segment of the CANAMEX Corridor, including US 93 between Wickenburg and Las Vegas, has recently been named an "NHS High Priority Corridor designated as a future Interstate," otherwise known as I-11, through the Moving Ahead in the 21st Century (MAP-21) legislation (FHWA 2012). Figure 1-2 shows the Congressionally designated High Priority Corridors in Arizona and Nevada.

FIGURE 1-2
**Arizona and Nevada Transportation Network**


The following sections provide roadway and traffic data for north-south routes currently used to travel between Arizona and Nevada.

## Traffic Data

### *US Route 93*

While the Interstate system provides the primary routes for east-west travel across Arizona and Nevada, most north-south travel between Arizona and Nevada is via US 93. From its southern terminus at Wickenburg, US 93 passes north to I-40 through Kingman before continuing north across the Mike O'Callaghan-Pat Tillman Memorial Bridge (Hoover Dam Bypass Bridge) to the Las Vegas area. From Las Vegas, US 93 first travels north concurrent with I-15 before breaking off to pass through Ely and Wells before entering Idaho at Jackpot, Nevada.

US 93 is the primary route for travel between Arizona and Nevada. It connects the Phoenix and Tucson metropolitan areas with the Las Vegas metropolitan area. Table 1-1 shows the current annual average daily traffic (AADT) volumes and total travel lanes for US 93 in both states. Recent and future improvements to US 93 are discussed under "Future Highway Projects" later in this section.

TABLE 1-1
**US 93 Current Annual Average Daily Traffic Counts**

| Segment | | | | | |
|---|---|---|---|---|---|
| Start | End | AADT | % Trucks | Travel Lanes | Notes |
| **Nevada** | | | | | |
| Idaho/Nevada State Line | I-80 (Wells) | 2,100 | 20 | 2 | |
| I-80 (Wells) | US 50/US 6 (Ely) | 1,500 | 18 | 2 | |
| US 50/US 6 (Ely) | SR 319 | 400 | 25 | 2 | |
| SR 319 | SR 168 | 1,700 | 16 | 2 | |
| SR 168 | I-15 (Exit 64) | 2,100 | 16 | 2 | |
| I-15 (Exit 64) | I-15/I-515 (Spaghetti Bowl) | 80,000 | 24 | 4 to 6 | Concurrent with I-15 |
| I-15/I-515 (Spaghetti Bowl) | SR 582 | 131,000 | 4 | 6 | Concurrent with I-515/US 95 |
| SR 582 | I-215 | 132,000 | 4 | 6 | Concurrent with I-515/US 95 |
| I-215 | Wagon Wheel Drive | 85,000 | 4 | 6 | Concurrent with I-515/US 95 |
| Wagon Wheel Drive | US 93/US 95 Interchange | 42,000 | 9 | 4 | Concurrent with I-515/US 95 |
| US 93/US95 Interchange | Boulder City | 32,300 | 10 | 4 | Concurrent with I-515/US 95 |
| Boulder City | Nevada/Arizona State Line | 17,000 | 11 | 4 | |
| **Arizona** | | | | | |
| Arizona/Nevada State Line | Kingman Wash Road | 14,700 | 13 | 4 | |
| Kingman Wash Road | SR 68 | 11,200 | 17 | 4 | |
| SR 68 | I-40 (Exit 48) | 28,200 | 15 | 4 | |
| I-40 (Exit 48) | I-40 (Exit 71) | 21,800 | 30 | 4 | Concurrent with I-40 |
| I-40 (Exit 71) | SR 71 | 7,100 | 19 | 2 to 4 | |
| SR 71 | US 60 | 10,700 | 17 | 2 | |

Sources: Arizona Department of Transportation (ADOT) 2011d , Nevada Department of Transportation (NDOT) 2012g

### *US Route 95*

From its origin at the Mexican border south of Yuma, US 95 stretches approximately 123 miles across Arizona adjacent to the Colorado River northward to California, Nevada, and Idaho. At its junction with I-10, it runs concurrent heading west into California. SR 95 then continues north in Arizona from the I-10/US 95 junction providing a north-south connection between I-10 and I-40. US 95 enters Nevada west of Laughlin on its way to Las Vegas.

In Nevada, US 95 is the primary route between Las Vegas and Reno. It runs concurrently with I-80 between Lovelock and Winnemucca before heading north to enter Oregon. While US 95 is mostly an alternate route for travel between Arizona and Nevada, it is a significant route for north-south travel in Nevada. Table 1-2 shows the current AADT volumes and total travel lanes for US 95 in Nevada, California, and Arizona.

TABLE 1-2
**US 95/SR 95 Current Annual Average Daily Traffic Counts**

| Segment | | AADT | % Trucks | Travel Lanes | Notes |
|---|---|---|---|---|---|
| **Start** | **End** | | | | |
| **US 95 Nevada** | | | | | |
| Oregon/Nevada State Line | SR 140 | 1,600 | 40 | 2 | |
| SR 140 | I-80 (Exit 178) | 2,500 | 31 | 2 | |
| I-80 (Exit 178) | I-80 (Exit 83) | 7,700 | 45 | 4 | Concurrent with I-80 |
| I-80 (Exit 83) | US 50 (Fallon) | 1,700 | 14 | 2 | |
| US 50 (Fallon) | SR 359 (Hawthorne) | 3,200 | 29 | 2 | |
| SR 359 (Hawthorne) | US 6 (Tonopah) | 2,400 | 38 | 2 | |
| US 6 (Tonopah) | SR 160 (Pahrump Highway) | 2,000 | 29 | 2 | |
| SR 160 (Pahrump Highway) | Mercury Highway | 3,100 | 16 | 2 | |
| Mercury Highway | SR 157 | 5,300 | 20 | 4 | |
| SR 157 | I-15/I-515 (Spaghetti Bowl) | 150,000 | 5 | 4 to 6 | |
| US 93/ US 95 Interchange[a] | SR 163 | 8,700 | 25 | 4 | |
| SR 163 | Nevada/California State Line | 3,400 | 30 | 2 | |
| **US 95 California** | | | | | |
| Nevada/California State Line | I-40 (Exit 133) | 2,700 | 12 | 2 | |
| I-40 (Exit 133) | I-40 (Exit 144) | 11,500 | 53.8 | 4 | Concurrent with I-40 |
| I-40 (Exit 144) | Havasu Lake Road | 4,800 | 19 | 2 | |
| Havasu Lake Road | SR 62 | 2,200 | 25 | 2 | |
| SR 62 | I-10 | 2,600 | 14 | 2 | |
| I-10 | Arizona/California State Line | 24,500 | 36 | 4 | Concurrent with I-10 |
| **SR 95 Arizona** | | | | | |
| I-40 | North Lake Havasu City | 8,500 | 8 | 2 | |
| North Lake Havasu City | South Lake Havasu City | 25,500 | 8 | 4 | |
| South Lake Havasu City | Parker (North limit) | 6,100 | 8 | 2 | |
| Parker (North limit) | Parker (South limit) | 12,100 | 9 | 2 | |
| Parker (South limit) | I-10 (Quartzsite) | 2,700 | 25 | 2 | |
| **US 95 Arizona** | | | | | |
| I-10 (Quartzsite) | Yuma Proving Ground | 2,500 | 18 | 2 | |
| Yuma Proving Ground | I-8 in Yuma | 8,000 | 18 | 2 | |
| I-8 in Yuma | 4th Avenue (Yuma) | 35,500 | 6 | 4 | |
| 4th Avenue (Yuma) | 24th Street (Yuma) | 28,600 | 6 | 4 | |
| 24th Street (Yuma) | Somerton Avenue | 15,500 | 6 | 4 | |
| Somerton Avenue | County 19th Street | 8,900 | 10 | 4 | |
| County 19th Street | County 23rd Street | 14,800 | 10 | 4 | |
| County 23rd Street | San Luis Port of Entry | 19,800 | 10 | 4 | |

[a] Segments between I-15/I-515 and US93/US 95 Interchange are concurrent with US 93 (see Table 1-1 for data).

Sources: ADOT 2011d, Caltrans 2011, NDOT 2012g

### *SR 62*

SR 62 in California is an east-west route that terminates near the California/Arizona border at its intersection with Arizona's SR 95 in Parker, Arizona. SR 62 is a popular route for truck traffic connecting to US 95 in California from SR 95 in Arizona. Table 1-3 shows the current AADT volumes and percentage of trucks on SR 62 between SR 95 (in Arizona) and US 95 (in California).

TABLE 1-3
**SR 62 Current Annual Average Daily Traffic Counts**

| Segment | | | | | |
|---|---|---|---|---|---|
| Start | End | AADT | % Trucks | Travel Lanes | Notes |
| Arizona/California State Line | US 95 (in California) | 2,250 | 21 | 2 | |

Source: Caltrans 2011

### *I-17*

I-17 is an Interstate highway located entirely within Arizona. From its origin in Phoenix, I-17 stretches approximately 146 miles across Arizona northward to Flagstaff. I-17 is one of the Phoenix metropolitan area's primary freeways. I-17 begins in Phoenix at I-10. US 60 is coincident with the Interstate through central Phoenix and the Interstate's crossing of I-10, where US 60 branches northwest along Grand Avenue and I-17 continues north to its termination in Flagstaff.

The route gains more than a mile in altitude between Phoenix where the elevation is approximately 1,100 feet, to Flagstaff where the elevation is over 7,000 feet. In the mountainous roadway section north of the Phoenix metropolitan area, roadway grades exceed 6 percent (ADOT 2007a). Table 1-4 shows the current AADT volumes and total travel lanes for I-17 in Arizona.

TABLE 1-4
**I-17 Current Annual Average Daily Traffic Counts**

| Segment | | | | | |
|---|---|---|---|---|---|
| Start | End | AADT | % Trucks | Travel Lanes | Notes |
| I-10 | SR 101 | 183,500 | 7 | 6 | |
| SR 101 | SR 74 | 87,600 | 8 | 6 | |
| SR 74 | SR 69 (Cordes Junction) | 32,000 | 15 | 4 | |
| SR 69 (Cordes Junction) | SR 260 (Camp Verde) | 27,000 | 15 | 4 | |
| SR 260 (Camp Verde) | SR 89A | 18,000 | 20 | 4 | |
| SR 89A | Flagstaff | 28,500 | 18 | 4 | |

Source: ADOT 2011d

### *I-19*

I-19 in Arizona is only 63 miles in total length and runs from Nogales on the Mexico/Arizona border to Tucson where it intersects I-10. Table 1-5 shows the current AADT volumes and total travel lanes for I-19.

TABLE 1-5
**I-19 Current Annual Average Daily Traffic Counts**

| Segment | | AADT | % Trucks | Travel Lanes | Notes |
|---|---|---|---|---|---|
| Start | End | | | | |
| Nogales | Mariposa Road | 11,600 | 10 | 4 | |
| Mariposa Road | Grand Avenue | 23,100 | 10 | 4 | |
| Grand Avenue | Continental Road | 32,900 | 10 | 4 | |
| Continental Road | Duval Mine Road | 31,100 | 10 | 4 | |
| Duval Mine Road | San Xavier Road | 37,900 | 10 | 4 | |

Source: ADOT 2011d

### *US 395*

US 395 begins in California at I-15 and stretches all the way to the Canadian border. US 395 runs along the east side of the Sierra Nevada through California, Nevada, Oregon, and Washington. Table 1-6 shows the current AADT volumes and total travel lanes for US 395 in California and Nevada.

TABLE 1-6
**US 395 Current Annual Average Daily Traffic Counts**

| Segment | | AADT | % Trucks | Travel Lanes | Notes |
|---|---|---|---|---|---|
| Start | End | | | | |
| **California** | | | | | |
| I-15 | SR 18 | 21,000 | 17 | 2 | |
| SR 18 | SR 58 | 13,000 | 18 | 2 | |
| SR 58 | SR 178 | 4.200 | 15 | 2 | |
| SR 178 | SR 14 | 2,750 | 23 | 2 | |
| SR 14 | SR 190 | 5,400 | 12 | 2 | |
| SR 190 | SR 136 | 5,700 | 10 | 2 | |
| SR 136 | SR 168 | 6,300 | 19 | 2 | |
| SR 168 | US 6 | 7,800 | 11 | 2 | |
| US 6 | SR 120 | 6,000 | 12 | 2 | |
| SR 120 | SR 182 | 3,600 | 11 | 2 | |
| SR 182 | California/Nevada State Line | 3,300 | 11 | 2 | |
| **Nevada** | | | | | |
| Nevada/California State Line | SR 208 | 4,600 | 20 | 2 | |
| SR 208 | Pinenut Road | 8,500 | 15 | 2 | |
| Pinenut Road | US 50 (Fairview Drive) | 30,000 | 8 | 4 | |
| US 50 (Fairview Drive) | SR 431 (Mt. Rose Highway) | 35,000 | 10 | 4 | Concurrent with I-580 |
| SR 431 (Mt. Rose Highway) | I-80 | 125,000 | 5 | 6 | Concurrent with I-580 |
| I-80 | N. McCarran Boulevard | 95,000 | 5 | 6 | |
| N. McCarran Boulevard | Stead Boulevard | 50,000 | 5 | 4-6 | |
| Stead Boulevard | California/Nevada State Line | 25,500 | 5 | 4 | |

Source: NDOT 2012g

## Congestion

Congestion has impacts on both commuters and truckers, affecting businesses, suppliers, manufacturers, and the overall economy. If congestion affects truck productivity and delivery times, costs are passed on to consumers in the form of higher prices affecting areas far away from the region where the congestion occurs. Congestion can result in unreliable trip times and missed deliveries, both of which cause major business implications. If the infrastructure supporting freight traffic is reliable, manufacturing and retail firms can carry less inventory because they can rely on goods being delivered on time.

Five locations in Arizona and Nevada appear on FHWA's annual report on congestion at freight-significant highway locations. The majority of locations currently monitored are urban Interstate interchanges, and they are ranked according to congestion's impact on freight (American Transportation Research Institute 2011):

- I-15 at I-515 in Las Vegas
- I-10 at I-19 in Tucson

- I-10 at SR 51/SR 202 in Phoenix
- I-17 at I-40 in Flagstaff
- I-80 at US 395 in Reno

Figure 1-3 shows the existing congestion on the major highways in Arizona and Nevada. The segment of US 93 near Wickenburg is approaching capacity. US 93 and US 95 through Las Vegas are currently congested. US 395 in Southern California and northern Nevada is approaching capacity, and through Reno it is currently congested.

FIGURE 1-3
**Arizona and Nevada Existing Levels of Service on Major Highways**

## Safety

In addition to the damage done to lives and property, traffic incidents also contribute to significant delays for passenger and freight travel as well as costs to the public. Information regarding fatality rates and crash types can be used to analyze roadway conditions and driver performance.

Since US 93 between Wickenburg and Las Vegas was recently named an "NHS High Priority Corridor designated as a future Interstate," (otherwise known as I-11) through the MAP-21 legislation, it was the primary focus for this safety analysis. This portion of US 93 was broken into 11 segments. The most recent crash data for these segments of US 93 were obtained from ADOT and NDOT for review. Table 1-7 summarizes the traffic safety performance measures for each segment with a comparison to each state's fatality rate, which was obtained from the National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System (FARS). These data are also shown in Figure 1-4 with a comparison to the national fatality rate of 0.0111.

As shown in Figure 1-4, 5 of the 11 segments on US 93 (3 in Arizona and 2 in Nevada) have fatality rates higher than both the statewide and national fatality rates.

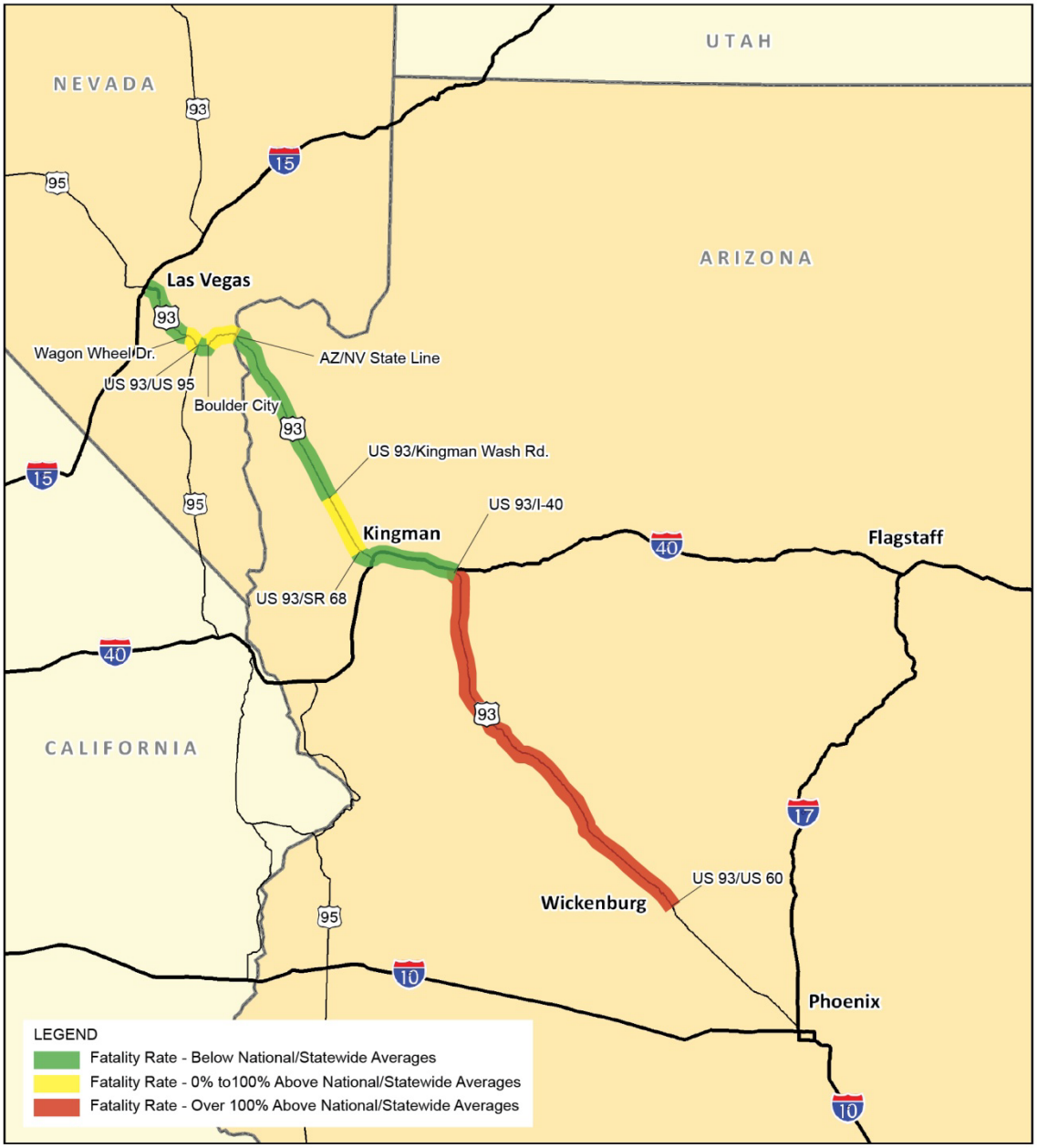
TABLE 1-7
**US 93 Crash Statistics between Wickenburg and Las Vegas**

| Segment | | Segment Length (miles) | AADT | Total Rate | PDO Rate | Casualty Rates (casualties per million vehicle miles) | |
|---|---|---|---|---|---|---|---|
| From | To | | | | | Injury Rate | Fatality Rate |
| **Arizona** | | | | | | | |
| **State of Arizona Average Rates (2010)** | | | | **1.7700** | **1.2070** | **0.8364** | **0.0127** |
| US 60 | SR 71 | 18.00 | 10,700 | 1.1010 | 0.6828 | 0.3329 | **0.0853** |
| SR 71 | I-40 (Exit 71) | 89.00 | 7,100 | 0.6469 | 0.3876 | 0.2298 | **0.0295** |
| I-40 (Exit 71) | I-40 (Exit 48) | 23.00 | 21,800 | 0.0251 | 0.0186 | 0.0066 | 0.0000 |
| I-40 (Exit 48) | SR 68 | 4.00 | 28,200 | 0.5586 | 0.3789 | 0.1700 | 0.0097 |
| SR 68 | Kingman Wash Road | 65.00 | 11,200 | 0.5525 | 0.2966 | 0.2333 | **0.0226** |
| Kingman Wash Road | Arizona/Nevada State Line | 1.00 | 14,700 | 0.4846 | 0.1491 | 0.3355 | 0.0000 |
| **Nevada** | | | | | | | |
| **State of Nevada Average Rates (2010)** | | | | **1.3355** | **0.9579** | **0.3754** | **0.0122** |
| Arizona/Nevada State Line | Boulder City | 8.03 | 17,000 | 0.7346 | 0.4375 | 0.2770 | **0.0201** |
| Boulder City | US 93/US 95 Interchange | 3.37 | 32,300 | 0.9162 | 0.6796 | 0.2316 | 0.0050 |
| US 93/US 95 Interchange | Wagon Wheel Drive | 3.40 | 42,000 | 0.7943 | 0.5641 | 0.2149 | **0.0153** |
| Wagon Wheel Drive | I-215 | 5.35 | 85,000 | 0.4892 | 0.3193 | 0.1699 | 0.0000 |
| I-215 | I-15/I-515 (Spaghetti Bowl) | 12.25 | 132,000 | 0.9641 | 0.6974 | 0.2643 | 0.0024 |

Sources: ADOT 2013a, NDOT 2013b, NHTSA 2010

Note: PDO = property damage only

FIGURE 1-4
**Fatality Rates for US 93 from Wickenburg to Las Vegas (2007 to 2012)**




Sources: ADOT 2013a, NDOT 2013b, NHTSA 2010

Per Section 148(c)(1)(D) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), all states are required to annually submit a report that describes the top 5 percent of locations with the most severe safety needs. Each state's *Five Percent Report* was reviewed to determine whether any segments on the major highways in Arizona and Nevada were identified as top crash locations. In Nevada, these locations include segments of US 95 in Clark County and US 93 in Clark, White Pine, and Elko Counties. In Arizona, the locations with severe safety needs include segments of I-40 near Kingman and I-10 in Phoenix.

## *Future Conditions*

This section presents future traffic forecasts, future congestion data, and information on future highway projects on major highways in both Arizona and Nevada.

## Traffic Forecasts

Arizona and Nevada statewide models were combined to develop 2040 traffic forecasts for the US 93 and US 95 corridors as well as SR 62 I-17, I-40, and US 395.

The newer second generation Arizona statewide travel demand model paints a different picture of the future than the first generation model. Forecasts from both models are presented below.

### *Arizona First Generation Model*

In 2009, ADOT developed its first generation statewide travel demand model (AZTDM1). Prepared for the *Building a Quality Arizona (bqAZ) Statewide Transportation Framework Program* (AECOM 2010), this high-level model included state highways and a generalized road network in urban areas. Traffic forecasts were prepared for 2030 and 2050.

### *Arizona Second Generation Model*

Immediately after completion of the AZTDM1, ADOT began developing a more detailed second generation statewide travel demand model (AZTDM2). Like its predecessor, this three-step model includes trip generation, distribution, and traffic assignment steps, but it is more detailed, with more than 6,000 traffic analysis zones. The current planning horizon for the AZTDM2 is 2035.

### *Arizona Population and Employment Projections*

Table 1-8 shows the population and employment projections for the 2035 AZTDM2 and the 2030 and 2050 AZTDM1. The table shows that the 2030 AZTDM1 growth scenario is higher than the 2035 AZTDM2 growth scenario. While the difference between these projections is explained by a revision in the statewide growth outlook based on the economic downturn that started in 2007, these growth scenarios represent alternative futures that help inform the planning process.

TABLE 1-8
**Arizona Statewide Travel Demand Model Socioeconomic Summary**

| | 2010 AZTDM2 | 2035 AZTDM2 | 2030 AZTDM1 | 2050 AZTDM1 |
|---|---|---|---|---|
| Population (household) | 6.3 million | 9.7 million | 11.1 million | 14.9 million |
| Employment | 2.3 million | 4.0 million | 5.5 million | 7.4 million |

Source: ADOT 2012k

For use in this planning effort, the AZTDM2 2035 traffic forecasts were extrapolated to 2040 based on the 2010 to 2035 statewide population growth rate. Based on the population growth shown between 2010 and 2035 in the AZTDM2, the extrapolated 2040 Arizona population is 10.6 million. The extrapolated 2040 Arizona employment projection is 4.5 million jobs.

### *Nevada Statewide Model*

The Nevada statewide travel demand model (NVTDM) was prepared in 2012 to support the *Connecting Nevada: Planning Our Transportation Future* Phase II study (NDOT 2012b). This model was used to evaluate a 2060 population and employment growth scenario for the state to identify potential deficiencies on state highways linking urban centers.

### *Population and Employment Projections*

Table 1-9 shows the NVTDM population and employment projections. The 2040 traffic forecasts for this study were prepared by interpolating between 2030 and 2060 NVTDM forecasts.

TABLE 1-9
**Nevada Statewide Travel Demand Model Socioeconomic Summary**

| | 2010 | 2020 | 2030 | 2060 |
|---|---|---|---|---|
| Population (household) | 2.7 million | 3.2 million | 3.6 million | 5.7 million |
| Employment | 1.1 million | 1.3 million | 1.6 million | 2.6 million |

Source: NDOT 2012f

Tables 1-10 through 1-16 show the traffic forecasts on the major highways linking Arizona and Nevada (US 93, US 95, SR 62, I-17, I-19, I-40, and US 395).

TABLE 1-10
**US 93 2040 Daily Traffic Forecasts**

| Segment | | | | | |
|---|---|---|---|---|---|
| Start | End | 2040 AADT | % Trucks | 2012 Travel Lanes | Notes |
| **Nevada** | | | | | |
| Idaho/Nevada State Line | I-80 (Wells) | 4,300 | 20 | 2 | |
| I-80 (Wells) | US 50/US 6 (Ely) | 4,200 | 18 | 2 | |
| US 50/US 6 (Ely) | SR 319 | 1,500 | 25 | 2 | |
| SR 319 | SR 168 | 3,600 | 20 | 2 | |
| SR 168 | I-15 (Exit 64) | 4,200 | 16 | 2 | |
| I-15 (Exit 64) | I-15/I-515 (Spaghetti Bowl) | 130,000 | 24 | 4 to 6 | Concurrent with I-15 |
| I-15/I-515 (Spaghetti Bowl) | SR 582 | 213,000 | 5 | 6 | Concurrent with I-515/US 95 |
| SR 582 | I-215 | 232,000 | 4 | 6 | Concurrent with I-515/US 95 |
| I-215 | Wagon Wheel Drive | 135,000 | 4 | 6 | Concurrent with I-515/US 95 |
| Wagon Wheel Drive | US 93/US 95 Interchange | 78,000 | 9 | 4 | Concurrent with I-515/US 95 |
| US 93/US95 Interchange | Boulder City | 39,000 | 11 | 4 | Concurrent with I-515 |
| Boulder City | Nevada/Arizona State Line | 20,500 | 12 | 4 | |
| **Arizona** | | | | | |
| Arizona/Nevada State Line | Kingman Wash Road | 23,000 | 15 | 4 | |
| Kingman Wash Road | SR 68 | 15,000 | 18 | 4 | |
| SR 68 | I-40 (Exit 48) | 53,000 | 15 | 4 | |
| I-40 (Exit 48) | I-40 (Exit 71) | 36,000 | 30 | 4 | Concurrent with I-40 |
| I-40 (Exit 71) | SR 71 | 11,000 | 20 | 2 to 4 | |
| SR 71 | US 60 | 17,000 | 20 | 2 | |

Sources: HDR analysis of ADOT 2012k and NDOT 2012f

TABLE 1-11
**US 95/SR 95 2040 Daily Traffic Forecasts**

| Segment | | 2040 AADT | % Trucks | 2012 Travel Lanes | Notes |
|---|---|---|---|---|---|
| Start | End | | | | |
| **US 95 Nevada** | | | | | |
| Oregon/Nevada State Line | SR 140 | 4,400 | 45 | 2 | |
| SR 140 | I-80 (Exit 178) | 6,100 | 33 | 2 | |
| I-80 (Exit 178) | I-80 (Exit 83) | 11,200 | 45 | 4 | Concurrent with I-80 |
| I-80 (Exit 83) | US 50 (Fallon) | 1,700 | 14 | 2 | |
| US 50 (Fallon) | SR 359 (Hawthorne) | 4,000 | 29 | 2 | |
| SR 359 (Hawthorne) | US 6 (Tonopah) | 2,400 | 38 | 2 | |
| US 6 (Tonopah) | SR 160 (Pahrump Highway) | 2,700 | 29 | 2 | |
| SR 160 (Pahrump Highway) | Mercury Highway | 5,800 | 16 | 2 | |
| Mercury Highway | SR 157 | 7,700 | 20 | 4 | |
| SR 157 | I-15/I-515 (Spaghetti Bowl) | 200,000 | 5 | 4 to 6 | |
| US 93/US 95 Interchange[a] | SR 163 | 16,400 | 25 | 4 | |
| SR 163 | Nevada/California State Line | 15,200 | 30 | 2 | |
| **US 95 California[b]** | | | | | |
| Nevada/California State Line | I-40 (Exit 133) | 4,600 | 12 | 2 | |
| I-40 (Exit 133) | I-40 (Exit 144) | 35,700 | 45 | 4 | Concurrent with I-40 |
| I-40 (Exit 144) | Havasu Lake Road | 7,900 | 18 | 2 | |
| Havasu Lake Road | SR 62 | 3,700 | 23 | 2 | |
| SR 62 | I-10 | 5,300 | 14 | 2 | |
| **SR 95 Arizona** | | | | | |
| I-40 | North Lake Havasu City | 14,000 | 10 | 2 | |
| North Lake Havasu City | South Lake Havasu City | 38,000 | 10 | 4 | |
| South Lake Havasu City | Parker (North limit) | 10,000 | 10 | 2 | |
| Parker (North limit) | Parker (South limit) | 25,000 | 10 | 2 | |
| Parker (South limit) | I-10 (Quartzsite) | 9,000 | 25 | 2 | |
| **US 95 Arizona** | | | | | |
| I-10 (Quartzsite) | Yuma Proving Ground | 6,000 | 18 | 2 | |
| Yuma Proving Ground | I-8 in Yuma | 12,000 | 25 | 2 | |
| I-8 in Yuma | 4th Avenue (Yuma) | 46,300 | 6 | 4 | |
| 4th Avenue (Yuma) | 24th St (Yuma) | 43,400 | 6 | 4 | |
| 24th St (Yuma) | Somerton Avenue | 21,000 | 6 | 4 | |
| Somerton Avenue | County 19th Street | 18,500 | 12 | 4 | |
| County 19th Street | County 23rd Street | 26,600 | 12 | 4 | |
| County 23rd Street | San Luis Port of Entry | 21,100 | 12 | 4 | |

a Segments between I-15/I-515 and US93/US 95 Interchange are concurrent with US 93 (see Table 1-10 for data).

b California AADT data provided by Caltrans is for forecast year 2035.

Sources: HDR analysis of ADOT 2012k, Caltrans 2013, NDOT 2012f

TABLE 1-12
**SR 62 2040 Daily Traffic Forecasts**

| Segment | | 2035 AADT | % Trucks | 2012 Travel Lanes | Notes |
|---|---|---|---|---|---|
| Start | End | | | | |
| Arizona/California State Line | US 95 (in California) | 7,100 | 3 | 2 | |

Source: Caltrans 2013

TABLE 1-13
**I-17 2040 Daily Traffic Forecasts**

| Segment | | 2040 AADT | % Trucks | 2012 Travel Lanes | Notes |
|---|---|---|---|---|---|
| Start | End | | | | |
| **Arizona** | | | | | |
| I-10 | SR 101 | 255,000 | 7 | 6 | |
| SR 101 | SR 74 | 205,000 | 8 | 6 | |
| SR 74 | SR 69 (Cordes Junction) | 45,000 | 25 | 4 | |
| SR 69 (Cordes Junction) | SR 260 (Camp Verde) | 35,000 | 20 | 4 | |
| SR 260 (Camp Verde) | SR 89A | 27,000 | 20 | 4 | |
| SR 89A | Flagstaff | 45,000 | 18 | 4 | |

Source: HDR analysis of ADOT 2012k

TABLE 1-14
**I-19 2040 Daily Traffic Forecasts**

| Segment | | AADT | % Trucks | 2012 Travel Lanes | Notes |
|---|---|---|---|---|---|
| Start | End | | | | |
| Nogales | Mariposa Road | 29,200 | 10 | 4 | |
| Mariposa Road | Grand Avenue | 26,000 | 10 | 4 | |
| Grand Avenue | Continental Road | 36,600 | 10 | 4 | |
| Continental Road | Duval Mine Road | 46,800 | 10 | 4 | |
| Duval Mine Road | San Xavier Road | 60,900 | 10 | 4 | |

Source: HDR analysis of ADOT 2012k

TABLE 1-15

**I-40 2040 Daily Traffic Forecasts**

| Segment | | 2040 AADT | % Trucks | 2012 Travel Lanes | Notes |
|---|---|---|---|---|---|
| Start | End | | | | |
| **Arizona** | | | | | |
| Arizona/New Mexico State Line | SR 191 | 33,500 | 47 | 4 | |
| SR 191 | Holbrook | 34,600 | 47 | 4 | |
| Holbrook | Winslow | 36,800 | 44 | 4 | |
| Winslow | Townsend Road | 35,000 | 44 | 4 | |
| Townsend Road | I-17 (Flagstaff) | 40,000 | 37 | 4 | |
| I-17 (Flagstaff) | Route 66 | 27,000 | 45 | 4 | |
| Route 66 | SR 64 (Williams) | 26,000 | 45 | 4 | |
| SR 64 (Williams) | Seligman | 22,000 | 38 | 4 | |
| Seligman | US 93 | 20,000 | 50 | 4 | |
| US 93 | East of Kingman | 39,000 | 50 | 4 | |
| East of Kingman | West of Kingman | 54,000 | 45 | 4 | |
| West of Kingman | Nevada/Arizona State Line | 22,000 | 45 | 4 | |

Source: HDR analysis of ADOT 2012k

TABLE 1-16
**US 395 2040 Daily Traffic Forecasts**

| Segment | | 2040 AADT | % Trucks | 2012 Travel Lanes | Notes |
|---|---|---|---|---|---|
| Start | End | | | | |
| **California**[a] | | | | | |
| I-15 | SR 18 | 57,730 | 14 | 2 | |
| SR 18 | SR 58 | 24,600 | 13 | 2 | |
| SR 58 | SR 178 | 21,140 | 9 | 2 | |
| SR 178 | SR 14 | 4,200 | 23 | 2 | |
| SR 14 | SR 190 | 8,200 | 12 | 2 | |
| SR 190 | SR 136 | 8,700 | 10 | 2 | |
| SR 136 | SR 168 | 9,600 | 19 | 2 | |
| SR 168 | US 6 | 11,900 | 11 | 2 | |
| US 6 | SR 120 | 9,100 | 12 | 2 | |
| SR 120 | SR 182 | 5,500 | 11 | 2 | |
| SR 182 | California/Nevada State Line | 5,000 | 11 | 2 | |
| **Nevada** | | | | | |
| Nevada/California State Line | SR 208 | 4,900 | 20 | 2 | |
| SR 208 | Pinenut Road | 9,200 | 15 | 2 | |
| Pinenut Road | US 50 (Fairview Drive) | 40,000 | 10 | 4 | |
| US 50 (Fairview Drive) | SR 431 (Mt. Rose Highway) | 45,000 | 10 | 4 | Concurrent with I-580 |
| SR 431 (Mt. Rose Highway) | I-80 | 170,000 | 6 | 6 | Concurrent with I-580 |
| I-80 | N. McCarran Boulevard | 150,000 | 5 | 6 | |
| N. McCarran Boulevard | Stead Boulevard | 85,000 | 5 | 4-6 | |
| Stead Boulevard | California/Nevada State Line | 35,000 | 5 | 4 | |

a California AADT data provided by Caltrans is for forecast year 2035; AADTs for corridor from SR 178 to California/Nevada state line are estimated based on population growth rate of the affected counties.

Sources: HDR analysis of Caltrans 2013, NDOT 2012f

## Congestion

Figure 1-5 shows the projected congestion along the major highways in Arizona and Nevada in 2040.

These forecasts show that in the Las Vegas area, new capacity may be needed to accommodate growth because US 93 and US 95 will continue to be congested. Portions of US 93 and US 95/SR 95 in Arizona will need additional capacity. The majority of US 395 in California is projected to be approaching capacity with continued congestion through Reno in northern Nevada.

FIGURE 1-5

**Arizona and Nevada Future Levels of Service on Major Highways**

## Future Highway Projects

This section summarizes future improvement projects on US 93 and US 95 in Arizona and Nevada as well as programmed and planned improvements for the other major north-south highways in the four major metropolitan areas: Tucson, Phoenix, Las Vegas, and Reno.

### *US 93*

It is the long-term vision of ADOT and NDOT to transform US 93 into a higher-capacity roadway. ADOT has dedicated nearly half a billion dollars to widening and improving US 93 from Wickenburg to Hoover Dam over the last several years and is in the process of converting the existing corridor into a four-lane divided highway through the entire 200-mile stretch. Table 1-17 summarizes the US 93 projects that have been completed in Arizona. The US 93 series of projects is a high priority for ADOT and has significantly improved the state highway system. Only five highway improvement projects remain, leaving approximately 45 miles of highway to be widened to at least four lanes (Table 1-18). Figure 1-6 shows the series of completed and proposed US 93 projects in Arizona.

TABLE 1-17
**Completed US 93 Projects in Arizona**

| US 93 Segment | Project Description | Completed |
|---|---|---|
| Old US 93 to Antelope Wash | Widened to four lanes from milepost 91.4 to 101.9. | January 2007 |
| Wikieup to Santa Maria River (south of I-40) | Widened 36-mile stretch of highway to four lanes. | February 2008 |
| McGarry's Wash (just south of I-40/US 93 interchange) | Constructed a four-lane divided parallel highway from milepost 91.7 to 95.2. | October 2008 |
| Tompkins Canyon (north of Wikieup) | Constructed a four-lane divided parallel highway from milepost 119.5 to 121.2. | November 2008 |
| Wikieup to I-40 | Widened to four-lane divided highway from milepost 104 to 106. | Late 2009 |
| US 93 Wickenburg Bypass | Constructed a four-lane divided highway (Wickenburg Interim Bypass) to relieve congestion at US 93/US 60 intersection in downtown Wickenburg. | February 2010 |
| Kingman to Hoover Dam (north of I-40) | Constructed a four-lane divided highway from milepost 2 to 17. | November 2010 |
| Southbound Wagon Bow Ranch and Southbound Deluge Wash (south of I-40) | Widened and improved US 93 to a four-lane divided highway including new southbound lanes from milepost 109 to 116.3. | July 2012 |

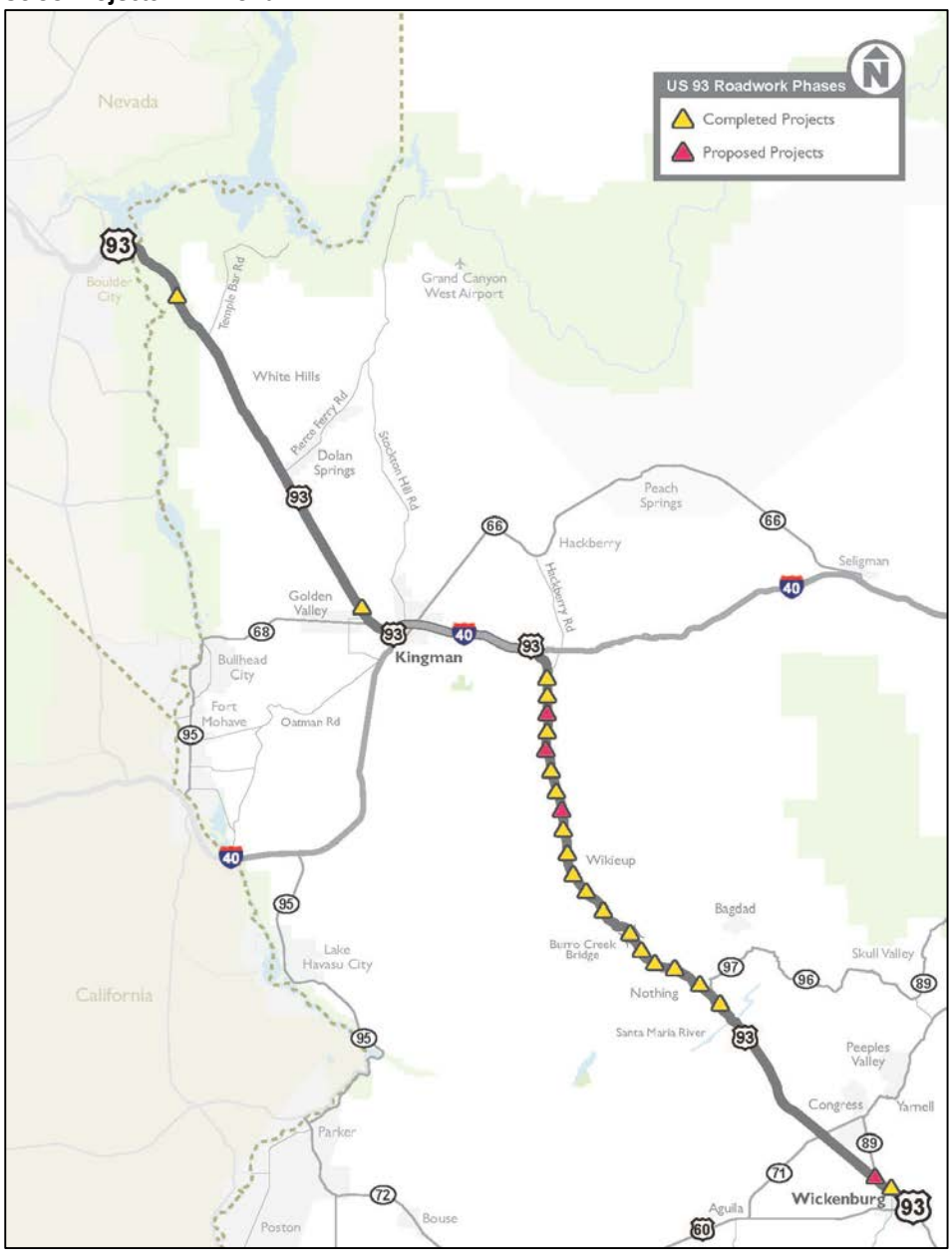
Source: ADOT 2012e

TABLE 1-18
**Future US 93 Projects in Arizona**

| US 93 Segment | Project Description | Time Frame |
|---|---|---|
| Antelope Wash | Widen to four-lane divided highway from milepost 101.8 to milepost 104. | Construction funding programmed for 2013 |
| Carrow Stephens | Widen to four-lane divided highway from milepost 116.3 to milepost 119.7. | Construction funding programmed for 2016 |
| Cane Springs | Widen to four-lane divided highway from milepost 106 to milepost 108.9. | Pending construction funding |
| Wickenburg Interim Bypass and SR 89 | Widen to four-lane divided highway from milepost 193 to milepost 198. | Construction currently unfunded |
| Wickenburg to Santa Maria River | Last section to be widened to four-lane divided highway. | Construction currently unfunded |

Source: ADOT 2012e

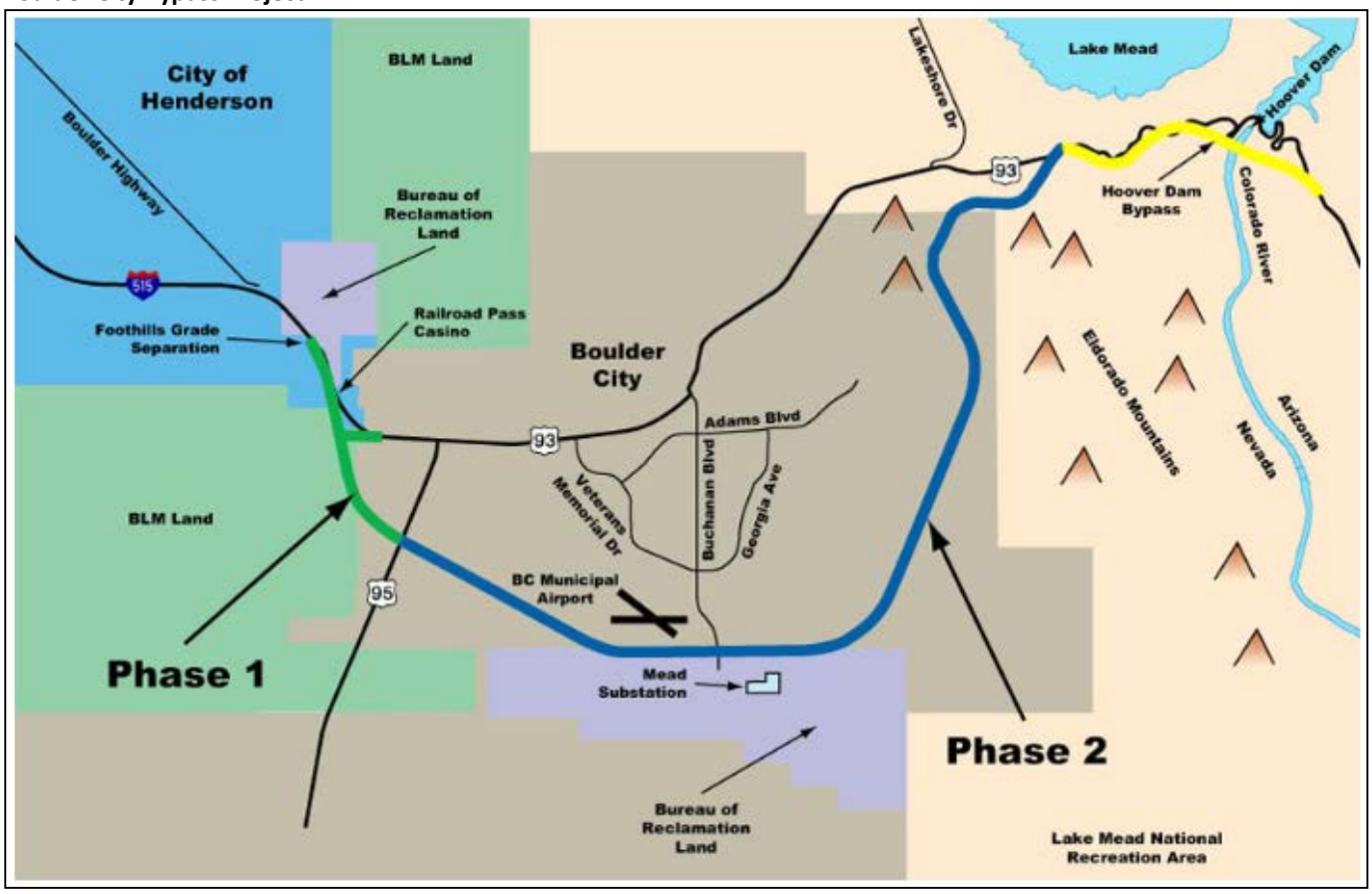
FIGURE 1-6
**US 93 Projects in Arizona**




Source: ADOT 2012e

The primary work on US 93 in Nevada relates to the Boulder City Bypass project, which involves traffic improvements to US 93 in Boulder City and Henderson, including a new alignment around Boulder City connecting US 95 to the Hoover Dam Bypass. This project will reduce congestion along US 95 by providing a bypass route for truck traffic. NDOT received a Record of Decision in support of the Boulder City Bypass in 2005, and the Regional Transportation Commission of Southern Nevada (RTCSNV) is investigating the financial feasibility of the corridor. The project includes two phases (Figure 1-7). Phase I extends from the Foothills Road grade separation to the US 95 interchange south of the existing US 93/US 95 interchange (approximately 2.75 miles). Phase II extends from the intersection of the bypass with US 95, approximately 1 mile south of the existing US 93/US 95 interchange, to the western limits of the overall project (approximately 12 miles).

FIGURE 1-7
**Boulder City Bypass Project**




Source: NDOT and RTCSNV 2005

### *US 95*

In southern Arizona, ADOT is working with the City of San Luis to improve traffic flow to and from the U.S./Mexico land port of entry (LPOE) through downtown San Luis. The project will redirect traffic around the San Luis downtown area on Main Street (US 95), directing northbound traffic from the LPOE to First Avenue and southbound traffic to the LPOE to Archibald Street. Construction is anticipated to be completed in 2013.

In northern Arizona, ADOT is studying a new realignment of SR 95 that would ultimately define a new route from I-40 to SR 68. This study is currently on hold pending resolution of funding issues.

In southern Nevada, NDOT is working with FHWA and RTCSNV on the US 95 Northwest Corridor Improvements Project. This project will widen US 95 between Washington Avenue and Kyle Canyon Road including widening six to eight lanes and adding auxiliary and high-occupancy vehicle (HOV) lanes from Washington Avenue to Ann Road, widening six to eight lanes from Ann Road to Centennial Center Boulevard, and widening four to six lanes from Centennial Center Boulevard to Kyle Canyon Road. It will also construct new interchanges at Horse Drive, Kyle Canyon Road, and a system-to-system interchange between US 95 and Clark County 215. This project has been divided into five phases and will be constructed over a series of years. Some phases are already under construction.

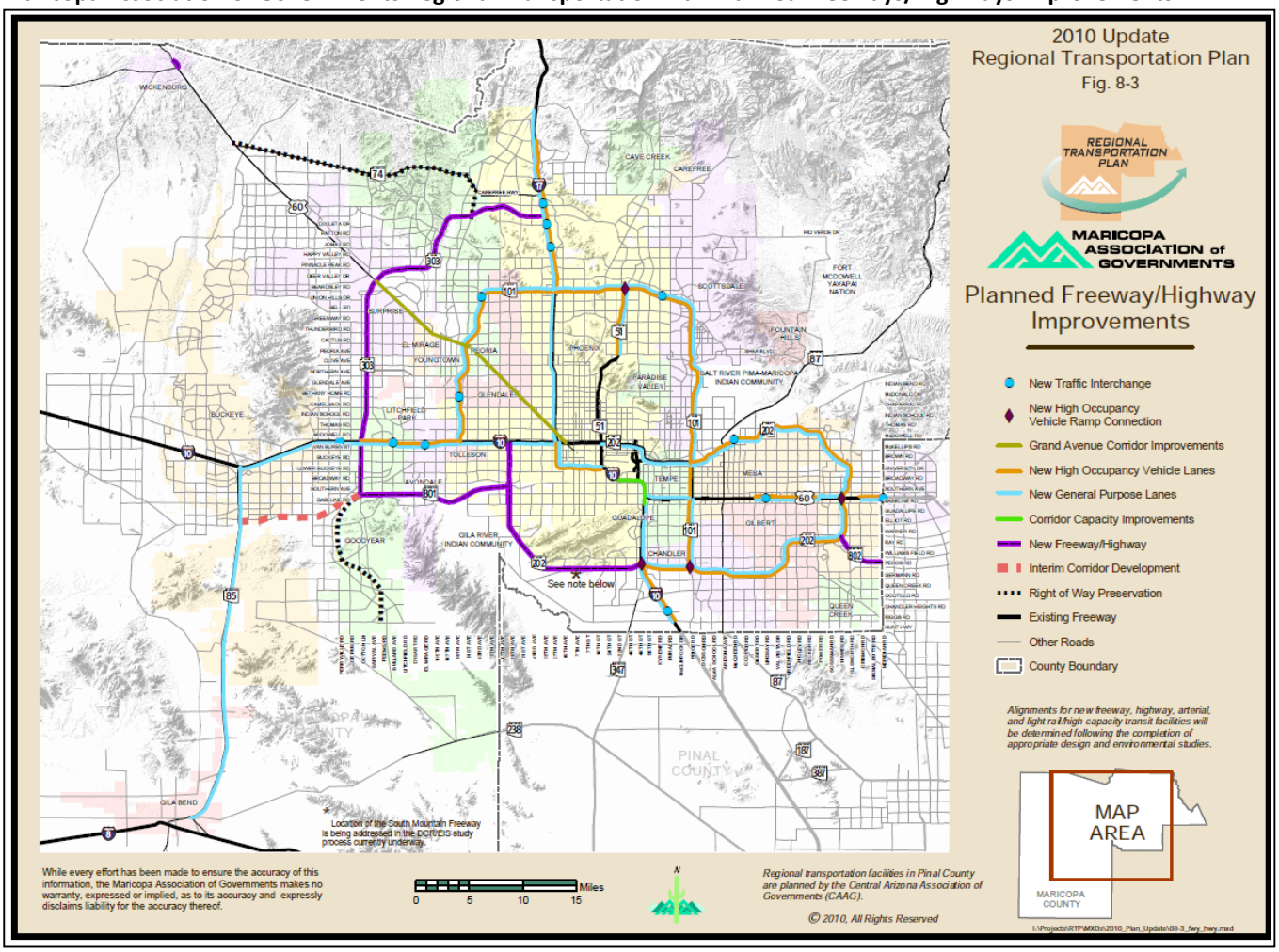
### *Tucson*

The *2040 Regional Transportation Plan Update* (Pima Association of Governments 2012) identifies several roadway improvement projects, including improvements to some regional corridors such as widening I-10 and I-19.

### *Phoenix*

The *Regional Transportation Plan Update* (Maricopa Association of Governments 2010c) identifies several regional roadway improvement projects through 2031. Freeway and highway improvements planned include both new freeway corridors and improvements to existing freeway and highway facilities (Figure 1-8).

FIGURE 1-8
**Maricopa Association of Governments Regional Transportation Plan Planned Freeways/Highways Improvements**




Source: MAG 2010c

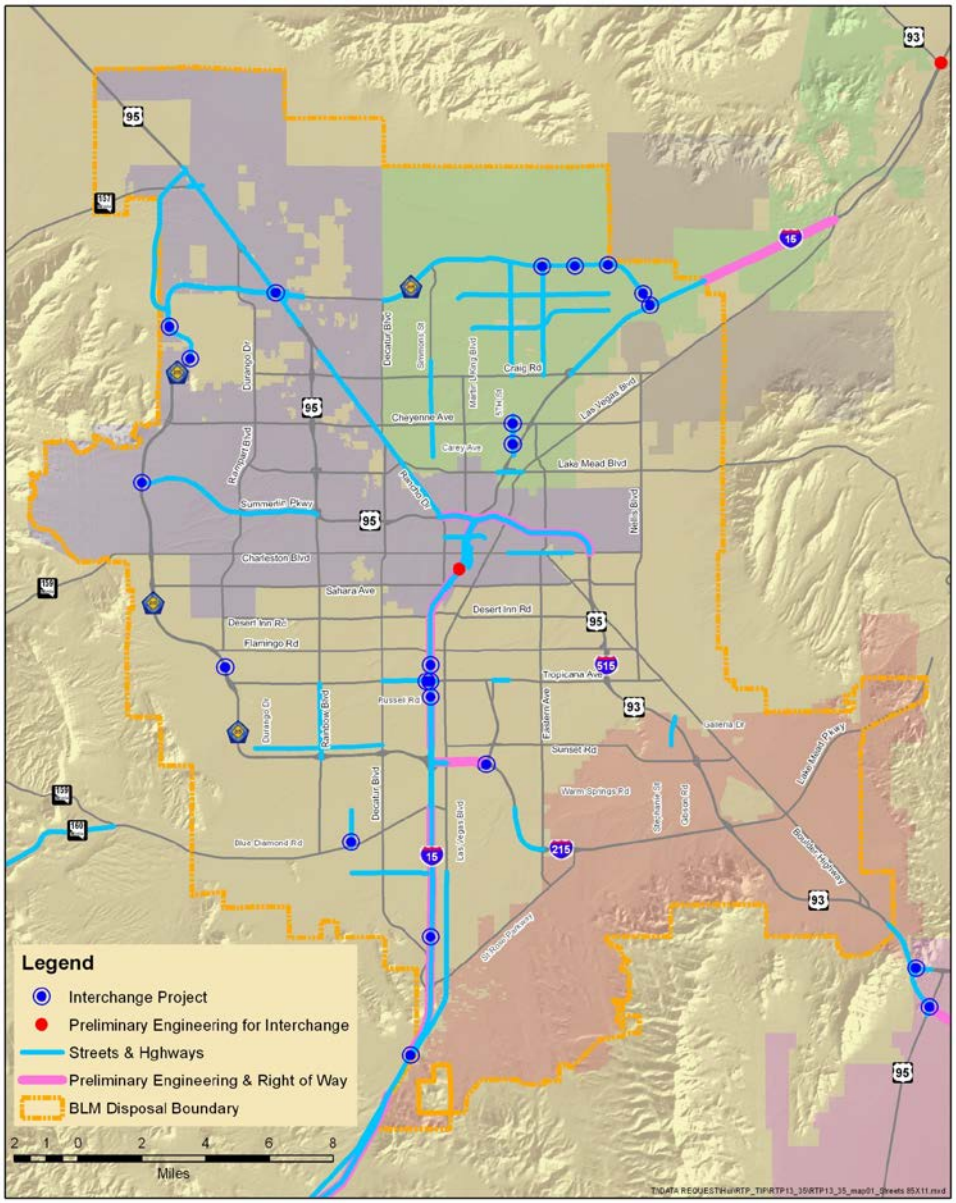
### *Las Vegas*

Figure 1-9 shows the locations of the roadway improvement projects identified in the *Draft Regional Transportation Plan, 2013-2035* (RTCSNV 2012g). Specific roadway projects on the major highways and Interstates include construction of the Boulder City Bypass (four-lane freeway) and widening of I-15 and US 95.

### *Reno*

The RTP for the Regional Transportation Commission of Washoe County (RTCWC) identifies a number of roadway projects including construction of new freeways, widening of existing freeways, and new and/or modified interchanges. Some of the fully funded street and highway projects include widening several segments of I-80 and US 395.

FIGURE 1-9
**Regional Transportation Commission of Southern Nevada**
**Regional Transportation Plan Streets and Highways Projects (2013-2035)**




Source: RTCSNV 2012g

## Potential Projects and Relevant Studies

In addition to the programmed projects discussed in the previous sections, a number of studies have been conducted over the past several years that looked at corridor concepts for transportation facilities in both Arizona and Nevada. These proposed improvements and potential projects could develop portions of I-11 and the Intermountain West Corridor.

In Arizona, the *I-10/Hassayampa Valley Transportation Framework Study* (MAG 2007) and *I-8 and I-10/Hidden Valley Transportation Framework Study* (MAG 2009a) proposed a bypass around the Phoenix metropolitan area, tentatively named the "Hassayampa Freeway," with the intention to connect further north and south.

ADOT's *bqAZ Statewide Transportation Planning Framework Program* (AECOM 2010) was a 40-year vision for multimodal transportation in Arizona, coordinated with all neighboring state Departments of Transportation. This

vision formalized, expanded, and solidified the concept of the I-11 transportation corridor with a recommendation for extending the Hassayampa Freeway using the existing US 93 corridor northwest from Wickenburg.

In Nevada, NDOT is continuing the *Connecting Nevada* process, a statewide, long-range transportation plan that will guide Nevada's transportation investments for the next 40 years and establish policies for preserving transportation corridors. This effort initiated multimodal transportation discussions among stakeholders and could be the catalyst to stitch I-15, I-80, and I-11 into one transportation triangle serving the state.

NDOT also recently completed a multi-state planning effort for the I-15 corridor. The *I-15 Corridor System Master Plan* (CSMP) (CH2M HILL 2012) defines a long-range, multimodal transportation system vision, governance, and implementation strategy, and provides a prioritized program of projects needed to serve all modes of transportation. As part of the I-15 CSMP, the *Draft Southern Nevada Outerbelt Feasibility Study Part I: Initial Environmental Screening* (NDOT 2012c) was conducted, which performed a preliminary screening of alternative routes bypassing the Las Vegas metropolitan area. This study included a high-level review of environmental features, opportunities, and constraints. Several corridor alternatives were conceptualized that could serve as I-11 alignment options around Las Vegas and could feed into this project's alternatives analysis process.

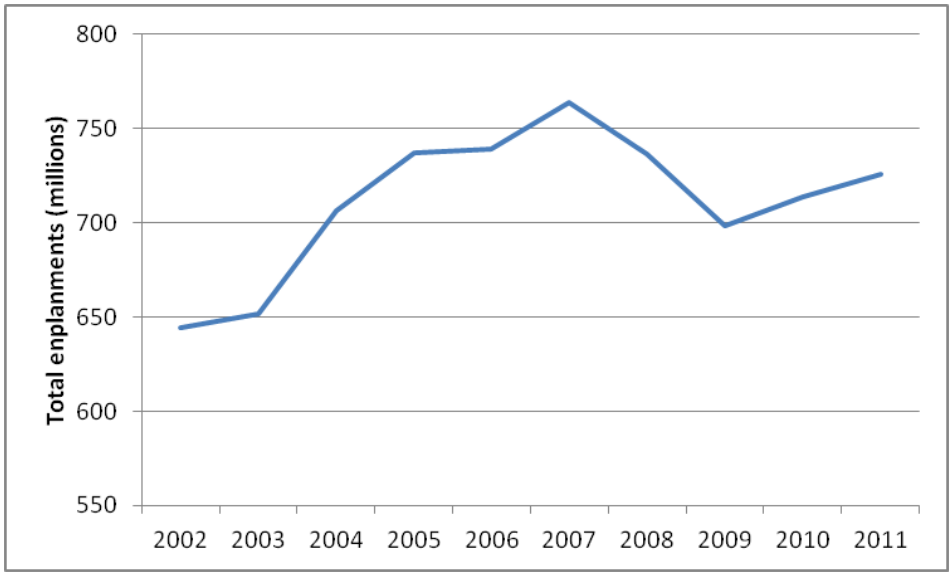
The Boulder City Bypass is currently under study by RTCSNV and NDOT and would connect I-515/US 95/US 93 from the Foothills Road grade separation in Henderson to the recently completed Hoover Dam Bypass at the Nevada Interchange. This project is a potential candidate for an I-11 alignment around Boulder City.

These studies are summarized in more detail in Appendix B, Past Planning Studies and Strategies.

### 1.1.2 Aviation

Aviation is vital to the U.S. transportation system, and it is currently the most efficient option for trips of 500 miles or more. North American airports handle more passengers and cargo than any other region in the world (Airports Council International 2012a), and the number of travelers continues to grow. Between 2002 and 2011, the total number of enplanements[1] in U.S. airports increased from 644 million to 726 million (Figure 1-10), over a 12 percent increase. Between 2002 and 2007, air passenger enplanements at U.S. airports increased by nearly 20 percent, but in September 2008, air passenger travel experienced its first annualized drop since September 11, 2001. This decline continued through 2009 (Figure 1-10).

FIGURE 1-10
**Historical Enplanement Totals through U.S. Airports (2002 – 2011)**




Source: Federal Aviation Administration (FAA) 2012a

[1] The number of enplanements is the total number of passengers boarding an airplane. It does not include arriving or through passengers.

Half of the flights in the U.S. are routes of less than 500 miles. According to the Brookings Institution, three of the ten busiest air travel corridors are less than 500 miles apart: between Los Angeles and San Francisco (347 miles), Los Angeles and Las Vegas (229 miles), and Los Angeles and Phoenix (358 miles). The lack of investment in alternative modes of transportation makes air travel the mode of choice for several short-haul air travel corridors (flights less than 500 miles). Continued growth in these short-haul routes presents logistical and economic challenges at airports as well as significant environmental impacts (Brookings Institution 2009b).

### *Existing Conditions*

The FAA defines a primary airport as a commercial service airport with more than 10,000 passenger boardings each year. Commercial Service Airports are publicly owned airports with scheduled passenger service. Hub type is defined by the percentage of total annual passenger boardings within the U.S. A large hub accounts for 1 percent or more of total boardings; a medium hub between 0.25 percent and 1 percent; a small hub between 0.05 percent and 0.25 percent; and a primary non-hub at least 10,000 but less than 0.05 percent (FAA 2012e). In total, Arizona has nine primary airports, and Nevada has four primary airports. Figure 1-11 shows the locations of these 13 primary airports in Arizona and Nevada. In addition to primary airports, Arizona has 24 other airports and Nevada has 14 other airports (FAA 2012c). Table 1-19 lists the number of enplanements for the 13 primary airports in Arizona and Nevada.

FIGURE 1-11

**Primary Airports in Arizona and Nevada**

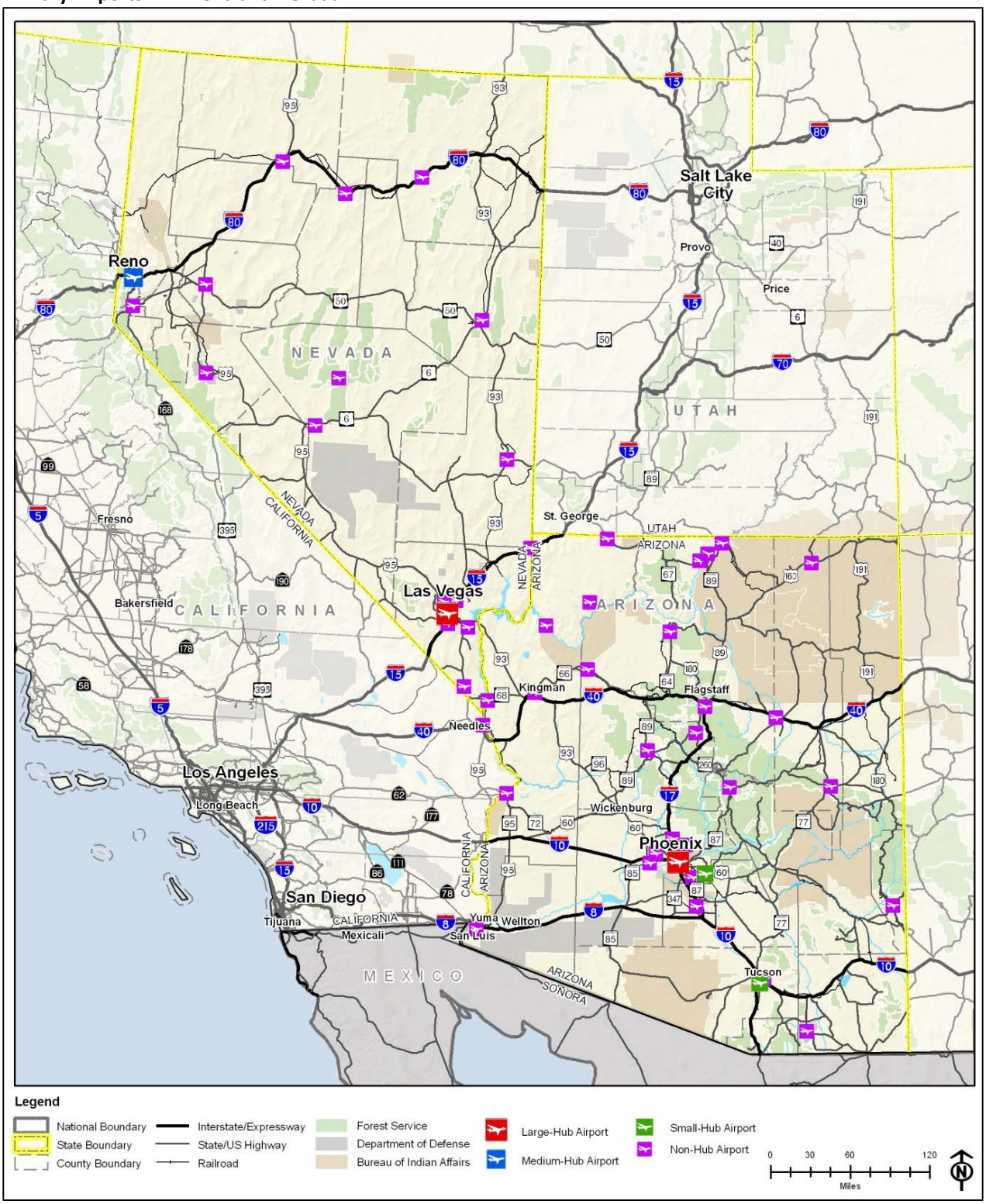


TABLE 1-19
**Enplanements at Primary Airports in Arizona and Nevada**

| City | Airport Name | ID | Size | 2011 Enplanements | 2010 Enplanements | % Change |
|---|---|---|---|---|---|---|
| **Arizona** | | | | | | |
| Phoenix | Phoenix Sky Harbor International | PHX | Large Hub | 19,750,306 | 18,907,171 | 4.46% |
| Tucson | Tucson International | TUS | Small Hub | 1,779,679 | 1,844,228 | -3.50% |
| Mesa | Phoenix-Mesa Gateway | IWA | Small Hub | 521,437 | 417,862 | 24.79% |
| Grand Canyon | Grand Canyon National Park | GCN | Non-Hub | 331,924 | 318,622 | 4.17% |
| Bullhead City | Laughlin/Bullhead International | IFP | Non-Hub | 113,280 | 121,468 | -6.74% |
| Yuma | Yuma Marine Corps Air Station/ Yuma International | NYL | Non-Hub | 82,420 | 82,163 | 0.31% |
| Peach Springs | Grand Canyon West | 1G4 | Non-Hub | 71,316 | 60,682 | 17.52% |
| Flagstaff | Flagstaff Pulliam | FLG | Non-Hub | 60,831 | 62,109 | -2.06% |
| Page | Page Municipal | PGA | Non-Hub | 23,938 | 20,264 | 18.13% |
| **Nevada** | | | | | | |
| Las Vegas | McCarran International | LAS | Large Hub | 19,872,617 | 18,996,738 | 4.61% |
| Reno | Reno-Tahoe International | RNO | Medium Hub | 1,821,051 | 1,857,488 | -1.96% |
| Boulder City | Boulder City Municipal | BVU | Non-Hub | 190,716 | 169,923 | 12.24% |
| Elko | Elko Regional | EKO | Non-Hub | 23,543 | 21,863 | 7.68% |

Source: FAA 2012b

In 2011, Arizona had 2,373,000 flights into and out of its airports; Nevada had 860,000 flights (FAA n.d.). These two states encompass two of the top ten busiest airports in North America ( Las Vegas McCarran International Airport at 8th and Phoenix Sky Harbor International Airport at 9th) and top 25 busiest airports in the world (FAA 2012b, Airports Council International 2012a). Travel through these two airports account for more than 5 percent of the passengers traveling through U.S. airports. In 2011, Las Vegas McCarran and Phoenix Sky Harbor had 19.9 million and 19.8 million enplanements, respectively. Between 2010 and 2011, these two airports saw 4.61 percent and 4.46 percent increases in enplanements for Las Vegas McCarran and Phoenix Sky Harbor (FAA 2012b).

As shown in Table 1-20, more than 2.5 million air passengers traveled between Arizona and Nevada in 2011. The Las Vegas-to-Phoenix air corridor (256 miles) is ranked in the top 100 most traveled air corridors in the nation (Brookings Institution 2009b). Air travel interaction with California is the highest for both Arizona and Nevada. After California, Arizona and Nevada share the largest interaction of passengers.

TABLE 1-20
**2011 Total Domestic Air Passenger Enplanements by Origin and Destination (1000s)**

| Origin/ Destination | Arizona | California | Idaho | Nevada | Oregon | Washington | Rest of U.S. | Total |
|---|---|---|---|---|---|---|---|---|
| Arizona | 721 | 5,062 | 122 | 1,278 | 476 | 833 | 12,903 | 21,395 |
| California | 5,019 | 17,663 | 237 | 4,950 | 2,218 | 4,023 | 37,725 | 71,835 |
| Idaho | 121 | 245 | 21 | 121 | 134 | 287 | 787 | 1716 |
| Nevada | 1,287 | 4,995 | 128 | 674 | 438 | 996 | 11,965 | 20,483 |
| Oregon | 467 | 2,229 | 131 | 435 | 481 | 814 | 2,978 | 7,535 |
| Washington | 813 | 4,036 | 286 | 1,001 | 794 | 1,738 | 8,419 | 17,087 |
| Rest of U.S. | 12,974 | 37,616 | 550 | 12,008 | 2,982 | 8,384 | 426,446 | 500,960 |
| Total | 21,402 | 71,846 | 1475 | 20,467 | 7,523 | 17,075 | 501,223 | 641,011 |

Source: Bureau of Transportation Statistics (BTS) 2012a

The sections below provide additional information on the airports in the four major metropolitan areas in Arizona in Nevada: Tucson, Phoenix, Las Vegas, and Reno.

**Tucson**

Tucson International Airport is the 2nd busiest airport in Arizona, handling 1.8 million enplanements. Between August 2011 and July 2012, there were approximately 23,000 scheduled flight departures. The top three destinations for passengers were Dallas-Fort Worth International Airport, Los Angeles International Airport, and Phoenix Sky Harbor International Airport. Las Vegas McCarran International Airport is the 5th most popular destination. Aviation passengers traveling to Phoenix and Las Vegas from Tucson account for 11 percent and 9 percent, respectively, of the total passengers.

**Phoenix**

Phoenix Sky Harbor International Airport is the busiest airport in Arizona, handling 19.8 million enplanements. Between August 2011 and July 2012, there were approximately 194,000 scheduled flight departures. The top three destinations for passengers were Denver International Airport, Los Angeles International Airport, and Las Vegas McCarran International Airport. Aviation passengers traveling to Las Vegas from Phoenix account for 4 percent of the total passengers.

**Las Vegas**

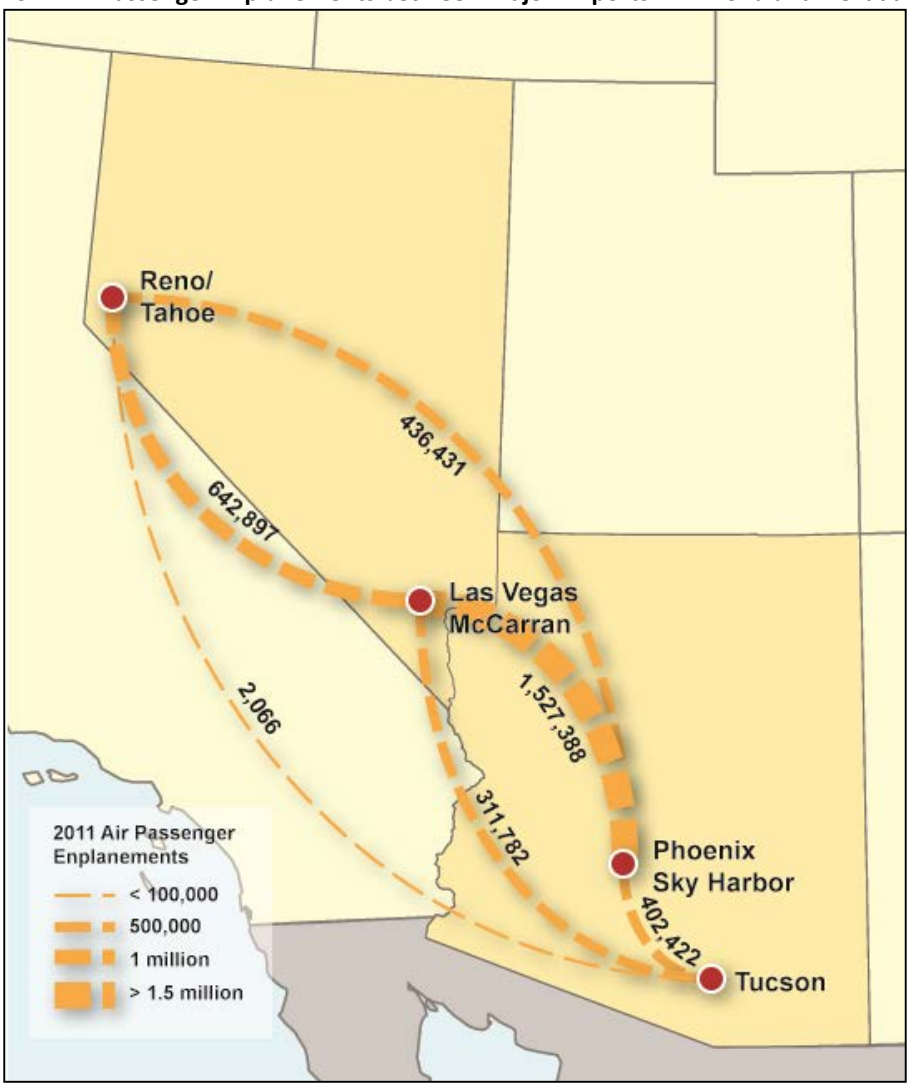
Las Vegas McCarran International Airport is the busiest airport in Arizona and Nevada, handling 19.9 million enplanements. Between August 2011 and July 2012, there were approximately 163,000 scheduled flight departures. The top three destinations for passengers were Los Angeles International Airport, Denver International Airport, and San Francisco International Airport. Phoenix Sky Harbor International Airport is the 4th most popular destination. Aviation passengers traveling to Phoenix from Las Vegas account for 4 percent of the total passengers.

**Reno**

Reno-Tahoe International Airport is the 2nd busiest airport in Nevada, handling 1.8 million enplanements. Between August 2011 and July 2012, there were approximately 25,000 scheduled flight departures. The top three destinations for passengers were Las Vegas McCarran International Airport, Phoenix Sky Harbor International Airport, and Los Angeles International Airport. Aviation passengers traveling to Las Vegas and Phoenix from Reno-Tahoe account for 19 percent and 12 percent of the total passengers, respectively.

Figure 1-12 shows the total number of passengers that traveled between the airports in the four major metropolitan areas in Arizona and Nevada. Sky Harbor and McCarran are among the top 10 destinations from each of these airports.

FIGURE 1-12
**2011 Air Passenger Enplanements between Major Airports in Arizona and Nevada**

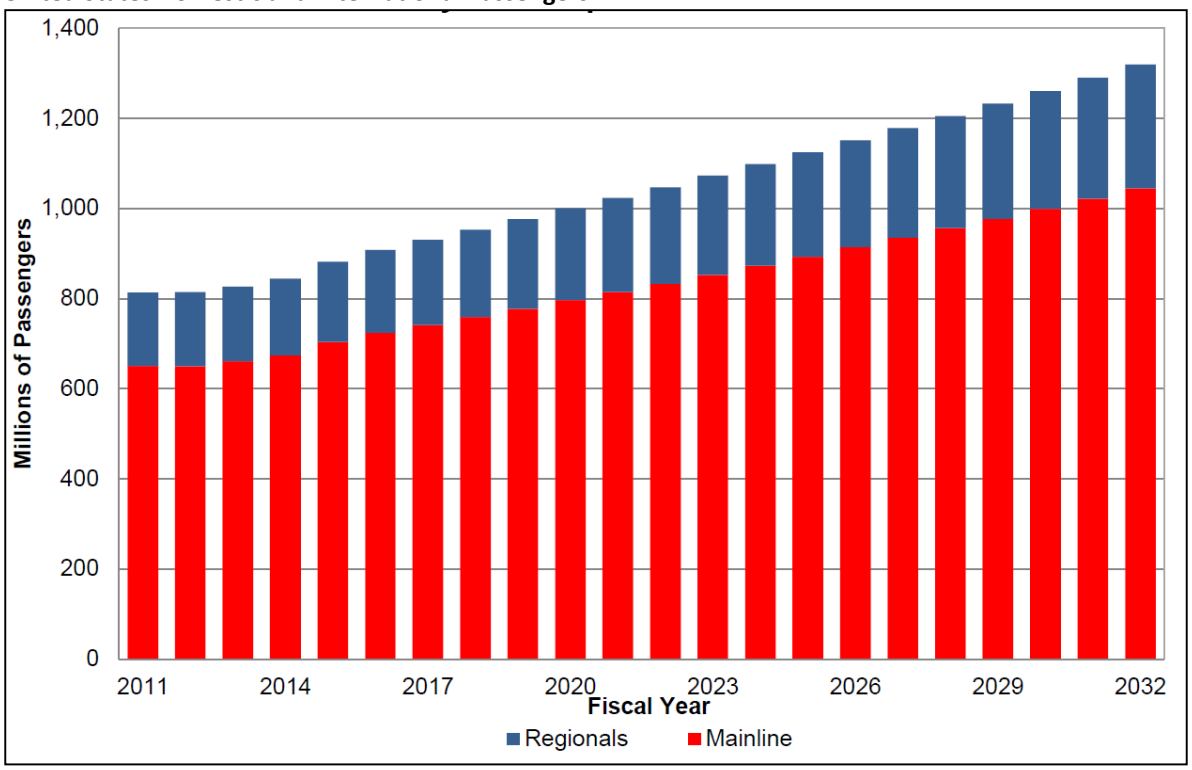



Source: BTS 2012b

## *Future Conditions*

The *FAA Aerospace Forecasts FY2012-2032: Full Forecast Document and Tables* (FAA 2012d) shows commercial air passenger and air cargo activity increasing through 2032, the latest year forecasts are available. Air passenger system enplanements are projected to increase an average of more than 2 percent domestically and 4 percent internationally per year. System capacity is projected to increase at 3 percent per year through 2032. This increase will equate to growth from 650 million domestic enplanements in 2011 to 1,044 million in 2032 and 81 million international enplanements in 2011 to 189 million in 2032 (Figure 1-13). Due to the increase in the number of enplanements, the load factor and size of airplanes will continue to steadily increase (FAA 2012d).

FIGURE 1-13
**United States Domestic and International Passengers**

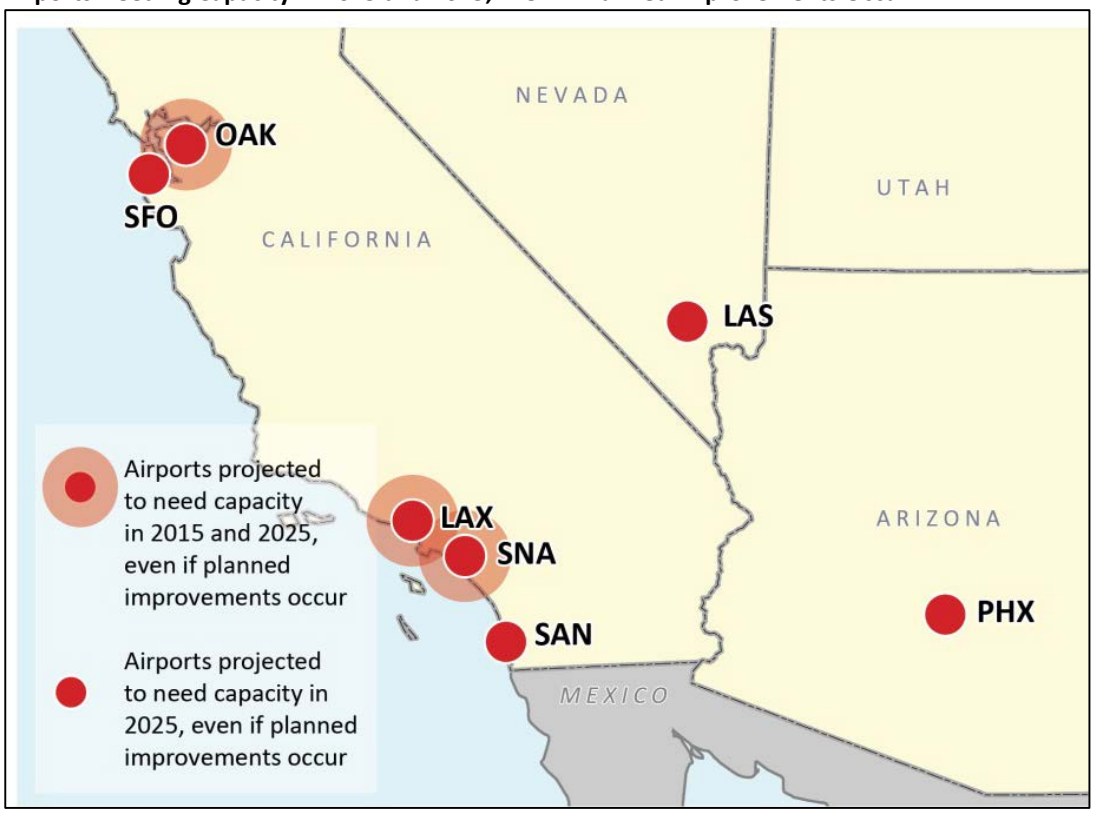



Source: FAA 2012d

Revenue passenger miles are projected to increase between 3.2 percent and 3.5 percent per year. Air cargo activity is expected to grow at near 5 percent annually through the 2032 forecast period. In Arizona and Nevada, this national aviation growth coupled with the projected population and employment increases will translate into new demand for commercial air travel and air cargo. Airports in Arizona and Nevada are already planning for additional capacity both in airside and landside facilities (FAA 2012d).

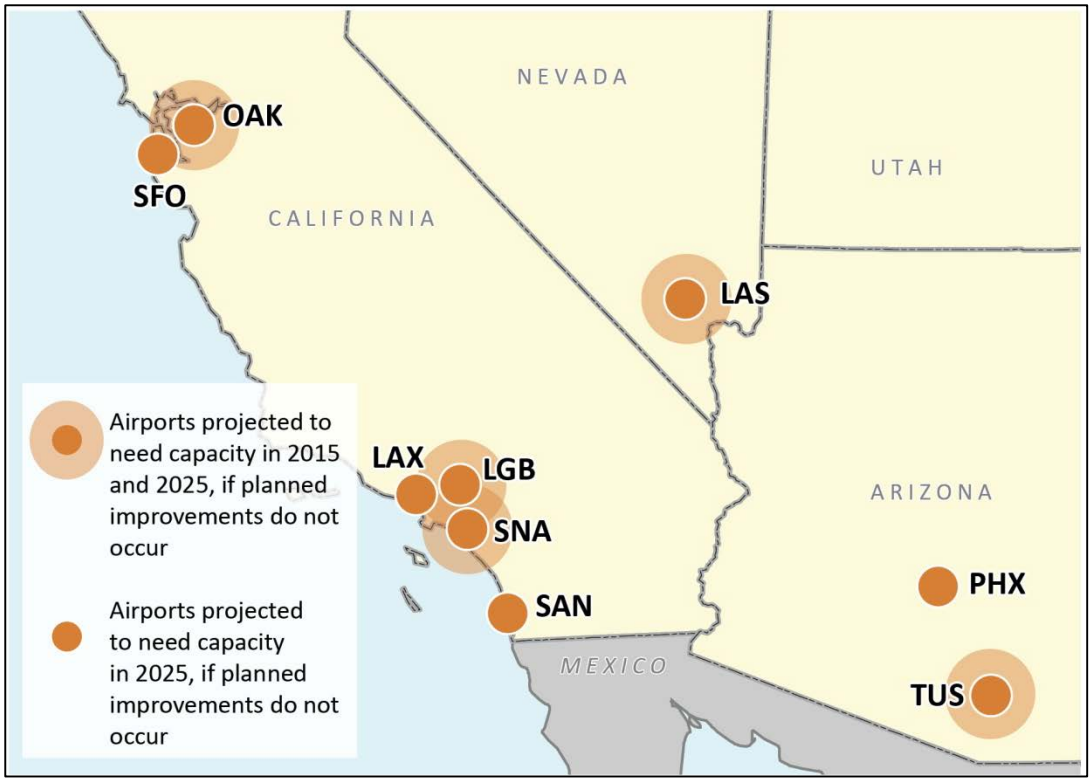
Planned airport improvements will help accommodate the rapid growth in the number of enplanements and flights. However, even with these improvements, both Phoenix Sky Harbor International and Las Vegas McCarran International will need additional capacity in 2025 (Figure 1-14). Without the planned improvements, Las Vegas McCarran and Tucson International will need additional capacity in 2015 (Figure 1-15). The following sections discuss planned improvements at airports in the four major metropolitan areas: Tucson, Phoenix, Las Vegas, and Reno.

FIGURE 1-14
**Airports Needing Capacity in 2015 and 2025, Even If Planned Improvements Occur**




Source: Government Accountability Office (GAO) 2009

FIGURE 1-15
**Airports Needing Capacity in 2015 and 2025, If Planned Improvements Do Not Occur**




Source: GAO 2009

**Tucson**

Tucson International Airport is currently in the process of developing its updated Airport Master Plan (2012).

**Phoenix**

Planning is underway at the Phoenix-Mesa Gateway Airport to construct a new passenger terminal in the next 10 years. Phoenix-Mesa Gateway functions as a reliever passenger airport to Phoenix Sky Harbor, serving additional passenger capacity needs in the Phoenix metropolitan area. Phoenix Goodyear Airport provides excess cargo capacity to Phoenix Sky Harbor. Phoenix Sky Harbor is reviewing expansion plans for its existing air passenger terminals. FAA published its Record of Decision on Airport Development of Phoenix Sky Harbor International Airport in 2006. Several proposed improvements, including demolition of Terminal 2 to accommodate on-airport roadway needs, development of a new 33-gate West Terminal, completion of the last concourse in Terminal 4, construction of cross-field taxiways, modification of Sky Harbor Boulevard to develop a new primary airport access roadway system, and an automated people mover to extend to Valley Metro light rail transit (LRT) system are proposed. The first phase of an automated train (Sky Train) linking the air passenger terminals with the regional light rail system will open in 2013. The *Pinal County Comprehensive Plan* (2009) has identified an area near the existing Coolidge Airport for a new commercial airport to serve the area's potential population growth and further relieve Phoenix Sky Harbor. However, there are currently no definite plans for the potential development of a commercial airport.

**Las Vegas**

While Nevada's existing airports are adequate to handle current air cargo and air passenger travel demand, population growth in northern and southern Nevada may warrant new commercial aviation airports. The Clark County Department of Aviation proposes to construct the Southern Nevada Supplemental Airport (also known as Ivanpah Airport) on approximately 6,000 acres in southern Nevada between Jean and Primm, near the California state line. The new airport would provide additional capacity to serve visitors to the metropolitan Las Vegas area and residents of greater Clark County and is intended to relieve congestion at McCarran. Planning of the Southern Nevada Supplemental Airport has slowed considerably due to the economic downturn and resulting decrease in air traffic at McCarran International Airport.

**Reno**

Stead Airport is the reliever for Reno-Tahoe International Airport. A former Air Force base, Stead is home to the Reno Air Races. Stead Airport may become more important as northern Nevada's economy grows and the Reno-Tahoe International Airport reaches capacity. The Silver Springs Airport may also provide air cargo service as industrial activities in the US 50 corridor between Carson City and Fallon develop.

### 1.1.3 Passenger Rail and Transit

This section provides an overview of the existing and future passenger rail and transit systems in Arizona and Nevada.

#### *Existing Conditions*

Similar to highways, intercity and interstate passenger rail is restricted to east-west travel in Arizona and Nevada. These rail routes started with the development of transcontinental railroads that linked the railway network in the eastern U.S. with the rapidly growing West. New passenger rail routes are currently under study to improve north-south passenger rail connectivity between Arizona, Nevada, and California. In the meantime, intercity and interstate public transportation between Arizona and Nevada is served exclusively by buses.

Amtrak provides intercity passenger rail service in the U.S. with 21,200 route miles with service to 500 destinations in 46 states, the District of Columbia, and three Canadian provinces. During fiscal year (FY) 2011 (October 2010 to September 2011), Amtrak served nearly 30.2 million passengers, the largest annual total in Amtrak's history, and the eighth annual ridership record in the last 9 years. More than 82,000 passengers ride more than 300 Amtrak trains every day (Amtrak 2012a). Four Amtrak routes (Figure 1-16) serve Arizona and Nevada:

- California Zephyr (Chicago-Denver-Glenwood Springs-Emeryville (San Francisco) with Nevada stations in Elko, Winnemucca, and Reno; 355,324 boardings in FY 2011
- Southwest Chief (Chicago-Albuquerque-Los Angeles) with Arizona stations in Winslow, Flagstaff, Williams Junction (with bus connections to the Grand Canyon), and Kingman; 354,912 boardings in FY 2011
- Sunset Limited (New Orleans-San Antonio-Los Angeles) with Arizona stations in Benson, Tucson, Maricopa (30 miles south of Phoenix on the fringe of the Phoenix metropolitan area), and Yuma; 99,714 boardings in FY 2011
- Texas Eagle (Chicago-St. Louis-Dallas-San Antonio-Los Angeles) with Arizona stations in Benson, Tucson, Maricopa (30 miles south of Phoenix on the fringe of the Phoenix metropolitan area), and Yuma; 299,508 boardings in FY 2011 (Amtrak 2011b, 2012b)

More information on Amtrak ridership in both Arizona and Nevada is provided in the following sections.

FIGURE 1-16
**Arizona and Nevada Amtrak Rail Routes**


## Arizona Passenger Rail Service

Passenger rail service in Arizona is limited to Amtrak and tourist railway services. Amtrak has two routes that travel on freight mainlines through Arizona. Amtrak uses the BNSF Railway (BNSF) Transcon mainline in northern Arizona and the Union Pacific Railroad (UPRR) Sunset Limited Route in southern Arizona.

Amtrak's Southwest Chief travels 2,256 miles between Chicago and Los Angeles, with 31 interim stops including Kingman, Williams, Flagstaff, and Winslow in Arizona. The line operates one trip daily in each direction and passes through Illinois, Iowa, Missouri, Kansas, Colorado, New Mexico, Arizona, and California. The route travels through

northern Arizona along the I-40 corridor within 30 miles of southern Nevada. Amtrak Thruway Buses connect the Kingman station with Laughlin and Las Vegas. In 2010, a total of 342,403 passengers rode the Southwest Chief.

Amtrak ridership in Arizona accounts for less than 0.5 percent of Amtrak's total ridership. For the three corridors that serve Arizona (Southwest Chief, Sunset Limited, and Texas Eagle), 14 percent of riders either board or alight in Arizona. The number of boardings and alightings by city are provided in Table 1-21. Figure 1-17 shows the Arizona station locations.

TABLE 1-21
**Amtrak Boardings and Alightings in Arizona in Fiscal Year 2011**

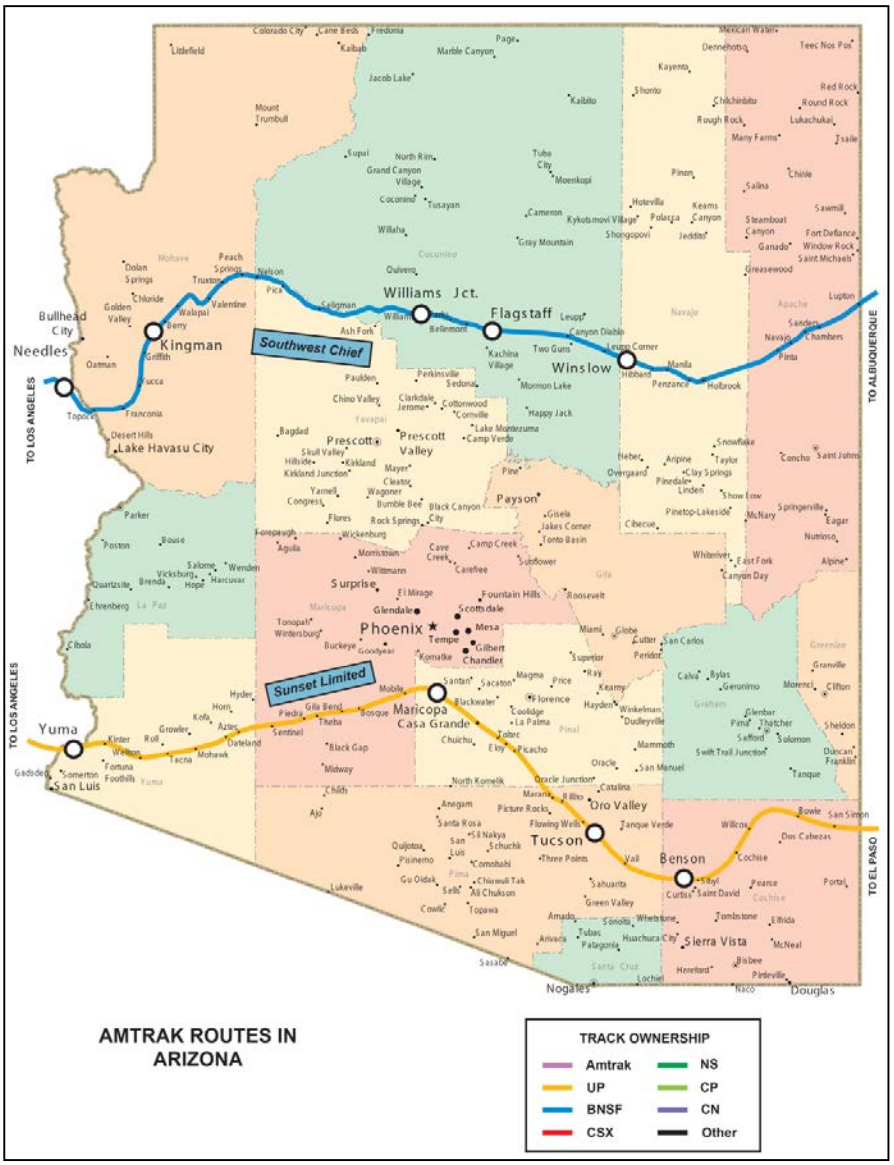
| City | Boardings + Alightings | % of Corridors |
|---|---|---|
| **Southwest Chief** | | |
| Flagstaff | 41,252 | 12.0 |
| Kingman | 10,944 | 3.0 |
| Williams Junction | 7,646 | 2.0 |
| Winslow | 5,399 | 2.0 |
| **Sunset Limited, Texas Eagle** | | |
| Benson | 1,208 | 0.3 |
| Maricopa | 9,819 | 2.0 |
| Tucson | 23,340 | 6.0 |
| Yuma | 3,386 | 1.0 |
| **Total** | **102,994 (up 3.5% from FY 2010)** | |

Sources: Amtrak 2011a, 2011b

### Excursion Railroads

Three tourist railroads exist in Arizona: the Grand Canyon Railway, the Verde Canyon Railroad, and the seasonal Copper Spike service of the Arizona Eastern Railway. These railroads provide excursions or service to and from one destination point.

FIGURE 1-17
**Amtrak Routes and Stations in Arizona**




Source: Amtrak 2011a

## Nevada Passenger Rail Service

### *Northern Corridor*

The California Zephyr is a cross-country intercity passenger rail service that Amtrak operates with one trip daily in both directions between Chicago and Emeryville, California. The route operates on 427 miles of UPRR-owned track in Nevada, with stops in Elko, Winnemucca, and Reno. Travel time between Sacramento and Reno is 5 hours (twice that of car travel); between Salt Lake City and Reno it is 11 hours (travel by car is approximately 8 hours).

Amtrak ridership in Nevada accounts for less than 0.5 percent of Amtrak's total ridership. For the corridor that serves Nevada (California Zephyr), 22 percent of riders either board or alight in Nevada. The number of boardings and alightings by city are provided in Table 1-22. Figure 1-18 shows the Nevada station locations.

### *Southern Corridor*

Since passenger service on the South Central Route (UPRR) was discontinued in 1997, southern Nevada has had no passenger rail service.

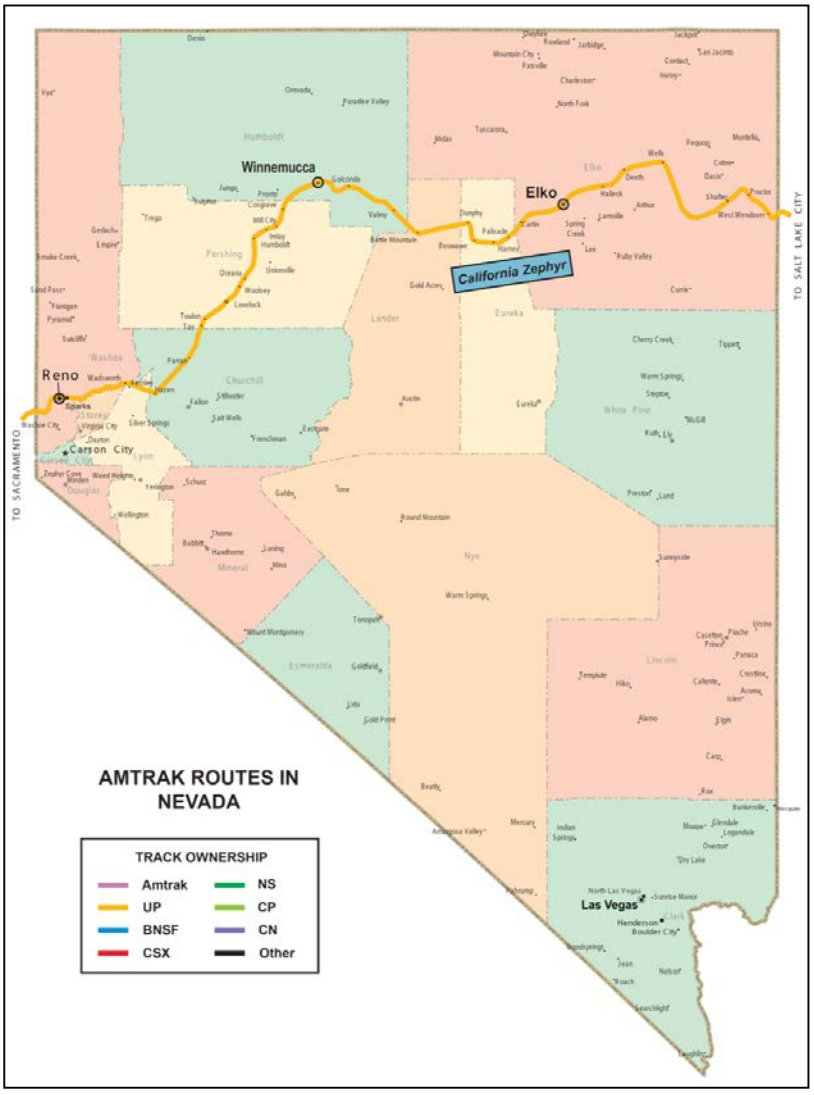
The state lacks north-south through rail, thus Las Vegas is not connected to Reno or Phoenix to the southeast via passenger rail.

TABLE 1-22
**Amtrak Boardings and Alightings in Nevada in Fiscal Year 2011**

| City | Boardings + Alightings | % of Corridor |
|---|---|---|
| **California Zephyr** | | |
| Elko | 7,125 | 2 |
| Reno | 69,257 | 19 |
| Winnemucca | 3,441 | 1 |
| **Total** | **79,823 (up 0.2% from FY 2010)** | |

Sources: Amtrak 2011a, 2011b

FIGURE 1-18
**Amtrak Routes and Stations in Nevada**




Source: Amtrak 2011a

## Transit

Local transit systems include support intercity rail and some other forms of commuter rail. Passenger rail ridership can benefit from local rail and bus transit. The bus systems provide connectivity beyond the rail stations to other destinations. The sections below describe current transit systems in the study area.

### *Intercity/Interstate Bus Networks*

Greyhound provides intercity and interstate public transportation travel options between Arizona and Nevada. It provides service to 31 bus stations in Arizona and 10 bus stations in Nevada (Greyhound 2011). Greyhound provides direct service between Phoenix and Las Vegas twice per day. The average scheduled travel time ranges from 8 hours and 30 minutes to 9 hours and 5 minutes (Greyhound 2012).

Tufesa provides bus service between the U.S. and Mexico (Tufesa 2012). Tufesa offers intercity travel service between Las Vegas and Phoenix twice per day and between Las Vegas and Tucson and Nogales once per day (GotoBus.com 2011). Additionally, several private shuttle transit providers offer bus service between Mexico and the U.S. daily, primarily serving the ports of entry in Yuma, Nogales, and Douglas.

### *Local Transit Networks*

The study area in Arizona and Nevada has four major metropolitan areas: Tucson, Phoenix, Las Vegas, and Reno. These areas are major destinations in Arizona and Nevada. Each area offers local public transportation facilities and services, which are summarized below.

#### *Tucson*

In Tucson, Sun Tran provides public transportation with approximately 20 million boardings per year (Sun Tran n.d.[a]). The regional system includes express, local, shuttle, and downtown circulator bus routes as well as demand response service.

The local transit system in Tucson provides direct connections to the Tucson Amtrak Station. Some local routes provide service between the Tucson International Airport and Laos and Tohono Transit Centers (Sun Tran n.d.[c]). Several express and local routes have bus stops adjacent to the Greyhound bus station, and a number of express routes and local routes provide connections between the Greyhound station and Ronstadt Transit Center (Sun Tran n.d. [d]).

**Tucson, Arizona – Local Transit System**
The Sun Tran transit system consists of:

- 3 transit centers
- 27 local bus routes
- 13 express bus routes
- 1 downtown circulator
- 9 shuttle bus routes
- Demand response service

Sources: City of Tucson 2012, Sun Shuttle n.d., Sun Tran n.d. (b), (c)

#### *Phoenix*

The transit providers in the Phoenix metropolitan area are integrated under Valley Metro, the regional transit system provider. In FY 2012, annual ridership on Valley Metro services exceeded 71 million, with 13.6 million boardings onto LRT and the remaining 57.5 million boardings onto bus routes (Valley Metro 2012b).

The regional system includes the METRO LRT; LINK bus rapid transit (BRT); Express, RAPID, local bus, and circulator bus routes; and demand response service.

No transit options provide connections to the Maricopa Amtrak station, which is approximately 30 miles from downtown Phoenix, clearly outside the Phoenix metropolitan area. A free airport shuttle and a local bus route provide service between Phoenix Sky Harbor International Airport and a METRO LRT Station (Valley Metro 2012d). The Phoenix metropolitan area has three Greyhound bus stations served by local bus routes.

**Phoenix, Arizona – Local Transit System**
The Valley Metro transit system consists of:

- 15 transit centers
- 1 METRO LRT route
- 2 LINK BRT routes
- 15 Express service bus routes
- 5 RAPID service bus routes
- 58 local bus routes
- 21 neighborhood circulators
- 1 rural bus route
- Demand response service

Sources: Valley Metro 2012c, 2012d

*Las Vegas*

The RTCSNV is the transit authority and the transportation planning agency for southern Nevada. In 2011, annual ridership on RTCSNV transit services reached nearly 58 million boardings (RTCSNV 2012a). The "Deuce" double-deck bus line on the Las Vegas Strip is the most popular route in terms of passenger volume, with an average of more than 650,000 riders every month (RTCSNV 2012g).

**Las Vegas, Nevada – Local Transit System**
The RTC transit system consists of:
- 4 transit centers
- 8 Express BRT routes
- 31 local bus routes
- 13 Silver STAR bus loop routes
- 1 privately owned and operated monorail system serving the Las Vegas Resort Corridor
- Demand response service

The regional system includes Express, Silver STAR, local bus routes; a privately owned and operated monorail; and demand response service.

Amtrak has no service to Las Vegas. Westcliff Airport Express BRT and local routes provide service to McCarran International Airport. Local routes also connect McCarran with Bonneville Transit Center. Westcliff Airport Express provides airport connections from the Westcliff and Bonneville Transit Centers and Las Vegas Premium Outlets/Government Center (RTCSNV 2012e). The Las Vegas metropolitan area has two Greyhound bus stations served by local bus routes.

*Reno*

The RTCWC Public Transportation Department coordinates all RTCWC transit services including route planning and scheduling. The regional system includes the RAPID BRT, the high-frequency SIERRA SPIRIT between downtown Reno and the University of Nevada, an intercity bus route, and local bus routes. In FY 2011, annual ridership on RTCWC services reached nearly 1.8 million, with 95,000 boardings onto the RAPID BRT route and 55,000 boardings onto the local RAPID CONNECT route (RTCWC 2011). CONNECT provides service to all local stops and RAPID BRT stops.

**Reno, Nevada – Local Transit System**
The RTCWC transit system consists of:
- 2 transit centers and 2 transfer points
- 1 RAPID BRT route
- 1 high-frequency SIERRA SPIRIT bus route
- 1 intercity bus route between Reno and Carson City
- 23 local bus routes
- Demand response service

Sources: RTCWC (date unknown)a-f

The local transit system in Reno provides direct connections to the Reno Amtrak station. Local routes provide service between the Reno-Tahoe International Airport and connections between the Reno Greyhound station and 4th Street Station (RTCWC n.d. [e]).

## Future Conditions

Demand for passenger rail is expected to grow as highway and aviation systems reach their capacities. The current passenger rail system is faced with the challenge of limited track capacity due to passenger and freight rail sharing tracks. One solution to the challenge of limited track capacity is the potential for new high-speed rail (HSR) corridors on dedicated track. Metropolitan areas with busy air markets and congested highways make prime candidates for HSR. The corridor between Phoenix and Las Vegas is within the 100- to 600-mile range in which HSR rail is competitive with other transportation modes such as highway and air travel.

### Regional Passenger Rail

#### *Federal Railroad Administration High-Speed Intercity Passenger Rail Program*

In 2008, Congress created the High-Speed Intercity Passenger Rail Program (Figure 1-19) to make strategic investments in advancing regional networks of passenger rail corridors and improve connectivity. While capital funding for the Southwest region has primarily been concentrated in California, the Federal Railroad Administration has also supported the development of a "pipeline" of future projects through investments in state and corridor planning and environmental studies.

As part of this effort, Federal Railroad Administration is also leading a multi-state rail planning study focused primarily on connectivity between Arizona, California, Nevada, and Utah. This study is one of the first of its kind in the U.S., and will result in a better understanding of the market need for passenger rail within the region's multimodal transportation network. However, there is not a specific corridor study looking at connecting California to Arizona or Arizona to Nevada.

FIGURE 1-19
**United States High-Speed Intercity Passenger Rail Investments**


Source: Federal Railroad Administration 2013

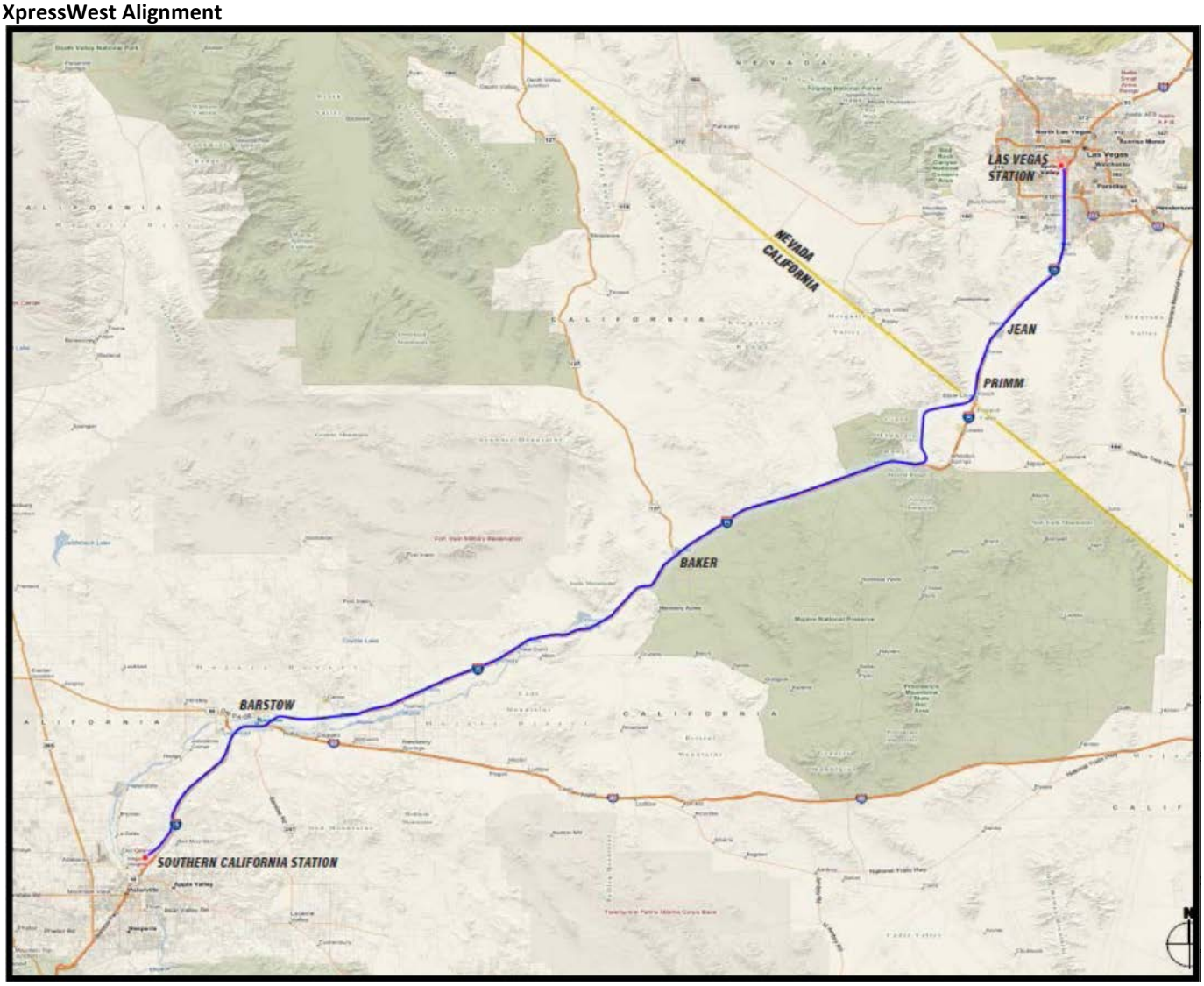
### *Western High Speed Rail Alliance*

The metropolitan planning organizations in the West have formed an alliance to explore HSR opportunities in the Intermountain West and Southwest. The goal of the Western High Speed Rail Alliance is to initiate feasibility studies, develop plans, and ultimately build HSR between Denver, Las Vegas, Phoenix, Salt Lake City, and Reno—cities that are among the largest in the Intermountain and Desert West and are among the fastest-growing in the country.

### *XpressWest (formerly DesertXpress)*

DesertXpress Enterprises is the development company for XpressWest (formerly DesertXpress), a 185-mile-long HSR project that would connect Las Vegas and Victorville (in San Bernardino County in Southern California) (Figure 1-20). XpressWest would be built exclusively on new double track within the I-15 freeway corridor and would provide service between Southern California and Las Vegas in 80 minutes with 150 mile-per-hour high speed trails. It is the only construction-ready dedicated HSR project in the United States as it has completed all of its permitting requirements and is currently working to secure funding (XpressWest 2013).

FIGURE 1-20
**XpressWest Alignment**



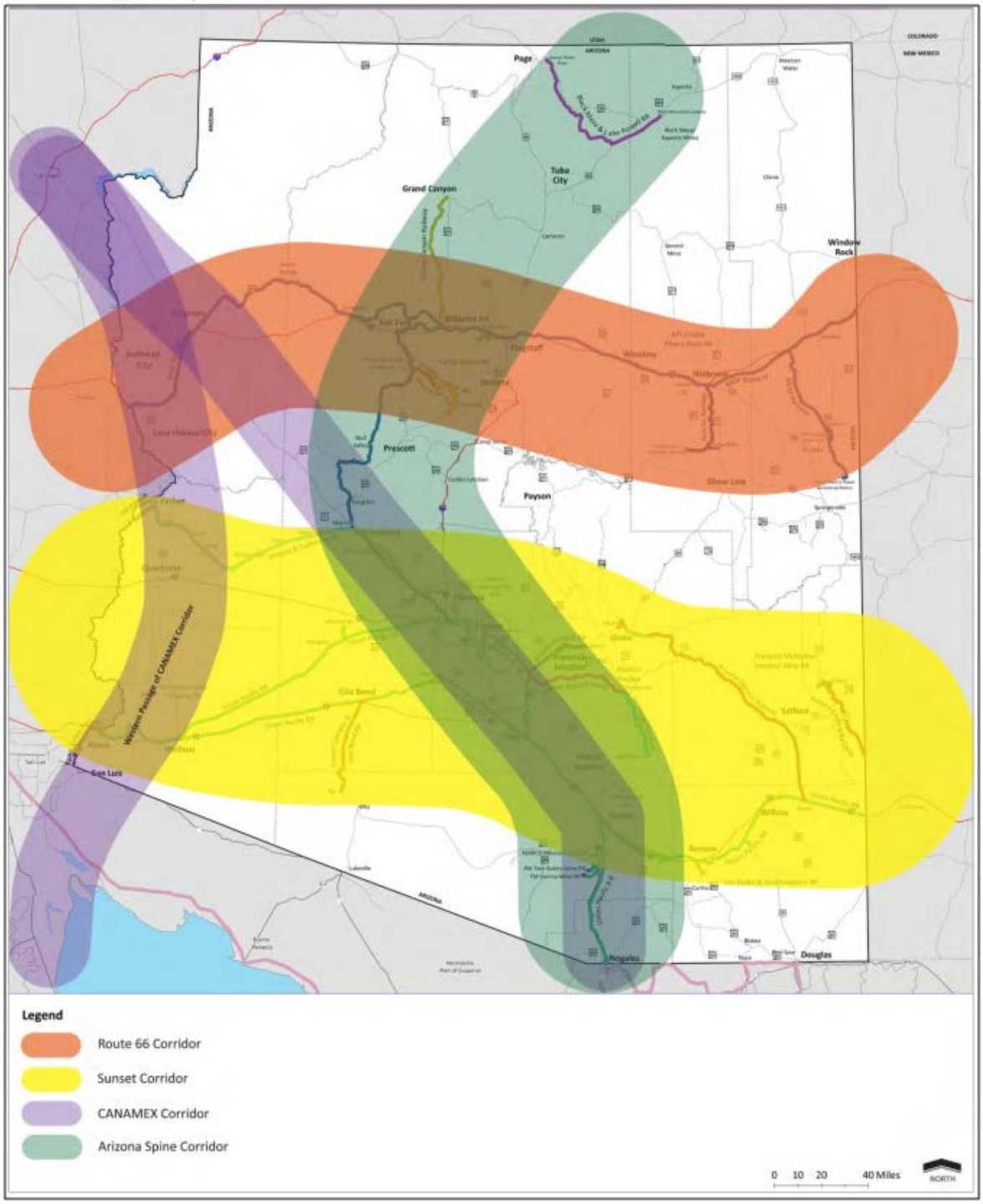

Source: XpressWest 2013

### Arizona Passenger Rail Plans

The *bqAZ Statewide Rail Framework Study* (ADOT 2010b) identifies four potential HSR corridors between Arizona and bordering states linking Phoenix/Tucson with Los Angeles, Las Vegas, San Diego, and Albuquerque/Denver. The study notes that these cities are within the 100- to 600-mile range in which HSR is competitive with other transportation modes such as highway and air travel.

ADOT prepared the *Arizona State Rail Plan* (ADOT 2011a) as a follow-up to the bqAZ *Statewide Rail Framework Study*. The *Arizona State Rail Plan* is a comprehensive assessment of Arizona's rail needs over the next 40 years that identifies opportunity rail corridors (Figure 1-21).

FIGURE 1-21
**Arizona Rail Opportunity Corridors**

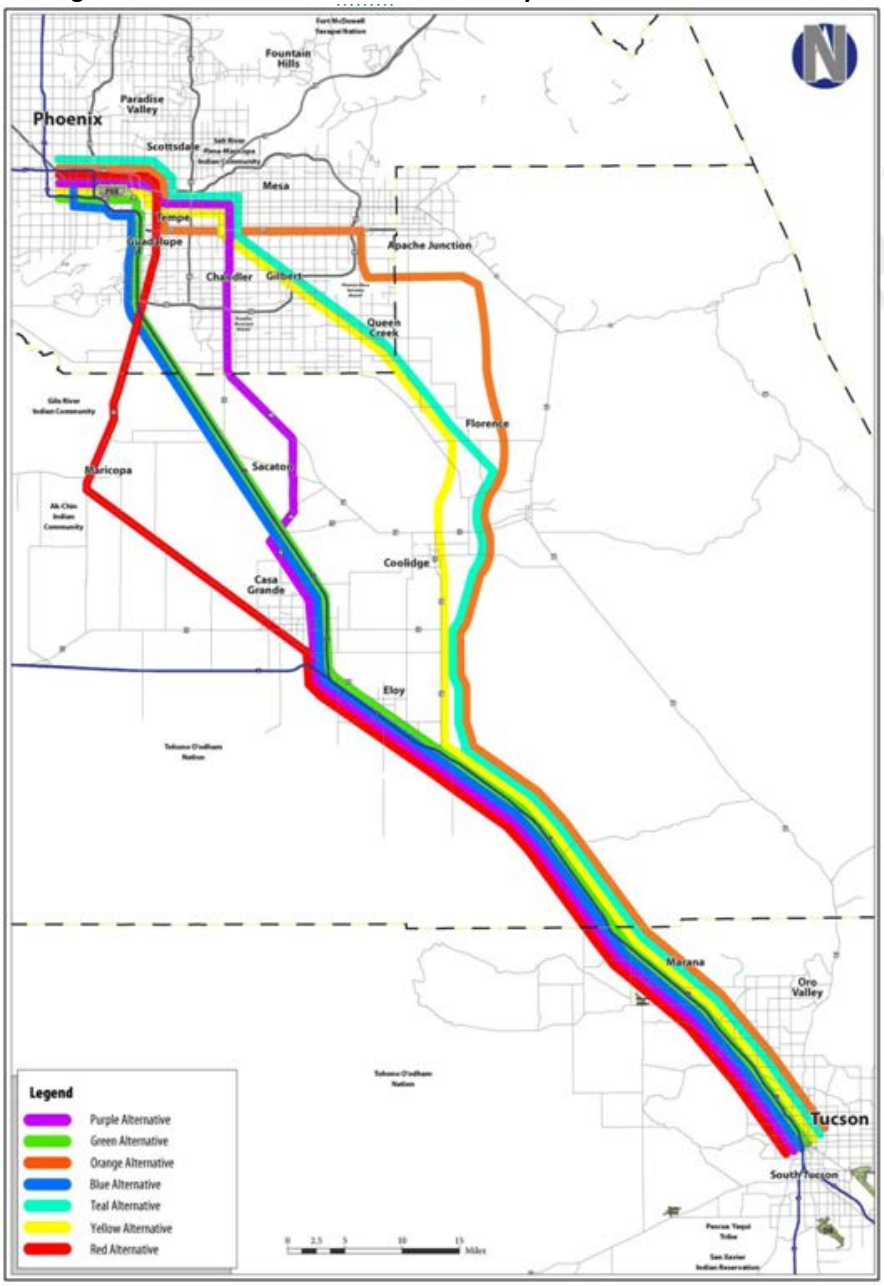



Source: ADOT 2011a

ADOT is currently evaluating alternative passenger rail corridors between Phoenix and Tucson to alleviate congestion on I-10 (Figure 1-22) (ADOT 2012l). It was noted in the *bqAZ Statewide Rail Framework Study* that

interstate intercity rail and HSR concepts can build on the Phoenix/Tucson corridor, which is a priority rail improvement for the state (ADOT 2009).

FIGURE 1-22
**Passenger Rail Alternative Corridors under Study between Phoenix and Tucson**




Source: ADOT 2012l

## Nevada Passenger Rail Plans

In September 2012, the Nevada State Transportation Board adopted the *Nevada State Rail Plan* (NDOT 2012a). The *Nevada State Rail Plan* provides the state with a plan for implementing passenger and freight rail service improvements, guiding multistate initiatives, and fulfilling requirements of the 2008 federal Passenger Rail Investment and Improvement Act. The plan has a multimodal passenger and intermodal freight focus designed to be compatible with highway, air, and transit modes operating in and through the state. Within Nevada, Amtrak and private operators, notably UPRR, rather than NDOT, provide and fund passenger and freight rail services. Nevada's role is one of supporting, coordinating, and enhancing services provided by these third-party

owners/operators, rather than taking on the role of owning and operating its own rail facilities and services. Proposed corridors for investment are shown in Figure 1-23 (NDOT 2012a).

FIGURE 1-23
**Proposed Nevada Passenger Rail Improvements**


Source: NDOT 2012a

The recommended projects included in the *Nevada State Rail Plan* involve a combination of private- and public-sector conventional and high-speed passenger rail, freight rail, excursion rail, and rail-highway grade crossing improvements to be made in the short-, mid-, and long-term. The *Nevada State Rail Plan* identified two key private company venture projects for the short-range period (5 years): (1) X-Train conventional passenger rail service between Los Angeles, Las Vegas, and Salt Lake City; and (2) the DesertXpress HSR (now called XpressWest) service between Las Vegas and Southern California. Table 1-23 lists other proposed passenger, HSR, and excursion rail projects in Nevada identified in the *Nevada State Rail Plan*.

TABLE 1-23
**Proposed Nevada Conventional Passenger Rail Projects**

| Conventional Passenger Rail/High Speed Rail Projects | Time Frame |
|---|---|
| X-Train between Fullerton and Las Vegas | 0-5 years |
| DesertXpress service between Las Vegas and Victorville, California | 0-5 years |
| Restore Desert Wind service between Salt Lake City, Las Vegas, and Los Angeles | 6-20+ years |
| Rail service between Emeryville, Sacramento, Salt Lake City, and Reno for 2022 Winter Olympic Games bid<br>Develop consolidated Amtrak/Thruway Bus/Greyhound/local bus terminals in Elko, Winnemucca, Sparks, Reno, Las Vegas, and Laughlin | 6-20+ years |
| California-Nevada Interstate Maglev between Las Vegas and Anaheim, California (269 miles) | 6-20+ years |
| California-Nevada Interstate Maglev between Las Vegas and Primm/Ivanpah Airport/California state line (40miles) | 6-20+ years |
| Western High Speed Rail Alliance long-term proposal for HSR between Denver, Salt Lake City, Reno, and San Francisco | 6-20+ years |
| Golden Triangle HSR service between Las Vegas, Phoenix, and Los Angeles | 6-20+ years |
| Multimodal transportation hub at Nevada high-speed intercity passenger rail termini, notably Las Vegas | 6-20+ years |
| **Excursion Rail** | **Time Frame** |
| Extend Nevada Northern Railway 4 miles between McGill Junction and McGill Depot | 0-5 years |
| Extend the V&T about 5 miles to the east side of Carson City and refurbish equipment and update stations | 0-5 years |
| Extend Southern Nevada Railway 7 miles in Henderson | 0-5 years |

Source: NDOT 2012a

### Transit

The sections below describe current and planned transit systems in the four major metropolitan areas in Arizona and Nevada.

#### *Tucson*

The Pima Association of Governments developed the *High Capacity Transit System Plan* in 2009. Since completion of the plan, several projects have been completed or are underway. The 2040 Regional RTP identifies several transit expansion/improvement projects included in this plan, including implementation and/or expansion of intercity/commuter rail, streetcar, BRT, and local transit services.

#### *Phoenix*

Several transit projects are planned in the Phoenix metropolitan area. These projects are part of Valley Metro's plan approved by the Maricopa County voters in November 2004 (Proposition 400) to develop a total of 57 miles of high capacity transit by 2031 (Valley Metro 2012h). These transit projects include the Sky Train, Valley Metro LRT extensions, Tempe Streetcar, BRT expansion, new and expanded transit centers, local bus service, and commuter/intercity rail.

MAG completed a *Commuter Rail Strategic Plan* in 2008 to identify priorities and develop an implementation strategy for commuter rail service in Maricopa County and northern Pinal County. The plan identified potential corridors, and the *MAG Commuter Rail System Study*, completed in 2010, further defined and evaluated these corridors.

***Las Vegas***

The *Regional Transportation Plan, 2013-2035* identifies several transit expansion/improvement projects including the University of Nevada, Las Vegas (UNLV) Multimodal Transit Center, BRT expansion, Monorail extension to McCarran International Airport, and the Summerlin Transit Center.

RTCSNV completed a feasibility study for the UNLV Multimodal Transit Center in 2009, and the project has received Federal Transit Authority funding. The UNLV Multimodal Transit Center will be located on the main campus, and development of the site and the usage of the multimodal transit center will be a joint venture between RTCSNV and UNLV. The transit center will include six transit vehicle bays, Centennial Express, and UNLV campus transit vehicles (RTCSNV 2012h). The project is scheduled to open by 2015 (RTCSNV 2012g).

***Reno***

RTCWC has no planned BRT or LRT capital projects.

# 1.2 Moving Goods

A profile of freight flows by transport mode (truck, rail, and multiple modes), commodity type, origin/destination, freight flow with neighboring states, and trade flows across southern land borders was prepared and analyzed using the FHWA Freight Analysis Framework (FAF3) database (FHWA 2013) and the BTS Transborder Freight Data (BTS 2012c).

For the purpose of these analyses, *inbound freight* includes the freight imported to the study area (Arizona or Nevada) or originated from other states with a destination in the study region. *Outbound freight* includes three components: (1) freight originating in the study area and shipped to other states or to foreign countries, (2) freight originating in other U.S. states and transferred to the study area for the export market, and (3) imported freight landing in the study area and transferred to its final destination within the rest of the U.S. Finally, *within/local freight* includes domestic freight originating in, and with a final destination in, the study area.

In this analysis, the rest of states were grouped by geographical location relative to the study area. For example, a state located in the east of the study area was grouped as East. Any freight flow to/from that state would be counted as freight flow to/from the east. The freight flow between California and the study region was estimated separately from the freight flow from western states because freight flow to/from California constitutes a large share of total freight flow to/out of the region. Therefore, the West category includes only Washington and Oregon, but not California. In addition, current freight flows within Arizona and Nevada and freight flows to/from following seven states were also individually estimated: California, Idaho, New Mexico, Oregon, Texas, Utah and Washington.

## 1.2.1 Arizona Flows

Arizona had total estimated freight of 309 million tons in 2010 with an estimated total current value of $381 billion (Table 1-24). The total freight includes $132 billion of inbound freight, $101 billion of outbound freight, and $147 billion of local freight movements. The inbound freight was about 30 percent more than outbound freight by total value, reflecting Arizona's continuing status as a net importer.

For the inbound freight, about 90 percent by value was domestic goods. Thirty percent of domestic products were from California.[2] For the import freight, slightly more than 50 percent of imports by value to Arizona were from Mexico, about 9 percent were from Canada, and slightly more than 20 percent of imported goods were transferred from California. Seventy-five percent of outbound freight by value was domestic, with 17 percent of total outbound freight headed for California alone. Another 14 percent of outbound freight by value was export and import transfer freight.[3] The majority of the transfer freight was U.S. imports from Mexico.

[2] Does not include foreign freight traveling through California.

[3] Transfer freight means the freight originating in other U.S. states and transferred to the study area for the export market or the imported freight landing in the study area and transferred to its final destination within the rest of the U.S.

By value, the projected average annual growth of total Arizona inbound freight is 4.6 percent, which is lower than the annual growth of outbound freight (2.9 percent). For inbound freight, domestic growth is expected to outpace, on average, international imports through 2040. However, for outflows, domestic growth is projected to average a mild 2.6 percent annual rate while exports will increase by about 4.6 percent each year. Exports to Mexico are forecasted to grow even more rapidly, around 5.0 percent a year. Likely, the shared border and NAFTA play important roles in fostering trade. Unsurprisingly, Arizona's status as a net importer is preserved.

TABLE 1-24
**Arizona Inbound and Outbound Freight Volume and Forecast, 2012 Dollars**

| Arizona State | 2010 Volume ($ millions)[a] | 2040 Volume ($ millions) | Average Annual Growth (%) | 2010 Volume (thousand tons)[a] | 2040 Volume (thousand tons) | Average Annual Growth (%) |
|---|---|---|---|---|---|---|
| **Inbound** | **132,642** | **518,477** | **4.6** | **62,071** | **135,588** | **2.6** |
| Domestic | 121,243 | 482,723 | 4.7 | 57,121 | 122,522 | 2.6 |
| Nevada | 2,076 | 6,979 | 4.1 | 1,082 | 3,190 | 3.7 |
| California | 35,922 | 167,628 | 5.3 | 11,512 | 44,425 | 4.6 |
| Import | 11,399 | 35,754 | 3.9 | 4,950 | 13,066 | 3.3 |
| Canada | 1,029 | 4,515 | 5.1 | 399 | 1,563 | 4.7 |
| Mexico | 6,761 | 18,534 | 3.4 | 3,673 | 8,586 | 2.9 |
| **Outbound** | **101,024** | **238,291** | **2.9** | **27,689** | **53,449** | **2.2** |
| Domestic | 74,303 | 159,921 | 2.6 | 19,098 | 25,314 | 0.9 |
| Nevada | 4,259 | 8,929 | 2.5 | 2,277 | 3,315 | 1.3 |
| California | 17,238 | 29,820 | 1.8 | 6,688 | 7,908 | 0.6 |
| Export | 10,284 | 39,130 | 4.6 | 4,654 | 16,838 | 4.4 |
| Canada | 2,448 | 7,015 | 3.6 | 813 | 2,078 | 3.2 |
| Mexico | 6,217 | 26,738 | 5.0 | 3,366 | 13,720 | 4.8 |
| Export Transfer | 3,564 | 14,270 | 4.7 | 1,262 | 5,525 | 5.0 |
| Import Transfer | 12,873 | 24,971 | 2.2 | 2,675 | 5,772 | 2.6 |
| **Within/Local** | **147,951** | **307,197** | **2.5** | **219,319** | **344,336** | **1.5** |

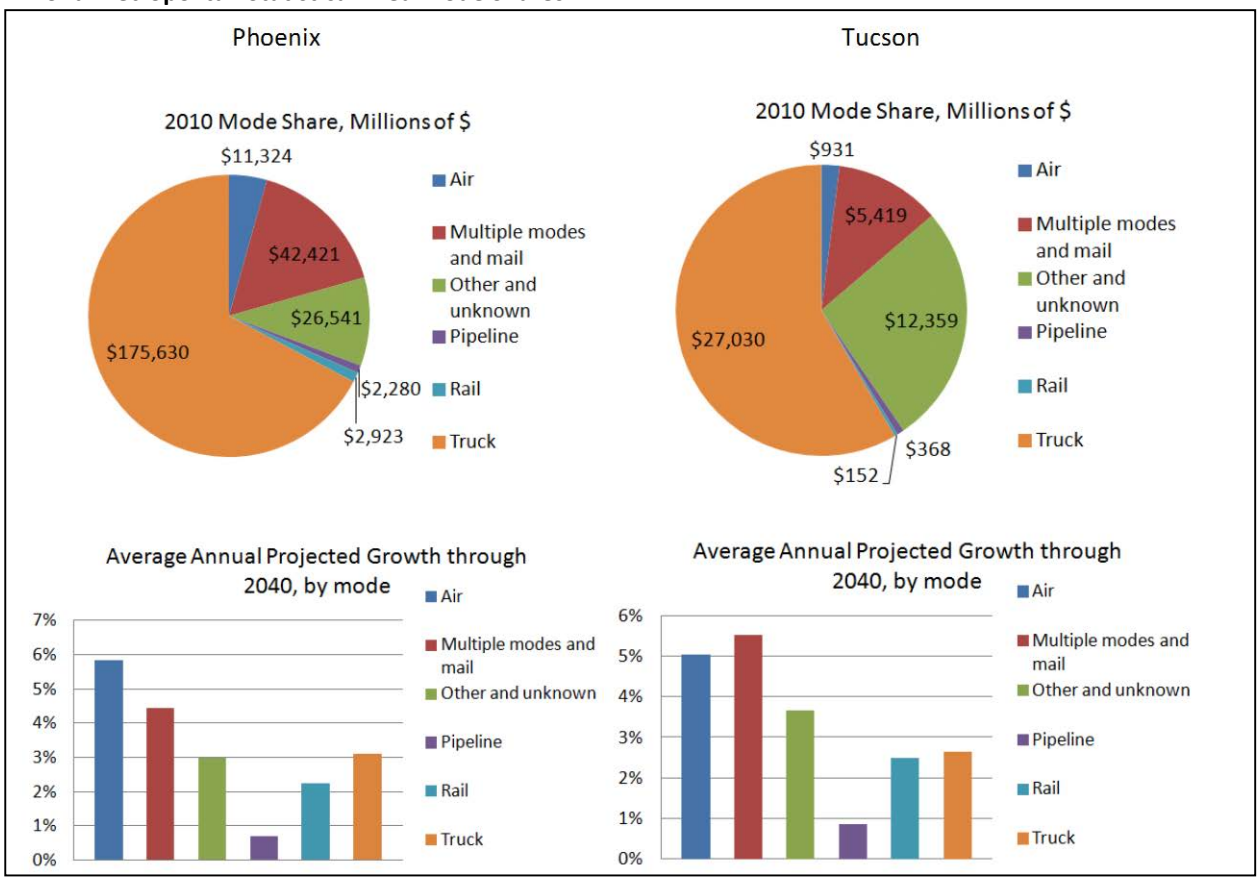
[a] FAF3 2010 Provisional Annual Data, inflated to 2012 value by Consumer Price Index (CPI) inflation factor provided by BLS CPI inflation calculator.

Source: FHWA 2013

While Table 1-24 provides an overview of current and projected total freight flows, directional flows are also of interest because they inform which transportation routes are used most heavily for transporting goods. Figure 3-8 if the *Corridor Justification Report* shows directional flows by volume for Arizona.

Mode share, or the percentage of goods that use different transportation methods, is also of interest because it helps to gauge current and future relative demand for roads, railways, airport cargo facilities, inland reloading facilities, pipelines, and the like. Figure 3-7 in *Corridor Justification Report* shows the 2010 Mode Share for Arizona as a whole, while Figure 1-24 shows mode shares for the two Arizona Metropolitan Statistical Areas (MSAs).

FIGURE 1-24
**Arizona Metropolitan Statistical Area Mode Shares**




Source: FHWA 2013

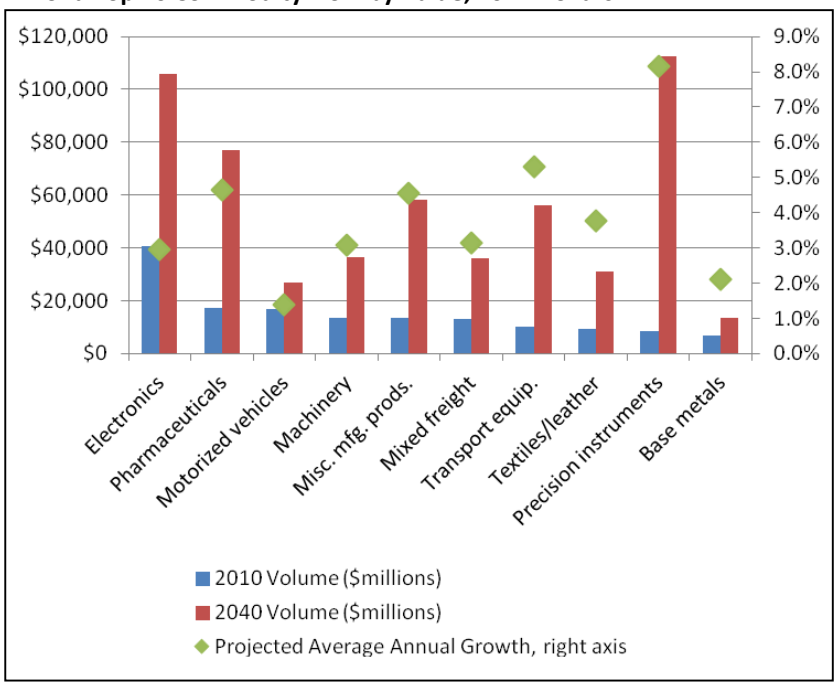
Note: FAF3 database 2010 Provisional Annual Data, inflated to 2012 value by CPI inflation factor provided by BLS CPI inflation calculator.

Figures 1-25 through 1-28 show the top 10 commodities moved into and out of Arizona by value and tonnage, by all modes as well as by truck only. Overall, the top 10 commodity groups accounted for more than 70 percent of freight value in 2010. The largest commodity group by value was electronics. The top 10 commodities by tonnage differed significantly from those of the value profile. Seven of the top 10 commodities ranked by value dropped out of the tonnage list: electronics, pharmaceuticals, machinery, miscellaneous manufactured products, transport equipment, textiles/leather, and precision instruments. By tonnage, these were replaced by the following lower-value commodity sectors: coal, agricultural products, foodstuffs, metallic ores, wood products, and gravel.

By tonnage, the top 10 commodity groups accounted for 64 percent of total tonnage in 2010. The largest commodity group was coal, which consisted of more than 20 percent of total freight tonnage. However, coal is projected to show restrained growth through 2040, perhaps as it loses market share to other energy sources.

Moreover, the second largest commodity by tonnage is coal and petroleum products, not elsewhere classified, which includes natural gas. As of 2010, this commodity showed muted growth prospects of less than 1 percent per year. However, in the last few years, the implementation of hydrological fracturing (fracking) technologies has dramatically increased potential growth. Utah and California both have extensive unconventional natural gas resources, and production in these states is expected to grow significantly in the next 30 years. Natural gas is currently transported via pipelines, railways, trucks, and tanker ships.

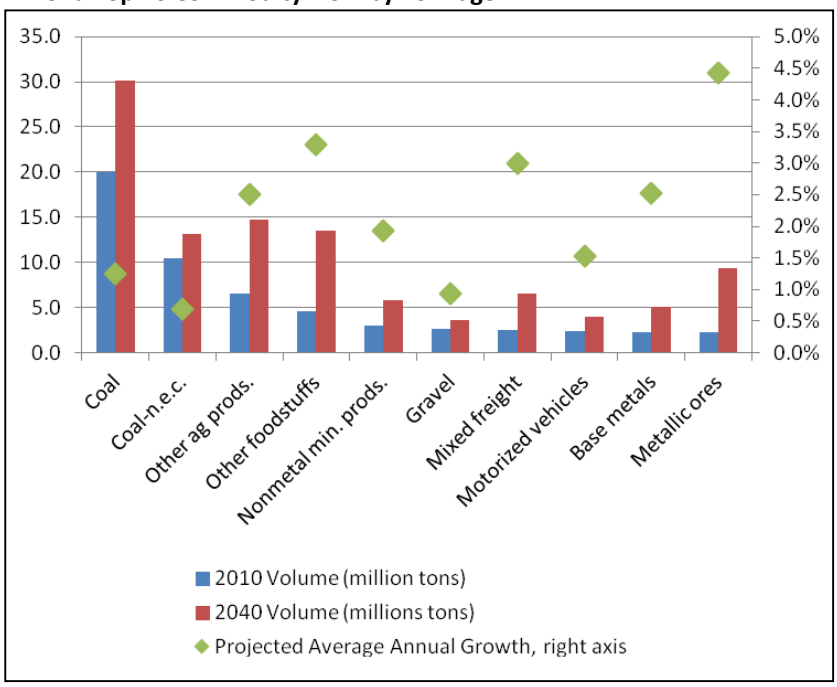
FIGURE 1-25
**Arizona Top 10 Commodity Flow by Value, 2012 Dollars**




Source: FHWA 2013

Note: FAF3 2010 data, inflated to 2012 value by CPI inflation factor provided by BLS CPI inflation calculator.

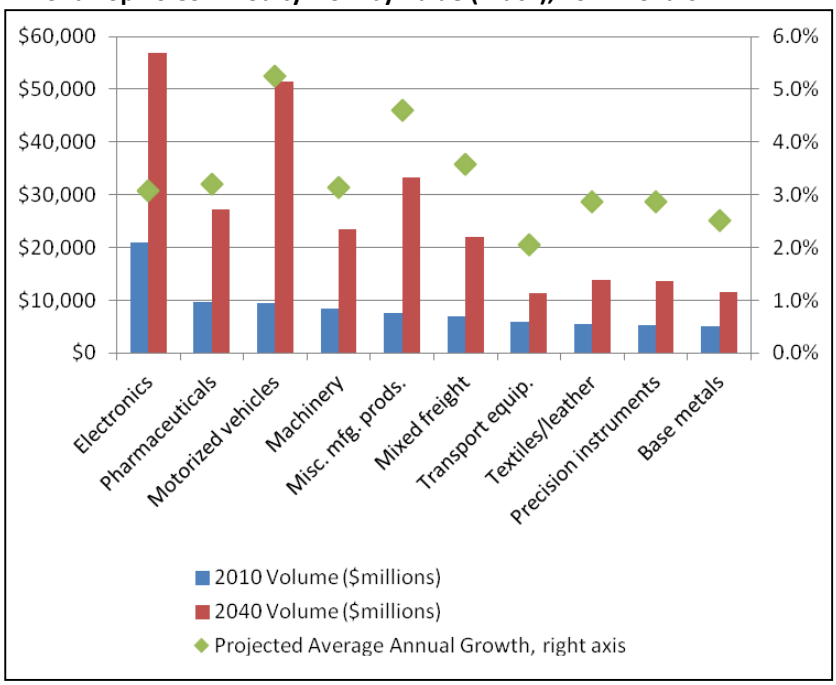
FIGURE 1-26
**Arizona Top 10 Commodity Flow by Tonnage**




Source: FHWA 2013

Note: FAF3 2010 data, inflated to 2012 value by CPI inflation factor provided by BLS CPI inflation calculator.

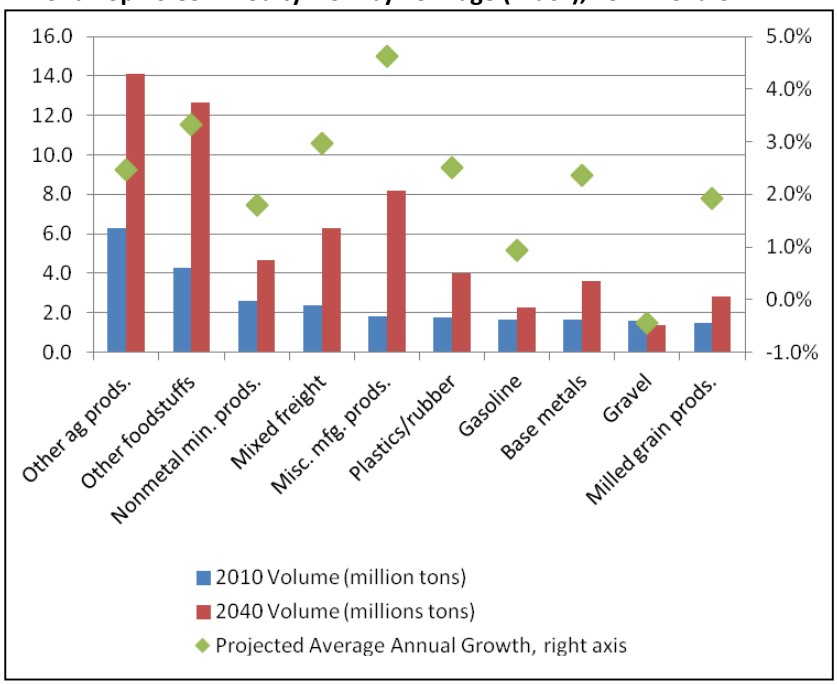
FIGURE 1-27
**Arizona Top 10 Commodity Flow by Value (Truck), 2012 Dollars**




Source: FHWA 2013

Note: FAF3 2010 data, inflated to 2012 value by CPI inflation factor provided by BLS CPI inflation calculator.

FIGURE 1-28
**Arizona Top 10 Commodity Flow by Tonnage (Truck), 2012 Dollars**




Source: FHWA 2013

Note: FAF3 2010 data, inflated to 2012 value by CPI inflation factor provided by BLS CPI inflation calculator.

Figures 1-27 and 1-28 show the top 10 commodities by value and tonnage transported only via truck. For the top 10 commodities moved by truck by value, most were higher value commodities such as electronics,

pharmaceuticals, and machinery. For the top 10 commodities moved by truck by tonnage, the top three commodities were agricultural products, foodstuffs, and nonmetal mineral products.

Figures 1-26 and 1-28 list the top 10 commodity flows in dollar terms in general and via truck, respectively. The two lists are broadly similar, suggesting that many of these commodities are transported by rail, truck, and intermodal methods. However, when comparing Figure 1-26 and Figure 1-28, which respectively list the top 10 commodity flows in tonnage terms by all methods and via truck only, there is a distinct lack of similarity. Coal leads all commodities in terms of tonnage transported in Arizona, but is not among the top 10 trucked commodities, again pointing to coal relying on railway transportation. Conversely, gasoline appears on the truck list only.

### 1.2.2 Nevada Flows

Nevada had total estimated freight of 136 million tons in 2010, with an estimated total current value of $154 billion. The total freight includes $70 billion of inbound freight, $36 billion of outbound freight, and $47 billion of local freight movements (Table 1-25). Like Arizona, but even more pronounced, Nevada is a net importer, with its inbound freight almost doubling the outbound freight by total value.

TABLE 1-25
**Nevada Inbound and Outbound Freight Volume and Forecast, 2012 Dollars**

| Nevada State | 2010 Volume ($ millions)[a] | 2040 Volume ($ millions) | Average Annual Growth (%) | 2010 Volume (thousand tons)[a] | 2040 Volume (thousand tons) | Average Annual Growth (%) |
|---|---|---|---|---|---|---|
| **Inbound** | **70,655** | **216,776** | **3.8** | **40,852** | **75,562** | **2.1** |
| Domestic | 67,545 | 206,673 | 3.8 | 40,045 | 72,804 | 2.0 |
| Nevada | 4,259 | 8,929 | 2.5 | 2,277 | 3,315 | 1.3 |
| California | 26,456 | 109,185 | 4.8 | 14,886 | 40,226 | 3.4 |
| Import | 3,109 | 10,103 | 4.0 | 807 | 2,759 | 4.2 |
| Canada | 645 | 2,615 | 4.8 | 364 | 1,236 | 4.2 |
| Mexico | 719 | 1,569 | 2.6 | 67 | 239 | 4.3 |
| **Outbound** | **36,255** | **93,981** | **3.2** | **17,296** | **31,766** | **2.0** |
| Domestic | 33,626 | 86,229 | 3.2 | 13,218 | 26,337 | 2.3 |
| Nevada | 2,076 | 6,979 | 4.1 | 1,082 | 3,190 | 3.7 |
| California | 13,044 | 28,848 | 2.7 | 6,505 | 11,667 | 2.0 |
| Export | 2,628 | 7,747 | 3.7 | 4,078 | 5,429 | 1.0 |
| Canada | 931 | 3,022 | 4.0 | 2,520 | 2,480 | -0.1 |
| Mexico | 205 | 928 | 5.2 | 31 | 183 | 6.1 |
| Export Transfer | 2 | 5 | 3.5 | 0 | 0 | N/A |
| Import Transfer | 0 | 0 | N/A | 0 | 0 | N/A |
| **Within/Local** | **47,585** | **106,118** | **2.7** | **78,787** | **131,855** | **1.7** |

[a] FAF3 2010 Provisional Annual Data, inflated to 2012 value by CPI inflation factor provided by BLS CPI inflation calculator.

Source: FHWA 2013

Note: N/A = not applicable

For inbound freight, about 95 percent was domestic freight, among which 40 percent was domestic products from California. For imported freight, by value, about 40 percent was from Mexico and Canada.

For outbound freight by value, about 90 percent was shipped to domestic destinations. Thirty percent of total outflows were bound for California. Less than 10 percent of outbound freight was for export market, 40 percent of which was destined for Canada and Mexico. The import and export transfer freight was minimal, with only $2 million of export transfer freight in 2010. Like Arizona, the forecast for export growth from Nevada to Mexico is

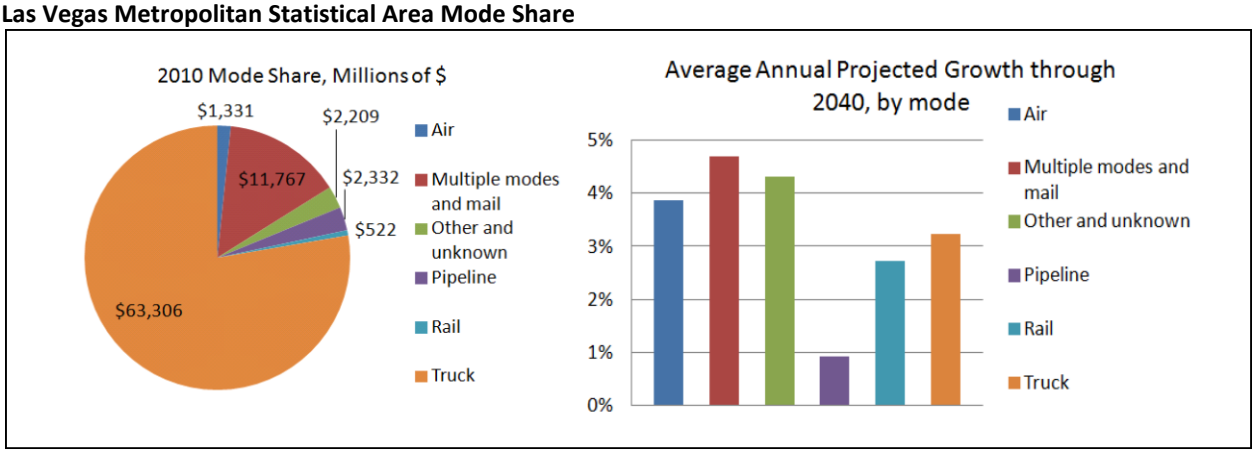
optimistic; exports to Mexico were ranked as the top forecasted growing freight sector for Nevada at 5.2 percent annual average growth rate by value.

The average annual growth of total Nevada inbound freight was forecasted at 3.8 percent, which was higher than the forecasted annual growth of outbound freight (3.2 percent) by value, suggesting that the trend of Nevada being a net importer will continue and, in fact, intensify.

While Table 1-25 gives an overview of current and projected total freight flows, directional flows are also of interest because they inform which transportation routes are used most heavily for transporting goods. Figure 3-9 in the *Corridor Justification Report* shows directional flows by volume for Nevada.

Mode share, or the percentage of goods that use different transportation methods, is also of interest because it helps to gauge current and future relative demand for roads, railways, airport cargo facilities, inland reloading facilities, pipelines, and the like. Figure 3-7 in the *Corridor Justification Report* shows the 2010 mode share for Nevada as a whole, while Figure 1-29 shows mode shares for the Las Vegas, the only MSA in Nevada.

FIGURE 1-29
**Las Vegas Metropolitan Statistical Area Mode Share**




Source: FHWA 2013

Note: FAF3 2010 data, inflated to 2012 value by CPI inflation factor provided by BLS CPI inflation calculator.

Figures 1-30 and 1-31 show the top 10 commodities moved into and out of Nevada by value and tonnage in 2010 as well as projections for 2040. The top 10 commodity groups accounted for 67 percent of freight value in 2010. The largest commodity group was electronics. The top 10 commodity profile alters when each commodity is ranked by tonnage. Nine of the top 10 commodities ranked by value dropped out of the tonnage list: electronics, textiles/leather, misc. manufactured products, pharmaceuticals, motorized vehicles, machinery, chemical production, plastics/rubber, and articles-base metal.

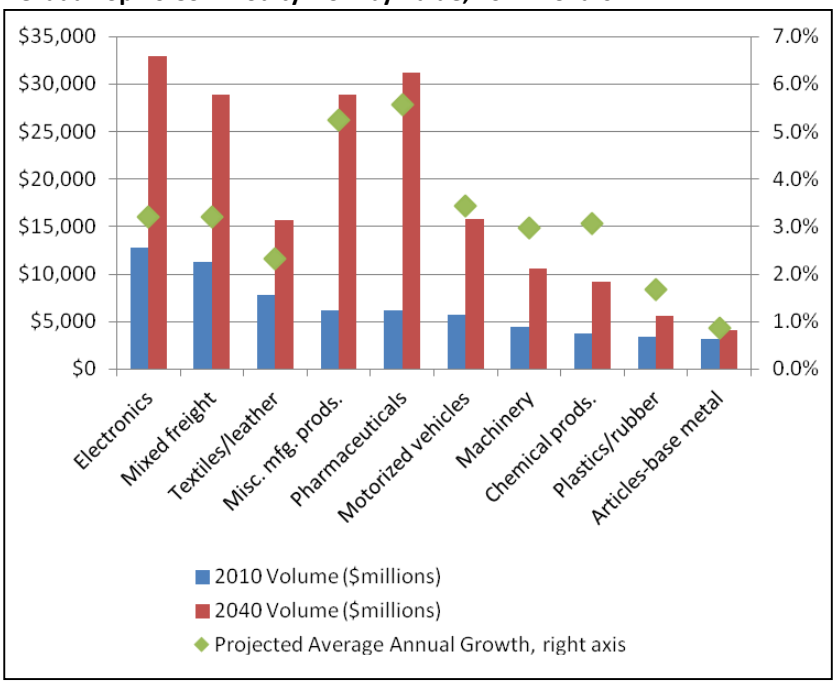
By tonnage, these commodities were replaced by the following lower-value commodity sectors: coal N.E.C.[4], nonmetal mineral products, coal, metallic ores, nonmetallic minerals, other agricultural products, foodstuffs, gasoline, and natural sands. The top three commodity groups by tonnage—coal N.E.C., nonmetal mineral products, and coal—accounted for more than 30 percent of tonnage in 2010.

Figures 1-32 and 1-33 show the top 10 commodities moved by truck, by value, and tonnage. Mixed freight was ranked as the top commodity moved by truck by value in 2010 and is forecasted to grow about 3 percent annually (USDOT et al. 2012).[5] For the top 10 commodities moved by truck by tonnage, the top three commodities were

[4] Coal and petroleum products, not elsewhere classified (includes natural gas).
[5] Mixed freight includes items for grocery and convenience stores, supplies and food for restaurants and fast food chains, hardware or plumbing supplies, office supplies, and miscellaneous.

nonmetal mineral products, other agricultural products, and mixed freight. Conspicuously absent from these lists of commodities moved by truck are coal and coal N.E.C., which are predominately moved by train.

FIGURE 1-30
**Nevada Top 10 Commodity Flow by Value, 2012 Dollars**

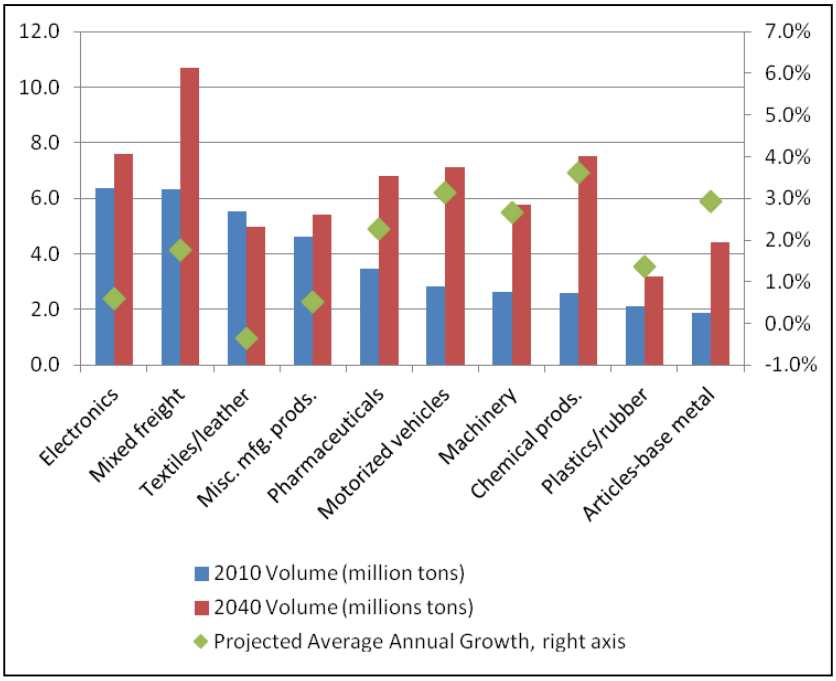



Source: FHWA 2013

Note: FAF3 2010 data, inflated to 2012 value by CPI inflation factor provided by BLS CPI inflation calculator.

Coal and petroleum products not elsewhere classified (includes natural gas).

FIGURE 1-31
**Nevada Top 10 Commodity Flow by Value, 2012 Dollars**

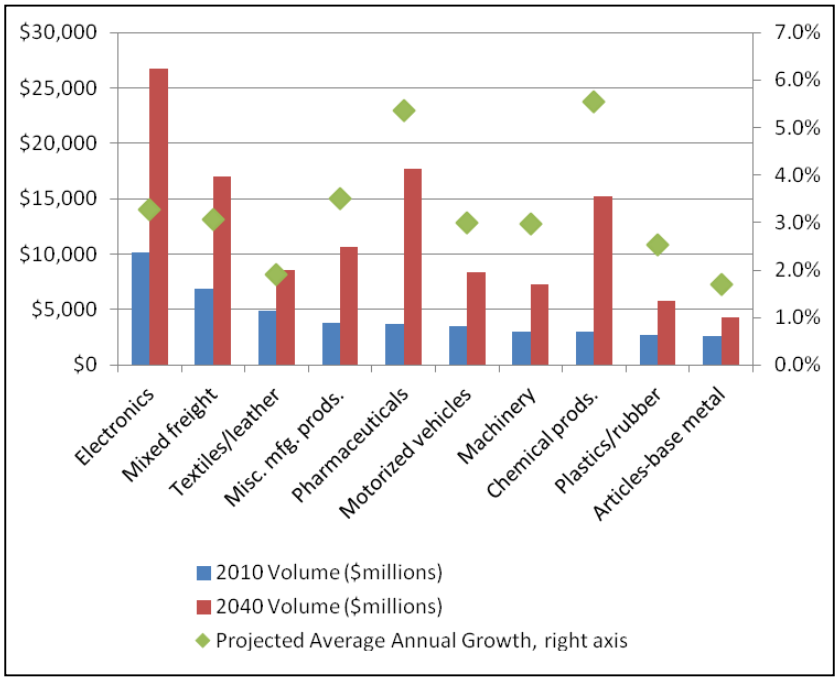



Source: FHWA 2013

Note: FAF3 2010 data, inflated to 2012 value by CPI inflation factor provided by BLS CPI inflation calculator.

Coal and petroleum products not elsewhere classified (includes natural gas).

FIGURE 1-32
**Nevada Top 10 Commodity Flow by Value (Truck), 2012 Dollars**

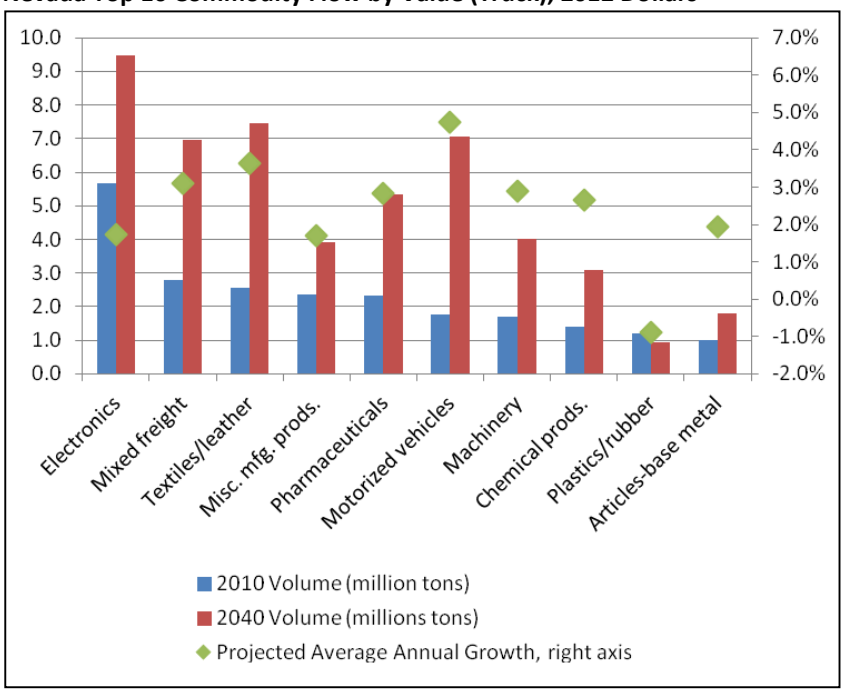



Source: FHWA 2013

Note: FAF3 2010 data, inflated to 2012 value by CPI inflation factor provided by BLS CPI inflation calculator.

Coal and petroleum products not elsewhere classified (includes natural gas).

FIGURE 1-33
**Nevada Top 10 Commodity Flow by Value (Truck), 2012 Dollars**




Source: FHWA 2013

Note: FAF3 2010 data, inflated to 2012 value by CPI inflation factor provided by BLS CPI inflation calculator.

Coal and petroleum products not elsewhere classified (includes natural gas).

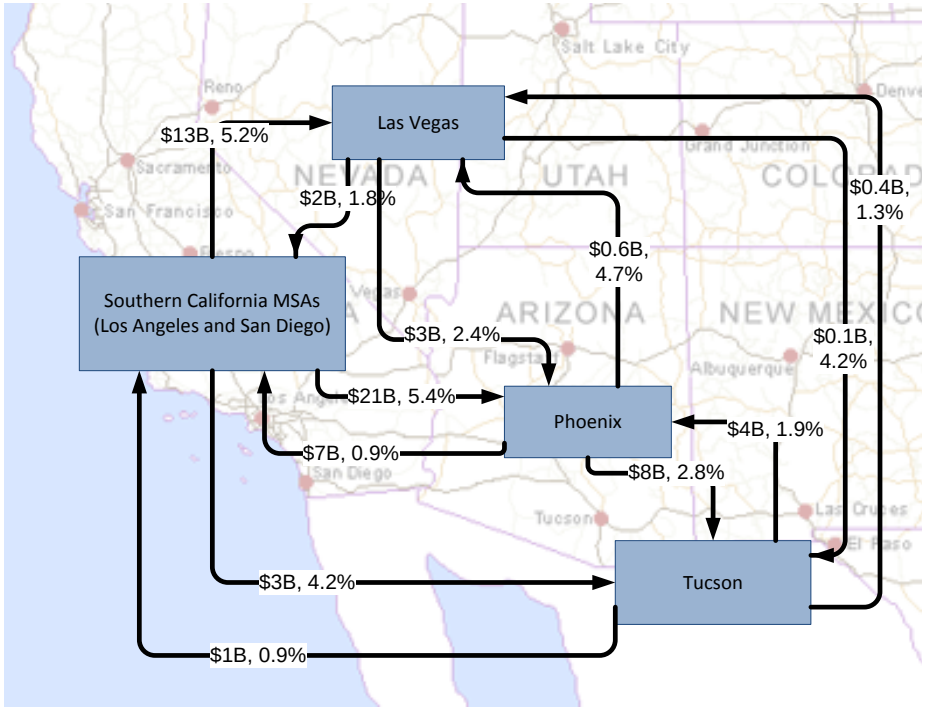
## 1.2.3 Metropolitan Statistical Area-Level Trends

California is a significant trade partner of both Arizona and Nevada. Of note, more than 95 percent of goods flowing from California to the study area MSAs were of domestic origin; this suggests that foreign goods entering the U.S. either in San Diego's LPOEs and water port or the Port of Los Angeles/Port of Long Beach (POLA/POLB) are traveling through, but are not primarily destined for, Arizona and Nevada.

Conversely, the flows from Southern California MSAs to the study area MSAs are projected to grow rapidly over the next 25 years, far exceeding the pace in the opposite direction; this will mean more trucks on the road, increased congestion in the I-5 corridor, and perhaps greater demand for inland reloading facilities or other infrastructure just to transport domestic freight.

Tucson serves as an origin for import transfer freight, particularly from Mexico or points south. Thirty-five percent of 2010 flows from Tucson to Southern California MSAs and 79 percent of flows from Tucson to Las Vegas were import transfer freight. This is a significant opportunity for potential I-11 alignment; while the current focus is on linking Phoenix and Las Vegas, Tucson is an important link in the supply chain from Mexico to the rest of the study area (Figure 1-34).

FIGURE 1-34
**Metropolitan Statistical Area-Level Freight Volumes and Projected Average Annual Growth Rates to 2040**




Source: FHWA 2013

Note: FAF3 2010 data, inflated to 2012 value by CPI inflation factor provided by BLS CPI inflation calculator.

## 1.2.4 Regional Domestic Freight Flows

Table 1-26 represents the domestic freight flow volume within the study area and neighboring states. The local freight flows within each state are not included. Among the 11 states included, the top three that generated most domestic freight flow were Texas, Louisiana, and California. California and Texas are the two states that consumed the most domestic freight originating from neighbor states, while Arizona and Oregon were 3rd and 4th. With the exception of Oregon, these states lie along I-10. However, the I-11 Intermodal Corridor may potentially structurally alter how goods move throughout this region.

TABLE 1-26
**Domestic Freight Flow Volume with Neighbor States**

| Destination States | 2010 Volume (thousand tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Origination States | | | | | | | | | | | |
| | AZ | CA | CO | ID | LA | NM | NV | OR | TX | UT | WA | Total |
| **Arizona** | | 11258 | 2521 | 576 | 1218 | 19333 | 996 | 857 | 3969 | 1215 | 471 | **42414** |
| **California** | 6488 | | 3864 | 3326 | 8374 | 2258 | 6328 | 8367 | 27365 | 5903 | 10696 | **82969** |
| **Colorado** | 784 | 2194 | | 875 | 1531 | 1288 | 156 | 747 | 7168 | 2054 | 533 | **17330** |
| **Idaho** | 37 | 677 | 310 | | 218 | 114 | 165 | 2861 | 699 | 10185 | 7049 | **22315** |
| **Louisiana** | 92 | 668 | 1950 | 1465 | | 2268 | 5 | 48 | 30910 | 666 | 470 | **38542** |
| **New Mexico** | 2934 | 1167 | 2104 | 227 | 505 | | 120 | 84 | 7735 | 152 | 115 | **15143** |
| **Nevada** | 2211 | 14686 | 648 | 265 | 628 | 205 | | 417 | 2289 | 6416 | 698 | **28463** |
| **Oregon** | 85 | 6311 | 729 | 2703 | 992 | 287 | 318 | | 3040 | 558 | 26398 | **41421** |
| **Texas** | 1806 | 7814 | 10023 | 4044 | 44035 | 10708 | 164 | 937 | | 2597 | 2296 | **84424** |
| **Utah** | 1039 | 3594 | 5787 | 1900 | 806 | 239 | 1847 | 2556 | 2341 | | 684 | **20793** |
| **W** | 151 | 6371 | 677 | 4172 | 811 | 332 | 326 | 16401 | 3185 | 1418 | | **33844** |
| **Total** | **15627** | **54740** | **28613** | **19553** | **59118** | **37032** | **10425** | **33275** | **88701** | **31164** | **49410** | **427658** |

Source: FHWA 2013

## 1.2.5 International Freight Flows in the Southwestern United States

### *International Trade in Arizona and Nevada*

For foreign trade, Canada and Mexico are among the top five trading partners of Arizona and Nevada (Table 1-27). Barriers to trade, which may be tariff-based or non-tariff based (for example, geographical distance or shared language), impede international trade flows. However, NAFTA and proximity, particularly between Mexico and Arizona which share a border, help encourage these flows of goods.

Mexico is Arizona's largest foreign trading partner in terms of both imports and exports. About 35 percent of Arizona's total imports come from Mexico, and an almost equal proportion (36 percent) is exported to Mexico. Nevada also has an important trade relationship with Mexico, albeit significantly smaller than Arizona. Both states export more to Canada than they import. However, as a percentage of the states' total trade, Nevada trades more with Canada than Arizona. Nevada's largest trading partners are China for imports and Switzerland for exports.[6]

[6] Nevada exports a substantial amount of gold to Switzerland.

TABLE 1-27
**Arizona and Nevada Largest Trading Partners (2011)**

| | Arizona | | Nevada | |
|---|---|---|---|---|
| | Country | % Share of State Total Trade | Country | % Share of State Total Trade |
| **Imports** | Mexico | 35.1 | China | 32.4 |
| | China | 13.9 | South Korea | 14.5 |
| | Japan | 9.7 | Canada | 11.0 |
| | Canada | 7.8 | Mexico | 5.1 |
| | Malaysia | 6.6 | Malaysia | 4.8 |
| **Exports** | Mexico | 33.6 | Switzerland | 46.6 |
| | Canada | 12.0 | Canada | 16.0 |
| | China | 5.6 | China | 5.3 |
| | Japan | 4.7 | Mexico | 4.0 |
| | United Kingdom | 4.5 | Japan | 3.4 |

Source: U.S. Census Bureau, Foreign Trade Statistics

## *Trade with Canada*

Table 1-28 shows the total value of Arizona and Nevada's trade with Canada. The two states display a similar trend, trade with Canada grew at a fairly steady rate from 2004-2008; however, both States experienced a dip in 2009 as a result of the economic recession in both the U.S. and Canada. Trade steadily increased from 2010 to 2011; however, Arizona/Canada trade activity is still below its pre-recession peak.

From 2008 to 2011, Arizona exported $8.2 billion in goods to Canada, and Nevada exported $4 billion. This compares to total Canadian imports of about $300 billion in goods and services each year from the U.S.

TABLE 1-28
**Arizona and Nevada Trade with Canada, 2011 Dollars**

| | Arizona | | Nevada | |
|---|---|---|---|---|
| Year | Exports, Millions of 2011$ | Imports, Millions of 2011$ | Exports, Millions of 2011$ | Imports, Millions of 2011$ |
| 2008 | 2,319 | 1,150 | 941 | 845 |
| 2009 | 1,762 | 814 | 798 | 662 |
| 2010 | 1,961 | 997 | 938 | 632 |
| 2011 | 2,135 | 1,376 | 1,273 | 819 |

Source: BTS 2012c

Trade with Canada had risen at a steady volume for both Arizona and Nevada until the start of the recession in 2008. Arizona's export trade with Canada peaked in 2008 at $2.3 billion and has not yet recovered to pre-recession levels; this is not uncommon because Canada has not yet reached its pre-recession peak for its own exports. Nevada, on the other hand, has exceeded its previous high trade volume from 2008.

Arizona's imports from Canada began a dramatic decline beginning in 2005 and reached a low of $814 million in 2009. Nevada's imports to Canada have not experienced the same volatility as Arizona, but did experience a

decline in 2009 and 2010. Both states started to recover in 2011. Imports from Canada may be somewhat restrained over the next year or so because the Canadian currency is currently strong, making Canadian goods feel expensive to American consumers.

### *Trade with Mexico*

Table 1-29 shows the economic value of trade with Mexico to the two states. On average, Arizona exports $5.4 billion in goods to Mexico annually. Nevada, on average, exports $270 million annually. With the exception of 2008 and 2009, Arizona's trade volume has steadily increased, and trade with Mexico today is nearly in equilibrium with $5.7 million in exports and $6.1 million in imports. Nevada, however, has not experienced the same growing trade relationship with Mexico as Arizona.

TABLE 1-29
**Arizona and Nevada Trade with Mexico, 2011 Dollars**

| | Arizona | | Nevada | |
|---|---|---|---|---|
| Year | Exports, Millions of 2011$ | Imports, Millions of 2011$ | Exports, Millions of 2011$ | Imports, Millions of 2011$ |
| 2008 | 5,910 | 5,330 | 186 | 264 |
| 2009 | 4,547 | 4,634 | 218 | 215 |
| 2010 | 5,053 | 5,631 | 351 | 286 |
| 2011 | 5,972 | 6,167 | 321 | 379 |

Source: BTS 2012c

### *International Trade with Neighboring States*

Table 1-30 shows the international freight flow volume among the study area and neighbor states. The table shows flows that originate in one state prior to export via another state or that enter the U.S. through one state prior to an ultimate destination in another state. California led all states as the origin of export freight, followed by Texas, and then Oregon. The top three states that served as the last stop of export freight before leaving the U.S. were California, Texas, and Washington. This is not surprising because these are the only three states among the group with both LPOEs to Canada or Mexico and water ports of entry.

Table 1-30 also shows dominant flows for exports. For example, in 2010 New Mexico shipped 228,000 tons of goods for export to Texas, while shipping only 2,000 tons to Arizona, suggesting that New Mexico companies prefer shipping through Texas. This preference could be based on many reasons, including better transportation infrastructure in Texas. I-11 has the potential to impact the preferences of these New Mexico companies, as well as those throughout the region.

TABLE 1-30
**Import and Export Freight Flow Volume with Neighbor States**

| | 2010 Volume (thousand tons) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Origination States | | | | | | | | | | | |
| Destinations | AZ | CA | CO | ID | LA | NM | NV | OR | TX | UT | WA | Total |
| AZ | | 561 | 8 | 15 | 25 | 2 | 1 | 0 | 585 | 47 | 317 | 1561 |
| CA | 784 | | 597 | 583 | 662 | 15 | 39 | 652 | 10496 | 875 | 2851 | 17554 |
| CO | 0 | 453 | | 75 | 162 | 0 | | 1 | 204 | 0 | 289 | 1184 |
| ID | 2 | 249 | 1 | | 5 | 0 | 1 | 1115 | 68 | 89 | 1922 | 3452 |
| LA | 1 | 1853 | 0 | 10 | | 0 | 0 | 1134 | 6256 | 0 | 969 | 10223 |
| NM | 5 | 13 | 0 | 0 | 7 | | 0 | 0 | 38 | 0 | 32 | 95 |
| NV | 2 | 224 | 0 | 61 | 27 | 0 | | 0 | 34 | 0 | 140 | 488 |
| OR | 8 | 1309 | 11 | 4206 | 170 | 0 | 15 | | 241 | 0 | 3033 | 8993 |
| TX | 628 | 8536 | 175 | 204 | 10776 | 228 | 1 | 201 | | 482 | 975 | 22206 |
| UT | 9 | 333 | 335 | 96 | 0 | 0 | | 0 | 79 | | 99 | 951 |
| WA | 91 | 6055 | 161 | 931 | 100 | 0 | 1465 | 10322 | 642 | 148 | | 19915 |
| Total | 1530 | 19586 | 1288 | 6181 | 11934 | 245 | 1522 | 13425 | 18643 | 1641 | 10627 | 86622 |

Source: FHWA 2013

## 1.3 Transportation Infrastructure

Arizona and Nevada freight flows are impacted by LPOEs, water ports, and airports, as well as current transportation infrastructure such as highways, railways, and pipelines. This section contains additional data tables for LPOE and water ports.

### 1.3.1 Southern Border Ports

The southern LPOEs in California, Arizona, New Mexico, and Texas provide controlled entry for both people and goods. Table 1-31 shows the top 20 land ports that handle U.S. and Mexico trade by value. Three are Arizona ports: Nogales (5th), Douglas (11th), and San Luis (12th). The top three land ports consisted of 65 percent of trade between the U.S. and Mexico that flow through land ports. Less than 10 percent of land freight between the U.S. and Mexico flowed through Arizona.

TABLE 1-31

**Top 20 Land Ports by Value (U.S. Import from and Export to Mexico, 2011)**

| Rank | Port Name | Total Trade Value by all Land Modes ($ billions) |
|---|---|---|
| 1 | Laredo – Texas | 144.6 |
| 2 | El Paso – Texas | 59.8 |
| 3 | Otay Mesa – California | 33.2 |
| 4 | Hidalgo – Texas | 24.5 |
| 5 | Nogales – Arizona | 22.1 |
| 6 | Eagle Pass – Texas | 19.6 |
| 7 | Santa Teresa – New Mexico | 17.8 |
| 8 | Brownsville – Texas | 13.4 |
| 9 | Calexico-East – California | 11.8 |
| 10 | Del Rio – Texas | 3.7 |
| 11 | Douglas – Arizona | 2.2 |
| 12 | San Luis – Arizona | 1.0 |
| 13 | Tecate – California | 0.8 |
| 14 | Progresso – Texas | 0.4 |
| 15 | Dallas/Ft. Worth Airport – Texas | 0.4 |
| 16 | Presidio – Texas | 0.3 |
| 17 | Detroit – Michigan | 0.3 |
| 18 | Nashville – Tennessee | 0.3 |
| 19 | Calexico – California | 0.2 |
| 20 | Rio Grande City – Texas | 0.2 |
| Total | All | 367.1 |

Source: BTS 2012c

Table 1-32 summarizes the total U.S. import freight by weight for all land modes entering through southern ports in 2011. Most import freight entered through Texas ports, about 74 percent of the total by weight. This is followed by California, which handled 13 percent of the total southern import freight, and Arizona, which handled 11 percent. In 2011, total U.S. imports from Mexico were $263 billion, and exports to Mexico were $198 billion (U.S. Census Bureau 2011). Therefore, about three-fourths of U.S. trade with Mexico flowed through southern land ports in 2011.

TABLE 1-32
**Import from Mexico via Southern Land Ports by Tonnage (2011)**

| Land Ports of Entry | Import Weight by All Land Modes (million tons) | % of Total Import Freight | Import Value by All Land Modes ($ billions) | Export Value by All Land Modes ($ billions) |
|---|---|---|---|---|
| Arizona | 4.7 | 11 | 15.8 | 9.6 |
| Naco | 0.0 | 0 | 0.0 | 0.1 |
| Douglas | 0.2 | 0 | 1.2 | 0.9 |
| Nogales | 4.3 | 10 | 14.0 | 8.1 |
| San Luis | 0.2 | 1 | 0.6 | 0.5 |
| California | 5.4 | 13 | 28.2 | 17.4 |
| Calexico-East | 1.8 | 4 | 6.0 | 5.7 |
| Otay Mesa | 3.4 | 8 | 21.7 | 11.4 |
| Tecate | 0.2 | 0 | 0.4 | 0.3 |
| New Mexico | 0.8 | 2 | 10.4 | 7.5 |
| Columbus | 0.1 | 0 | 0.1 | 0.0 |
| Santa Teresa | 0.7 | 2 | 10.3 | 7.5 |
| Texas | 31.4 | 74 | 142.7 | 119.1 |
| Brownsville | 1.2 | 3 | 3.2 | 5.5 |
| Del Rio | 0.3 | 1 | 2.2 | 1.5 |
| Eagle Pass | 4.8 | 11 | 12.0 | 7.6 |
| El Paso | 3.9 | 9 | 33.0 | 26.7 |
| Hidalgo | 4.0 | 10 | 14.8 | 9.6 |
| Laredo | 16.6 | 39 | 77.0 | 67.7 |
| Presidio | 0.1 | 0 | 0.2 | 0.2 |
| Progresso | 0.2 | 1 | 0.1 | 0.3 |
| Rio Grande City | 0.4 | 1 | 0.1 | 0.1 |
| Total | 42.3 | 100 | 197.0 | 153.6 |

Source: BTS 2012c

For those imports entering the U.S. via southern land ports, 60 percent (based on volume) had destinations in the following nine states: Arizona, California, Idaho, New Mexico, Nevada, Oregon, Texas, Utah, and Washington.

Table 1-33 shows the entry and destination states of U.S. imports from Mexico by weight. About 65 percent of import freight was destined for Texas, followed by California (19 percent) and Arizona (13 percent). For imports entering the U.S. via Arizona ports, over three-fourths were destined for Arizona, and 20 percent were transferred to California and Texas. For imports entering via Texas ports, 11 percent of imported freight was transferred to California and Arizona, 85 percent was destined for Texas. Cells shaded in pink represent freight flows that could conceivably be diverted in part to the I-11 Multimodal Corridor according to its origin/destination.

TABLE 1-33
**Neighbor States Import from Mexico via Southern Land Ports (2011)**

| Land Ports of entry | Import Weight by all Land Modes (thousand tons) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | AZ | CA | ID | NM | NV | OR | TX | UT | WA | Total |
| **Arizona** | **2,540.9** | **514.5** | **1.8** | **13.5** | **3.3** | **12.9** | **176.1** | **13.8** | **8.9** | **3,285.7** |
| Naco-Arizona | 1.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.4 |
| Douglas-Arizona | 98.2 | 12.8 | 0.0 | 5.2 | 1.2 | 0.0 | 9.9 | 7.0 | 0.0 | 134.2 |
| Nogales- Arizona | 2,352.1 | 403.7 | 1.8 | 8.3 | 0.9 | 11.8 | 160.8 | 6.9 | 8.9 | 2,955.1 |
| San Luis-Arizona | 89.2 | 98.0 | 0.0 | 0.0 | 1.2 | 1.1 | 5.5 | 0.0 | 0.0 | 194.9 |
| **California** | **97.5** | **4,104.8** | **0.5** | **0.1** | **22.4** | **5.0** | **251.9** | **35.5** | **4.9** | **4,522.6** |
| Calexico-East-California | 66.1 | 1,160.1 | 0.1 | 0.1 | 1.3 | 2.3 | 207.4 | 0.1 | 3.8 | 1,441.2 |
| Otay Mesa-California | 29.0 | 2,877.5 | 0.3 | 0.1 | 21.1 | 2.7 | 44.4 | 35.4 | 0.9 | 3,011.5 |
| Tecate-California | 2.4 | 67.2 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 70.0 |
| **New Mexico** | **16.0** | **14.9** | **0.5** | **152.1** | **0.0** | **1.1** | **579.5** | **0.5** | **0.0** | **764.6** |
| Columbus-New Mexico | 2.2 | 0.6 | 0.0 | 112.9 | 0.0 | 0.0 | 13.9 | 0.0 | 0.0 | 129.6 |
| Santa Teresa-New Mexico | 13.8 | 14.3 | 0.5 | 39.2 | 0.0 | 1.1 | 565.6 | 0.5 | 0.0 | 635.0 |
| **Texas** | **345.6** | **1,540.0** | **8.8** | **80.5** | **54.0** | **115.7** | **13,528.6** | **105.1** | **71.0** | **15,849.4** |
| Brownsville-Texas | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1,198.0 | 0.0 | 0.0 | 1,198.0 |
| Del Rio-Texas | 4.4 | 21.7 | 0.0 | 0.0 | 0.0 | 0.0 | 157.9 | 0.0 | 0.0 | 184.0 |
| Eagle Pass-Texas | 13.0 | 17.0 | 0.5 | 0.8 | 0.0 | 1.4 | 1,630.8 | 5.4 | 0.6 | 1,669.6 |
| El Paso-Texas | 101.9 | 381.0 | 0.4 | 67.6 | 3.7 | 3.4 | 1,437.2 | 3.8 | 8.1 | 2,007.1 |
| Hidalgo-Texas | 114.4 | 277.0 | 0.0 | 0.2 | 0.2 | 7.5 | 2,826.1 | 6.9 | 6.0 | 3,238.4 |
| Laredo-Texas | 105.9 | 838.1 | 7.8 | 6.1 | 50.0 | 103.3 | 5,695.1 | 88.9 | 56.4 | 6,951.4 |
| Presidio-Texas | 0.0 | 0.6 | 0.1 | 5.8 | 0.0 | 0.0 | 50.9 | 0.0 | 0.0 | 57.4 |
| Progresso-Texas | 5.9 | 3.9 | 0.0 | 0.0 | 0.1 | 0.1 | 221.6 | 0.0 | 0.0 | 231.7 |
| Rio Grande City-Texas | 0.0 | 0.7 | 0.0 | 0.0 | 0.0 | 0.0 | 311.2 | 0.0 | 0.0 | 311.9 |
| **Total** | **3,000.0** | **6,174.2** | **11.6** | **246.3** | **79.7** | **134.8** | **14,536.1** | **154.9** | **84.9** | **24,422.3** |

Source: BTS 2012c

More than 7 million border crossings were made via Arizona in 2011. The total number of truck and rail crossings was 0.4 million, or about 5 percent of the total border crossings. The remaining border crossings were made by buses and personal vehicles, with personal vehicles making up 95 percent of the total border crossing trips by vehicles.

## 1.3.2 Western Sea Ports

POLA/POLB are the largest seaports in the study area, serving as the main gateway for goods from Asia. Figure 1-35 shows port container volume data on the top 25 U.S. ports. Twenty-foot equivalent unit (TEU) is a

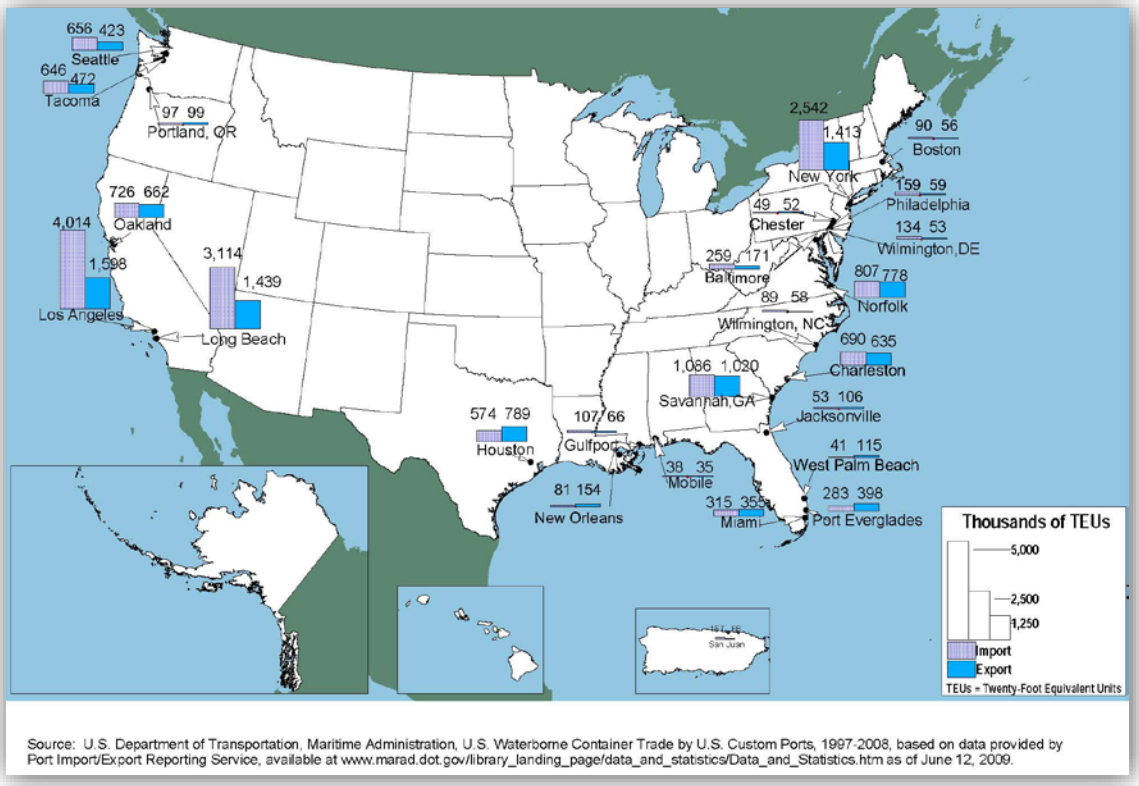
standard unit of measurement for containerized cargo that describes the volumetric capacity of a 20-foot-long cargo container.

Lack of container capacity at western ports, particularly POLA/POLB, could have a significant effect on demand for freight traffic on the I-11 Corridor. One important factor is the amount of goods that a port can process. POLA/POLB combined are by far the most active port operations in the U.S., thus any slowdown due to overcrowding at these ports is likely to have a significant effect on freight flows.

Interestingly, POLB reduced capacity as a cost-saving measure in 2009 following the global economic slowdown and domestic recession. As trade tends to be more cyclical then growth, freight traffic plummeted during the downturn. When growth in China stabilized in 2010, cargo volume unexpectedly surged at POLB and led to marine terminal congestion.

In 2010, POLB received foreign imports valued at more than $56 billion, an increase of over 27 percent compared to the previous year. When measured in U.S. dollars, the top countries sending goods to POLB were China, Japan, South Korea, Iraq, and Taiwan. Foreign exports totaled nearly $32 billion, an increase of 31 percent compared to 2009. Again, the top countries receiving goods from POLB were from the Pacific Rim. China stands out as both the leading origin and destination; exports account for nearly $9 billion (35 percent of total value of exports), while imports account for more than $34 billion (60 percent of total value of imports). Foreign imports to POLA exceeded $202 billion in 2010, while foreign exports were valued at $33.75 billion.

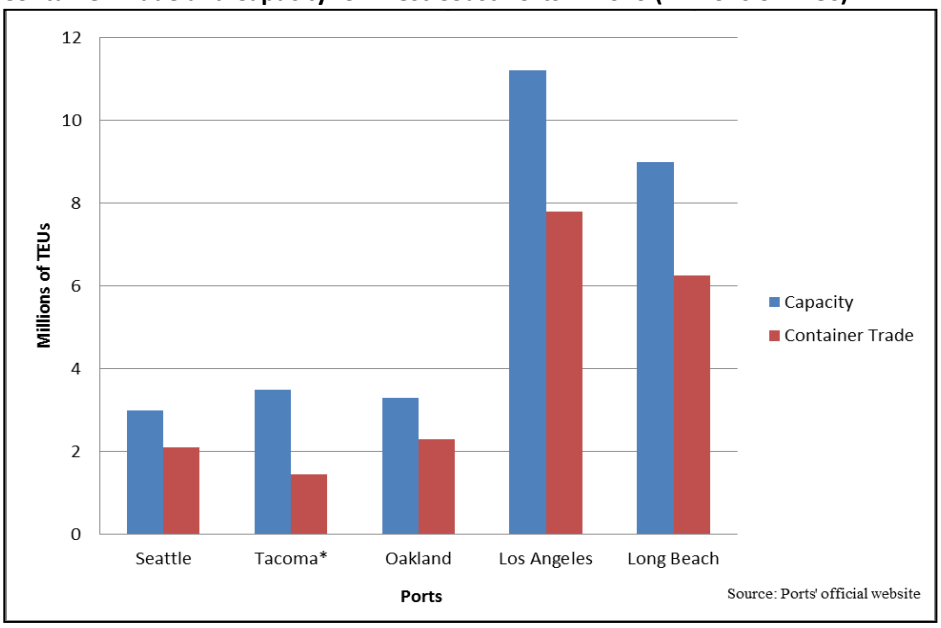
FIGURE 1-35
**Top 25 U.S. Ports by Container Volume, 2008**




High growth rates in trade volumes like those seen in 2010 are uncommon; in this case, they were the result of trade activity recovering following a recession. However, many Pacific Rim countries have relatively booming growth and economies oriented toward exports. Therefore, one might likely expect fairly robust demand for POLA/POLB capacity going forward.

Studies have been conducted on container trade volumes and capacity on West Coast ports. Figure 1-36 and Table 1-34 show current and future volumes and capacity for major West Coast ports, with the exception of Tacoma.[7]

FIGURE 1-36
**Container Trade and Capacity for West Coast Ports in 2010 (Millions of TEUs)**




Source: Ports' official Website

TABLE 1-34
**Container Trade (Millions of TEUs)**

| Ports/Years | 2010 | 2011 | 2020 | 2030 |
|---|---|---|---|---|
| Seattle | 2.13 | 2.03 | N/A | N/A |
| Tacoma | 1.46 | 1.50 | N/A | N/A |
| Oakland | 2.33 | 2.34 | 3.40 | 5.10 |
| Los Angeles | 7.80 | 7.90 | 18.7 | 23.70 |
| Long Beach | 6.26 | 6.06 | 17.3 | 20.30 |
| **Total** | **19.98** | **19.83** | **42.93** | **52.93** |

Sources: Ports' official Websites.

Notes:

Forecast Studies: 2009 South Pacific Region Forecast from IHS Global Insight for Oakland, 2007 San Pedro Bay Forecast for Los Angeles and Long Beach. For 2009 Forecast Study, add 5-7 years of delay to meet 2020 and 2030 estimates.

N/A = not available

The ports of Seattle, Tacoma, and Oakland handled a combined total of approximately 6 million TEUs in 2010, representing 61 percent of their total capacity. POLA/POLB handled more than 14 million TEUs, representing 70 percent of total capacity. However, forecasts suggest that West Coast ports, especially POLA/POLB and Oakland, will have to expand capacity to accommodate anticipated increases in cargo volumes.

[7] Capacity of 3.5 million TEUs represents a forecast for 2008 conducted by experts at the Port of Tacoma in 2005.

Mercer Management Consulting and Standard & Poor's DRI estimated that containerized cargo volumes would grow at approximately 6.6 percent from 1996 through 2020, which is on the low end of the range of West Coast forecasts (Mercer 1998). DRI (2006 Forecast) forecasted an average annual growth rate of 10.5 percent through 2020 and 6.1 percent through 2030. Some experts estimate that 56 million TEUs will pass through West Coast ports in 2020, and they expect annual average growth of 7.8 percent between 2020 and 2030. However, with the recent economic recession and slow recovery, experts suggest that it could take an additional 5 to 7 years to reach the 2030 predictions from 2007 forecasts.

Economists at his Global Insight predict that Oakland will handle 3.40 million TEUs in 2020 and 5.10 million TEUs in 2030. Currently, the Port of Oakland can accommodate only 3.30 million TEUs. Unless it expands in terms of acres, the Port of Oakland could experience a capacity shortfall well before 2020. The situation is similar for POLA/POLB on a larger scale. The San Pedro Bay Forecast for POLA/POLB estimates that 22 million TEUs will transit through both ports in 2020 and 44 million TEUs in 2035. The current combined existing capacity is approximately 20.2 million TEUs. To avoid major congestion issues, both ports must expand their capacity.

# 2.0 Acronyms and Abbreviations

| | |
|---|---|
| AADT | annual average daily traffic |
| ADOT | Arizona Department of Transportation |
| BLS | Bureau of Labor Statistics |
| BNSF | BNSF Railway |
| bqAZ | Building a Quality Arizona |
| BRT | bus rapid transit |
| BTS | Bureau of Transportation Statistics |
| CANAMEX | Transportation corridor connecting Canada and Mexico through the United States |
| CPI | Consumer Price Index |
| CSMP | Corridor System Master Plan |
| FAA | Federal Aviation Administration |
| FAF3 | Freight Analysis Framework [database] |
| FARS | Fatality Analysis Reporting System |
| FHWA | Federal Highway Administration |
| FY | fiscal year |
| GAO | Government Accountability Office |
| HOV | high-occupancy vehicle |
| HSR | high-speed rail |
| LPOE | land port of entry |
| LRT | light rail transit |
| MAG | Maricopa Association of Governments |
| MAP-21 | Moving Ahead for Progress in the 21st Century |
| MPO | metropolitan planning organization |
| MSA | metropolitan statistical area |
| NA | not applicable |
| N.E.C. | not elsewhere classified |
| NAFTA | North American Free Trade Agreement |
| NDOT | Nevada Department of Transportation |
| NHS | National Highway System |
| NHTSA | National Highway Traffic Safety Administration |
| NVTDM | Nevada statewide travel demand model |
| POLA | Port of Los Angeles |
| POLB | Port of Long Beach |

| | |
|---|---|
| PDO | property damage only |
| RTCSNV | Regional Transportation Commission of Southern Nevada |
| RTCWC | Regional Transportation Commission of Washoe County |
| RTP | regional transportation plan |
| SAFETEA-LU | Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users |
| SR | State Route |
| TEU | 20-foot equivalent unit |
| UNLV | University of Nevada, Las Vegas |
| UPRR | Union Pacific Railroad |
| U.S. | United States |

# 3.0 References


AECOM. 2010. *Building a Quality Arizona (bqAZ) Statewide Transportation Planning Framework Program*. Available at: http://www.bqaz.org/.

Airports Council International. 2012a. *North American Airport Passenger Traffic Up 1.8 Percent*. Available at: http://www.aci-na.org/newsroom/press-releases/north-american-airport-passenger-traffic-18-percent. Accessed November 27, 2012.

American Transportation Research Institute. 2011. *FPM Congestion Monitoring at 250 Freight Significant Highway Locations.* Available at: http://atri-online.org/2011/10/01/fpm-congestion-monitoring-at-250-freight-significant-highway-locations/

Amtrak. 2011a. *State Fact Sheets*. Available at: http://www.amtrak.com/servlet/ContentServer?c=Page&pagename=am%2FLayout&cid=1246041980432. Accessed November 27, 2012.

Amtrak. 2011b. *News Release: Amtrak Ridership Rolls Up Best-Ever Records*. Available at: http://www.amtrak.com/ccurl/968/399/ATK-11-133%20Record%20FY11%20Ridership%20and%20Revenue.pdf. Accessed January 8, 2013.

Amtrak. 2012a. *Amtrak National Facts*. Available at: http://www.amtrak.com/servlet/ContentServer?c=Page&pagename=am%2FLayout&cid=1246041980246. Accessed November 27, 2012.

Amtrak. 2012b. *West Train Routes*. Available at: http://www.amtrak.com/west-train-routes. Accessed November 27, 2012.

Arizona Department of Transportation (ADOT). 2007a. *Alternative Selection Report I-17, New River Traffic Interchange To Jct. SR 69 (Cordes Junction)*.

Arizona Department of Transportation (ADOT). 2009. *Arizona Multimodal Freight Analysis Study*. Available at: http://www.azdot.gov/mpd/systems_planning/freightstudy.asp Accessed September 20, 2012.

Arizona Department of Transportation (ADOT). 2010b. *Statewide Rail Framework Study*.

Arizona Department of Transportation (ADOT). 2011a. *Arizona State Rail Plan*. Available at: http://www.bqaz.gov/rail_plan.asp Accessed September 20, 2012.

Arizona Department of Transportation (ADOT). 2011d. *Average Annual Daily Traffic*. Last updated December 7, 2011. Available at: http://www.azdot.gov/mpd/data/aadt.asp

Arizona Department of Transportation (ADOT). 2012e. US 93 Statewide Projects. Available at: http://www.azdot.gov/Highways/Projects/us93/index.asp. Accessed October 9, 2012.

Arizona Department of Transportation (ADOT). 2012l. *Initial Rail Corridor Alternatives Spring 2012*. Available at: http://www.azdot.gov/passengerrail/Alternatives.asp. Accessed November 27, 2012.

Arizona Department of Transportation (ADOT). 2012k. *Arizona Statewide Travel Demand Model*.

Arizona Department of Transportation (ADOT). 2013a. US 93 2007 to 2012 Crash data received by Don Campbell, CH2M HILL traffic engineer, in March 2013, via e-mail from ADOT.

Brookings Institution. 2009b. *An Analysis of Air Traffic Patterns in the Intermountain West.* Available at: http://www.brookings.edu/~/media/Research/Files/Reports/2009/10/08%20air%20travel%20tomer%20puentes/1008_air_travel_imw_report.PDF

Bureau of Transportation Statistics (BTS). 2012a. Air Carriers: T-100 Domestic Market (U.S. Carriers). Accessed at: http://www.transtats.bts.gov/DL_SelectFields.asp?Table_ID=258&DB_Short_Name=Air Carriers. Accessed November 5, 2012.

Bureau of Transportation Statistics (BTS). 2012b. Airport Summary Data (U.S. Flights Only) – August 2011 to July 2012b. Available at: http://www.transtats.bts.gov/airports.asp?pn=1. Accessed November 5, 2012.

Bureau of Transportation Statistics (BTS). 2012c. *Transborder Freight Data*. Available at: http://transborder.bts.gov/programs/international/transborder/TBDR_QA.html

Caltrans. 2011. *2011 Annual Average Daily Truck Traffic on the California State Highway System*. Available at: http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/truck2011final.pdf. Accessed January 2013.

Caltrans. 2013. Future forecast data for California highway segments received by Jennifer Roberts, CH2M HILL traffic engineer, in February 2013, via e-mail from Richard Dennis, Caltrans District 8.

CH2M HILL. 2012. *I-15 Corridor System Master Plan.* Available at: http://www.i15alliance.org/master_plan_1.html

City of Tucson. 2012. *Downtown Loop – Free Transit Service Information*. Available at: http://cms3.tucsonaz.gov/parkwise/downtown-loop. Accessed November 27, 2012.

Federal Aviation Administration (FAA). 2012a. *Historical Passenger Totals*. Available at: http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/index.cfm?year=2011. Accessed November 27, 2012.

Federal Aviation Administration (FAA). 2012b. *Enplanements at Primary Airports by Rank*. Available at: http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/index.cfm?year=2011. Accessed November 27, 2012.

Federal Aviation Administration (FAA). 2012c. *Enplanements at Primary, Non-Primary Commercial Service, and General Aviation Airports by State*. Available at: http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/passenger/index.cfm?year=2011. Accessed November 27, 2012.

Federal Aviation Administration (FAA). 2012d. *FAA Aerospace Forecasts FY2012-2032: Full Forecast Document and Tables*. Available at: http://www.faa.gov/about/office_org/headquarters_offices/apl/aviation_forecasts/aerospace_forecasts/2012-2032/. Accessed December 3, 2012.

Federal Aviation Administration (FAA). 2012e. *Airport Categories*. Available at: http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/categories/. Accessed January 8, 2013.

FAA. [date unknown]. Air Traffic Activity System – Airport Operations. Available at: http://aspm.faa.gov/opsnet/sys/Airport.asp. Accessed November 27, 2012.

Federal Aviation Administration (FAA). n.d. Air Traffic Activity System – Airport Operations. Available at: http://aspm.faa.gov/opsnet/sys/Airport.asp. Accessed November 27, 2012.

Federal Highway Administration (FHWA). 2012. *National Highway System*. Available at: http://www.fhwa.dot.gov/planning/national_highway_system/. Accessed November 2012.

Federal Highway Administration (FHWA). 2013. *Freight Analysis Framework Version 3.4 (FAF3)*.Released January 10, 2013. Accessed February 2013.

Federal Railroad Administration. 2013. *High-Speed Intercity Passenger Rail Program*. Available at: https://docs.google.com/viewer?url=http://www.fra.dot.gov/eLib/Document/1484&chrome=true.

GotoBus.com. 2011. Bus Tickets. Available at: http://www.gotobus.com/las-vegas-to-phoenix-bus/. Accessed November 27, 2012.

Government Accountability Office, United States (GAO). 2009. National Airspace System: Regional Airport Planning Could Help Address Congestion If Plans Were Integrated with FAA and Airport Decision Making. Available at: http://www.gao.gov/products/GAO-10-120. Accessed December 3, 2012.

Greyhound. 2011. *Locations: States*. Available at: https://www.greyhound.com/en/locations/states.aspx. Accessed November 27, 2012.

Greyhound. 2012. *Tickets*. Available at: https://www.greyhound.com/farefinder/step1.aspx. Accessed November 27, 2012.

Maricopa Association of Governments (MAG). 2007. *I-10/Hassayampa Valley Transportation Framework Study*. Available at: http://www.bqaz.org/hasOverview.asp?mS=m3 Accessed October 9, 2012.

Maricopa Association of Governments (MAG). 2009a. *I-8 and I-10/Hidden Valley Transportation Framework Study*. Available at: http://www.bqaz.org/hiddReports.asp?mS=m4 Accessed October 9, 2012.

Maricopa Association of Governments (MAG). 2010c. *Regional Transportation Plan Update*. Available at: http://www.azmag.gov/Projects/Project.asp?CMSID2=1126&MID=Transportation Accessed October 9, 2012.

Mercer Management Consulting, Inc. and Standard and Poor's DRI. 1998. San Pedro Bay Ports Long-Term Cargo Forecast – Final Report.

National Highway Traffic Safety Administration (NHTSA). 2010. *Fatality Analysis Reporting System (FARS)*. Available at: http://www-fars.nhtsa.dot.gov/States/StatesCrashesAndAllVictims.aspx

Nevada Department of Transportation (NDOT) and Regional Transportation Commission of Southern Nevada (RTCSNV). 2005. *Boulder City Bypass Phase I and II EIS*. Available at: http://www.nevadadot.com/Micro-Sites/BoulderCityBypass/The_Boulder_City_Bypass.aspx Accessed September 13, 2012.

Nevada Department of Transportation (NDOT). 2012a. *Nevada State Rail Plan.* Available at: http://nvrailplan.com Accessed September 13, 2012.

Nevada Department of Transportation (NDOT). 2012b. *Connecting Nevada: Planning Our Transportation Future (Phases I and II)*. Available at: http://www.connectingnevada.org/default.html Accessed September 13, 2012.

Nevada Department of Transportation (NDOT). 2012c. *Draft Southern Nevada Outerbelt Feasibility Study Part I: Initial Environmental Screening*.

Nevada Department of Transportation (NDOT). 2012f. *Nevada Statewide Travel Demand Model*.

Nevada Department of Transportation (NDOT). 2012g. *2011 Vehicle Classification Distribution Report.* Available at: http://www.nevadadot.com/uploadedFiles/NDOT/About_NDOT/NDOT_Divisions/Planning/Traffic/2011%20Veh%20Class%20Rpt.pdf.

Nevada Department of Transportation (NDOT). 2013b. US 93 2007 to 2012 Crash data received by Don Campbell, CH2M HILL traffic engineer, in March 2013, via e-mail from NDOT Traffic Information Services.

Pima Association of Governments. 2009. *High-Capacity Transit Plan*. Available at: http://www.pagnet.org/programs/transportationplanning/transit/tabid/485/default.aspx. Accessed December 3, 2012.

Pima Association of Governments. 2012. *2040 Regional Transportation Plan Update*. Available at: http://www.pagnet.org/programs/transportationplanning/2040regionaltransportationplan/tabid/809/default.aspx. Accessed October 9, 2012.

Pinal County. 2009. *Comprehensive Plan*. Available at: http://pinalcountyaz.gov/Departments/PlanningDevelopment/ComprehensivePlanUpdate/Pages/Home.aspx Accessed November 30, 2012.

Regional Transportation Commission of Southern Nevada (RTCSNV). 2012a. RTC Transit Services. Available at: http://www.rtcsnv.com/transit/rtc-transit-services/. Accessed November 27, 2012.

Regional Transportation Commission of Southern Nevada (RTCSNV). 2012e. *Getting to the Airport*. Available at: http://www.rtcsnv.com/transit/getting-to-mccarran-airport/#. Accessed November 27, 2012.

Regional Transportation Commission of Southern Nevada (RTCSNV). 2012g. *Draft Regional Transportation Plan, 2013-2035*. Available at: http://www.rtcsnv.com/planning-engineering/transportation-planning/2013-2035-regional-transportation-plan-update/

Regional Transportation Commission of Southern Nevada (RTCSNV). 2012h. *Proposed Maryland Parkway Transit Improvements*. Available at: http://www.rtcsnv.com/planning-engineering/streets-highways/road-construction-projects/proposed-maryland-parkway-transit-improvements/

Regional Transportation Commission of Washoe County (RTCWC). 2011. *RTC Transit Operating Statistics Fiscal Year 2011*. Available at: http://www.rtcwashoe.com/PTreports/documents/TOS_1106.pdf. Accessed November 27, 2012.

Regional Transportation Commission of Washoe County (RTCWC). n.d. (a). *Public Transportation Program Overview*. Available at: http://www.rtcwashoe.com/public-transportation-72. Accessed November 27, 2012.

Regional Transportation Commission of Washoe County (RTCWC). n.d. (b). *Transit Centers*. Available at: http://www.rtcwashoe.com/public-transportation-26. Accessed November 27, 2012.

Regional Transportation Commission of Washoe County (RTCWC). n.d. (c). *RTC RAPID*. Available at: http://www.rtcwashoe.com/public-transportation-76. Accessed November 27, 2012.

Regional Transportation Commission of Washoe County (RTCWC). n.d. (d). *RTC SIERRA SPIRIT*. Available at: http://www.rtcwashoe.com/RTCSPIRIT/documents/RTCSS_broch_FEB11_web.pdf. Accessed November 27, 2012.

Regional Transportation Commission of Washoe County (RTCWC). n.d. (e). *Public Transportation Schedules and Maps*. Available at: http://www.rtcwashoe.com/public-transportation-88. Accessed November 27, 2012.

Regional Transportation Commission of Washoe County (RTCWC). n.d. (f). RTC ACCESS. Available at: http://www.rtcwashoe.com/public-transportation-2. Accessed November 27, 2012.

Sun Shuttle. n.d. *Route and Times*. Available at: http://www.suntran.com/sunshuttle/shuttle-route.htm. Accessed November 27, 2012.

Sun Tran. n.d. (a). *Welcome to Sun Tran*. Available at: http://suntran.com/index.php. Accessed November 27, 2012.

Sun Tran. n.d. (b). *Transit Center Locations*. Available at: http://www.suntran.com/customer_transit.php. Accessed November 27, 2012.

Sun Tran. n.d. (c). *Routes and Times*. Available at: http://www.suntran.com/routes.php. Accessed November 27, 2012.

Sun Tran. n.d. (d). *Congress/Central SE (Stop # 14900).* Available at: http://infoweb.suntran.com/hiwire?.a=iStopLookupDetails&StopId=14900&.s=f53493a5&Date=11-27-2012. Accessed November 27, 2012.

Tucson International Airport. 2012. Airport Master Plan Website. Available at: http://www.tiamasterplan.com/index.php/project/overview. Accessed December 3, 2012.

Tufesa. 2012. Home Page. Available at: http://www.tufesa.com.mx/home.html. Accessed November 27, 2012.

U.S. Census Bureau. *Foreign Trade Statistics*. Available at: http://www.census.gov/foreign-trade/statistics/

U.S. Census Bureau. 2011. *Trade in Goods with Mexico.* Available at: http://www.census.gov/foreign-trade/balance/c2010.html#2011, Accessed December 2012.

U.S. Department of Transportation, Maritime Administration, U.S. Waterborne Container Trade by U.S. Custom Ports. 1997-2008, based on data provided by Port Import/Export Reporting Service. Available at www.marad.dot.gov/library_landing_page/data_and_statistics/Data_and_statistics.htm as of June 12, 2009.

U.S. Department of Transportation, et al, 2012. *Commodity Flow Survey Standard Classification of Transported Goods*. Available at: http://bhs.econ.census.gov/bhs/cfs/Commodity%20Code%20Manual%20(CFS-1200).pdf

Valley Metro. 2012b. *Official Ridership Reports*. Available at: http://www.valleymetro.org/valleymetro/ridership_reports. Accessed November 27, 2012.

Valley Metro. 2012c. *Transit Centers*. Available at: http://www.valleymetro.org/planning_your_trip/transit_centers. Accessed November 27, 2012.

Valley Metro. 2012d. *Route Schedules & Maps*. Available at: http://routes.valleymetro.org/. Accessed November 27, 2012.

Valley Metro. 2012h. *Northeast Extension*. Available at: http://www.valleymetro.org/metro_projects_planning/project_detail/northeast. Accessed November 27, 2012.

XpressWest. 2013. Available at: http://www.xpresswest.com/.