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Working Paper

Arizona State Freight Plan

(ADOT MPD 085-14)

Phase 3 Working Paper
Transportation and Logistics Profile and Transportation Performance Needs

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Arizona Department of Transportation

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Solutions for growing economies

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Working Paper

This working paper is one of 10 focusing on key Arizona economic sectors. Its purpose is to document the economic profile, outlook and transportation performance needs of Arizona's transportation and logistics Sector. This working paper will later inform system improvement needs to increase Arizona's economic competitiveness and growth. This working paper is provided for comment and discussion and should not be interpreted as final.

Acknowledgements

The CPCS team would like to thank the Arizona Department of Transportation (ADOT) for its guidance and input in developing this working paper. The team also recognizes the considerable contribution of the transportation and logistics stakeholders consulted in the development of this working paper.

Opinions

Unless otherwise indicated, the opinions herein are those of the author and do not necessarily reflect the views of ADOT or the State of Arizona.

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Table of Contents

Executive Summary

Arizona is home to two of the largest truckload carriers in the U.S. and supports a major concentration of other transportation and logistics firms. These companies arrange, move, store, and transfer a wide array of materials and finished goods related to every economic sector in the state.

	Measure	Transportation and Logistics	Arizona (statewide)
Economy	GDP (2012, $ million)	$8,069	$271,503
	GDP Annualized Growth (1997-2012)	5.3%	4.9%
Jobs	Employment (2013)	92,137	2,619,055
	Compensation per Employee (2013)	$59,619	$57,393
Transportation	Total Commodity Flows (2012, Mt)	2.8	138.2
	Top Origin (2012, Mt)	California (0.9 Mt)	California (9.5 Mt)
	Top Domestic Destination (2012, Mt)	New Mexico (0.1 Mt)	Mexico (5.6 Mt)
	Intrastate Flows (2012, Mt)	1.6	101.8
	% Truck (2012)	99.1%	87.2%

Source: CPCS analysis of data from Bureau of Economic Analysis and 2012 Commodity Flow Survey

The health of Arizona's transportation and logistics sector is highly reliant on the state's investment in and management of its transportation network. The objective of this working paper is to provide a focused assessment of the performance needs, key trends, and economic contribution of the transportation and logistics sector in Arizona to assist ADOT in understanding which improvements might be most beneficial. Specifically, this paper describes the sector's economic and traffic profile; its supply chain structure and transportation performance needs; and its key transportation barriers and related priority improvements.

Economic and Traffic Profile

The transportation and logistics sector employs more than 92,000 people in Arizona and contributed $8.1 billion to the state's gross domestic product (GDP) in 2012, representing three percent of the state's total economic output. The sector is growing at a faster rate than the economy as a whole: 5.3 percent per annum versus 4.9 percent per annum, respectively.

Transportation and logistics firms moved 2.7 million tons (Mt) of freight in Arizona in 2013, representing two percent of the statewide total, consisting of empty and loaded intermodal containers, mail, parcels, mixed freight, and air cargo.

A majority of flows for this sector (57 percent) are intrastate. About 37 percent of movements are inbound from other states, 90 percent of which is from California.

Transportation and logistics firms are clustered in Phoenix, Tucson, Nogales, Kingman, Flagstaff, Casa Grande, and Yuma—with the greatest concentration along I-10 in Phoenix and Tempe, near Phoenix Sky Harbor International Airport

Supply Chain Structure and Transportation Performance Needs

The transportation and logistics sector in Arizona serves a variety of roles and supply chain types, depending on the commodity or equipment being moved. Many of the moves are international or domestic shipping containers with mixed freight that must be broken down and delivered or stored in warehouses. The sector also repositions empty equipment, and moves mail and parcels.

The sector measures its performance based on travel time reliability, costs of operations (labor, rent, vehicles, maintenance, inventory carrying costs, and regulatory and tax costs), safety, and availability of well-served terminal and warehousing sites.

Current trends are driven by population and economic growth and include increasing congestion, growth of warehousing, intermodal, and cross-border freight.

Key Barriers and Related Priority Improvements to Enhance Competitiveness and Growth

Generally speaking, the notable barriers affecting transportation performance include congestion, infrastructure condition (e.g. deteriorating or failing bridges), truck driver shortages, truck productivity regulations, safety, truck parking, and infrastructure funding constraints.

Specifically, Arizona's transportation and logistics stakeholders believe their industry and the state could be more competitive with the following:

- improvements to I-17 and I-10 to enhance capacity and safety
- access improvements to arterials leading to key terminals and warehouses
- the development of safe truck parking, especially on the I-17 and I-10 corridors
- investments in maintenance on the system to prevent incidents like the recent I-10 bridge collapse in California, and
- enhancements to truck productivity through higher weight allowances.

Acronyms and Abbreviations

3PL	THIRD PARTY LOGISTICS
ACA	ARIZONA COMMERCE AUTHORITY
ADOT	ARIZONA DEPARTMENT OF TRANSPORTATION
ATA	ARIZONA TRUCKING ASSOCIATION
CFS	COMMODITY FLOW SURVEY
GDP	GROSS DOMESTIC PRODUCT
MAP-21	MOVING AHEAD FOR PROGRESS IN THE 21ST CENTURY
MPD	MULTIMODAL PLANNING DIVISION (OF ADOT)
Mt	MILLIONS OF TONS

1 Introduction

Key Messages

The Arizona Department of Transportation, Multimodal Planning Division, retained a team lead by CPCS Transcom, Inc. to assist in the development of Arizona's State Freight Plan.

The aim of this working paper is to establish the freight transportation performance needs, outlooks, and economic contribution of Arizona's transportation and logistics sector This will later inform the analysis of broader transportation system based needs and priorities.

This working paper was developed in large part through stakeholder consultations and analysis of transportation and logistics sector data.

1.1 Introduction: Why an Arizona State Freight Plan?

Arizona's economic potential is supported by the state's transportation infrastructure, which connects sources of production to markets.

When transportation infrastructure and related services are efficiently designed and competitively positioned, businesses benefit from lower transportation costs, faster and better transportation services, and increased reliability, which in turn contribute to their own competitiveness and growth, and that of the broader region.

Jurisdictions with access to competitive transportation infrastructure and services are at a competitive advantage in attracting investment, creating jobs and realizing economic growth. Arizona's State Freight Plan can help enable this outcome.

To this end, the ADOT's Multimodal Planning Division (MPD), is developing Arizona's State Freight Plan which will provide strategic guidance to enhance Arizona's economic competitiveness and facilitate economic growth.

1.2 Project Objectives

The State Freight Plan will define immediate and long-range investment priorities and policies that will generate the greatest return for Arizona's economy, while also advancing other key transportation system goals, including national goals outlined in MAP-21. It will identify freight transportation facilities in Arizona that are critical to the State's economic growth and give appropriate priority to investments in such facilities.

The State Freight Plan will ultimately provide Arizona with a guide for assessing and making sound investment and policy decisions that will yield outcomes consistent with the state's visions, goals, and objectives, and notably, promote regional competitiveness and economic growth.

1.3 Purpose of this Working Paper

Since it is economic activity – particularly from goods movement sectors - that drives demand for freight transportation infrastructure and services, optimization of the state's freight transportation system, and related strategies, goals and investments, must start by addressing the transportation performance needs of the sectors moving freight. Yet, the transportation performance needs of freight can differ by sector and commodity group, locations and even company.

The purpose of this working paper is to provide a focused assessment of the transportation performance needs, outlooks and economic contribution of the transportation and logistics sector (defined here as NAICS Codes 48 and 49).

Specifically, it addresses the following key questions:

- At a high level, what is the profile and economic contribution of the transportation and logistics sector to Arizona's economy?
- How do the supply chains of Arizona's transportation and logistics sector utilize the transportation system and what are the major origins, destinations, intermediate points, and final products of these chains?
- How are transportation and logistics sector supply chains structured, managed, and what are the primary drivers of transportation decisions and related performance needs?
- What are the key trends in the transportation and logistics, how are these influencing freight flows, and what are the implications, opportunities and challenges for the competitiveness of Arizona's freight system going forward?

1.4 Methodology

This working paper is informed by a combination of literature review, data collection and analysis, and extensive consultation with transportation and logistics stakeholders. Documents reviewed are footnoted throughout the working paper, as appropriate. A list of individuals consulted is provided in Appendix A (unless the stakeholder has specifically requested non-attribution.

1.5 Limitations

While railroads, pipelines, and air cargo are important components of the transportation and logistics sector, this paper focuses in greater detail on trucking, warehousing and distribution, and transportation support industries. Information on the state of Arizona's rail, pipeline, and air cargo sectors is covered in some detail in the working paper prepared for Phase 2 of this project.

This working paper is in many cases informed by data and input provided by third parties. CPCS has verified this information to the extent possible through analysis and cross-checking with other sources but cannot guarantee the accuracy of data received from third parties.

2 Transportation and Logistics Sector Profile

Key Messages

- The transportation and logistics sector employs more than 92,000 people in Arizona and contributed $8.1 billion to the state's GDP in 2012, representing three percent of the State's total economic output. The sector is growing at a faster rate than the economy as a whole: 5.3 percent per annum versus 4.9 percent per annum, respectively.
- Transportation and logistics firms moved 2.7 million tons of freight in Arizona in 2013, representing two percent of the statewide total, consisting of empty and loaded intermodal containers, mail, parcels, mixed freight, and air cargo.
- A majority of flows for this sector (57 percent) are intrastate. About 37 percent of movements are inbound from other states, 90 percent of which is from California.
- Transportation and logistics firms are clustered in Phoenix, Tucson, Nogales, Kingman, Flagstaff, Casa Grande, and Yuma.

2.1 Overview of Transportation and Logistics Sector

The transportation and logistics sector includes firms which provide transportation of cargo and passengers, warehousing and storage, and support activities – including firms that arrange freight transportation such as third-party logistics agents. The sector covers all modes in Arizona: air, rail, road, water, and pipeline.

With the state serving as home to two of the nation's largest motor carriers, as well as hundreds of owner-operators, Arizona's transportation and logistics sector. Arizona's transportation and logistics sector is frequently associated with trucking.[1] Yet among the state's top 100 employers are five other firms in the sector, including: American Airlines (10,000 employees), FedEx Corp (6,000 employees), UPS (4,500 employees), Southwest Airlines (3,800 employees), and BNSF (1,600 employees).[2]

The sector is broadly divided by two key functions: moving freight and supporting the movement of freight. Carriers fulfill the first function while logistics and transportation support services fulfill the second. Figure 2-1 summarizes the composition of the sector, the role of key subsectors, and examples of Arizona companies falling into each category.

Figure 2-1: Composition of Transportation and Logistics Sector

Moving Freight	Logistics and Support Functions
Truck Transportation Transportation of cargo using motor vehicles and including general trucking and specialized carriers. Specialized carriers use special equipment or terminals to carry specific loads, including refrigerated loads or heavy loads. • Swift and Knight are large truckload carriers, typically moving full truckloads of cargo long distances for a single shipper • Central Arizona Freight is a less-than-truckload carrier, typically moving many shipments to different destinations for multiple shippers • J & L Transport is a specialized carrier focused on moving intermodal containers • Owner operator and small trucking firms, provide general and specialized trucking	**Warehousing and Storage** Warehousing and storage activities are often a function of a specific sector—like retail—where a chain may own and operate its own warehousing facilities. This paper specifically focuses on third-party warehousing companies which do not ultimately own or sell the goods. • Freeport Logistics in Phoenix provides third-party warehousing and fulfillment services • Mesa Cold Storage (in Mesa) and G. Mendez & Co. Inc. (in Nogales) are part of a critical series of cold storage facilities in Yuma, Nogales, Tucson, and Phoenix that support transborder agricultural and food shipments
Integrated Carriers Move freight over multiple modes and operate trucking fleets, aircraft, and terminals and provide parcel delivery or general freight transport. • Large integrated carriers include UPS and FedEX Corp.	**Intermediaries** Third-party logistics (3PL) providers help arrange the transportation of goods from producers to sellers, and may offer other services, including warehousing. Some logistics firms provide services across industries; others are very specialized. • One-Source Freight Solutions is a Tempe-based 3PL with special capabilities in energy products

[1] Journal of Commerce. Top 25 Truckload Carriers, 2014.
[2] Arizona Republic 100: State's Largest Employers. April 27, 2015.

Moving Freight	Logistics and Support Functions
	• Elite Logistics is a Nogales-based 3PL with expertise in cross-border logistics
Railroads Move freight by rail using a variety of equipment types. • BNSF Railway and Union Pacific are the largest railroads in Arizona, providing national service • Arizona Eastern Railway is one of seven short line railroads which feed BNSF and UP local traffic	**Transportation support services** Firms providing maintenance, repair, human resource and other support functions to the transportation industry. • Swissport Ltd. provides cargo and mail handling services at Sky Harbor airport • Choice Drivers is an Arizona-based truck driver staffing firm in Yuma, Tucson, and Phoenix
Airlines Move parcels in passenger aircraft (as belly cargo) or dedicated-cargo aircraft, and larger cargo in specialized aircraft. • All major airlines provide cargo service at Arizona's commercial airports	
Other Activities Include postal service, couriers, and messengers, pipeline companies, and other speciality firms in transportation and logistics.	

2.2 Economic Profile and Importance to Arizona's Economy

2.2.1 GDP

The transportation and logistics sector in Arizona contributed $8.1 billion to the State's GDP in 2012, representing three percent of the state's total economic output. Since 1997, GDP in the transportation and logistics sector has grown at a rate of 5.3 percent per annum, over performing compared to the overall state average of 4.9 percent GDP growth per annum.[3]

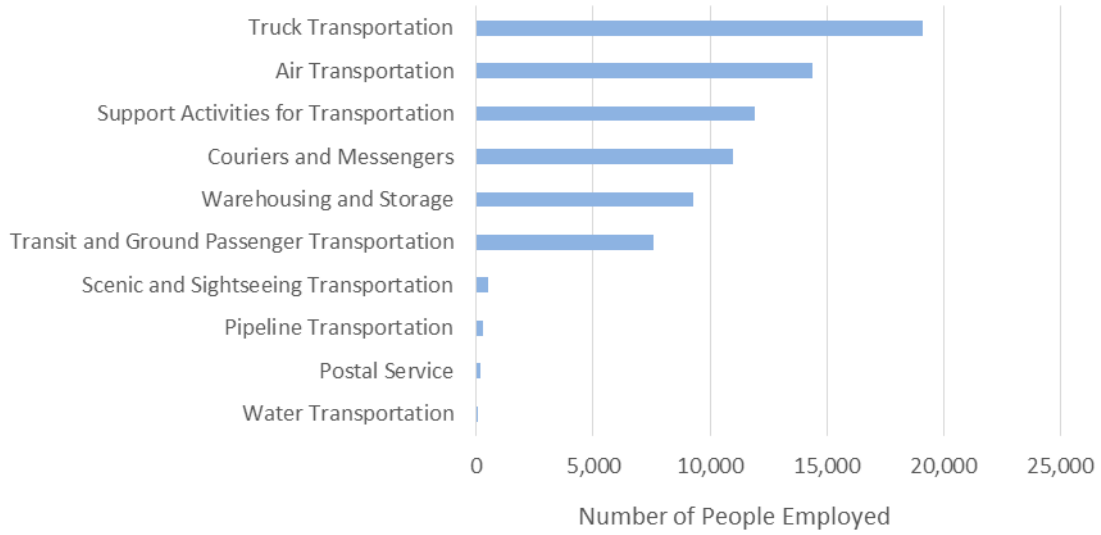
2.2.2 Employment and Wages

In 2013 the transportation and logistics sector employed 92,137 people, representing 3.5 percent of total employment in the state.[4] [5] The total wages and salaries paid to employees in 2013 was $5.5 billion dollars[6], making the average annual earnings per employee in 2013 approximately $59,619 for the sector. Annual earnings per employee were highest in the pipeline transportation industries at around $118,100 and lowest in the scenic and sightseeing transportation industry (which also accounts for some freight movement in Arizona, including

[3] Bureau of Economic Analysis Regional Economic Accounts, GDP by State. GDP in current dollars.
[4] Excludes self-employment
[5] Bureau of Economic Analysis Regional Economic Accounts, Personal Income and Employment by State. Wages and Salaries by NAICS Industry
[6] Bureau of Economic Analysis Regional Economic Accounts, Personal Income and Employment by State. Wages and Salaries by NAICS Industry

gasoline distribution) at $39,100. Figure 2-2 provides a breakdown of employment in the sector.

Figure 2-2: Breakdown of Employment in the Transportation and Logistics Sector in Arizona (Q1 2014)



Source: CPCS analysis of Quarterly Workforce Indicators dataset, United States Census Bureau

The largest industry generating employment in the transportation and logistics sector is truck transportation, mostly related to general freight trucking. The next largest industries are air transportation, and support activities for all forms of transportation, the majority of which are involved in supporting the air transportation sector such as airport operations and air traffic control.

2.3 Locations and Traffic Profile

The transportation and logistics sector generates 2.7 Mt of freight in Arizona annually which is just over two percent of the total freight tonnage in the state. A majority of these movements are intrastate (1.6 Mt or 59 percent). Just over one Mt or 37 percent are inbound and .1 Mt, or four percent, are outbound shipments. Figure 2-3 illustrates the shares of movement by direction and how intrastate trade and inbound flows from California are the most prevalent flows.

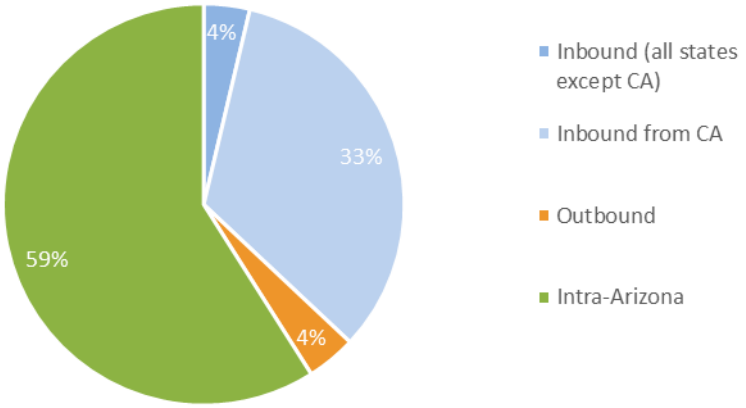
The freight directly associated with the transportation and logistics sector consists of:

- Mail and express parcels
- Miscellaneous (mixed) freight
- Freight forwarder traffic
- Warehouse and storage goods
- Empty trailers and containers
- Drayage of rail intermodal
- Drayage of air cargo

However, it should be noted that the sector moves, arranges, stores, and transfers freight across all industries.

As shown in Figure 2-3, most freight generated by this sector is transported intrastate, with most of the remaining share being inbound freight from California. These data are line with the fact that some of the freight generated by this sector is drayage of intermodal cargo, which would mainly be shorter haul movements from a rail terminal or airport to the final destination.

Figure 2-3: Value of Flows Into, out of, and Within Arizona in 2012 ($millions)

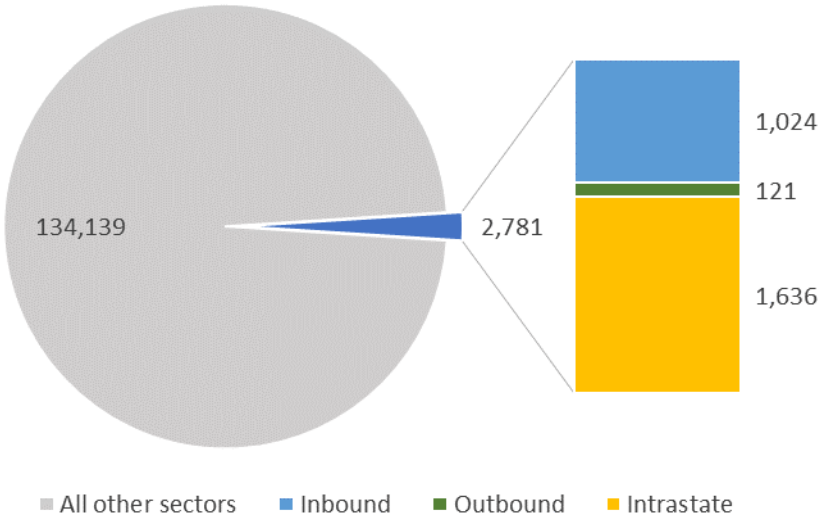


The numbers presented here are obtained from Commodity Flow Survey (CFS), 2012. CFS only accounts for domestic movements. These include domestic shipments as well as the domestic components of international supply chains.[7] The volumes presented below illustrate transportation and logistics sector domestic flows (inbound, outbound, intrastate), in comparison to flows from all other sectors of the economy. The transportation and logistics sector flows exclude wholesale and retail shipments which are part of a separate working paper on the wholesale and retail sector.

As shown in Figure 2-4, the freight generated by the transportation and logistics sector is a very small share relative to all other sectors. Though this sector is responsible for the freight movement of all other sectors, it generates relatively little freight itself. Again, most freight generated by this sector is moved intrastate, or is inbound movements.

[7] In CFS, the sum of individual state volumes is slightly lower than the national volume which is due to data suppression and rounding in individual state-to-state movements. For consistency across all the graphics (maps and charts), this paper presents the total of state level volumes.

Figure 2-4: Arizona Transportation and Logistics Sector Volume ('000 Tons)

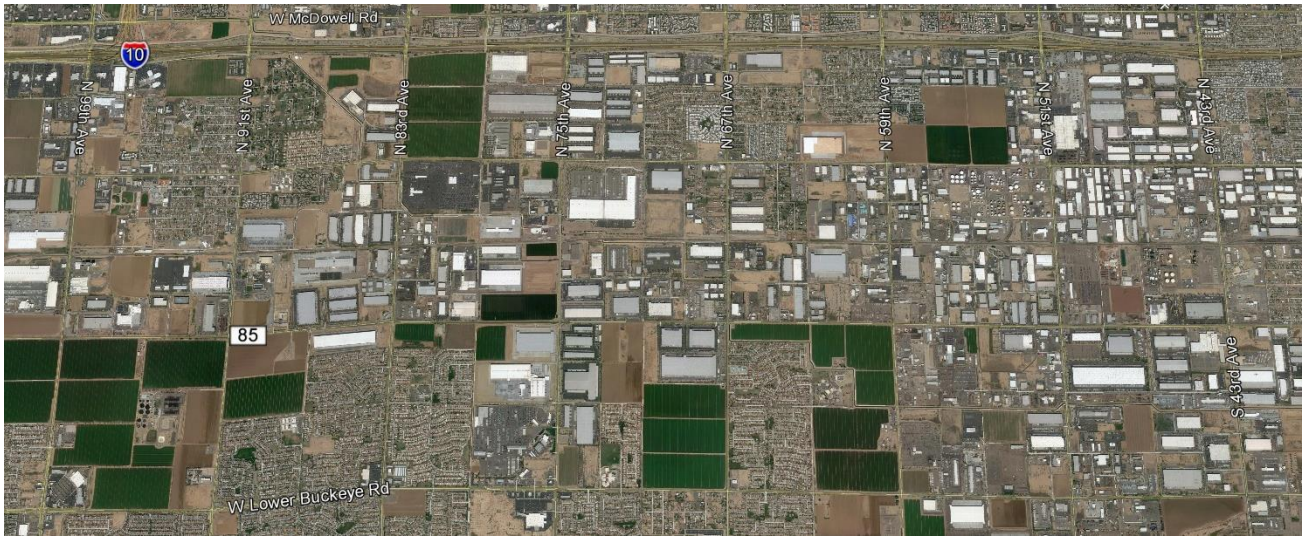


Source: CPCS analysis of Commodity Flow Survey, 2012.

2.3.1 Activity Clusters

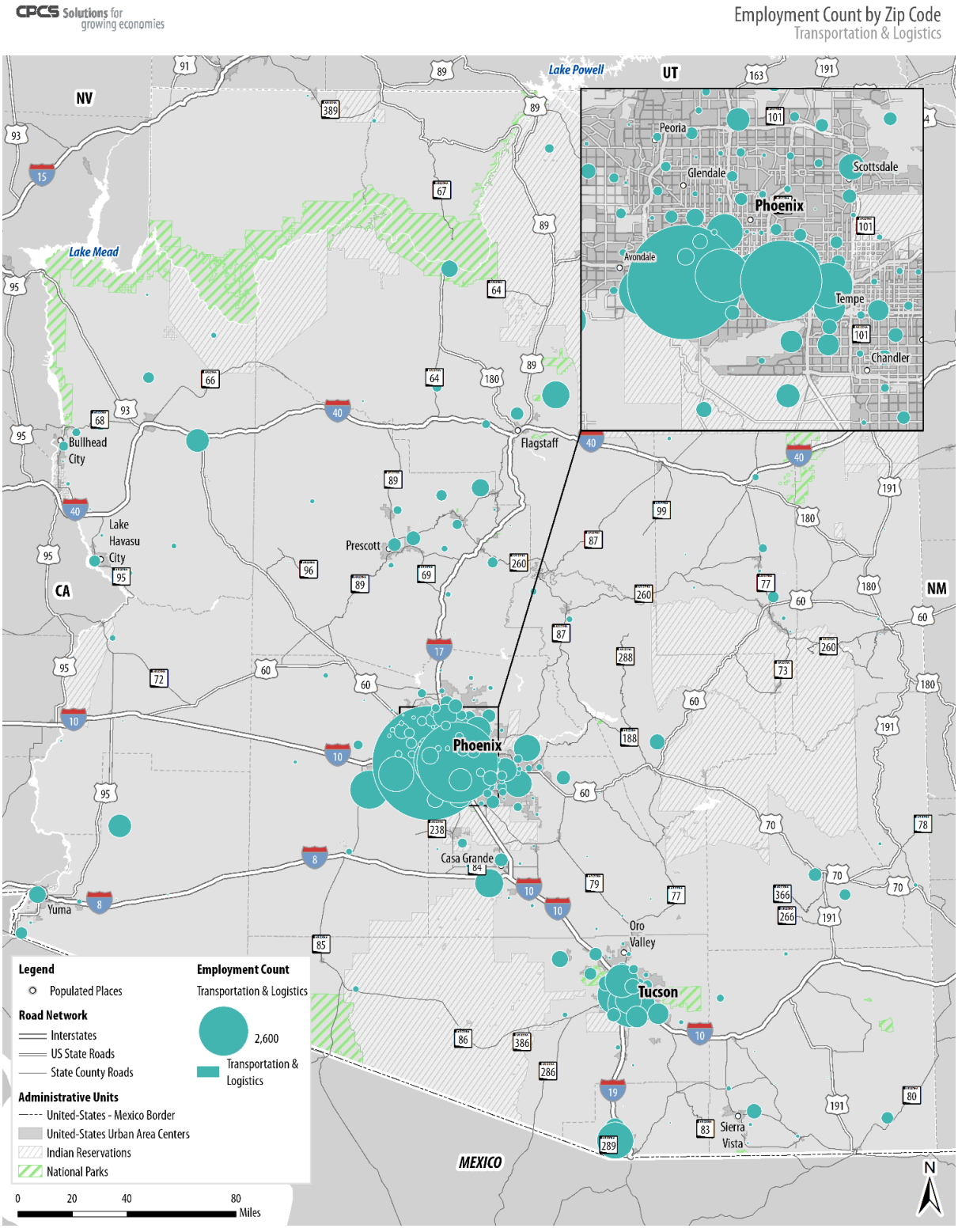
The activity clusters of the transportation and logistics sector are illustrated by the geographic distribution of employment in the sector shown in Figure 2-6. The highest concentration of clusters are located along the I-10 corridor in the Phoenix metropolitan area (including the western side of the City of Phoenix and Tempe), Tucson and near the border crossing of Nogales. Other clusters are located at Kingman, Yuma, and Flagstaff. Figure 2-5 shows the core of the largest cluster of transportation and warehousing activity in Phoenix bounded roughly by I-10 on the north, Lower Buckeye Road on the South, 99th Avenue on the West and 43rd Avenue on the East.

Figure 2-5: West Phoenix Transportation and Warehousing Cluster



Source: Google Earth

Figure 2-6: Arizona Transportation and Logistics Sector Employment Clusters

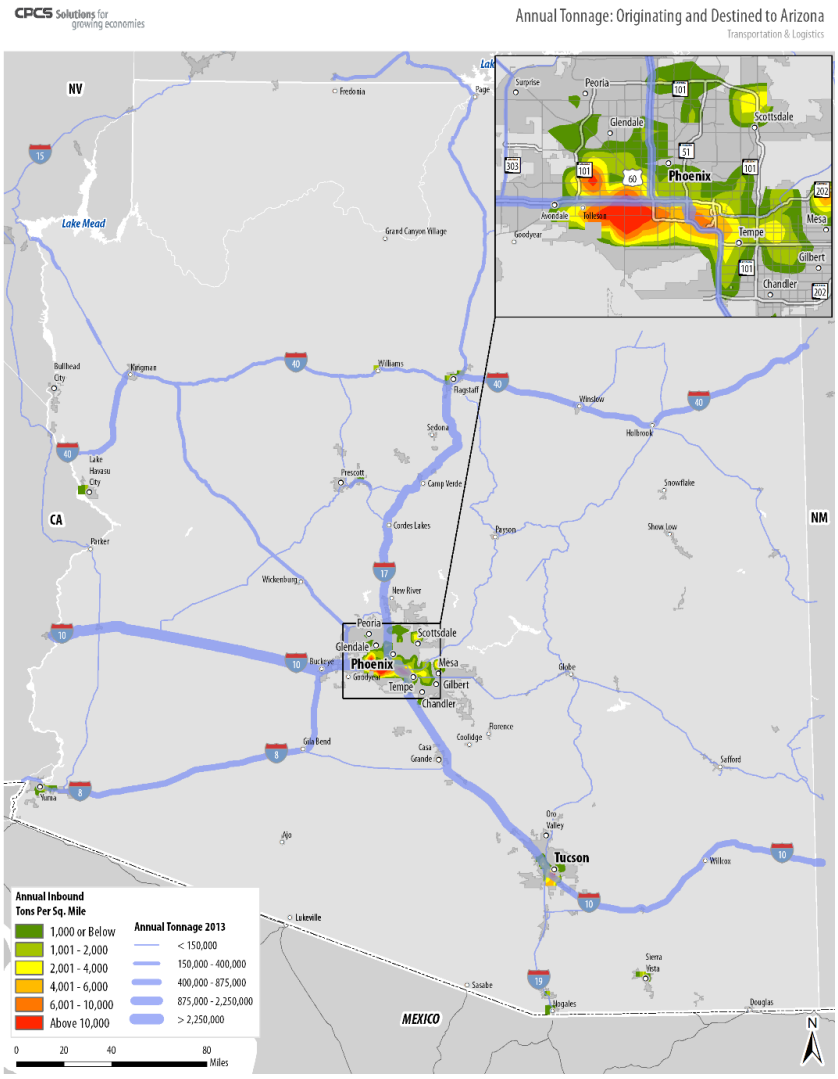


Source: CPCS analysis of County Business Pattern Data, 2013 by US Census Bureau.

Figure 2-7 combines transportation and logistics sector flows on highways with the area of freight production. The clusters were identified from kernel density estimation in ArcGIS using Global Insight's Freight Finder dataset. The estimated inbound[8] volumes produced by this sector are clustered in southern part of Phoenix, Tucson, Nogales, Yuma, Sierra Vista, Flagstaff and Lake Havasu City. In Phoenix, the major concentration is at Tolleson as well as near Sky Harbor, Mesa and north of Scottsdale.

The commodity flow information was extracted from Global Insight's Transearch dataset for 2013. Only Arizona-generated (originated or destined) flows are shown in the map which excludes any through traffic. The major corridors used by this sector are I-10, I-8 and I-17 leading to I-40 eastward. Interstate I-10 is the busiest highway for the sector and reflects California's role as Arizona's largest trading partner for this sector.

Figure 2-7: Arizona Transportation and Logistics Sector Freight Cluster and Commodity Flow



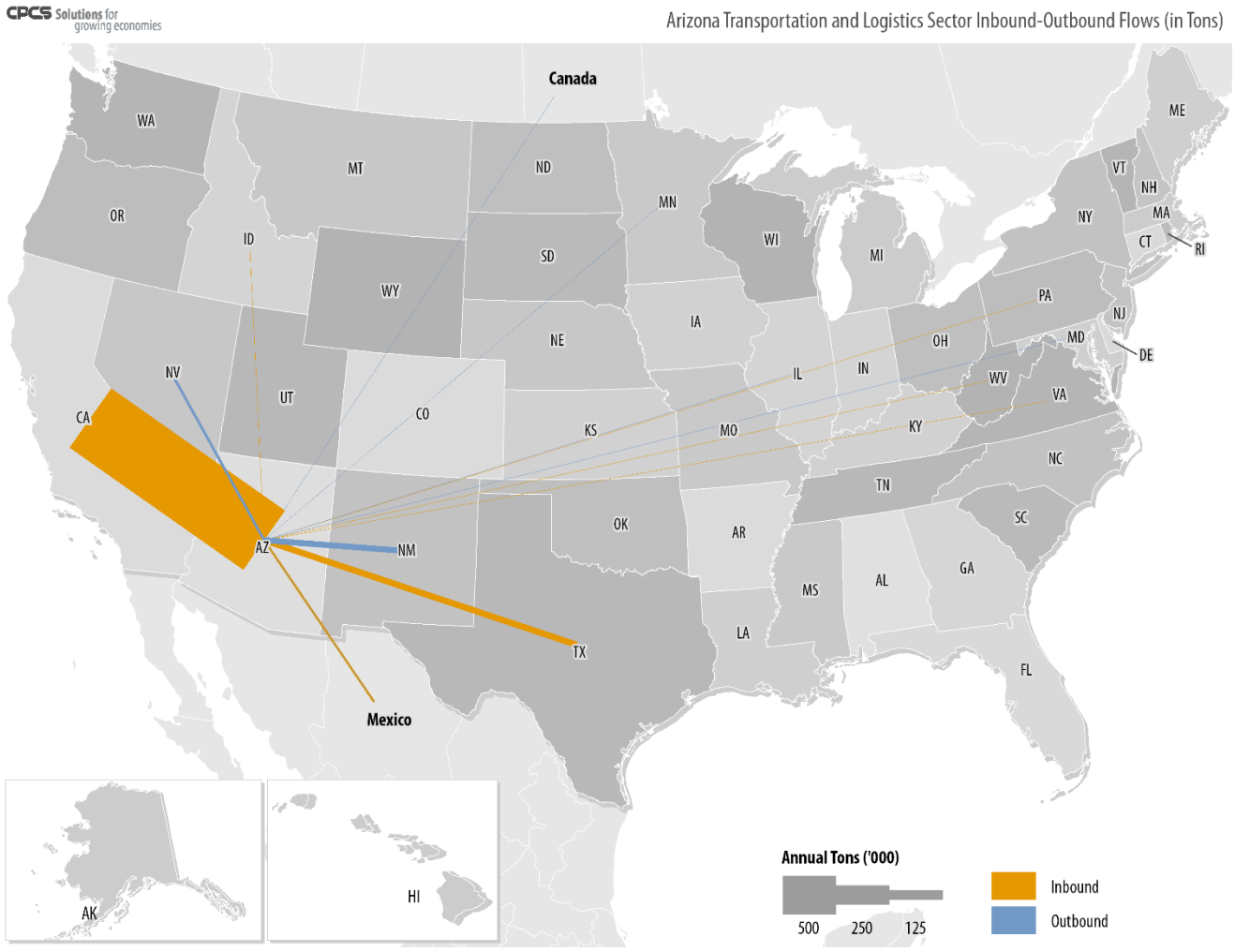
Source: CPCS analysis of Freight Finder and Transearch 2013

[8] Freight Finder dataset does not have outbound tonnage information for this sector.

2.3.2 Major Origins and Destinations

As illustrated above, transportation and logistics freight movements in Arizona are predominantly intrastate, followed by inbound and a small portion of outbound movements. In terms of inbound shipments, California is the major domestic source comprising over 90 percent of all inbound tonnages and I-10 is the major conduit for that movement. The other notable source is Texas. In terms of outbound shipments, New Mexico and Nevada are the major destinations for this sector. The flows shown in Figure 2-8 are limited to movements listed on page seven, including mixed freight, parcels, drayage, containers, and empties. The transportation and logistics industry moves a wide array of other commodities described in other sector papers.

Figure 2-8: Arizona Transportation and Logistics Sector Inbound-Outbound Tonnages

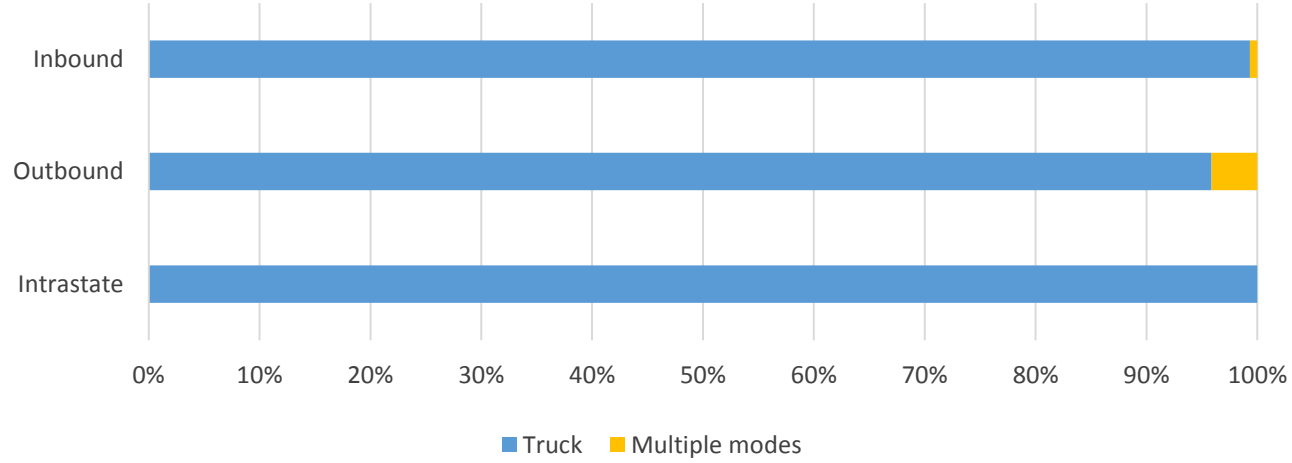


Source: CPCS analysis of Commodity Flow Survey, 2012. The import/export figures were obtained from Freight Analysis Framework 3 estimates for 2012

2.3.3 Modal Breakdown

Truck is the primary mode of shipment for all types of movements – inbound, outbound or intrastate.[9] It is the only mode used for intrastate shipments. Some four percent of the outbound freight (5,000 tons) is multimodal which is primarily parcel or courier freight shipped by truck and air. Although the share of such shipments is much smaller (.7 percent) for inbound tonnages, the actual volume is higher (7,000 tons), suggesting a similar pattern of air usage for inbound-outbound shipments.

Figure 2-9: Arizona Transportation and Logistics Sector Volume (Tons) by Mode



Source: CPCS analysis of Commodity Flow Survey, 2012.

[9] In the CFS dataset, the individual mode volumes do not add up to the aggregate "All Mode" which is due to the data suppression and rounding at detailed mode level.

3 Supply Chain Structure and Transportation Performance Parameters

Key Messages

The transportation and logistics sector in Arizona serves a variety of roles and supply chain types, depending on the commodity or equipment moved. Many of the moves by the sector are international or domestic shipping containers with mixed freight that must be broken down and delivered or stored in warehouses. The sector also repositions empty equipment, and moves mail and parcels.

The sector measures its performance based on travel time reliability, costs of operations (labor, rent, vehicles, maintenance, inventory carrying costs, and regulatory and tax costs), safety, and availability of well-served terminal and warehousing sites.

Key barriers affecting transportation performance include congestion, infrastructure condition (e.g. deteriorating or failing bridges), truck driver shortages, truck productivity regulations, safety, truck parking, and funding constraints.

Key trends are driven by population and economic growth and include increasing congestion, growth of warehousing, intermodal, and cross-border freight.

3.1 Supply Chain Structure

Because the transportation and logistics sector facilitates the supply chains and movements of many individual industries and products, it would be impossible to describe its supply chain structure in a single snapshot. However, the sector serves several key functions, which can be described generally. Those include:

- **Regional delivery of mixed freight.** This includes mixed freight and intermodal shipments which move with great frequency between Arizona and centers of domestic and international trade outside the state's borders. For example, a domestic container from Southern California is moved by truck to a third-party warehouse and fulfillment center in metropolitan Phoenix where its contents are broken down, repackaged, and delivered via integrated carrier to the homes of customers throughout Arizona.
- **Mail, parcel delivery, and air cargo.** These activities are conducted by the U.S. Postal Service and its contractors, integrated carriers (e.g. UPS, FedEx), air cargo carriers and drayage companies, respectively.
- **Repositioning of empty equipment**. Given the imbalance of inbound-to-outbound trade, Arizona generates many more empty trailers and containers than it refills. As a consequence, the repositioning of empty trailers and containers is a major activity of the transportation and logistics sector in the state. This activity is characterized by the prevailing flow of empty equipment via truck (and to a lesser extent rail) back to Southern California where it is redeployed for domestic use or shipped to Asia.

Increasingly Arizona firms are seeking ways to repurpose empty equipment. For example, the Port of Tucson is filling empty containers with grain from the U.S. Midwest for export to Asia via rail to the ports of Los Angeles and Long Beach.

3.2 Transportation Performance Parameters

The way in which Arizona's transportation and logistics companies measure performance depends on a number of factors, including the type of freight they are handling and their role in the supply chain they are serving. Common performance parameters include the following:

- **Travel Time and Reliability.** The single most important performance metric of the transportation and logistics sector is travel time. Travel time affects planning and scheduling of freight moves, including the return of empty equipment. The reliability of travel times is a critical factor for planning trips. Reliability is affected by a number of factors including the condition of infrastructure, volumes, congestion, weather, and other variables. Unanticipated delays impacts firms' bottom lines.
- **Operating Costs.** For the transportation and logistics sector, operating cost is a key performance parameter because it determines a firm's relative competitiveness in the marketplace against other firms providing transportation or warehousing services. Part of operating cost is determined by travel time reliability. Other major cost categories include labor, physical buildings, inventory carrying costs, and regulatory and tax costs.

- **Suitable Sites for Warehousing and Distribution.** Transportation and logistics firms require suitable sites with good highway, and sometimes rail access, to remain competitive. Yet sites with the desired combination of highway, direct rail services, and acreage to support large distribution and fulfillment centers can be scarce.
- **Safety**. Safety not only includes operation of trucks but management of incidents by transportation agencies, including dust and snow storms, as well as flash floods encountered in the Mojave and Sonoran deserts.

3.3 Barriers to Transportation Performance

A number of key issues affect the performance of the transportation and logistics sector.

- **Infrastructure Condition.** Arizona's transportation and logistics sector depends on properly maintained highways and bridges. The 2015 bridge failure and subsequent closure of I-10 at Desert Center, California highlighted the critical role of the state's highway infrastructure in sustaining the movement of commerce. Industry stakeholders are concerned about the possibility of similar incidents in Arizona.
- **Congestion and bottlenecks.** Peak hour bottlenecks on urban Interstates and near major warehousing and terminal clusters inhibit productivity. One frequently cited area is the bottleneck near 99th Avenue and I-10 in Phoenix, which is heavily congested during morning peak periods, and similarly on 44th and 55th Avenues.
- **Truck Driver Labor Shortage.** The trucking industry faces, for the first time since the pre-recessionary period in 2007, a labor shortage in drivers. The driver shortage is symptomatic of the improving economy in Arizona and the tightening labor pool in which trucking companies compete with construction and other trades for talent.
- **Trucking Productivity.** A common theme among trucking companies interviewed is the limiting effect of current federal truck size and weight regulations applicable to Arizona on productivity. Carriers specializing in liquid bulk and other specialized commodities are especially concerned about their ability to compete and have proposed increasing the gross vehicle weight of 5-axle semi-trailer trucks from 80,000 to 86,000 lbs. or changing the regulations to

The I-10 and Transportation and Logistics in Arizona

As the single most important freight transportation facility serving Arizona measured by value of trade, I-10 at the Arizona/California border carries:

- 8,000 trucks each day—or 2.4 million trucks per year.
- These trucks carry nearly $460 million worth of freight each day or $140.6 billion per year—making this route by far the highest value freight corridor in Arizona.
- About 32 percent of the value of goods moved by truck over this segment has an Arizona origin or destination; the remaining 68 percent is moving through.

Source: CPCS analysis of IHS Global Insight Transearch Data

allow for a trailer to be towed behind the main semitrailer. Carriers believe these changes would help alleviate productivity constraints associated with the driver shortage.

- **Truck Parking.** Truck drivers are concerned about the lack of safe truck parking across Arizona, especially on the I-17 corridor between Phoenix and Flagstaff and on I-10 between Tucson and Blythe, California. Carriers expect the truck parking situation to deteriorate further once electronic logs go into full effect, requiring drivers to closely adhere to Federal hours of service regulations. Drivers in Arizona are already spending up to a half hour to find parking each day. This issue impacts both local and long-haul carriers although larger carriers are less frequently affected, in part because they can accommodate trucks at their terminal facilities. For carriers moving hazardous materials (including gasoline or diesel), the situation is further complicated by the lack of Safe Haven parking near motels.

Truck Parking Availability Metrics

An August 2015 report by the FHWA, "Jason's Law Truck Parking Survey Results and Comparative Analysis," Chapter IV, "Truck Parking Metrics", outlines several metrics to measure truck parking supply based on readily available data, ("Tier 1") including:

- Number of Spaces, Public and Private
- Number of Spaces in Relation to NHS Mileage
- Number of Spaces in Relation to VMT
- Number of Spaces in Relation to GDP by State

The report also outlines several metrics that can be used to further determine the requirements for truck parking, such as "utilization for Public and Private Facilities (hourly, weekly and monthly)," but may require further data collection.

- **Safety and Weather Incidents.** Trucking carriers in Arizona are concerned about safe operations, especially on heavily traveled Interstate sections and busy two-lane highways. They cite several routes as concerns, including I-17 from Phoenix to Flagstaff due to its steep grades and lack of passing lanes and US 93 from Wickenburg to Kingman with several two-lane sections serving high volumes of traffic.

  Trucking companies in Arizona are also concerned about the fast-moving dust storms that frequent some of the major highway corridors in the state, most notably the I-10 Corridor between Phoenix and Tucson. Many carrier utilize the Department of Public Safety's SMS alert system to alert trucks in real time of hazards—including pending dust storms. Yet some carriers are unaware of the advanced alert system and ADOT and partners should consider ways to spread the word about available advanced alert systems to promote wider adoption.

- **Funding Constraints.** Transportation and logistics stakeholder are concerned about the limited funding available to maintain and expand the state's highway network. The industry fears that without funding there is little that can be done in the future to improve the system.

3.4 Trends and Implications

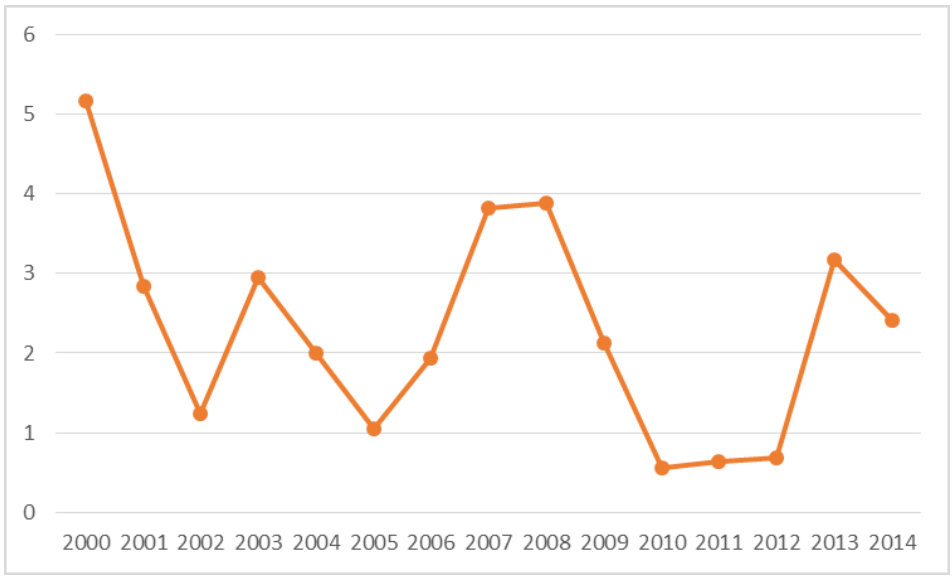
In addition to the key barriers affecting system performance described in 3.3, transportation and logistics firms are responding to several other current trends.

- **Traffic Congestion and Bottlenecks.** While many of the state's challenges are related to peak hour congestion on busy urban highways, the transportation and logistics sector recognizes that long-term population and economic growth will outpace the capacity of Arizona's existing transportation system. For Arizona to maintain and enhance its competitiveness in this area, it must develop policies and projects that maintain system reliability—either through measures that make the system more productive or through capacity additions. Stakeholders laud the development of the South Mountain Freeway (Route 202) because it will provide a means of bypassing congestion on I-10 through Tempe and Phoenix.
- **Growth of Intermodal Freight**. The demand for intermodal freight service will continue to grow as shippers realize the efficiencies of using containers to move goods domestically and internationally. For Arizona, the growth in intermodal demand may require new investments by the private sector and railroads in terminals and the implication is that Arizona will need more facilities that can accommodate this. The limiting factor for Arizona is its proximity to Southern California, which is the single greatest source of international and domestic containers in the state.
- **Growth of warehousing and distribution.** Driven by rapid population and economic growth, the industry has invested nearly $2 billion to construct nearly 35 million square feet of new warehouse and distribution space in Arizona since 2000.[10] While the pace of construction has slowed considerably (Figure 3-1), the number of projects moving through the development pipeline has increased significantly since the recession. Continued development of warehousing and distribution is dependent on the health of the transportation network.

  While most of the growth in warehousing occurred in the Phoenix-Scottsdale-Mesa area, the Tucson, and Yuma regions also experienced growth. Figure 3-2 summarizes the growth of warehousing and distribution square footage across Arizona's regional real estate market. Put into perspective, Arizona added warehousing square footage from 2000 to 2014 equivalent to the footprint of 243 Costco retail stores.

[10] CPCS analysis of CBRE Economic Advisors data 2000 to 2014.

Figure 3-1: Arizona Warehouse Development Completed 2000 to 2014 (Millions of S.F.)



Source: CPCS analysis of CBRE Economic Advisors data 2000 to 2014

Figure 3-2: Arizona Warehouse Development Completed 2000 to 2014 By Market

Market	Value of Construction ($B)	Square Footage (000's of square feet)	Costco Equivalents (143,000 SF retail center)
Flagstaff, AZ	$28	374	3
Lake Havasu City-Kingman, AZ	$34	735	5
Phoenix-Mesa-Scottsdale, AZ	$1,472	29,564	207
Prescott, AZ	$20	321	2
Tucson, AZ	$194	2867	20
Yuma, AZ	$31	635	4
Rest of Arizona	$19	280	2
TOTAL	$1,798	34,776	243

Source: CPCS analysis of CBRE Economic Advisors data 2000 to 2014

- **Mexico-Arizona Transportation Demand.** Concentrations of maquiladoras in Sonora and Juarez (within a relatively short drive from Tucson) continue to expand, driving growth in transshipments between U.S. distributors and Mexico. Some of the transshipments are Asian components that transit Arizona en route to maquiladoras. The transportation and logistics sector is responding to this trend through the provision of services to meet demand for freight transportation and warehousing in this market space, including the expansion of warehousing and transfer facilities (e.g. those at the Port of Tucson) that facilitate this type of trade.

4 Sector Priorities for Transportation System Performance Improvement

Key Messages

Arizona's transportation and logistics stakeholders believe their industry and the state could be more competitive with the following investments and policies:

- Improvements to I-17 and I-10 to enhance capacity and safety
- Access improvements to arterials leading to key terminals and warehouses, especially in western Phoenix
- The development of safe truck parking, especially on the I-17 and I-10 corridors
- Investments in maintenance on the system to prevent incidents like the recent I-10 bridge collapse in California
- Enhancements to truck productivity through higher weight allowances

4.1 Priority Improvements Needs and Implications

The transportation and logistics sector fundamentally believes that the Arizona transportation system is functioning well, but could use improvement in several important ways:

- **Improvements to I-17 Corridor.** Trucking companies are concerned about I-17 and believe that ADOT should address several issues on the corridor, including its limited capacity, which makes it prone to congestion and delays, and safety issues on the corridor, including steep grades and limited passing zones. The corridor is especially problematic during incidents because of the lack of parallel or detour routes. As a result, carriers suggested that improving incident management (e.g. faster clearance of accidents) along this corridor would be particularly beneficial. With these improvements, freight could move more efficiently and reliably between Phoenix and Flagstaff, improving intrastate trade and making interstate commerce between Phoenix and the rest of the U.S. (via I-40) more competitive.
- **Improvements to I-10 Corridor.** While the I-10 corridor generally functions well outside of peak hours, stakeholders believe that Arizona could be more competitive if the I-10 corridor were improved by adding more capacity in key locations (e.g. widening between Casa Grande and Chandler). This improvement would facilitate trade through the heart of the state's most populous counties (Maricopa, Pinal, and Pima).).
- **Access to Major Freight Terminals**. Congestion on major arterials such as 51st and 99th Avenues in Phoenix create access problems and delays for carriers moving between Interstate corridors and local terminals. Access improvements along I-10 and intersecting north-south arterials in western Phoenix and Tolleson are desired to alleviate severe local congestion. These improvements could help sustain growth in key warehousing and trucking terminal locations along the I-10 corridor.
- **Safe Truck Parking.** Many Arizona carriers are adversely affected by the limited supply of truck parking, including for hazardous materials. The I-17 and I-10 corridors in particular suffer from acute shortages. Through the provision of more truck parking options (public or private sector), freight operations along these corridors will become more reliable and less costly by saving truckers an average of 30 minutes of searching each time they exit to find parking. ADOT has conducted a statewide inventory of truck parking facilities to assess the supply of safe parking spaces versus growing demand.
- **Truck Productivity.** Specialized carriers, especially bulk transporters, believe they would be more competitive if gross vehicle weight limits were increased. Carriers frequently cited a proposal to allow 86,000 lbs. on five-axle semi-trailer trucks and the ability to add a trailer to certain configurations as desirable and necessary to compete with firms in states which already have higher limits, including Utah.
- **Bridge and Pavement Condition**. In the wake of the 2015 I-10 bridge failure in California, Arizona's transportation and logistics sector has become increasingly concerned about the potential for a similar event to disrupt freight movement and supply chains in the state. To that end, stakeholders believe that greater investments are needed to properly maintain facilities, especially bridges, to avoid the detours, delays, and other supply chain disruptions

caused by system failure. The following map, prepared by ADOT and CalTrans, shows potential detour routes around the I-10 collapse at Desert Center, California.

Figure 4-1 1-10 Alternate Routes During Closure July 2015

Source: ADOT

Tony Bradley, President and CEO of the Arizona Trucking Association said that the detour added "about three hours to a typical route" and "becomes a problem because drivers are required by federal regulation to take a 30-minute break in their first eight hours and can drive for no more than 11 hours each day." This means that truckers who were previously able to travel round trip from Phoenix to Los Angeles in one day cannot complete the trip. The implication is higher costs for consumers and producers. According to Bradley "truckers usually charge by the mile, so if you add a couple hundred miles, that adds to the final bill."[11]

[11] Wiles, Russ. Potential fallout from I-10 bridge collapse: Higher shipping, retail costs. Arizona Republic. July 21, 2015

Appendix A: List of Stakeholders Consulted

Name	Title	Organization
Tony Bradley	CEO	Arizona Trucking Association (ATA)
Raymond Morgensen	CEO	ATG Transport
Brian Beamer	President	B-4 Transport Inc.
Jason Hoffman	President	Cactus Transport
Ed Knabb	President	Productivity Constructs
Gill Hicks	President	Gill Hicks & Associates
Michael Jimenez	President& CEO	J and L Transportation
Chris Petroff	Senior Vice President	Greater Phoenix Economic Council
Stefan Baumann	Director of Business Development	Port of Tucson
Miguel Valencia	President	SALEO
Tom Stratford	President	Stratford Trucking
*Note, other trucking firms contacted referred the consulting team to ATA for their positions on key issues.		