Phoenix Regional
Air Cargo Planning Study

FINAL REPORT

Prepared for:
Phoenix Sky Harbor International Airport

Prepared by:
InterVISTAS Consulting Group

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City of Phoenix
Aviation Department

InterVISTAS
AVIATION TRANSPORTATION TOURISM

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Air Cargo Planning Study

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Executive Summary

Introduction and Study Background

In December 2012, the City of Phoenix Aviation Department commissioned the Phoenix Regional Air Cargo Planning Study ("Study") to identify opportunities for air cargo growth at the Phoenix metropolitan area airports and to assess development activities the airports should consider to accommodate that growth. Specifically, the Study was designed to:

1. Complete an inventory and air cargo market analysis of the Phoenix metropolitan area airports which include Phoenix Sky Harbor International Airport ("PHX"), Phoenix-Mesa Gateway Airport ("IWA"), Phoenix Deer Valley Airport ("DVT"), and Phoenix Goodyear Airport ("GYR");

2. Identify trends and future demand for air cargo services;

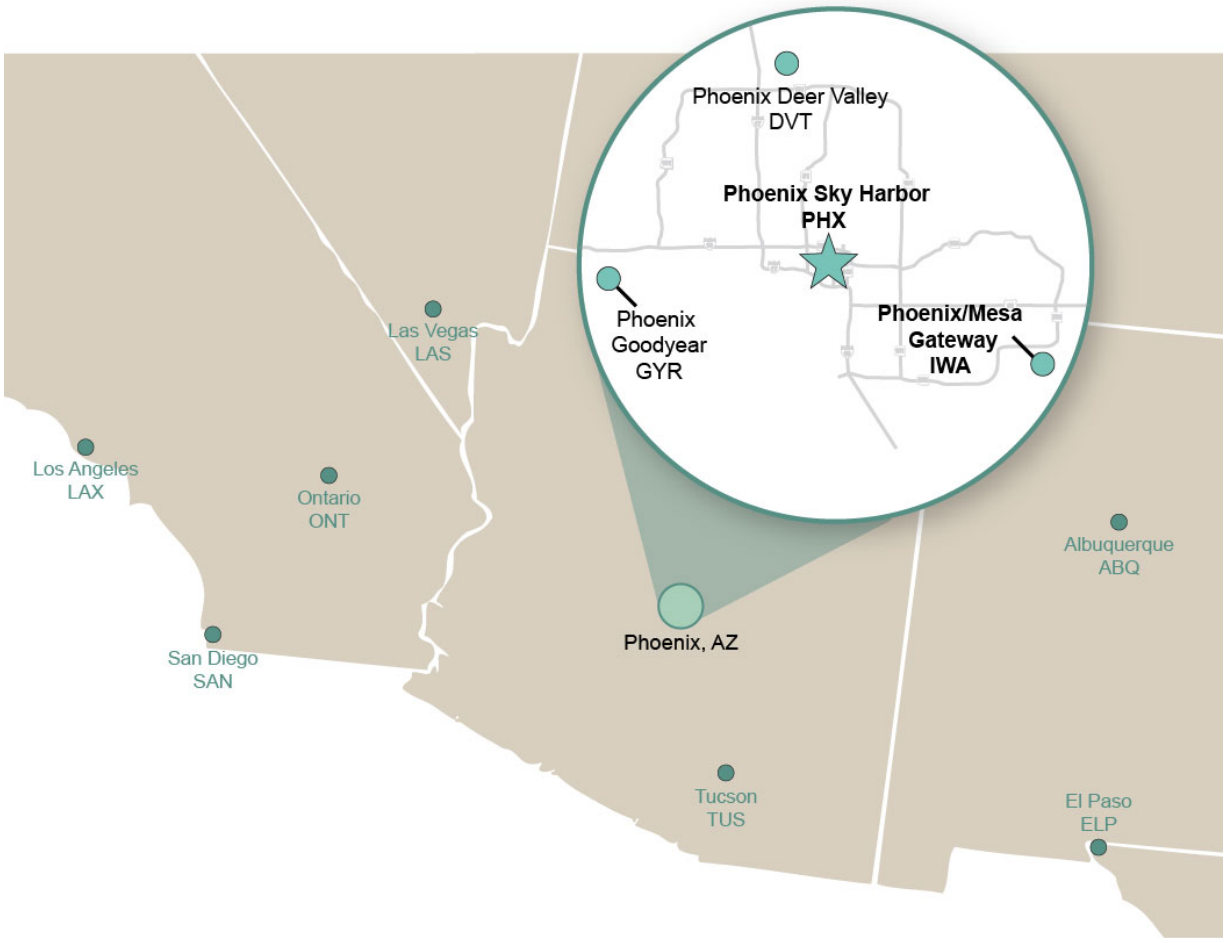
3. Determine if the Phoenix area airports have the facilities and infrastructure to support future air cargo demand; and

4. Assess the feasibility of additional air cargo development at selected Phoenix area airports.

Study Region

Due to the heavy use of trucking in moving air cargo (often over long distances) to and from airports, it was appropriate to consider a wide geographic area for the Study. When analyzing air cargo markets, it is common practice to consider regional air cargo flows within a one-day truck drive of an airport – for purposes of this Study approximated as a 500-mile distance radius around Phoenix Sky Harbor and Phoenix-Mesa Gateway (see **Exhibit ES-1**). Within this 500-mile radius (defined as the Study Region), there are several commercial airports that compete for the region's air cargo shipments. Included amongst these airports is Los Angeles International Airport ("LAX") - one of the largest cargo gateway airports in the world, which effectively competes for air cargo flows across North America. Accordingly, various aspects of the Study Region's airports were analyzed in the context of their impacts on air cargo demand at the Phoenix area airports.

Exhibit ES-1: Definition of Study Region



Focus Airports

In the early stages of the project work, it became clear that, within the Phoenix area, Phoenix Sky Harbor and Phoenix-Mesa Gateway would be the focal points of the Study. Both airports have scheduled commercial air services as well as the capabilities and potential to serve the region's air cargo demand. According to statistics compiled by Airports Council International ("ACI"), in 2012, PHX ranked 21st amongst North American airports in terms of air cargo tonnage handled, while IWA ranked 151st.

At PHX, integrated express carriers, such as FedEx and UPS, carry over 65% of the airport's cargo, while passenger airlines carry much of the remainder. Currently, IWA's air cargo business is sporadic and highly dependent on charter airline activity and the airport's main airline (Allegiant Air) does not carry cargo as a matter of corporate policy. Very little of the total air cargo carried at PHX and IWA is coded as International cargo as most cargo is bound, at least initially, for other Domestic U.S. points. International cargo markets have higher growth profiles than the Domestic U.S. market and opportunities were investigated for growing direct international shipments at the Phoenix area airports.

Methodology

To meet the Study objectives, the task work followed an orderly and sequential approach. In very basic terms, the work progressed in the following manner:

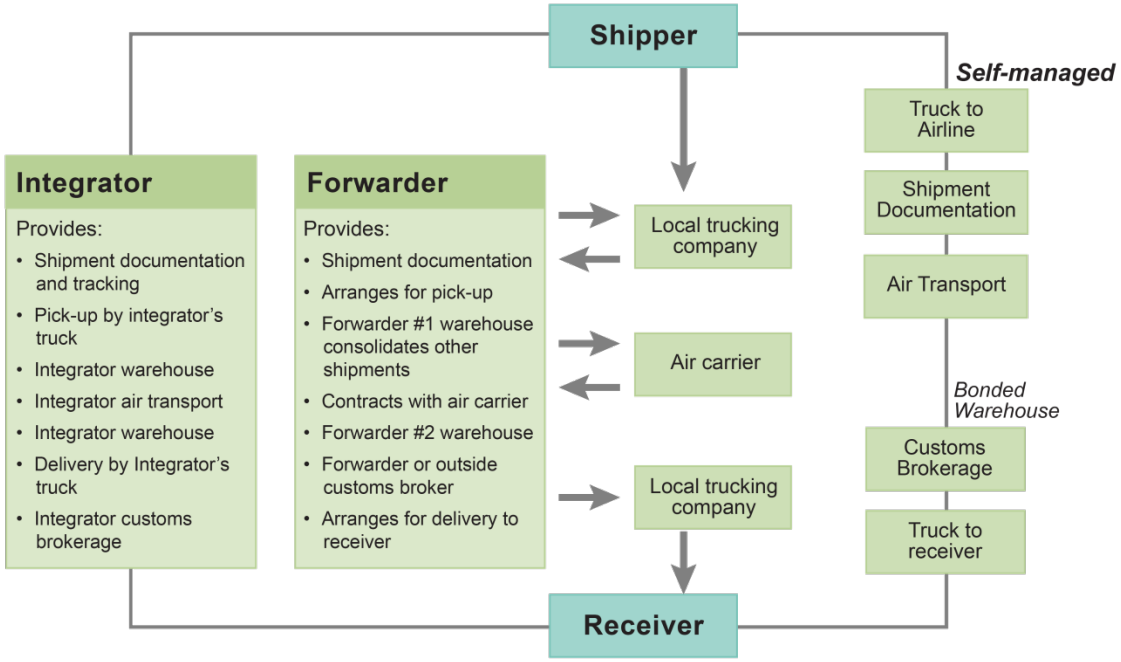
- Analyze the air cargo market and identify regional air cargo opportunities;
- Based on findings from the market analysis, develop forecasts of air cargo demand at the Phoenix area airports;
- Inventory the Phoenix area airports in terms of air cargo facilities and infrastructure;
- Determine future needs regarding air cargo facilities and infrastructure at the Phoenix area airports considering the forecasted air cargo volumes;
- Assess the financial feasibility of the identified cargo-related development options (i.e. facilities and infrastructure needs); and
- Recommend the development options that should be considered by the airports.

The major findings related to these tasks are described below.

Air Cargo Industry Overview and Trends

There are three basic options for shippers that require air transportation (see **Exhibit ES-2**). One option is for an in-house transportation/logistics department to make all of the arrangements themselves. The more common options are for shippers to outsource these activities to freight forwarders/third party logistics companies or integrated carriers (e.g. FedEx or UPS).

Exhibit ES-2: Air Cargo Industry Structure: Three Basic Options for Shippers



From an operational perspective, much of the air cargo handled in the U.S. flows through large cargo gateway airports where cargo infrastructure and services by passenger and cargo airlines have been established. In particular, international air cargo is concentrated at the large gateway airports where direct international flights with larger aircraft are more readily available.

The air cargo industry has been challenged in recent years with the effects of the U.S. recession, the global economic downturn, rising jet fuel prices, and the implementation of security-related regulations. After recovering from the effects of the September 11, 2011 terrorist attacks, the air cargo industry saw negative growth in 2008-2009 due to adverse global economic conditions. A healthy recovery in air cargo activity in 2010 has given way to an environment of flat growth which is expected to continue for the near future.

Some of the major trends influencing the air cargo industry include:

- Security regulations since the September 11, 2001 terrorist attacks;
- Modal shifts away from air transportation and towards surface, sea and rail modes;
- Expanded use of passenger aircraft belly space;
- Consolidation of U.S. domestic air cargo services;
- Nearshoring of manufacturing centers (particularly in Mexico); and
- Changing roles of freight forwarders.

Background on the Regional Air Cargo Market

An essential element of the work employed to achieve the Study objectives is the analysis of the relevant air cargo market. The analysis included a review of historical data, a competitive assessment of other airports, and synthesis of information gathered from stakeholder groups via primary research. This work enabled the identification of air cargo opportunities for the Phoenix metropolitan area which, in turn, informed cargo demand forecasts at the region's airports.

The initial phase of the market analysis involved a review of air cargo operations at the Study Region airports in the context of industry practices and trends. The Study Region includes a total of 15 airports in the states of Arizona, California, Nevada, New Mexico and Texas. **Exhibit ES-3** shows published data for the 13 commercial airports with reported air cargo tonnage in 2012. (Note: Phoenix Deer Valley Airport and Phoenix Goodyear Airport do not have commercial air service and do not report air cargo statistics in any of the data sources reviewed.)

Exhibit ES-3: Air Cargo Tonnage at Study Region Airports (metric tons)

Airport Code	Airport Name	2012	North American Airport Ranking - 2012
LAX	Los Angeles International Airport	1,780,998	5
ONT	LA/Ontario International Airport	412,661	16
PHX	**Phoenix Sky Harbor International Airport**	**273,605**	**21**
SAN	San Diego International Airport	141,233	32
LAS	McCarran International Airport (Las Vegas)	91,356	41
ELP	El Paso International Airport	85,408	47
ABQ	Albuquerque International Sunport	58,386	61
BUR	Bob Hope Airport (Burbank)	48,821	66
TUS	Tucson International Airport	33,877	78
LGB	Long Beach Airport	24,470	90
SNA	John Wayne Airport	16,179	102
SBA	Santa Barbara Municipal Airport	1,711	130
IWA	**Phoenix-Mesa Gateway Airport**	**100**	**151**

Source: Airports Council International – North America.

Phoenix/Arizona Region Market Overview

The Phoenix/Arizona region's air cargo industry is primarily a function of the activities conducted by various businesses and organizations that comprise the region's air cargo community. These constituencies include manufacturers, shippers/consignees, freight forwarders, integrated express carriers, passenger and cargo air carriers, airports, trucking companies, customs brokers and other service providers.

The Phoenix area and the State of Arizona are home to an array of manufacturers of air-eligible goods, as well as shippers and consignees who demand air cargo services for outbound and inbound shipments. Notable companies located in the region that produce air-eligible goods include manufacturers of semiconductors, aerospace parts and vehicles, and electronics. The region is also home to medical device manufacturers, Department of Defense contractors and distribution centers for online retailers. The items produced and shipped by these varied businesses include commodities that are high in value, low in weight and time and temperature sensitive – ideal attributes of air-eligible goods. Furthermore, bordering Arizona, and just a few hours' drive south of the Phoenix area, is the Mexican State of Sonora. Sonora's vibrant maquiladora and agricultural industries generate air cargo that transits the Arizona-Mexico border on a daily basis.

Air cargo is carried by a variety of airlines at PHX, including integrated express carriers, passenger airlines and operators of freighter aircraft. **Exhibit ES-4** identifies the top cargo carriers at PHX in 2012 in terms of share of total cargo handled at the airport. Not surprisingly

FedEx and UPS led the way due to their concentration on express freight and the operation of large all-cargo airplanes. US Airways and Southwest have robust service levels at PHX and, while it is narrowbody aircraft capacity, their service appeals to many shippers who like the high frequency and variety of direct destinations to/from PHX. Notably, British Airways captured 1.2% of the airport's total air cargo, despite operating less than daily service with a Boeing 747 at PHX in 2012. While the British Airways' share of cargo may seem modest, the share of cargo relative to its low level of operations is evidence of the appeal of a widebody international service to the air cargo market.

Exhibit ES-4: PHX Air Cargo by Carrier

Air Carrier	2012 Share of PHX Total Air Cargo
FedEx	41.1%
UPS	24.0%
US Airways	16.4%
Southwest Airlines	5.6%
DHL	5.5%
Ameriflight	1.7%
United / Continental	1.5%
British Airways	1.2%
Delta Air Lines	1.2%
All Other Carriers	1.8%
Total	100.0%

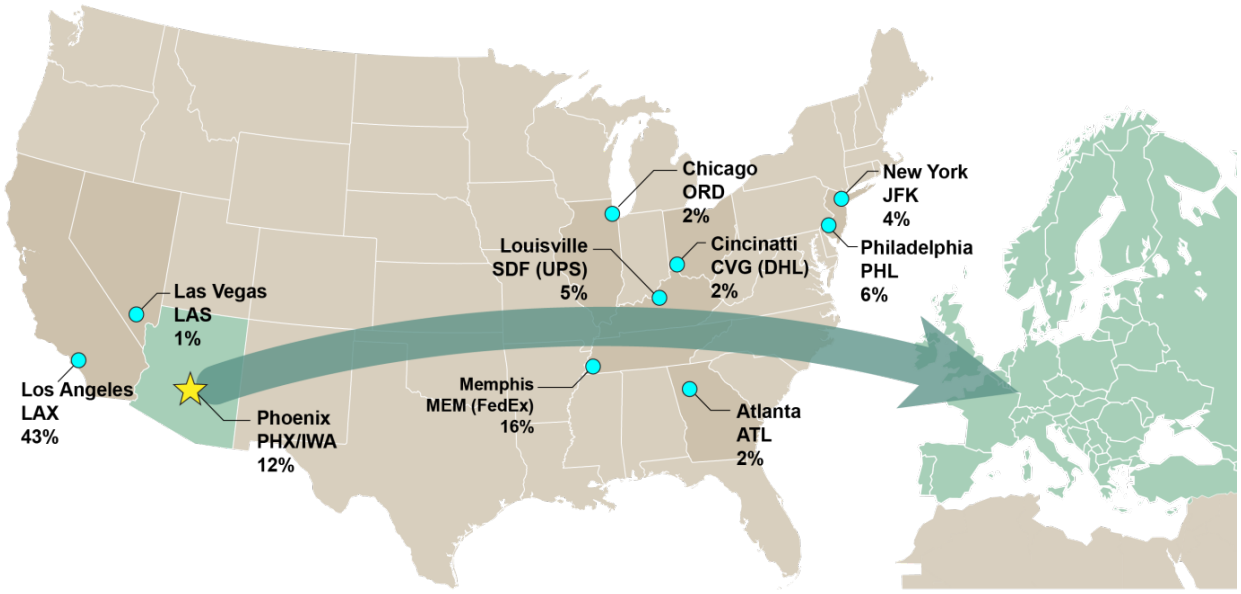
Source: Phoenix Sky Harbor International Airport.

Opportunities for International Air Cargo Growth

As mentioned previously, international air freight (designated as shipments moved on flights at PHX directly to/from points outside of the U.S) accounts for a small portion of PHX's total air freight. Based on this definition, just 2% of PHX's total freight was international in 2012. Again, this is mainly driven by the dominance of domestic air services at PHX and is not indicative of the amount of international air freight being generated in the Phoenix/Arizona region.

An analysis of the states in the Study Region looked at the way in which U.S. air freight is routed to international markets. **Exhibit ES-5** below provides an example of the output of this analysis for Arizona's exports to Europe. In this example, it can be observed that LAX handles 43% of Arizona's exports to Europe. Other airports capture varying amounts of Arizona's exports – often in relation to their distance from Arizona and the amount of direct international air cargo services available (via both passenger and freighter aircraft). In 2012, the data shows that the Phoenix area airports handled 12% of Arizona's exports to Europe – largely as a result of the British Airways' nonstop London services at PHX.

Exhibit ES-5: Arizona Air Exports to Europe by Airport of Exit (2012)



City/Airport = Gateway City for Arizona Air Exports to Europe
% = Share of Arizona Air Exports to Europe

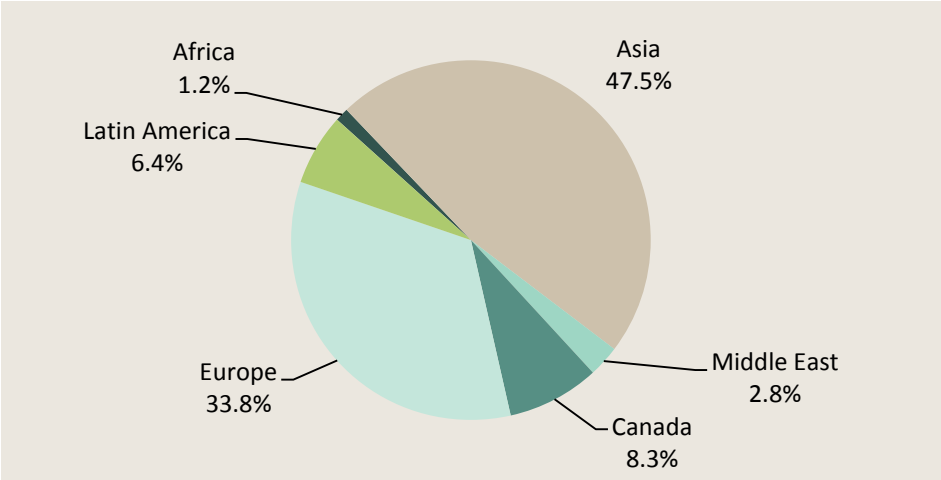
All Other U.S. Gateways 7%

Source: U.S. Census Bureau, Foreign Trade Statistics.

Arizona's International Trade by Geography

The U.S. Census Bureau's Foreign Trade Statistics database allows for analysis of Arizona's international air cargo market by the foreign origins and destinations of commodities shipped by air. Arizona's international air trade is dominated by Asia and Europe (see **Exhibit ES-6**). Asia alone accounts for almost one-half of Arizona's combined air imports and exports, while Europe represents one-third of the State's total trade volume. It is logical that Asia is Arizona's largest trading partner, given the State's location in the Western U.S. where supply chains with Asia are strong. Also, many of the types of products manufactured in Arizona, including semiconductors, electronics and aerospace parts, have natural ties with the Asian markets. Canada and Latin America also represent significant air trade partners with Arizona, albeit at much lower levels than Asia and Europe.

Exhibit ES-6: Shares of Arizona Air Trade Weight by World Region (2012)



Source: U.S. Census Bureau, Foreign Trade Statistics.

Local Stakeholder Input and Mexico Opportunities

As part of the market analysis phase of the Study, interviews were conducted with several key stakeholders regarding the region's air freight market including air carriers, freight forwarders, shippers/manufacturers, and other interested organizations. The personal interviews yielded detailed information on air cargo market dynamics as well as reliable forward-looking information on the market's potential growth.

The information gathered via the interviews was consistent with and validated the secondary research findings. The key findings from the interviews are summarized below:

- **Need for More Widebody Aircraft Serving International Markets:** There is a high interest amongst the Phoenix air cargo community in additional widebody aircraft services at the Phoenix area airports. Widebody aircraft provide cargo-friendly capacity and it is assumed that the aircraft would likely serve international markets - where direct cargo capacity is needed the most.
- **Evolving Shipper Behavior May Encourage Use of Local Airports:** Shippers are increasingly sophisticated and powerful, making the competitive environment of the air cargo industry even more intense. The changing business practices of shippers is putting pressure on freight forwarders and air carriers to ship goods in the most efficient and reliable ways – including potentially higher use of local airports versus distant cargo gateway airports.
- **Integrated Express Carrier Growth will be Focused on PHX:** The integrated express carriers based at Phoenix Sky Harbor are focused on the core Phoenix market and do not foresee expanding air services to other airports in the metropolitan area. Due to the associated high costs and focus on international markets, opening new airport stations in the U.S. will be very much the exception for these carriers moving forward.

- **Potential Needs Related to Air Cargo Security and Temperature-Sensitive Shipments:** Infrastructure issues related to air cargo security/screening and temperature controlled shipments are concerns for some members of the Phoenix air cargo community. While solutions to these issues have been identified, some of those interviewed believe other alternatives should be explored.
- **Soft Near-Term Growth Projections:** The regional air cargo market is projected to experience stable, but soft growth over the next 5 years. The majority of interviewees predicted growth in the range of 1% to 3% per year in the coming 5 year period. One exception to the slow growth sentiments relates to the online retail distribution segment which is viewed as having great potential for higher levels of growth, especially for the integrated express carriers.

In addition to the interviews with local Phoenix/Arizona stakeholders, the Study sought to identify air cargo-related implications of the Northern Mexico market – specifically the State of Sonora which borders Arizona. Sonora presents an abundance of current and imminent opportunities for Phoenix's air cargo market. The Sonoran economy is centered on the automotive, aerospace, mining, technology, agriculture, and medical manufacturing industries – all of which generate air-eligible cargo shipments. Production in Sonora is anticipated to steadily grow over the next 13 years due to increased wealth creation, foreign direct investment, and plans to attract other manufacturing industries. The strategic proximity of Sonora to Phoenix, the increasing trend of near-shoring and the rise of maquiladoras makes the State of Sonora an ideal focus for strengthening and expanding the air cargo transport market in the Phoenix region.

Air Cargo Demand Forecasts for Phoenix Area Airports

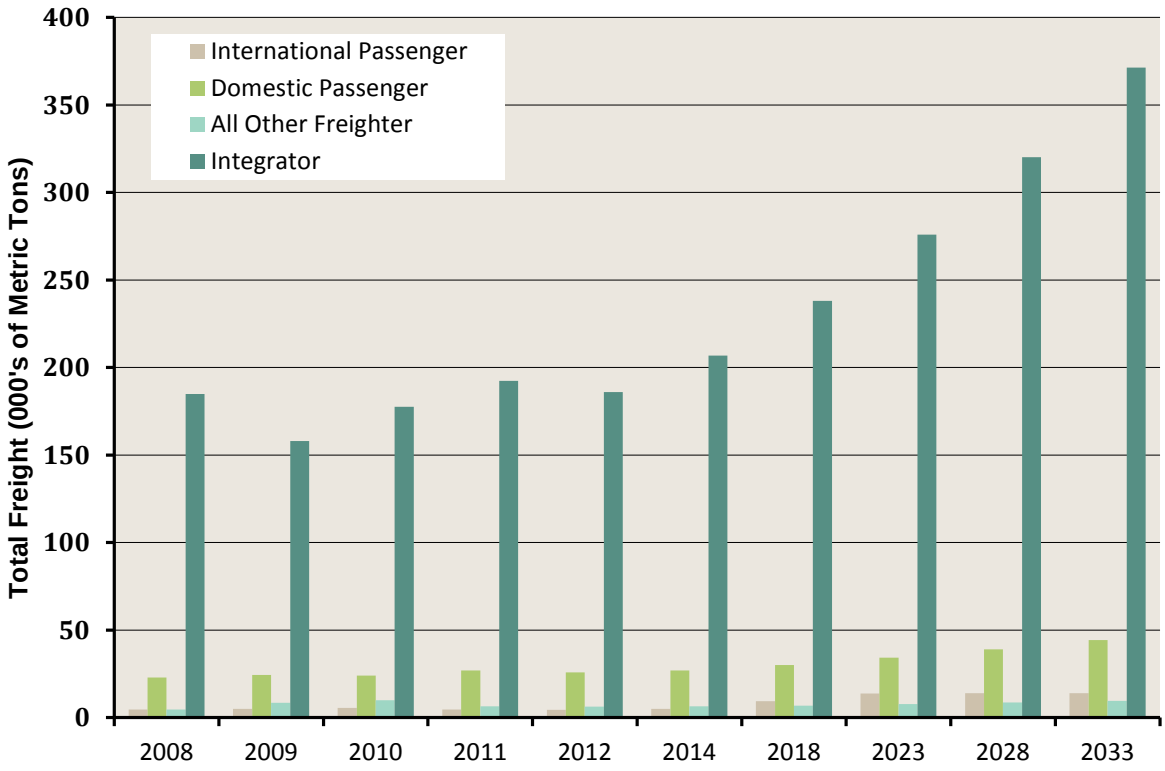
Utilizing information from primary and secondary research of the relevant air cargo market, long-term air cargo forecasts were developed for Phoenix Sky Harbor and Phoenix-Mesa Gateway. Estimations of future demand levels are a key aspect of the Study because forecasts provide the basis for subsequent analyses by airport planners in determining potential needs for future cargo-related facilities and/or infrastructure at these airports.

A summary of the total air cargo forecast for Phoenix Sky Harbor International Airport by type of carrier is provided in **Exhibit ES-7**. The major observations for the PHX forecast include:

- Total air cargo tonnage (freight and mail combined) handled at PHX is projected to increase from 256,400 metric tons in 2012 to over 460,000 metric tons in 2033. This translates to total growth of 79%, or an average annual growth rate of 2.8% over the forecast period.
- Integrators will grow at an average of 3.3% annually through 2033, while belly cargo carried on international passenger flights will grow an average of 5.3% per year, due to expectations of additional international air services, including those using widebody, cargo-friendly aircraft.

- Freighter operations will handle more than 380,000 metric tons (83%) of total cargo shipments at PHX in the next 20 years, with the vast majority of that volume carried by integrators.
- By 2033, passenger operations will handle over 80,000 metric tons (17%), with domestic operations comprising the largest share (82%) of those belly cargo shipments.

Exhibit ES-7: PHX Total Air Cargo Forecast Summary by Type of Carrier



Source: InterVISTAS Consulting.

The cargo forecasts for Phoenix-Mesa Gateway Airport were developed using a scenario-based approach. This was deemed appropriate given the overall lack of consistent air cargo-related operations at IWA and the types of operations that may be envisioned at the airport. The following scenarios were developed to estimate projected cargo traffic at IWA:

- Additional Low Cost Carrier (LCC) passenger operations (belly cargo)
- New Boeing 737 passenger operations by a network carrier (belly cargo)
- New freighter cargo operations

Exhibit ES-8 provides a numeric table on the projected estimates for the defined scenarios. The major observations for the IWA forecast include:

- The new freighter operation scenario is forecast to have the fastest growth in air cargo, followed by the network carrier passenger operation scenario.
- By 2033, a total of approximately 21,840 metric tons of cargo is projected for the freighter operations scenario, while a total of more than 20 metric tons is predicted for the LCC passenger operations scenario.
- The scenario with a network carrier passenger operation with a Boeing 737 is estimated to handle a consistent volume of air cargo throughout the last 10 years of the forecast period, with nearly 200 metric tons by 2033.

Exhibit ES-8: IWA Air Cargo Forecast Summary

Forecast Year	Potential Scenario		
	Additional LCC	New Network Carrier	New Freighter Operator
	Forecast Air Freight (Metric Tons)		
2018	10	50	280
2023	20	200	5,100
2028	20	200	11,650
2033	20	200	21,840

Source: InterVISTAS Consulting.

Synopsis of Existing Facilities and Development Needs

Existing Facilities

Existing cargo facilities at Phoenix Sky Harbor, Phoenix-Mesa Gateway and other airports in the region were catalogued to demonstrate the capacity of each airport in terms of volume of cargo and aircraft operations.

PHX has a mature base of cargo operations and facilities which are primarily located in two dedicated on-airport cargo areas: 1) the South Air Cargo Complex and 2) the West Air Cargo Complex. The locations of these cargo areas at PHX are shown in **Exhibit ES-9**.

Exhibit ES-9: Phoenix Sky Harbor International Airport – Cargo Areas

The South Air Cargo Building is a multi-tenant building with three tenants, including FedEx and UPS. Landside access to the South Air Cargo Complex is via the intersection of Interstates 10 and 17, S. 24th Street and E. Old Tower Road. The South Air Cargo Building is owned by PHX and is just over 173,000 square feet in size with contiguous access to nearly 1.2 million square feet of shared aircraft apron. The apron consists of 18 aircraft parking positions currently made up of 3 positions designated for Group V cargo aircraft, 10 positions designated for Group IV cargo aircraft, and 5 positions for single and multi-engine general aviation aircraft. The facility also has dedicated truck parking of nearly 237,000 square feet.

The West Air Cargo Complex is made up of three primary buildings and associated aircraft parking aprons that include Buildings A, B and C. Landside access to the West Air Cargo Complex is via Interstate 10 and multiple local roads that include S. 24th Street, E. Buckeye Road, E. Sky Harbor Boulevard, S. 27th Street, and E. Yuma Street. Building C is primarily occupied by Southwest Airlines and US Airways while Buildings A and B house cargo operations for the airport's remaining airlines and freight forwarders.

Details of PHX's air cargo facilities are shown in **Exhibit ES-10**.

Exhibit ES-10: Summary Inventory of the PHX South and West Air Cargo Complexes

Facility	Total Building Sq. Feet	Apron Sq. Feet	Aircraft Park. Pos.	Truck Bays
South Air Cargo Complex	173,134	1,200,000	18	45
West Air Cargo Complex	77,920	397,000	8	94
Vacant Space	96,800	0	0	0
Expansion in Progress	0	288,000	2	0
Total Cargo Space	**347,854**	**1,885,000**	**28**	**139**

There is no existing scheduled cargo activity at the Phoenix-Mesa Gateway Airport. The airport does receive cargo via charter aircraft service to support specialized commercial activities, including Mesa's Boeing helicopter manufacturing facility. The existing building in IWA's Alpha Apron area that could support cargo operations currently houses Immigration and Customs Enforcement ("ICE"), a non-cargo tenant. See **Exhibit ES-11**.

The Alpha Apron is approximately 440,000 square feet and can accommodate 3 Group V aircraft. IWA's facilities are presented in **Exhibit ES-12**.

Exhibit ES-11: Phoenix-Mesa Gateway Airport – Alpha Apron Area

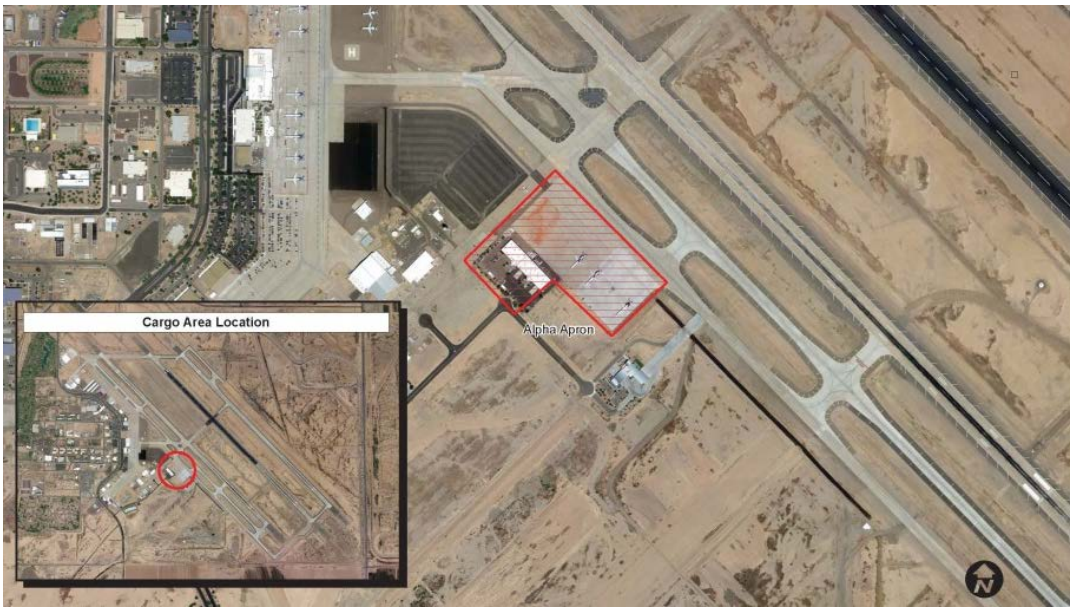


Exhibit ES-12: Inventory of IWA's Alpha Apron Aircraft Parking Space

Facility Apron Area	Apron Sq. Feet	Aircraft Parking Positions
Alpha Apron	440,000	4
Expansion in Design (Phase III)	240,000	2
Apron Areas Total	**680,000**	**6**

Development Needs

The results of the cargo demand forecasts, facility requirements, and gap analysis have defined the potential need for the future development of air cargo facilities over the 20-year planning period. The recommended projects are presented below along with the potential layouts of the proposed facilities, the timeframe when the development may need to occur, and the estimated cost of the facilities.

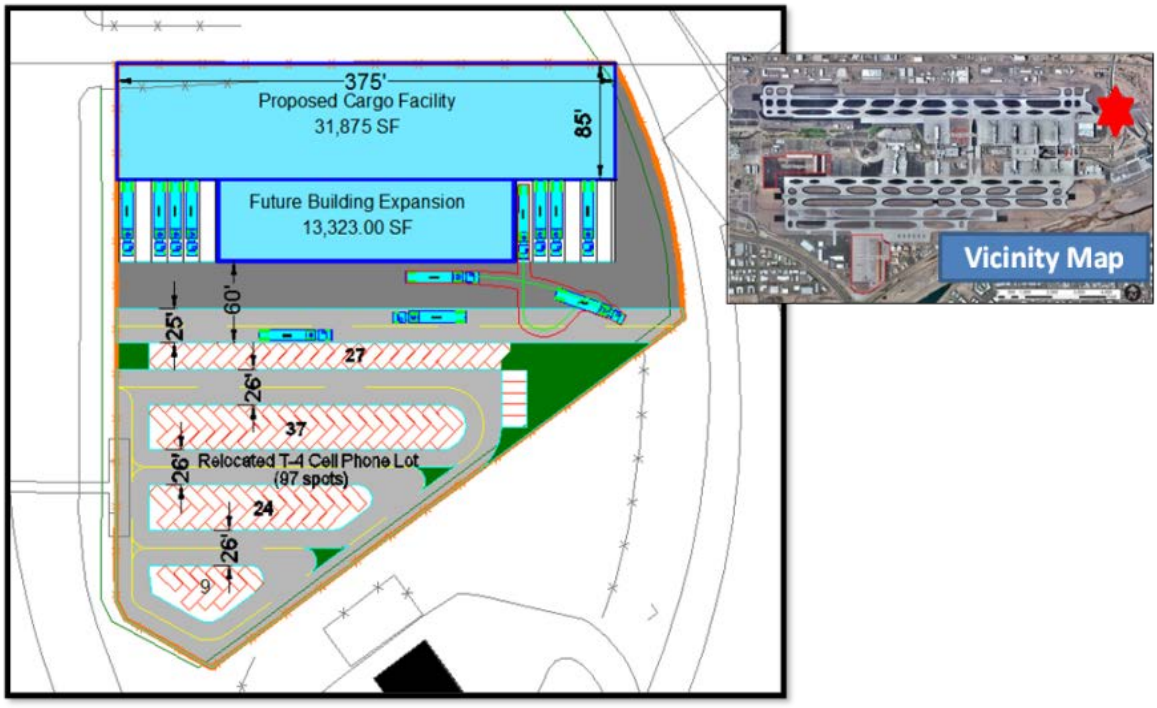
A review of the study airports and discussion with the management at each facility identified areas to consider for air cargo development as defined below:

- Phoenix Sky Harbor – 42nd Street Area
- Phoenix Sky Harbor – West Air Cargo Area
- Phoenix-Mesa Gateway – Alpha Apron, South Industrial Area

2018 – Consideration of US Airways Cargo Warehouse and C-Point Operations

In the near future, US Airways' C-Point operation will have restricted access. The 42nd Street Area has been preliminarily proposed as an option to relocate the C-Point operation. A further consideration is to combine the US Airways' Building C and C-Point operation in this 42nd Street Area on the east side of Phoenix Sky Harbor Airport. The estimated cost of this development is just under $4 million. A conceptual proposed layout of this facility is shown in **Exhibit ES-13**.

Exhibit ES-13: PHX - Proposed 42nd Street Layout



2023 – West Air Cargo Area Development Considerations

The three main projects considered for the 2023 planning horizon are presented below. There are a few factors that could affect this implementation schedule, notably if US Airways relocates its cargo warehouse operation as presented above, or other airfield development projects occur (i.e., west side cross-field parallel taxiways), and their ultimate impact on Cargo Building C. For the purposes of this effort, it was assumed that approximately 50% of Building C would be retained.

As a result, the following cargo infrastructure improvements for the West Cargo Area may need to be considered in the 2023 timeframe:

New 78,000 square foot Cargo Warehouse
Estimated Cost: $6,235,000

Air Cargo Apron Associated with New Warehouse Above
Estimated Cost: $6,098,000

Demolition of a Portion of Building C in Lieu of New Parallel Taxiways
Estimated Cost: $62,000

2028 Air Cargo Apron Rehabilitation (Remaining Building C)

As a result of the Building C reduction, it is assumed that the aircraft apron area that remains will need to be rehabilitated in the 2028 timeframe.

2031 and Beyond – Maximum Build-Out of West Air Cargo Area

As an optional layout to accommodate for potential changes to the assumptions used above such as cargo activity that may occur in advance of the forecasted timeframe or impacts from other development that may occur at the Airport, a maximum build-out of the new warehouse building space in the West Cargo Area is shown. This would provide for approximately 48,500 square feet in additional cargo warehouse space.

The West Air Cargo Layout and Phasing is shown in **Exhibit ES-14** and the project needs and costs for each of the forecast periods are shown in **Exhibit ES-15**.

Exhibit ES-14: PHX - West Air Cargo Layout and Phasing

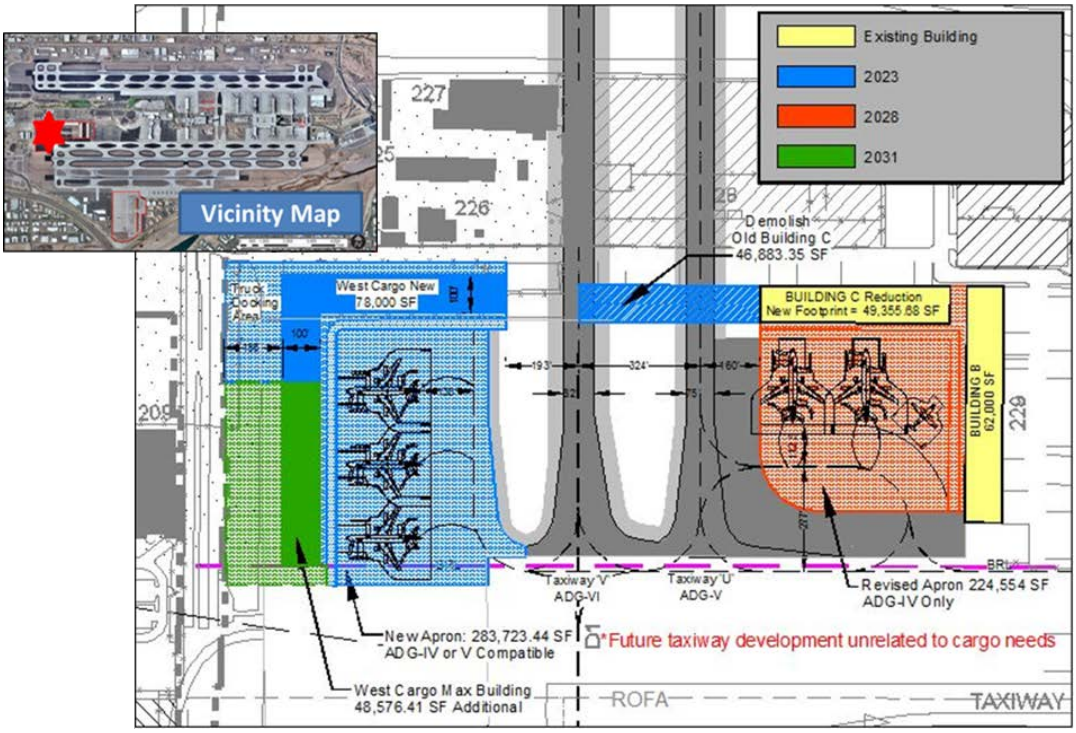


Exhibit ES-15: PHX Air Cargo-Related Project Needs and Costs

	Warehouse Needs (sq-ft)	Warehouse Cost ($)	Apron Cost ($)	Demolition ($)	Total Cost ($)
2018	41,000	$3,996,000			$3,996,000
2023	78,00	$6,235,000	$6,098,000	$68,000	$12,401,000
2028			$2,980,000		$2,980,000
2031	48,500	$4,319,000			$4,319,000
Total	**167,500**	**$14,550,000**	**$9,078,000**	**$68,000**	**23,696,000**

Phoenix-Mesa Gateway – Alpha Apron, South Industrial Area

The cargo infrastructure in place at IWA can accommodate the forecasted demand through its existing Alpha Apron and other available infrastructure. Should demand advance ahead of the forecasted timeframe, the Airport's Master Plan identifies a significant area of land adjacent to the Alpha Apron that encompasses a majority of the South Industrial Area of the airport that can be used for additional air cargo needs. **Exhibit ES-16** shows the cargo areas available at Phoenix-Mesa Gateway.

Exhibit ES-16: IWA's South Industrial Area and Proposed Future Cargo Areas

Financial Feasibility Analysis and Cost-Benefit Analysis

The purpose of the Financial Feasibility Analysis and Cost-Benefit Analysis is to determine whether the proposed development options at Phoenix Sky Harbor can be justified financially from the airport's perspective.

Financial Feasibility Analysis

In performing the Financial Feasibility Analysis, it is assumed that the additional air cargo facilities will be leased to tenants in a manner that is consistent with the way current facilities are leased. Therefore, the cash flows analyzed included: 1) revenues from lease payments made by tenants and 2) expenses incurred for utilities and maintenance and repair of the facility. Further, assumptions have been made regarding the leasing of the proposed additional facilities whereby the facilities are expected to realistically reach full occupancy over time.

The key observation from the Financial Feasibility Analysis is that the proposed air cargo facilities return a positive net present value of almost $650,000. This positive value generates an internal rate of return of 5.6%, which is higher than the weighted average cost of capital of 5.0%. Thus, the conclusion is that the proposed investments in additional air cargo facilities at PHX are to be considered financially feasible.

Cost-Benefit Analysis

For the Cost-Benefit Analysis of the proposed PHX cargo facilities, external costs and benefits (for users of the aviation system) are considered in addition to the cash flows included in the

Financial Feasibility Analysis. The proposed investments are aimed at maintaining existing cargo handling capacity and providing sufficient additional cargo handling capacity when required for the PHX cargo community. Having sufficient cargo handling space is of paramount importance for users of air cargo facilities as it allows for efficient operations. Conversely, a lack of space for air cargo operations suggests that certain processes may be conducted in non-standard, sub-optimal ways which add inefficiency, time and cost to an operation.

The results of the Cost-Benefit Analysis show that when the identified benefits associated with the investment in PHX air cargo facilities are added to the financial analysis, the net present value and internal rate of return of the cash flows further improves. The Cost-Benefit Analysis results in a 7.1% internal rate of return versus the 5.6% rate determined by the Financial Feasibility Analysis alone. This translates to a net present value of $2.3 million for the proposed air cargo development options. Therefore, the conclusion regarding the investment in PHX cargo facilities is unchanged - the proposed investments are not only financially feasible, but they also add positive benefits to the users of the aviation system.

Summary and Recommendations

The work involved in completing the Phoenix Regional Air Cargo Planning Study has led to several key conclusions and recommendations regarding air cargo development at the Phoenix metropolitan area airports.

The Market Analysis identified potential air cargo development opportunities in four general areas related to: 1) integrated express carrier operations, 2) air cargo business model evolution, 3) airline capacity, and 4) facilities, infrastructure and services. The findings of the Market Analysis aided in the development of long-term, 20-year Demand Forecasts for air cargo at Phoenix Sky Harbor International Airport and Phoenix-Mesa Gateway Airport. These forecasts predict slow, but stable growth in air cargo volumes at PHX. Meanwhile, forecasted air cargo growth at IWA is largely a function of the number and types of air services the airport attracts over time – possibly driven by manufacturers of air-eligible goods locating in proximity to IWA where developable land is plentiful. In fact, as this Study was nearing completion in late 2013, Apple Computer announced that it would be establishing a large manufacturing facility in Mesa, very close to IWA. After analyzing the current inventory of cargo-related facilities and infrastructure at the Phoenix area airports, potential development needs were identified and analyzed in terms of cost, size, location and financial feasibility.

The Study concludes that the Phoenix area airports – namely Phoenix Sky Harbor and Phoenix-Mesa Gateway – are well-positioned to continue serving the regional air cargo market and handle near-term growth. Based on all available information, the proposed air cargo-related facilities and infrastructure should be considered financially feasible options and, therefore, should be provided by the airports as required. Due to the long-term nature of the forecasts and the fact that no near-term cargo-related development needs were identified at the Phoenix area airports, it is recommended that elements of this Study be updated in the future to ensure that the size and location of the proposed facilities and infrastructure meet the requirements of the cargo community at that time.

Phoenix Regional
Air Cargo Planning Study

CHAPTER 1

Chapter 1: Introduction and Study Background

In December 2012, the City of Phoenix Aviation Department commissioned the Phoenix Regional Air Cargo Planning Study ("Study") to identify opportunities for air cargo growth at the Phoenix metropolitan area airports and to assess development activities the airports should consider to accommodate that growth. Specifically, the Study is designed to:

1. Complete an inventory and air cargo market analysis of the Phoenix metropolitan area airports which include Phoenix Sky Harbor International Airport ("PHX"), Phoenix-Mesa Gateway Airport ("IWA"), Phoenix Deer Valley Airport ("DVT"), and Phoenix Goodyear Airport ("GYR");
2. Identify trends and future demand for air cargo services;
3. Determine if the Phoenix area airports have the facilities and infrastructure to support future air cargo services demand; and
4. Assess the feasibility of additional air cargo development at the Phoenix area airports.

This report describes the methodologies, findings, and recommendations of the task work which has been accomplished during the course of the Study. The report is organized in a way that reflects the order of the task work and as described here:

Chapter 1: Introduction and Study Background

Provides background on the Study and an overview of the region's air cargo market

Chapter 2: Air Cargo Industry Overview and Trends

Provides an analysis of air cargo industry operations and current air cargo trends

Chapter 3: Analysis of Regional Air Cargo Market

Provides an analysis of the regional air cargo market conditions and an assessment of air cargo opportunities for the Phoenix area airports

Chapter 4: Air Cargo Demand Forecasts for Phoenix Area Airports

Provides forecasts of air cargo demand at selected airports relevant to the Study

Chapter 5: Synopsis of Existing Facilities

Provides a review of existing air cargo infrastructure and facilities at airports relevant to the Study

Chapter 6: Development Needs

Provides an analysis of existing and planned infrastructure to accommodate potential opportunities and forecasted demand

Chapter 7: Financial Feasibility Analysis and Cost-Benefit Analysis

Provides financial analysis of potential cargo-related development projects

Chapter 8: Conclusions and Recommendations

Provides recommendations for potential cargo-related development at Phoenix area airports and presents conclusions of the project

At the outset of this report, it is necessary to provide some background information on the region's air cargo industry as well as insights into industry trends. Further, at this stage of the report, the Study Region is defined in terms of the relevant airports and the methodologies employed for the major tasks are described. Many of the topics introduced in this chapter are expanded upon further in subsequent chapters.

1.1 Regional Air Cargo Industry Overview and Industry Trends

For purposes of this report, the region's air cargo industry includes the Phoenix metropolitan area and the State of Arizona – referred to as the Phoenix/Arizona region. Below, the region's main drivers of air cargo activity (manufacturers, shippers, and consignees[1]) are identified and highlights of the region's air cargo market are described.

1.1.1 Manufacturers and Shippers/Consignees

The Phoenix/Arizona region's air cargo industry is primarily a function of the activities conducted by various businesses and organizations that comprise the region's air cargo community. These constituencies include manufacturers, shippers/consignees, freight forwarders, integrated express carriers, passenger and cargo air carriers, airports, trucking companies, customs brokers and other service providers.

The Phoenix area and the State of Arizona are home to an array of manufacturers of air-eligible goods, as well as shippers and consignees who demand air cargo services for outbound and inbound shipments. Notable companies located in the region that produce air-eligible goods include manufacturers of semiconductors, aerospace parts and vehicles, and electronics. The region is also home to medical device manufacturers and Department of Defense contractors. The goods produced by these businesses include commodities that are high in value, low in weight and time and temperature sensitive – ideal attributes of air-eligible goods. Bordering Arizona, and just a few hours' drive south of the Phoenix area, are the Northern Mexico maquiladoras that produce a variety of consumer goods including electronics, appliances, and automobiles. These types of goods often contain components that are shipped by air for at least a portion of their journey to Mexico and many of these components are sourced from distant countries in Asia, Europe, and Latin America.

[1] Consignees refer to the intended recipients of air cargo shipments.

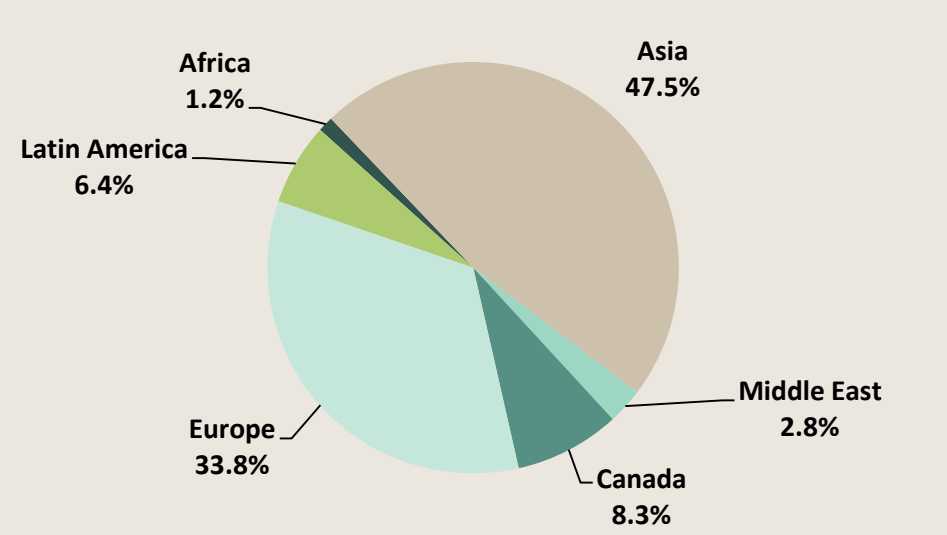
Further, the Southern Arizona and Northern Mexico regions are known for producing high-quality fruits and vegetables – some of which require transport by air to reach markets where they are in demand. Other producers of air-eligible, temperature sensitive goods in the market relevant to the Phoenix area airports include pharmaceutical companies and biomedical research labs. A notable group of shippers that are relatively new to the market are online retailers that have established distribution centers in the Phoenix area. While these retailers do not manufacture goods in the region, their presence is growing along with their needs to ship items by air and other modes from the Phoenix area.

1.1.2 Air Cargo Markets

Air cargo related to the Phoenix/Arizona region moves to/from a variety of domestic U.S. and international locations. Domestic cargo includes express documents and small packages, mail, expedited shipments of larger items, as well as some perishable and temperature sensitive products. Domestic air cargo for the region is transported by U.S. passenger airlines and by the U.S. integrated express carriers (e.g. FedEx and UPS). International air cargo for the region is transported by U.S. and foreign flag carriers and often travels long distances via truck to airport gateways where a variety of direct international air services are available. International air cargo (air imports and exports) for the United States is reported by the U.S. Census Bureau's, Foreign Trade Division by individual states for country markets around the world.

A summary of Arizona's 2012 air trade (imports and exports combined) by world region is shown in **Exhibit 1.1** below. As expected, Arizona's international air trade is dominated by Asia and Europe, collectively representing over 80 percent of the state's total air trade, by weight. Arizona's top country markets for air imports and exports include China, Japan, Germany, France, the United Kingdom, and Canada.

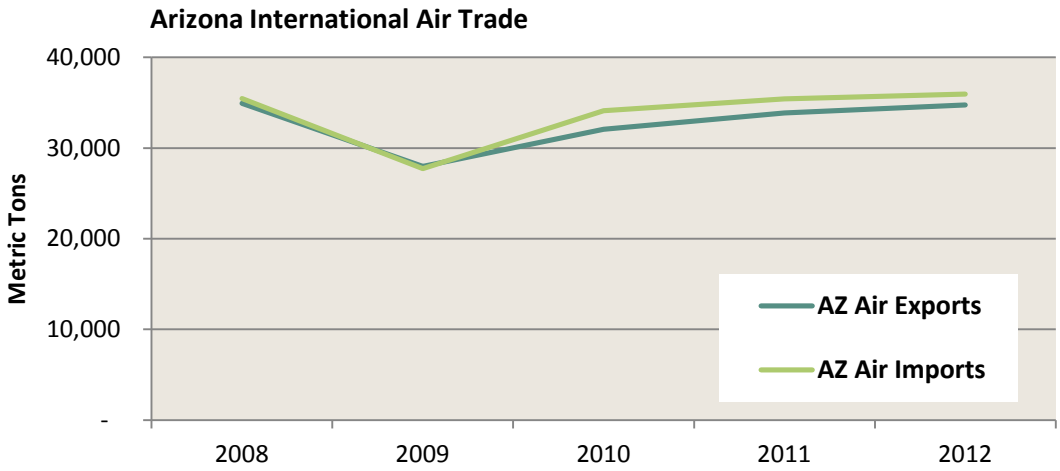
Exhibit 1.1: Shares of Arizona Air Trade Weight by World Region (2012)



Source: U.S Census Bureau, Foreign Trade Statistics via WISERTrade.

Like all states, Arizona's international air trade experienced a downturn during the recent recession. Between 2008 and 2009, the state's air trade declined by 21% (see **Exhibit 1.2**). In 2010, air trade volumes rebounded with a 19% increase over 2009 and, since then, Arizona's air trade has experienced positive, but slow, growth. One of the notable characteristics of Arizona's international air trade is the relative balance between imports and exports. In 2012, the state's air imports exceeded air exports by just 3%, in terms of weight. Only one state had a more balanced air trade profile and thirty-seven states had imbalances between air imports and exports of 20% or more in 2012.

Exhibit 1.2: Arizona International Air Trade by Direction (2008-2012)



Source: U.S Census Bureau, Foreign Trade Statistics via WISERTrade.

Arizona's top air exports and imports are shown below in **Exhibits 1.3 and 1.4**. These commodities are consistent with the types of manufacturers and shippers that have been identified in the Phoenix/Arizona region. As expected, many of the commodities also fall in the category of high-value, low-weight goods which are often shipped by air. These goods include electronics, computer equipment, medical equipment, aircraft parts, and perishables.

Exhibit 1.3: Top 10 Arizona Air Export Commodities (2012)

Rank	Description	Metric Tons	Share of Total
1	Electric Machinery Etc.; Sound Equip; Tv Equip; Pts	7,642	22%
2	Industrial Machinery, Including Computers	7,623	22%
3	Aircraft, Spacecraft, And Parts Thereof	3,055	9%
4	Plastics And Articles Thereof	2,227	6%
5	Optic, Photo Etc, Medic Or Surgical Instruments Etc	1,981	6%
6	Articles Of Iron Or Steel	1,268	4%
7	Copper And Articles Thereof	942	3%
8	Aluminum And Articles Thereof	776	2%
9	Miscellaneous Articles Of Base Metal	602	2%
10	Miscellaneous Edible Preparations	480	1%
Other	All Other Commodities	8,144	23%
	TOTAL ALL COMMODITIES	34,740	100%

Source: U.S Census Bureau, Foreign Trade Statistics via WISERTrade.

Exhibit 1.4: Top 10 Arizona Air Import Commodities (2012)

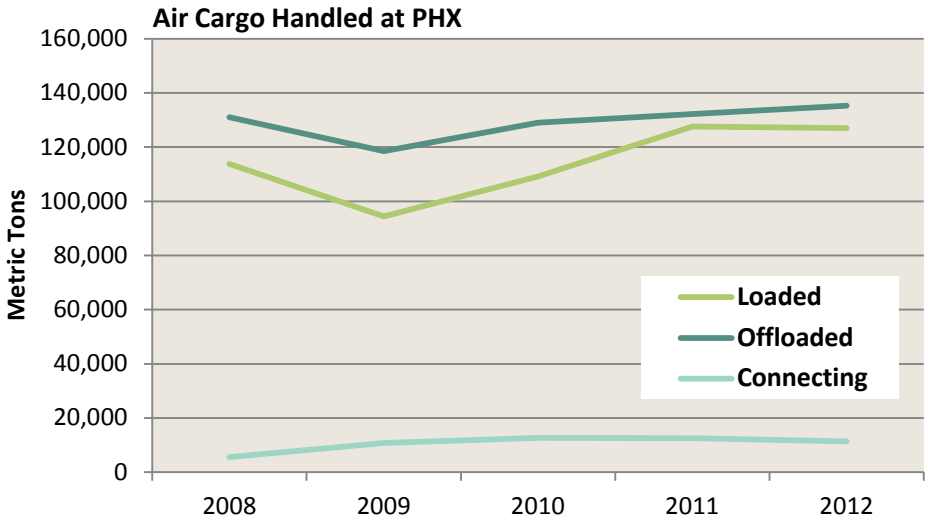
Rank	Description	Metric Tons	Share of Total
1	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	10,988	31%
2	Industrial Machinery, Including Computers	7,142	20%
3	Special Classification Provisions, Nesoi	3,505	10%
4	Optic, Photo Etc, Medic Or Surgical Instrments Etc	1,974	5%
5	Vehicles, Except Railway Or Tramway, And Parts	1,293	4%
6	Edible Vegetables & Certain Roots & Tubers	915	3%
7	Ceramic Products	840	2%
8	Oil Seeds Etc.; Misc Grain, Seed, Fruit, Plant Etc	816	2%
9	Arms And Ammunition; Parts And Accessories	735	2%
10	Plastics And Articles Thereof	671	2%
Other	All Other Commodities	7,052	20%
	TOTAL ALL COMMODITIES	35,931	100%

Source: U.S Census Bureau, Foreign Trade Statistics via WISERTrade.

While these commodities are imported and exported by Arizona companies, the vast majority of the goods are not transiting via Phoenix area airports. PHX currently has limited international widebody services and is only a 6 hour truck drive from the West Coast's major international airport, Los Angeles International Airport ("LAX"). The LAX gateway has been a consolidation and distribution point for international air cargo for decades and it handles air cargo from all across the United States and parts of Mexico. Due to its abundant international freighter and widebody passenger services and its strong freight forwarder base, LAX is an effective and powerful air cargo hub. The strong Los Angeles origin-destination passenger market drives robust widebody passenger services and also produces synergies with all-cargo freighter services at LAX. Meanwhile, by consolidating cargo at large international gateways like LAX, freight forwarders not only reduce risk, but gain leverage. At airports with numerous international flights, freight forwarders can be assured that adequate capacity will be available for their shipments, even if certain flights are cancelled or delayed. By consolidating cargo at large gateways, forwarders gain leverage, in the form of volume discounts from air carriers, and can benefit from the competitive environment whereby multiple air carriers may bid on the finite amount of freight ready for shipment on any given day.

While the airports in the Phoenix region do not currently carry high volumes of cargo relative to large gateway airports like LAX and New York's JFK International Airport, Phoenix Sky Harbor ranked in the Top 25 for cargo amongst North American airports in both 2011 and 2012. According to Airports Council International – North America ("ACI-NA"), PHX was the 21st largest cargo airport in North America in 2012, with approximately 274,000 metric tons. Like the State of Arizona's air trade, air cargo at PHX was negatively impacted by the recent recession, as evidenced by the net losses between 2008 and 2009 (see **Exhibit 1.5**). Similarly, PHX cargo volumes recovered in 2010, much like the Arizona international air cargo volumes recovered. Further, in 2011 and 2012, PHX air cargo showed signs of more directional balance than was experienced in the period 2008-2010. The 274,000 metric tons of cargo handled by PHX in 2012 is approximately 10% lower than the peak year of 2004 when PHX handled over 302,000 metric tons.

Exhibit 1.5: PHX Air Cargo (2008-2012)



Source: Phoenix Sky Harbor International Airport.

In terms of carrier shares, PHX air cargo is dominated by the integrated express carriers – FedEx and UPS. In 2012, FedEx and UPS directly accounted for over 65% of PHX's cargo (see **Exhibit 1.6**). Meanwhile, the two largest passenger carriers at PHX, US Airways and Southwest Airlines, account for a combined 22% of the airport's total cargo. Although US Airways and Southwest both fly narrowbody aircraft at PHX, together they operate hundreds of flights each day which enables them to capture a significant share of the total air cargo shipped at the airport.

Exhibit 1.6: Air Carrier Shares of PHX Air Cargo (2012)

Air Carrier	2012 Share of PHX Total Air Cargo
FedEx	41.1%
UPS	24.0%
US Airways	16.4%
Southwest Airlines	5.6%
DHL	5.5%
Ameriflight	1.7%
United / Continental	1.5%
British Airways	1.2%
Delta Air Lines	1.2%
All Other Carriers	1.8%
Total	**100.0%**

Source: Phoenix Sky Harbor International Airport.

It should be noted that the air cargo volume handled at Phoenix-Mesa Gateway Airport is currently negligible due to the absence of integrated express carriers and the presence of low cost passenger airlines that do not carry cargo. While IWA has experienced rapid passenger growth in recent years with services by Allegiant Air, Allegiant does not carry cargo as a matter of corporate policy. Phoenix-Mesa Gateway has plans to grow its cargo business and has existing facilities and infrastructure to handle cargo operations. At this time, air cargo that does transit IWA is largely related to periodic charter flights serving local companies.

As non-commercial airports, Phoenix Deer Valley Airport and Phoenix Goodyear Airport do not have services by the types of air carriers that move air cargo. The aviation activities at these airports are dominated by flight training, general aviation, and aircraft maintenance.

1.2 Air Cargo Industry Trends

Currently, there are several trends impacting the air cargo industry, some of which appear to be long-term trends. These trends include:

Modal Shifts

In the recent challenging economic times, manufacturers and shippers have looked to cut costs overall. The implementation of just-in-time production strategies, aimed at reducing inventories, had the adverse consequence of increasing the use of costly, expedited shipping methods, including air cargo. As a result, many companies analyzed their supply chains and transportation networks to optimize factors related to cost and time. Supply chains were altered to take advantage of less costly deferred shipping methods, including the use of trucks, railroads, and ocean vessels. Meanwhile, service levels in these transportation modes have improved and, while slower than air cargo, they now offer many of the same services traditionally offered by air. The result of more competitive and less costly shipping methods has led to an overall modal shift away from air cargo and some believe that many shipments that have migrated away from air may never return.

Changes in the geographic location of manufacturing facilities have also led to modal shifts away from air cargo. A growing trend toward nearshoring has brought manufacturing facilities closer to the markets where their products are targeted for consumption. This, in turn, makes surface modes such as trucking, a viable option to air cargo.

Air Cargo Security

In response to the September 11, 2001 terrorist attacks, air cargo security processes were revised to require 100% screening of all air cargo loaded on passenger aircraft in the U.S., as well as air cargo loaded in foreign countries on passenger aircraft headed to the U.S. These security requirements have led to investments by the cargo community in screening technology and staff training. Further, the air cargo security rules have led to structural changes in the industry whereby many air cargo companies limit their security screening capabilities to certain airports. This limits the investments individual companies must make for security, but it also

effectively limits the number of airports that they may ship from. As a result, even more consolidation of cargo is occurring at large gateway airports.

Domestic Air Cargo Services

Due to macro-economic challenges, intense competition and consolidation, the U.S. domestic market has lost many of its dedicated air cargo service providers over the last 10-15 years. During this time, carriers including Emery Worldwide, Airborne Express, Kitty Hawk Cargo, Northwest Airlines Cargo, and BAX Global have either exited the domestic market or have been absorbed by other companies' operations. The decline in domestic all-cargo air service providers is primarily a function of changing customer needs, and more competitive surface modes.

International Air Cargo Services

International air cargo carriers have also experienced numerous challenges in recent years as global economic conditions have led to slow or declining growth in air cargo shipments. All-cargo carriers including Northwest Airlines Cargo and Jade Cargo International have ceased operations in the past 5 years. Meanwhile, other airlines such as Lufthansa Cargo and Air France–KLM have reduced their all-cargo fleets to match declining demand.

Even as worldwide air cargo demand has slowed, certain carriers have leveraged their own growth to increase their share of the worldwide cargo market. The Middle East carriers, in particular, have aggressively added cargo-friendly, widebody passenger aircraft, as well as freighter aircraft to their fleets. Carriers like Emirates and Etihad have already successfully attracted air cargo flows between Asia and Europe via their respective hubs in Dubai and Abu Dhabi. Now, the Middle East carriers are making inroads into other markets, including the U.S., with excellent service levels and well-developed global networks.

Expanded Use of Belly Space for Air Cargo

Airlines are increasingly seeking to produce revenue with the belly space of their passenger aircraft. While widebody aircraft are often preferred by freight forwarders due to their ability to handle containerized and palletized cargo, narrowbody belly space is also being used heavily for cargo. Many shipments do not require the main deck space of a freighter aircraft and belly space is often priced much lower than freighter capacity. The trend toward increased use of belly space has also been partially driven by the global economic slowdown – which has encouraged the use of less costly belly space and which has caused some freighter capacity to be removed from the market.

Third-party Development of Air Cargo Facilities
As airports seek to maximize all potential sources of revenue, the profile of air cargo has risen. An increasingly common issue for airports is the age and condition of their existing air cargo facilities. Many airports are not able to readily invest in the re-development of air cargo facilities and have turned to third-party developers for assistance. Third-party developers assess the risk at individual airports to determine whether or not potential investments are feasible.

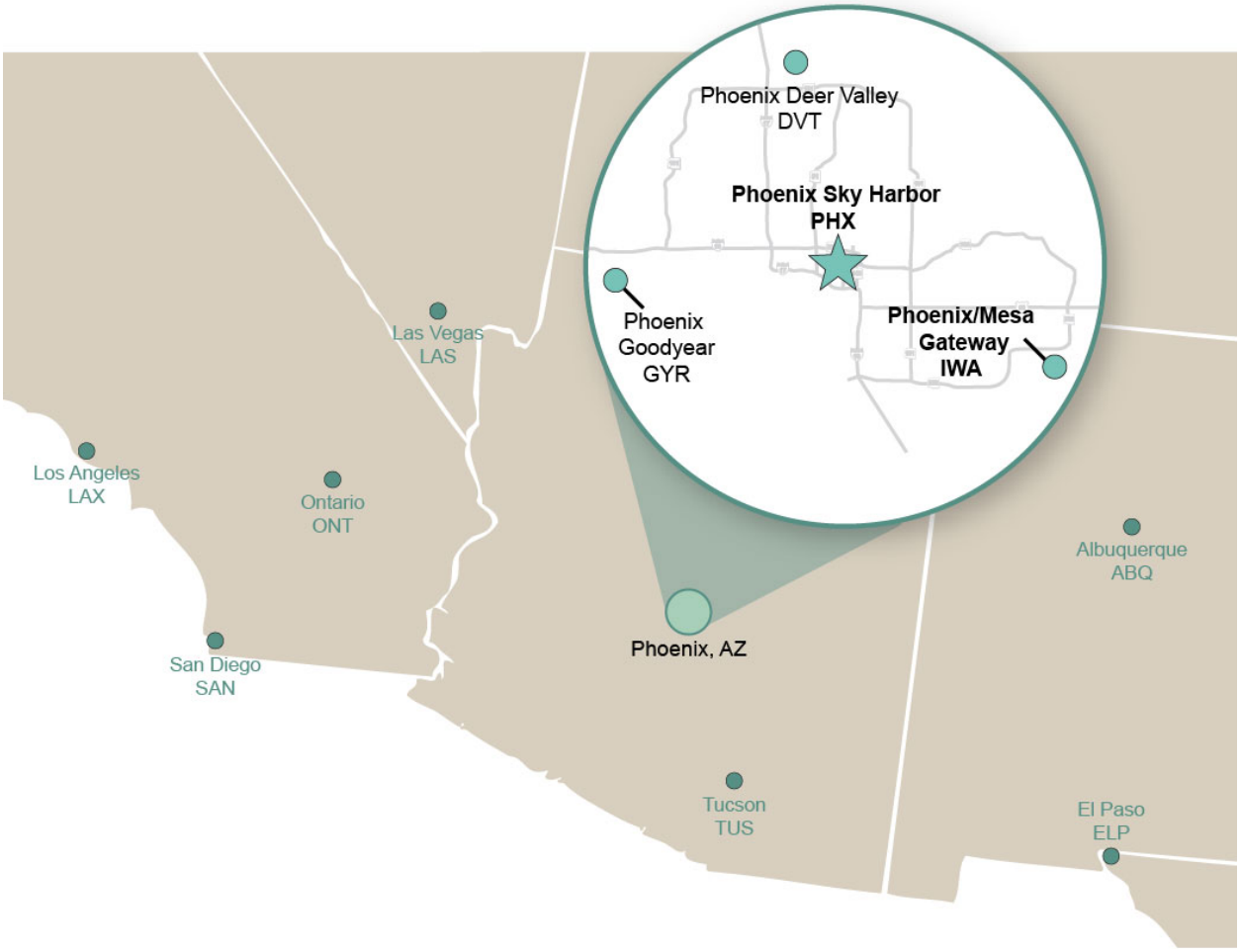
These and other trends are discussed more fully in Chapter 2.

1.3 Major Airports and Cities in the Study Region

Due to the heavy use of trucking in moving air cargo (often over long distances) to and from airports, it is appropriate to consider a wide geographic area for the Phoenix Regional Air Cargo Planning Study. When analyzing air cargo markets, it is common practice to consider regional air cargo flows within a one-day truck drive of an airport – for purposes of this Study approximated as a 500-mile distance radius around Phoenix Sky Harbor and Phoenix-Mesa Gateway. Of course, the relevant region for airport air cargo markets can vary widely depending on the location of airports and air cargo services available at each airport. It is not uncommon for some major U.S. airport gateways to attract and disperse air cargo via trucks from thousands of miles away. For this Study, however, a 500-mile distance radius from PHX and IWA defines a reasonable core region in which to focus the task work.

With its location in the Southwestern U.S., the Phoenix metropolitan area enjoys proximity to markets in multiple states including Arizona, New Mexico, Texas, Utah, Nevada, and California. Of course, Arizona's shared border with Mexico makes several large markets in Northern Mexico easily accessible as well. Within this region are several commercial airports and major cities. These airports include: Phoenix Sky Harbor International Airport, Phoenix-Mesa Gateway Airport, Phoenix Deer Valley Airport, Phoenix Goodyear Airport, Tucson International Airport, Albuquerque International Sunport, El Paso International Airport, Las Vegas McCarran International Airport, Los Angeles International Airport, LA/Ontario International Airport, and San Diego International Airport. **Exhibit 1.7** below presents a graphic depiction of the 11 major commercial airports in the Study Region. Further, there are several smaller airports in the Los Angeles Basin that are considered as well, but to a lesser extent. These Los Angeles area airports include Long Beach Airport, John Wayne Airport, Burbank Bob Hope Airport, and Santa Barbara Airport.

Exhibit 1.7: Identification of Relevant U.S. Airports within 500-Mile Radius of PHX and IWA



The cities identified within the Study Region are considered primarily from the perspective of how they may drive demand for air cargo services and whether the Phoenix area airports could likely be seen as viable alternatives for that demand. Air cargo demand at the individual city (or metropolitan area) level is typically driven by: 1) manufacturing activities that produce outbound air-eligible shipments and/or require inbound air-eligible commodities in the conduct of those manufacturing processes and 2) general growth in economic activity and demographics (namely population and income). The large cities listed in **Exhibit 1.8** are located within the 500-mile Study Region and include cities in both the U.S. and Mexico.

Exhibit 1.8: Identification of Large Cities within 500-Mile Radius of PHX and IWA

Metro Area Type	Metro Area	2012 Population (000)	2012 Income Per Capita
CSA	Las Vegas-Paradise-Pahrump, NV	2,052	36,863
CSA	Los Angeles-Long Beach-Riverside, CA	18,273	42,576
MSA	Albuquerque, NM	943	35,759
MSA	El Paso, TX	834	30,180
MSA	Phoenix-Mesa-Glendale, AZ	4,358	38,174
MSA	Riverside-San Bernardino-Ontario, CA	4,401	30,561
MSA	San Diego-Carlsbad-San Marcos, CA	3,180	48,540
MSA	Tucson, AZ	1,005	36,719
City	Ciudad Juarez, MX	1,512	N/A
City	Hermosillo, MX	596	N/A
City	Guaymas, MX	103	N/A
City	Nogales, MX	186	N/A

Source: Woods & Poole Economics, 2013 & GeoNames Geographical Database.

1.4 Overview of Methodology and Tasks for the Study

To meet the Study objectives, the task work followed an orderly and sequential approach. In very basic terms, the tasks progressed in the following manner:

1. Analyze the air cargo market and identify regional air cargo opportunities;
2. Based on findings from the market analysis, develop forecasts of air cargo demand at the Phoenix area airports;
3. Inventory the Phoenix area airports in terms of air cargo facilities and infrastructure;
4. Determine future needs regarding air cargo facilities and infrastructure at the Phoenix area airports considering the forecasted air cargo volumes;
5. Assess the financial feasibility of the identified cargo-related development options (i.e. facilities and infrastructure needs); and
6. Recommend the development options that should be considered by the airports.

More detailed descriptions of the task methodologies, priorities, and objectives are provided below.

1.4.1 Analysis of Regional Air Cargo Market

A profile of regional market conditions was developed for the major cargo airports in the Study Region, to include air cargo shipments that originate in, are destined for, or transit through the Phoenix area. Understanding how air cargo currently flows in the Study Region enables identification of the possible opportunities as well as the challenges for the Phoenix area airports – particularly Phoenix Sky Harbor and Phoenix-Mesa Gateway - in capturing shares of this cargo. Other selected airports in the Study Region are evaluated, as appropriate, in this task.

Both primary and secondary research was performed to collect the necessary information and include activities such as reviewing historical air cargo data, conducting surveys and interviews of various stakeholder groups, analyzing the air cargo that passes through the Phoenix area en-route to/from other airports – particularly Southern California airports – and identifying the catchment area for PHX and IWA.

The primary research entailed interviews and surveys of stakeholders including PHX and IWA airport users, local shippers and freight forwarders. The objective of the primary research activities was to collect highly detailed, granular information to better understand the air cargo market beyond information that is available in the public realm. Interviews and surveys also provide the opportunity to query those in the air cargo community about forward-looking trends and expectations of future growth that cannot be readily obtained in any other fashion. Information regarding current shipping patterns, airports utilized, major inbound and outbound markets, commodity types and annual air cargo shipment levels are sought through the primary research.

Stakeholders targeted for primary research included shippers and manufacturers from a variety of industries, freight forwarders, air carriers, airport service providers, governmental departments, Chambers of Commerce and economic development groups. Given the potential importance of the Northern Mexico market for air cargo flows relevant to PHX and IWA, primary and secondary research was also conducted related to this geographic region.

Finally, a detailed analysis of cargo terminal costs for the Phoenix area airports and selected airports in the larger Study Region was conducted with information from commercial real estate companies and other firms regarding on-airport and off-airport warehouse space. The goal of this effort was to compare cargo facilities costs across airports to understand the cost competitiveness of the Phoenix area airports from the perspective of potential air cargo tenants.

1.4.2 Identification of Trends and Future Demands

To provide context for the findings of the Study, Chapter 2 of the report describes how the air cargo industry operates both domestically and internationally. This task work puts the potential opportunities available to PHX and IWA in perspective given operational aspects of the air cargo industry, national trends and industry forecasts. The demand forecasts for the relevant Study Region airports are used to determine if any gaps exist in air cargo facilities and infrastructure at the Phoenix area airports.

In describing how the air cargo industry operates and identifying industry trends, issues such as increasing security requirements, rising fuel costs, modal shifts, air carrier consolidation, and the changing regulatory environment are considered. Further, Chapter 2 explicitly provides an overall perspective on the industry as national trends are often related to the dynamics of overall global air trade.

Industry forecasts take these trends into consideration and quantify their impacts on demand. Air cargo forecasts produced by companies and organizations such as Boeing, Airbus and the Federal Aviation Administration (FAA) are examined and are used to calibrate the forecasts developed for this study. Ultimately, forecasts for the relevant Phoenix area airports are completed using macro-economic inputs as well as information gathered through the Study's market analysis phase.

1.4.3 Inventory of Existing Infrastructure and Identification of Needs to Support Development

The inventory and assessment of existing air cargo facilities and supporting infrastructure at Phoenix Sky Harbor, Phoenix-Mesa Gateway and other airports deemed to be relevant within the Study Region was completed to understand the ability to accommodate cargo volumes identified in this report. Existing documentation (e.g., master plans, airport layout plans, regional and statewide system plans, etc.) was examined to understand current and planned facilities. Additionally, site visits at PHX and IWA and telephone interviews with other airport managers in the region were conducted to facilitate the understanding of existing facilities.

Airport cargo facilities examined include:

- Location and number of on-airport air cargo facilities;
- Size in square feet of each facility;
- Cargo ramp space and access to cargo ramp space;
- Ownership details, current tenants, occupancy rates;
- General description and condition of facilities (if available);
- Expansion capabilities; and
- Existing plans to build new facilities.

Supporting infrastructure for cargo activities includes:

- Airport roadways;
- Regional roadways, highways, and interstate access; and
- Truck parking and staging capacity.

Forecasted data was analyzed to determine the ability of existing facilities to meet future demand. Based on existing capacity documented in the inventory process and future demand based on the forecast of cargo activity, the net difference suggests what deficiency, if any, exists with regard to the ability of existing infrastructure to meet the future demand. Where expected future cargo volumes cannot be accommodated efficiently, development options for appropriate facilities and infrastructure are presented.

1.4.4 Feasibility Assessment and Cost-Benefit Analysis

Financial Feasibility

As a part of the Study, a financial feasibility analysis was conducted in order to provide evidence for the financial / economic sustainability and relevance of potential development options. As is common in any investment analysis, the feasibility analysis is based on (incremental) cash flows.

Cash Flow Projection

As a first step, a cash flow projection was prepared for the 20-year planning period, which identifies and reflects all cash flows related to the cargo facility development at selected Phoenix area airports, including:

- Revenues and proceeds;
- Related operating cost; and
- Required capital expenditures

Data and necessary inputs for the cash flow projections were provided by the respective airports and professional airport planning firms. The capital expenditures for the potential development options are derived from industry averages, state averages, airport sources, cargo developers, and airfield engineering resources.

In the second step, based on the cash flows identified, the financial return (Net Present Value and Internal Rate of Return) and the payback period were calculated for the planning period. Funding requirements (in addition to operational cash flow) were then identified both in terms of timing and disbursement amounts.

Cost-Benefit Analysis

In addition to the financial feasibility analysis, a cost-benefit analysis was prepared in which the attractiveness of investment alternatives is presented from a broader economic point of view rather than only a financial point of view. For the specific purpose of this task, relevant

incremental cost-benefit effects of the investment opportunities are assessed against a "do-nothing" (baseline) scenario.

As appropriate in the cost-benefit analysis, direct and indirect costs and benefits were considered. Direct costs and benefits are those that are believed to have a direct impact on the airport's financials and Master Plan economic feasibility. Indirect costs and benefits together, are believed to have economic (income) consequences for activities at the airports for airport users (such as airlines) or other stakeholders (such as passengers, visitors, cargo shippers, and neighboring communities).

Preliminary Environmental Review

The feasibility of cargo facility development to meet forecasted demand at the Phoenix area airports was evaluated in terms of anticipated environmental concerns. Order of magnitude costs were estimated for proposed capital development to accommodate future cargo demand. Environmental concerns made known by the airport were documented and considered when evaluating development options.

Phoenix Regional
Air Cargo Planning Study

CHAPTER 2

Chapter 2: Air Cargo Industry Overview and Trends

2.1 Introduction

In order to provide context for the subject matter covered in this Study, it is important to provide a summary of the air cargo industry and its current trends. The air cargo industry operates in a dynamic, often volatile, environment. This chapter provides information on the structure of the industry and the factors that drive demand for air cargo services.

2.2 Overview of the Air Cargo Industry

When examining trends that are expected to impact air cargo growth at the Phoenix area airports, it is useful to review the key elements of air cargo transportation. While there are many similarities between air cargo and passenger transportation, there are some unique elements to cargo that differentiate it from passenger services.

2.2.1 Role of Air Freight in Commodity Movements

Air transportation is, by quite a margin, the most expensive option for moving commodities. However, despite the high relative cost, select commodities continue to move by air. Shippers choosing air transportation generally do so for one or more of the following reasons:

- The commodity itself is **perishable** and subject to physical deterioration, and the price the shipper gets for the product dramatically declines in a short period of time. Examples include fresh fish, cut flowers, and vegetables. Speed of delivery is paramount for the shipper to receive any revenue from the products, and this outweighs the additional cost.
- The commodity itself is not physically perishable and does not decay, but has a **short shelf life** before its values starts declining due to obsolescence. This includes goods such as fashion items, which have a high value when the items are in demand during a particular season, but are thereafter placed in the discount bin. Electronic products are another example, as the market for a new, in-demand device is much greater when the product first comes out, so the quicker it is on the shelves the better.
- The well-being of the commodity is tied to the **length of time spent on the journey**. For example, the international shipment of live horses or cattle by air produces less stress on the animals than transportation by alternative modes.
- The commodity has a **high value to weight ratio**. The additional cost of air transport can be absorbed due to the high price of the goods themselves. Medical equipment, pharmaceuticals, electronics and precious metals are all examples of this kind of product.
- The commodity may not have a high value itself, but the **opportunity cost of not having it immediately is significant**. This includes such items as parts for machinery that are needed to keep an assembly line or plant working, as each hour the line is down has major costs for a firm. Stock-outs are another example, for stores that have a chance of

losing customers permanently if a product they need at a specific time is not available on the shelves.

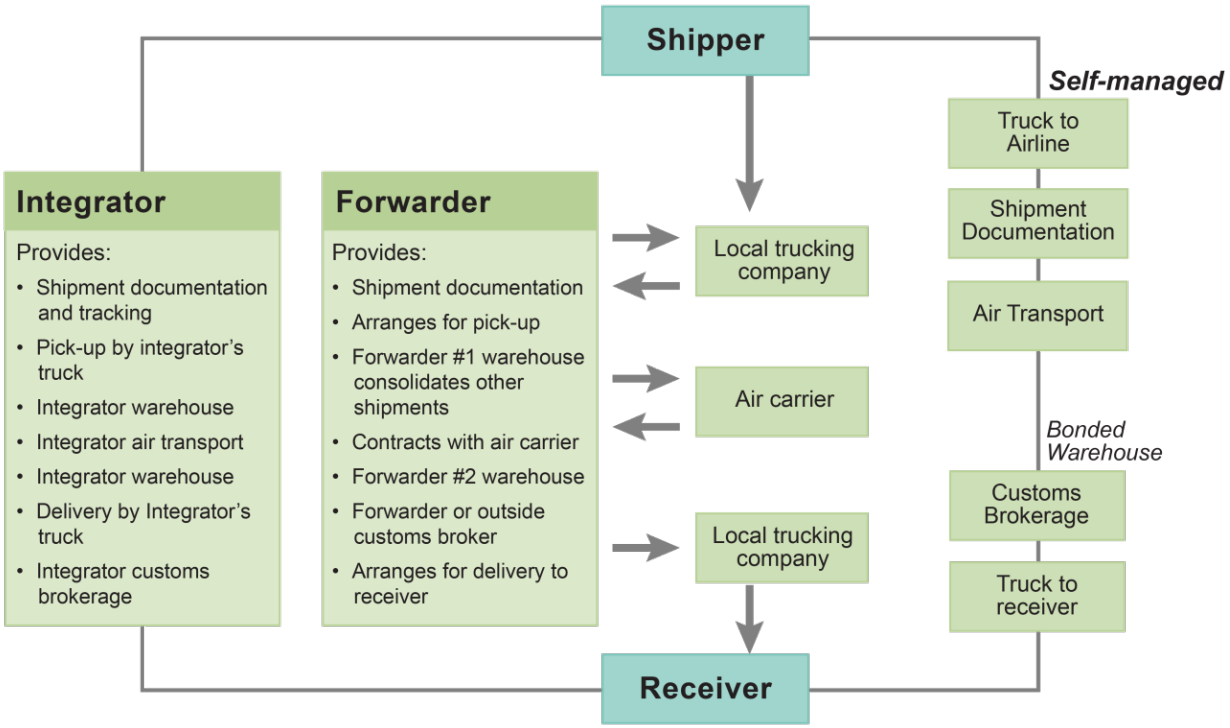
- The **potential for theft is great**. While no mode of transport is immune from employee pilferage or theft, aviation tends to be the most secure of transport modes.
- Demand is **less predictable**. If demand for a commodity is relatively stable, it is easy to plan ahead and rely on slower (and less expensive) modes of transport. Where demand for commodities fluctuates dramatically, it is often necessary to utilize air transport to deal with sudden or unexpected increases in demand.

To assess a region's potential for developing air cargo, it is helpful to understand the region's propensity to produce or consume goods with the attributes described above. Communities that are producing or consuming significant quantities of these types of goods tend to be more attractive to air cargo operators than communities that produce less perishable or lower value-added types of goods.

2.2.2 Air Cargo Industry Structure and the Roles of Industry Groups

There are three basic options for shippers that require air transport. The first is for an in-house transportation/logistics department to make all the arrangements themselves. The other options are to outsource this activity to a freight forwarder/third party logistics company or an integrated carrier (e.g. FedEx or UPS). **Exhibit 2.1** portrays the three options.

Exhibit 2.1: Air Cargo Industry Structure: Three Basic Options for Shippers



2.2.3 Air Cargo Service Providers

In choosing an air cargo service provider, shippers considering air transport have a variety of options. A concise description of air cargo service providers is presented below to illustrate how the air cargo industry conducts domestic and international air cargo activities. Current trends, as well as implications for the Phoenix area airports, are also included.

Integrated Carriers

An integrated carrier provides a combined suite of all the services that are required to transport goods from origin to destination. Unlike the freight forwarders/general freight carriers, the integrated carriers operate under a centralized business model. In addition to transporting shipments between airports, integrated carriers also own/control the ground assets that pick up the shipments from shippers and deliver them to consignees. For example, when a law firm ships a document to a client, the integrated carrier comes to the office, picks up the package, delivers it to the local sorting hub, transports the package to the airport, redirects the package to the appropriate aircraft, ships the package to the destination sorting hub, sorts it onto the appropriate truck, and then delivers the package to the ultimate recipient.

All elements of the service are under the direct control of the integrated carrier from start to finish. Because of this, they can offer a reliable, guaranteed, time-specific, door-to-door service that the customer can follow on a real-time basis. The complexity of the service is completely behind the scenes, wherein the shipper only sees the pick-up and has confidence that once it is in the integrator's system that it will be controlled appropriately and delivered as intended. This integrated, door-to-door service is especially critical for express shipments where time and reliability of services are critical. The implied premium service levels offered by the integrated carriers justify the premium rates charged for those services.

While initially focused on envelopes and small parcels, integrated carriers now offer a much wider range of cargo capabilities for large shipments. Today, through a combination of organic growth and strategic acquisitions, the integrators provide a full suite of services to customers of all types and at all price points - including general air freight shippers. The integrators now provide services like long-haul trucking and supply chain management. To create additional efficiencies, the integrated carriers have developed hub-and-spoke networks. Through these networks, many global markets are linked via any combination of air and surface transportation modes. Using their expanded networks, integrators can often handle shipments with minimal or no use of airplanes. Instead, they use transportation alternatives like trucks, rail cars, and even ocean vessels to move goods as efficiently and cost-effectively as possible.

There are only four major integrated carriers offering global service: FedEx, UPS, DHL, and TNT. The U.S. market is dominated by FedEx and UPS. In 2009, DHL pulled out of the domestic U.S. market, although it still provides international services to/from the U.S. The Dutch company, TNT, does not have a major presence in the North American express freight market, and instead focuses the bulk of its operations in Europe, the Middle East and Asia-Pacific markets, with smaller operations in the Americas.

The location of integrator hubs has a huge impact on air cargo volumes at an airport. For example, Memphis, Louisville, and Indianapolis are relatively small cities with much lower passenger volumes than Phoenix, but these cities' airports have extremely high cargo volumes by virtue of being hubs for the integrated carriers. Attracting an integrator hub would be a major coup for air cargo development; however, this is generally a difficult proposition. Hubs are rarely moved because of the significant investment that goes into the highly mechanized sorting facilities and the U.S. domestic integrator market is mature and well-developed, so the need for additional hubs is likely tied to international growth and non-U.S. locations. As can be expected, the need for new international hubs arises very rarely.

There is limited need to develop additional hubs to serve the mature domestic U.S. market. It is more efficient for the integrators to handle organic growth by more intensively utilizing existing hubs than to develop new hubs. Even international integrator traffic growth is moderating over time as global markets mature, so the pressures on the existing networks are not as great as in the past when integrators were taking significant incremental market share from the forwarders and non-integrated air cargo carriers.

Non-Integrated Air Cargo Carriers

Non-integrated air cargo carriers operate freighter aircraft – typically between international markets. Some carriers, like Polar Air Cargo and Cargolux do not provide passenger service and solely operate freighters. Other carriers, like Lufthansa, Singapore Airlines, Korean Air Lines and Emirates operate both freighter and passenger aircraft.

Non-integrated air cargo carriers largely provide airport-to-airport transportation services whereby they are only responsible for tendering goods for outbound shipment at the origin airport and deliver goods to the destination airport. The shipper or the shipper's representative arranges for delivery to the origin airport and pick-up from the destination airport.

Air carriers that operate fleets of both passenger and freighter aircraft frequently serve key airports in their networks with both types of aircraft. In doing so, they benefit from synergies at the common airports in the form of shared ground handling equipment, shared facilities, as well as shared sales, management and administrative staff in those markets. Those carriers that solely offer freighter service generally have more flexibility as to the airports they serve, and thus, often serve secondary points and cargo-specialty airports (e.g., Frankfurt Hahn, Paris Vatry), as well as the more common major airports.

In recent years, there has been an increasing incidence on non-integrated freighter carriers that have discontinued operations. As mentioned previously, in the past 10-15 years, several U.S.

all-cargo carriers have ceased operations in the U.S. In some cases, FedEx and UPS have filled the voids left by these cargo airlines, but generally, airports that were served by the now defunct carriers simply lost cargo services and capacity.

Other carriers have replaced older freighter aircraft from their fleet, such as the Boeing 747-200 and 747-400 freighters, with more efficient aircraft, such as the Boeing 747-8 and 777 freighters, during the recession. Furthermore, the new generation passenger aircraft (with the exception of the Airbus A380) are increasingly cargo-friendly with large belly capacities. Even well-established market leaders such as Cargolux have recently made public statements of concern about the future of dedicated freighters. Due to their unique characteristics and ability to serve all air cargo customers, dedicated freighters will continue to be in demand at some level, but it seems highly likely that industry consolidation and cargo capacity rationalization will continue in the near-term as well.

Passenger Airlines

All passenger aircraft have space below the main deck that is available to carry luggage and cargo. However, carriers that solely rely on this "belly space" for cargo movements have more limited ability to move cargo, as passenger baggage takes priority over freight. Moreover, the relatively restricted belly space imposes limitations on weight and volume of individual pieces, as well as the total cargo capacity. For example, although the belly space of widebody aircraft, such as the Boeing 747, can accommodate pallets, there are height constraints in the belly-hold that limits pallet size relative to freighters. In addition, for narrowbody passenger aircraft (such as the Boeing 737 and the 757), cargo is loaded loosely as these aircraft do not have the capability to handle unit load devices (ULDs), which are pallets/containers used to consolidate and load luggage, freight and mail.

It should be noted that the most recent generation of passenger aircraft have been designed to be very cargo-friendly. Aircraft such as the Boeing 777 can accommodate significant amounts of cargo in the belly. As these newer aircraft replace older, less cargo-friendly aircraft, belly space has become an increasingly attractive option for shippers and forwarders. Further, passenger airlines that also have freighter aircraft fleets have become more sophisticated in using the belly cargo space of their passenger aircraft to complement their freighter aircraft capacity. In this way, the airlines are able to provide expanded geographic coverage and a wider variety of services to their customers. With the large passenger volumes at PHX, the transition to these newer aircraft and more efficient use of belly cargo space bodes well for cargo activity.

The trend towards the use of smaller regional jets on domestic routes, however, creates disadvantages for air cargo. Aircraft, such as the Canadair and Embraer regional jets, have very limited cargo capabilities. For example, in the U.S. domestic market, several all-cargo airlines have ceased operations and passenger airlines have phased out many cargo-friendly widebody aircraft on domestic routes in favor of narrowbody aircraft. In this case, less domestic air cargo capacity has led to increased demand for surface options like trucks. Thus, airports predominantly served by regional jet aircraft offer shippers limited choice.

Trucking Firms

There are numerous trucking firms that provide air cargo services. In some cases, trucking services actually serve as "air cargo flights." The Official Airline Guide ("OAG"), an airline schedules database, lists airline flights (flight number, origin, destination, departure and arrival time, type of aircraft, and days of the week the service is offered) - including numerous services with flight numbers that are noted as RFS – or Road Feeder Services. This network of trucking services links airports across the U.S., and offers a less costly alternative to air, while providing a timely and reliable service at the same time. Thus, trucking plays both a competing role as a substitute for air transport and a complementary role as a feeder service.

Freight Forwarders

Freight forwarders are companies that specialize in organizing the shipments of goods by coordinating all of the relevant service providers and handling items such as Customs documentation. Forwarders typically do not own and operate trucks or aircraft, though some firms have moved away from this traditional model in recent years. Global forwarding firms have office/warehouse space in major centers around the world. Freight forwarders arrange for pick-up, provide shipment documentation, consolidate shipments in warehouses, contract with air freight carriers (including passenger and all-cargo airlines) that provide airport-to-airport services, handle Customs matters, separate individual shipments and arrange for final delivery.

Forwarders consolidate the shipments from a number of shippers, thereby increasing their negotiating influence with air carriers for rates/space over and above the influence that individual shippers would have. Because of this, forwarders are able to negotiate lower rates with air carriers. Freight forwarders control the routing of commodity flows and can direct their movements to the airports and air carriers of their choice. At the selected airports, the forwarders can consolidate freight volumes from multiple customers so as to obtain the most favorable pricing from the air carriers offering flights. Due to the structure of the agreements, forwarders are often incentivized to flow the bulk of their traffic through select gateway airports in order to reach trigger volumes which lead to lower rates from air carriers.

Forwarders aim to create a seamless set of services in order to compete with the integrated carriers. However, competing interests among forwarders and air carriers typically prevent them from working closely. In general, forwarders (as true middle-men) generate profits based on the difference between what they charge shippers and what they pay air carriers. As there are few barriers to entry, the freight forwarding industry tends to be very competitive, and forwarders operate on very thin margins. As a result, the well-financed integrated carriers have made significant inroads into the U.S. domestic air cargo market, and are increasing their share of the international air cargo market.

Self-managed Shippers

Shippers that completely self-manage their air transportation needs are increasingly rare. Most companies outsource much of the expertise required to complete a shipment – especially for international shipments where Customs documents and various fees can be extremely

confusing and time-consuming. Further, freight forwarders and other third-party service providers can offer significant savings due to their ability to buy transportation in large volumes.

From an airport perspective, shippers who self-manage their air transportation needs represent an interesting and potentially powerful marketing ally. Local shippers are likely to support the cargo aspirations of the local airport as this provides them with additional options and convenience. Carriers and freight forwarders are more likely to have competing loyalties when it comes to selecting airports to utilize. As a result, garnering the support of local shippers can be a key target for the cargo development initiatives of an airport. The committed support of local shippers (e.g., guarantee of volume) can be a powerful incentive to a carrier to begin/expand service.

Customs Brokers

Customs brokers act on behalf of shippers/importers to clear goods through customs and deliver them to their final destination. U.S. customs brokers are licensed, bonded and regulated by the U.S. Customs and Border Protection. In many cases, freight forwarders are also licensed as customs brokers. The role of the customs broker is extremely important as customs laws and procedures can be very complicated and can change frequently. The knowledge and expertise of professional customs brokers facilitates the movement of air cargo shipments by ensuring that the correct forms are filed and that all applicable duties are paid. In doing so, customs brokers reduce the risk involved with shipping air cargo to and from international locations.

2.2.4 Influence of Supporting Infrastructure

Key supporting "infrastructure" for the air cargo industry include:

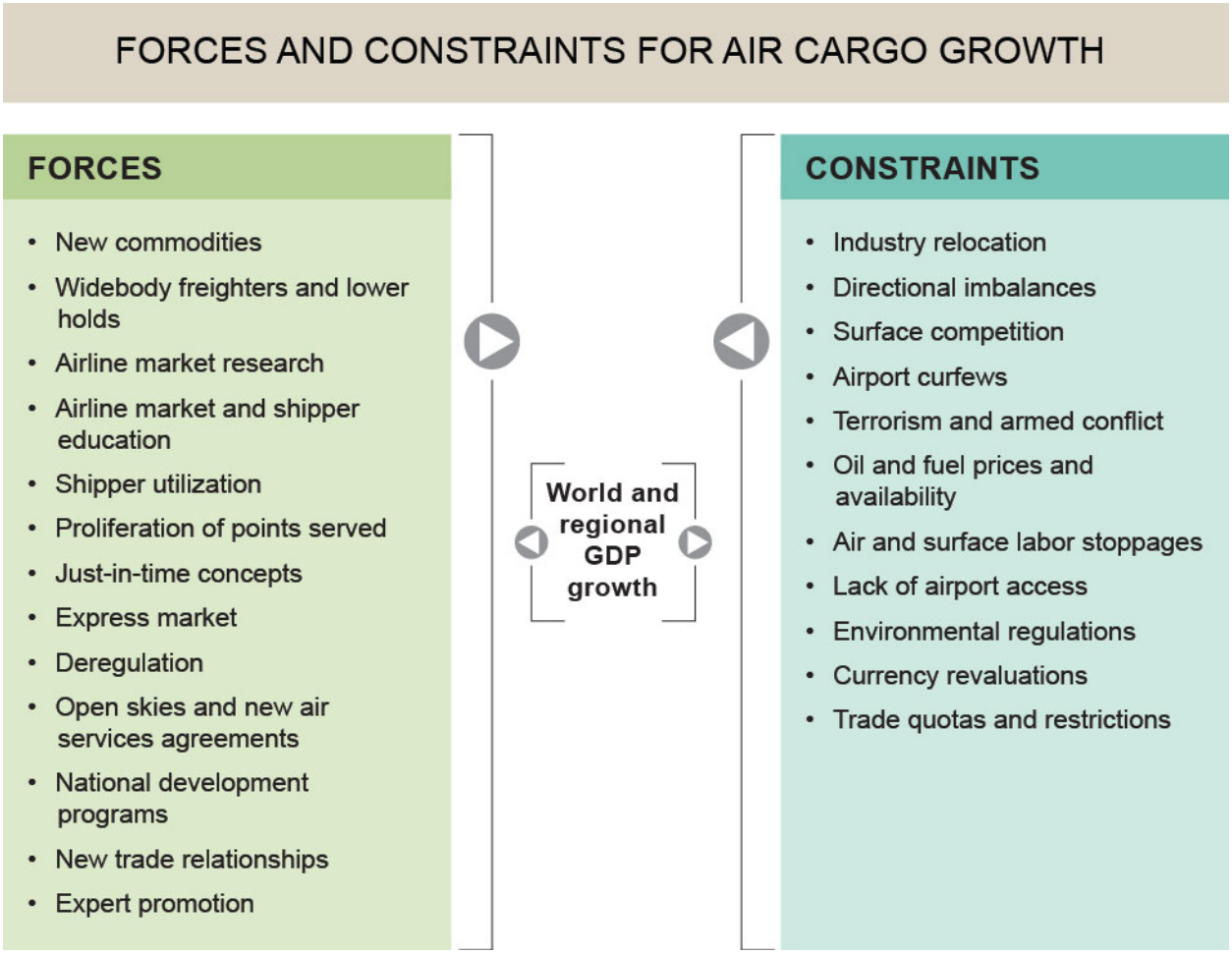
- **Road Access.** Good road access, including highway access, for the rapid and reliable surface transport of air cargo shipments is a critical part of the supply chain. Rail access has been cited as an advantage for air cargo as well, but to date there has been very little use of air/rail intermodal operations. Rail access is useful, however, for growing the overall distribution capability of a site, which generally has some spin-off benefits to air cargo.
- **24/7 Customs Operation.** Given that many cargo flights operate at night, the ability to clear customs at any time of day and any day of the week is an important factor.
- **On-site Customs Brokers.** It is helpful to have customs brokers on-site at airports to expedite any problems that may arise related to international shipments.
- **Common-use Cargo Facility.** Although air cargo can be handled on the cargo apron outside of the aircraft, freight forwarders and carriers prefer to use dedicated cargo facilities. Forwarders are unlikely to make the financial commitment necessary to build their own on-airport facilities, so the existence of a common-use facility can make an airport more attractive to the air cargo community.

- **Main-deck Loader.** If dedicated freighters are to effectively serve a market, a main-deck loader needs to be available. These specialized pieces of ground-handling equipment facilitate the safe and efficient loading and unloading of freighter aircraft.
- **Widebody Passenger Operations.** The presence of widebody passenger aircraft, which can accommodate large pallets and unit load devices, is a strong supporting element for the development of cargo services. This widebody capacity provides forwarders and shippers with greater flexibility and service options. Further, belly capacity tends to be attractive from a cost perspective as it is marginally priced due to the fact that the passenger services are the primary source of revenues for these operations.
- **Extensive Network.** A large number of destinations served by air carriers at an airport provide forwarders and shippers with more options for direct flights to the ultimate destinations of their shipments.

2.2.5 Global Air Cargo Market Drivers

Although economic activity is the primary driver of air cargo development, there are a number of other forces and constraints that influence air cargo growth as shown in **Exhibit 2.2**. Other factors that impact air cargo include new commodities, national development programs, industry relocation, and environmental regulations.

Exhibit 2.2: Factors (Forces and Constraints) Influencing Air Cargo

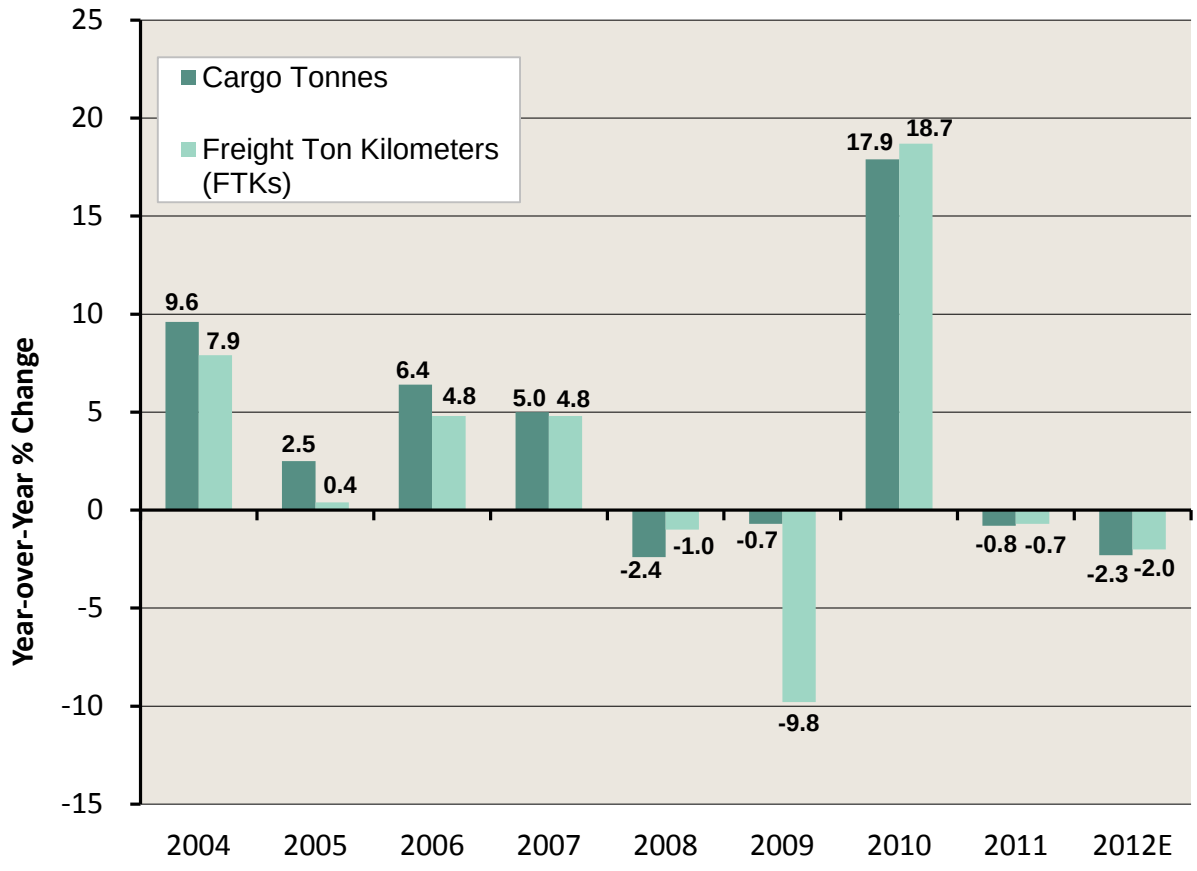


Source: Boeing, World Air Cargo Forecast, 2012-2013.

World Economic Context

The annual percentage change in world air cargo demand from 2004 to 2012 is summarized in **Exhibit 2.3**. The global economic downturn in 2008 and 2009 caused a great decline in worldwide air cargo traffic. Worldwide air cargo traffic dropped by 9.8% year-over-year in 2009. After a brief recovery in 2010, air cargo traffic continued to decline after that, with the European debt crisis and China's slowing economic growth affecting international air cargo. The demand for worldwide air cargo declined in both 2011 and 2012 year-over-year. In 2012, total global cargo tons moved by air transport dropped by 2.3% and worldwide freight ton kilometers decreased by 2.0% compared to 2011. Since 2012, the reported cargo figures have not been overly encouraging. Despite an increase in global freight ton kilometers (FTKs) in January 2013 by 5.0% year-over-year, total FTKs decreased by 6.2% in February 2013 compared to a year earlier.[2]

Exhibit 2.3: World Air Cargo Demand Year-Over-Year Percentage Change, 2004-2012

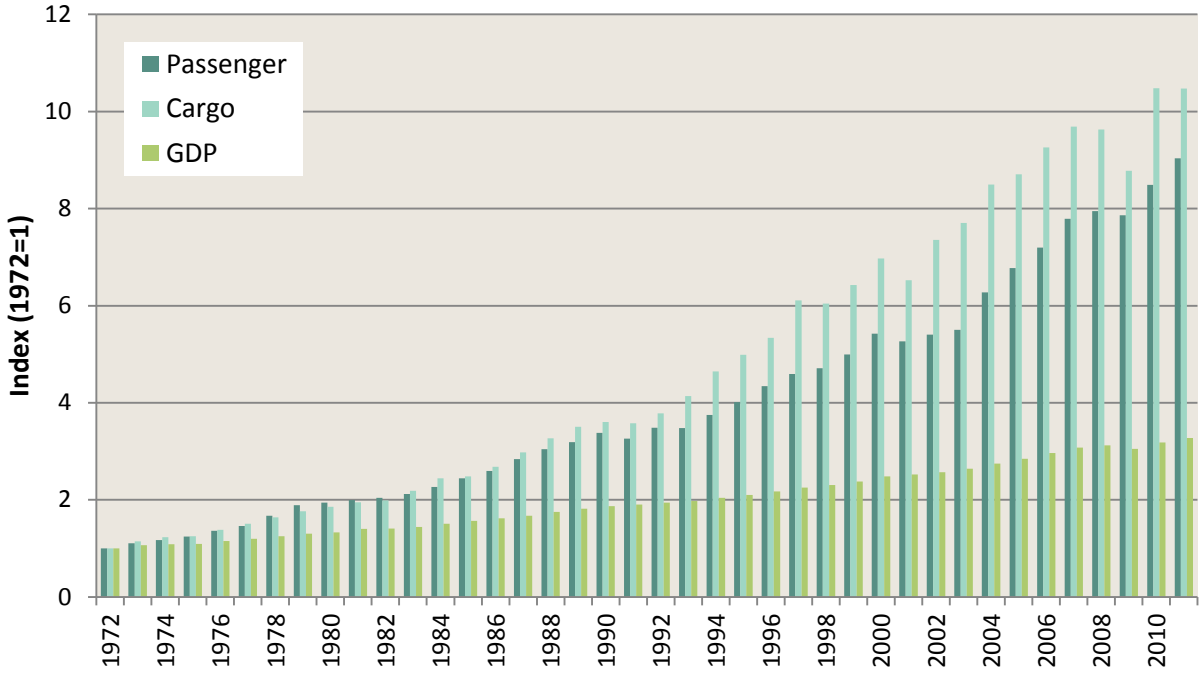


Source: International Air Transport Association (IATA).

[2] International Air Transport Association, Air Freight Market Analysis, January 2013 and February 2013.

The key drivers behind the demand in international air cargo volumes have been world GDP and world trade, facilitated by pro-trade initiatives such as those promoted by the General Agreement on Tariffs and Trade ("GATT") and subsequent World Trade Organization ("WTO") activities. Over the past decades, there has been strong growth in global air cargo transport compared to world GDP and global air passenger traffic. Historically, air cargo has grown at three times the rate of world GDP (compared to two times the rate for passengers), as illustrated in **Exhibit 2.4**.

Exhibit 2.4: World GDP vs. Air Passenger & Air Cargo Traffic, 1972-2011



Source: World Bank and International Civil Aviation Organization (ICAO).

There is evidence that as the air cargo market matures, it will not be able to maintain this rate of growth. For example, the emergence of the integrated carriers into the international market to compete with the traditional freight forwarder / general air cargo carrier model is now well-established, and the integrated carriers are having less of a market stimulation effect than they had in the past. There is also the risk that progress made in trade liberalization is slowing down (e.g. the lack of success of the Doha Round due to agricultural protectionism) and may even reverse (e.g. the threat of more general protectionism as a mechanism for countries to deal with the current economic uncertainties). These recent trends, along with other developments, are discussed further in Section 2.2.6.

2.2.6 Air Cargo Industry Forecasts

Short- and Long-term Air Cargo Industry Outlook

Despite the negative impact that global economic conditions have had on air cargo growth in recent years, industry forecasts predict that air cargo traffic will improve gradually in the coming years. This section provides an overview of the global and national trends from air cargo industry forecasts, with particular focus on national trends.

Global Trends

Almost all world regions were adversely affected by the recent economic downturn, as well as rising fuel prices and improving surface transport mode options. Although recovery of air cargo volumes began in the second half of 2009, and continued in 2010 with an increase of 18.5% revenue tonne-kilometers (RTKs) year-over year, world air cargo traffic dropped slightly by 0.9% year-over-year to 202.4 billion RTKs in 2011.[3] From 2001 to 2011, the average growth rate for world air cargo traffic was approximately 3.7% per year.

Looking at the longer term, Boeing continues to forecast world air cargo traffic will nearly triple to more than 558.3 billion revenue ton-kilometers (RTKs) by 2031. This represents an average of 5.2% growth per year, as shown in **Exhibit 2.5**.[3] Airbus forecasts an annual average growth rate for air cargo of 4.9% from 2011 to 2031.[4] The OAG air cargo forecast expects an annual average growth rate of 4.7% from 2010 to 2014 and an annual average growth rate of 5.3% from 2010 to 2019.[5] According to Boeing's World Air Cargo Forecast, international air freight will account for majority of the increase in global air cargo traffic, as opposed to domestic air freight and airmail. Other factors that will assist in the recovery of world air cargo traffic growth are long-term projected growth in the global economy and international trade, continuing industry globalization, increasing adoption of inventory-reduction strategies, and ongoing renewal of the world freighter fleet.

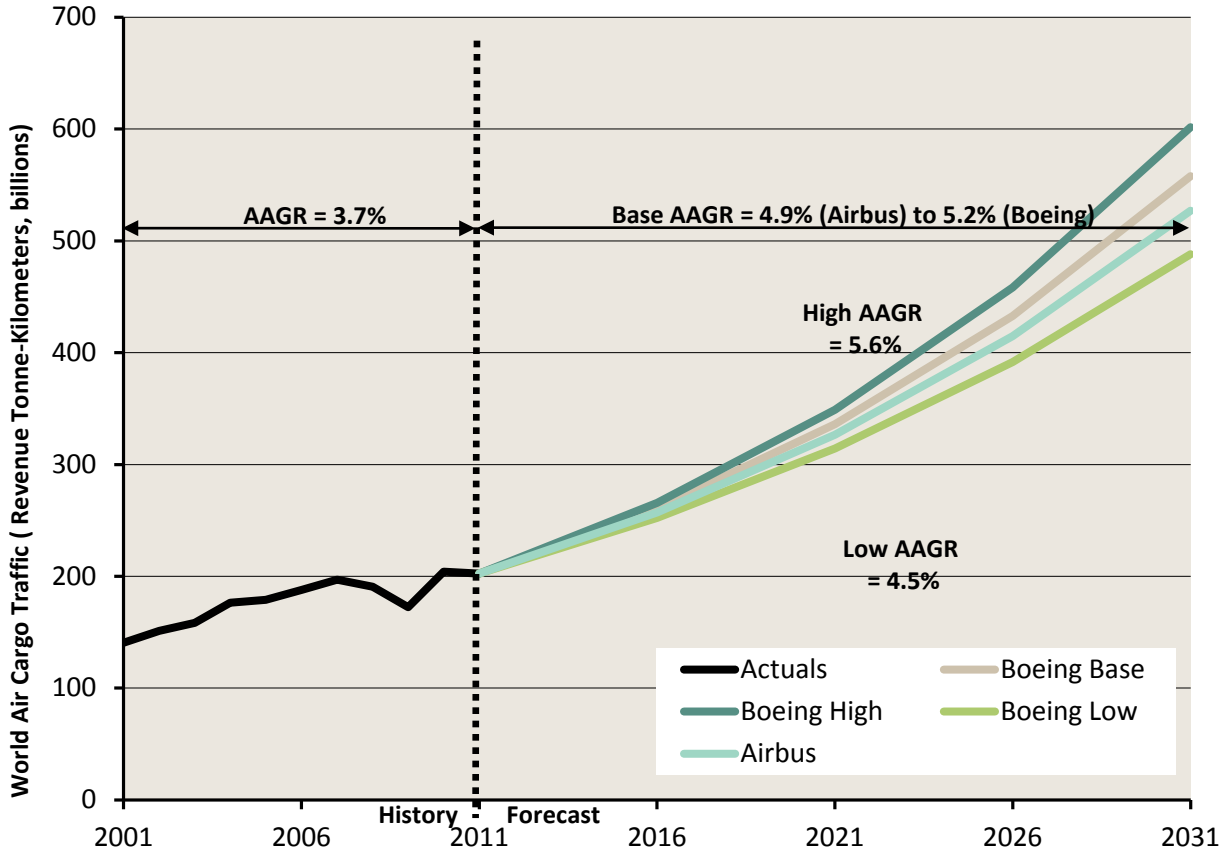
It should be noted that the Boeing forecast growth rate has declined each time the forecast has been updated since 2002, except for 2010. (The Boeing forecast is updated every two years.) Despite the small increase in the 20-year outlook in the 2010 forecast to an annual average growth rate of 5.9%, the rate of growth seems to be moderating, with a decrease of 0.7 percentage points in the 20-year Boeing forecast completed in 2012.

[3] Boeing, World Air Cargo Forecast, 2012-2013.

[4] Airbus Global Market Forecast 2012-2031.

[5] OAG Global Air Freight Forecast, 2010.

Exhibit 2.5: World Air Cargo Traffic (Historical and Forecast), 2001-2031



Sources: Boeing, World Air Cargo Forecast, 2012-2013 and Airbus Global Market Forecast 2012-2031.

U.S. Trends

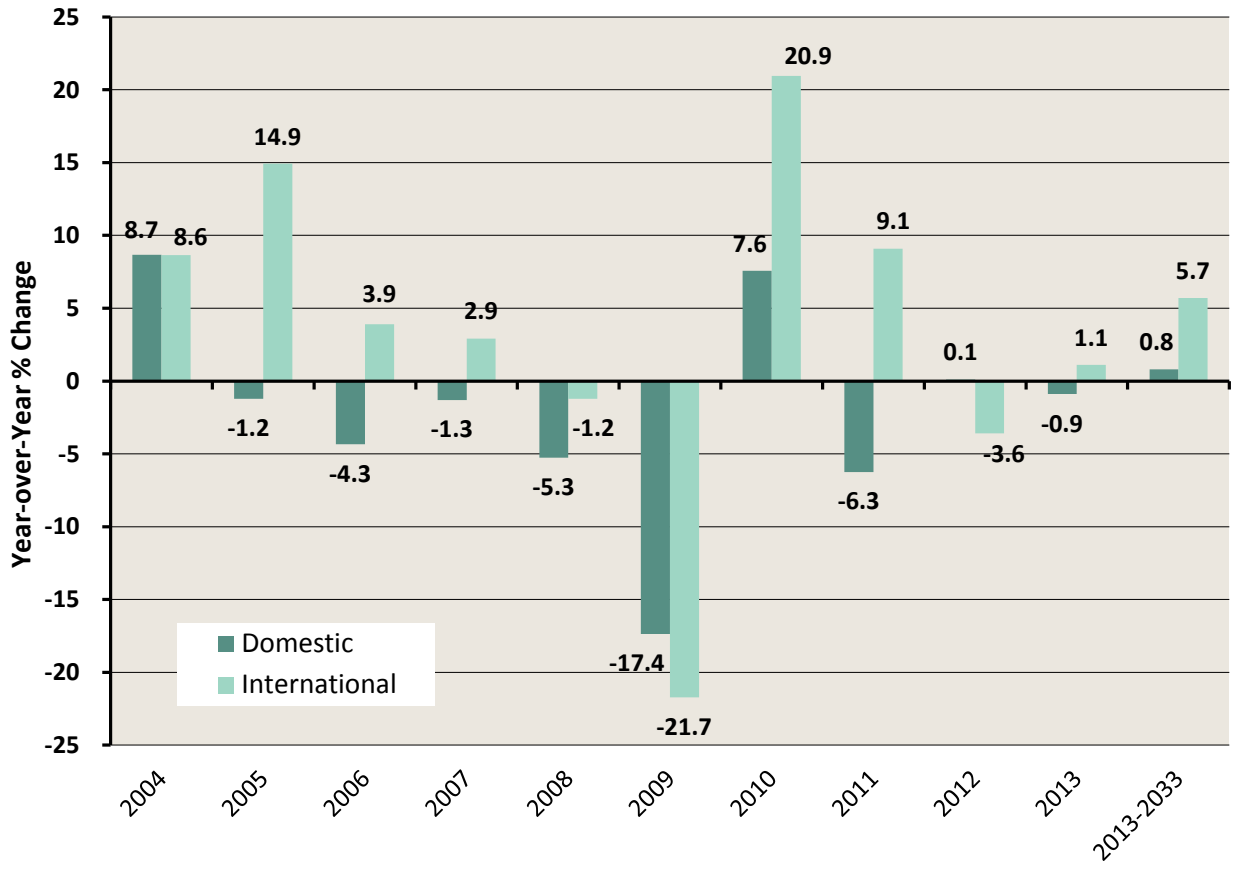
The economic recession and significant structural changes in the air cargo industry, such as fuel price volatility, changes to air cargo security regulations, and a shift to other modes of transportation, resulted in total revenue ton miles (RTMs) declining in 2012 by 2.4% year-over-year to 36.4 billion RTMs.[6] The majority of this decline was accounted for by a year-over-year drop in international air cargo traffic of 3.6% to 24.3 billion RTMs due to debt restructuring in Europe and the slowing down of China's economic growth. Domestic cargo remained relatively constant at 12.0 billion RTMs with a 0.1% increase year-over-year.

Despite this drop in the last year, the FAA predicts growth in U.S. air cargo activity in the coming years. In 2013, domestic air cargo is forecasted to experience a marginal decrease of 0.9% year-over-year. On the other hand, with the recovery of global trade, international air cargo is

[6] U.S. Federal Aviation Administration, FAA Aerospace Forecast Fiscal Years 2013-2023.

expected to grow by 1.1% compared to 2012. Over the next 20 years, the FAA predicts that total air cargo traffic will improve at an average annual rate of 4.6%. Domestic air cargo RTMs are forecasted to increase at an average annual rate of 0.8% from 2013-2033, while international air cargo RTMs are forecasted to increase at an average annual rate of 5.7% per annum during the forecast period. The predicted growth in U.S. air cargo is driven by projected U.S. and world economic growth. **Exhibit 2.6** summarizes the year-over-year percentage change in U.S. air cargo activity from 2004 to 2012, as well as the predicted annual growth rate from 2013-2033.

Exhibit 2.6: U.S. Air Cargo Traffic Year-Over-Year Percentage Change, 2004-2023



Source: U.S. Federal Aviation Administration, FAA Aerospace Forecast Fiscal Years 2013-2023.

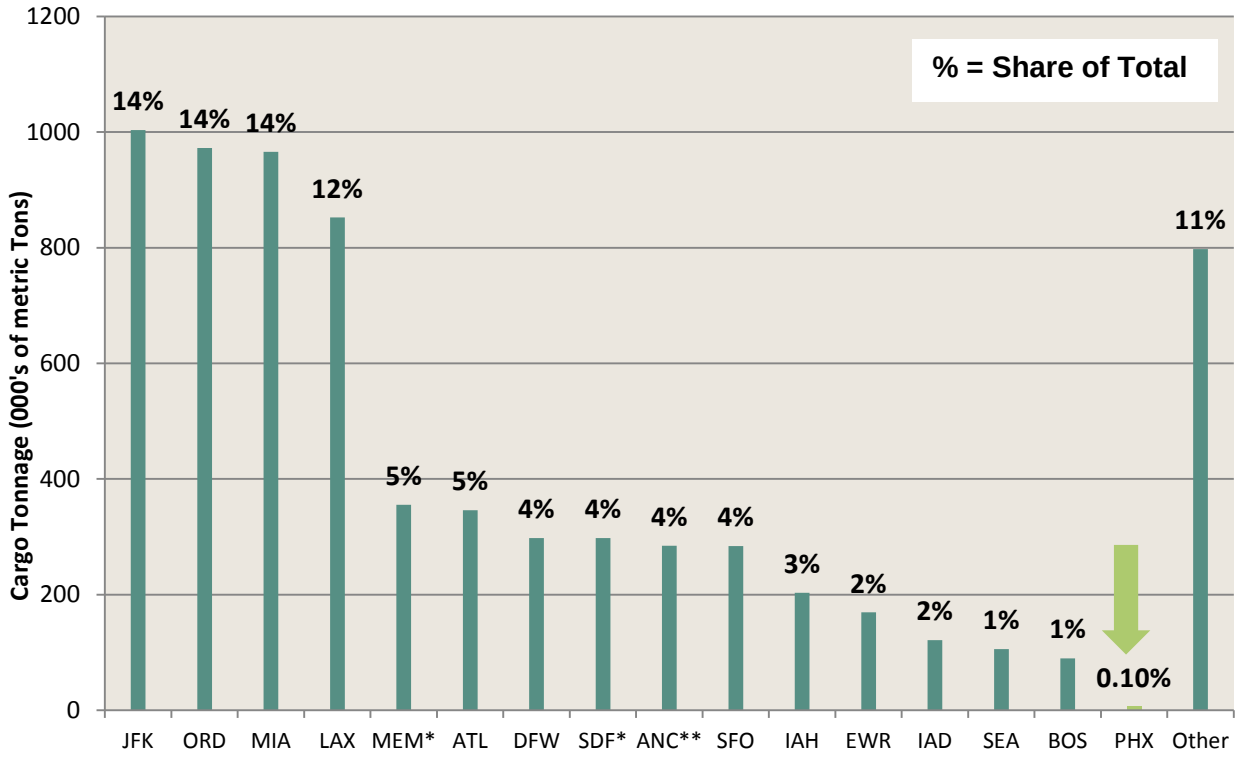
2.3 U.S. Air Cargo Industry Overview

To provide additional context specifically regarding the U.S. air cargo industry, this section presents an overview of the key U.S. air cargo gateways, as well as information on U.S. export and import volumes by mode of transportation.

2.3.1 Key U.S. Gateways

From an "operational" perspective, the international air cargo market tends to be concentrated at key U.S. hub airports, where the scope and scale of passenger flight networks provide significant belly space capacity to foreign markets. In fact, the top 10 U.S. international passenger airports are also the top 10 U.S. international cargo markets (excluding integrator hubs and Anchorage). **Exhibit 2.7** and **Exhibit 2.8** show top U.S. international cargo and passenger airports, respectively.

Exhibit 2.7: Top U.S. International Cargo Airports, 2012



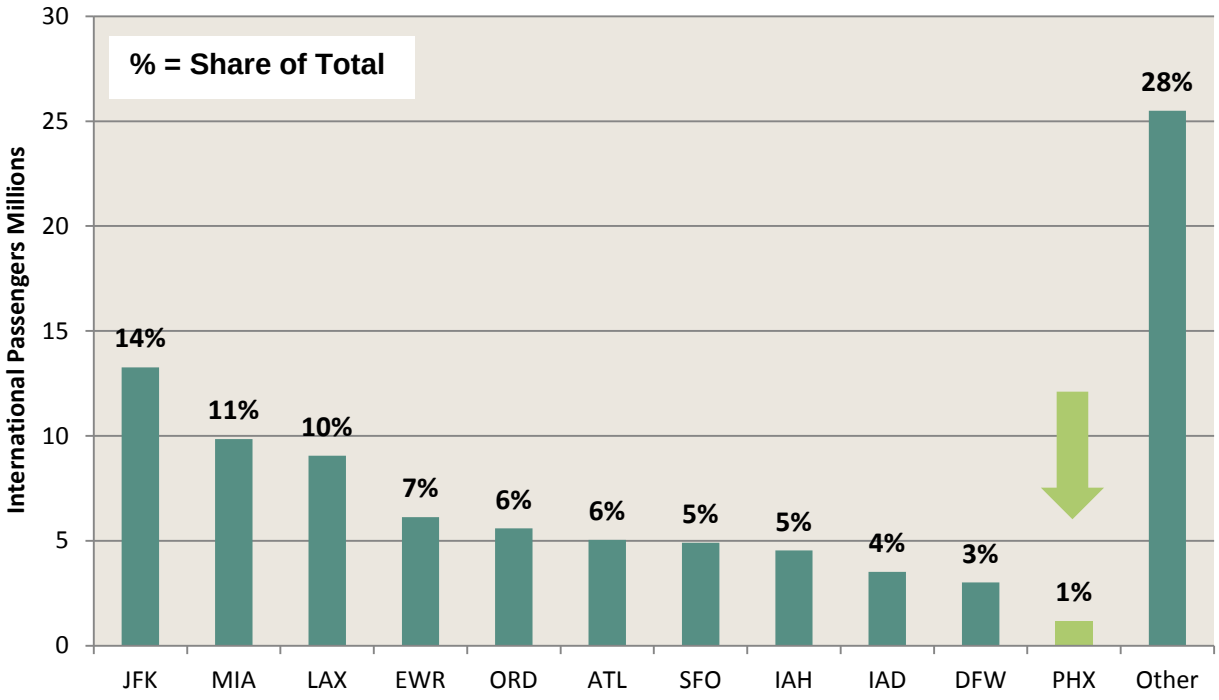
Source:WISERTrade International Trade Database, 2012.

Notes:

* Under agreement with the U.S. government, FedEx and UPS shipments are accounted for under the Customs Districts of New Orleans, LA and Cleveland, OH, respectively.

** Anchorage, AK includes transit shipments.

Exhibit 2.8: Top U.S. International Passenger Airports, October 2011-September 2012



Source: US DOT, T100, October 2011-September 2012.

The location of integrator hubs is driven by a myriad of factors, including the absence of airport curfews or slot restrictions and the quality of road access, rather than by population. Anchorage is a special case, as the cargo volumes there are driven by the need for transpacific freighter flights to refuel, as well as by special transshipment traffic rights granted by the federal government at Anchorage (and Fairbanks).

The top four cargo hubs (excluding the integrator hubs and Anchorage) account for over half (54%) of total U.S. international air cargo traffic. The top four passenger hubs account for only 42% of total U.S. international passenger traffic.

The U.S. domestic cargo market is much more fragmented compared to the international cargo market. Several factors contribute to the phenomenon including the higher use of narrowbody aircraft with more limited cargo capacity, shorter distances, and the availability of surface transport as an alternative. Of the aforementioned factors, the availability of road and rail service greatly diminishes the attractiveness of air cargo hubs because of its price, availability, and speed over shorter distances.

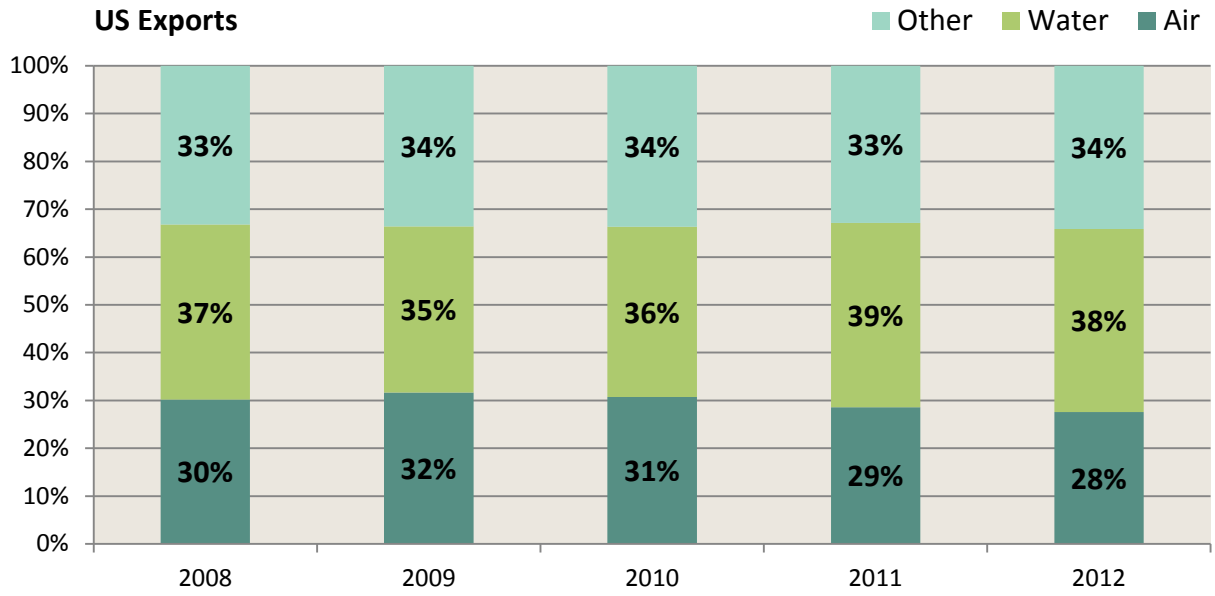
Integrated express carriers play a dominant role in the U.S. domestic cargo market. In 2011, Boeing estimated that express carriers such as UPS and FedEx held 64.4% of the domestic market. Their aggressive expansion in recent years has increased cargo flow into their respective hubs. FedEx's Memphis Super-Hub is the largest cargo airport in North America with just over 4 million metric tons of cargo and mail in 2012. UPS' Louisville Worldport is ranked

third in North America with 2.1 million metric tons of cargo mail handled in 2012. Other key integrator hubs such as Indianapolis, Oakland, and Cincinnati all have large cargo volume compared to other airports their size.

2.3.2 Overview of Transport Modes

The U.S. is well served by air, water, rail, and road modes of transport. An overview of market shares by mode of transport is summarized to compare which mode dominates the majority of freight activities, and to provide an indication of air cargo activities. **Exhibit 2.9** and **Exhibit 2.10** provide a breakdown for commodities exported and imported from/to the U.S. by mode of transport, respectively, over the past five years. In 2012, total U.S. exports amounted to more than $1.5 trillion, while total U.S. imports reached nearly $2.3 trillion. Based on value, water transport continues to dominate the majority of freight activities, comprising 38% of all U.S. exports (equivalent to $0.6 trillion) and 52% of all U.S. imports (equivalent to $1.2 trillion) in 2012. Air freight movements made up 28% (equivalent to $0.4 trillion) and 22% (equivalent to $0.5 trillion) of all U.S. exports and imports, respectively, during the same period.

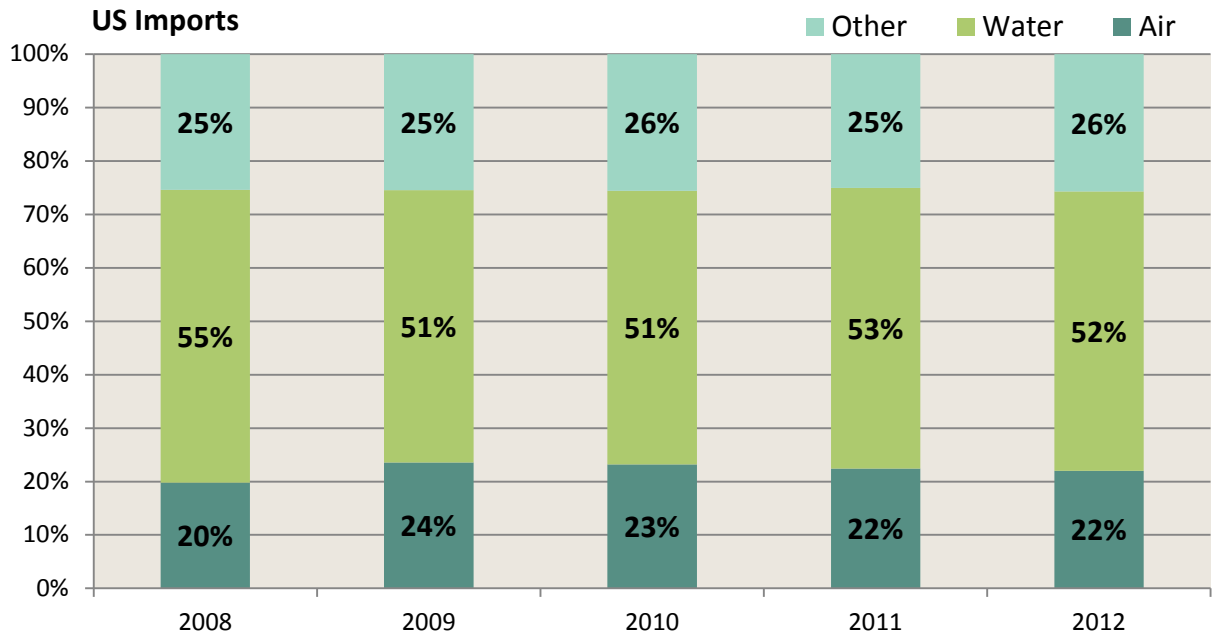
Exhibit 2.9: Market Shares by Mode of Total Exports from the U.S. (by Value), 2008-2012



Source: WISERTrade International Trade Database.

Notes: "Other" includes rail and road transport. Rail and road transport are not separately identified by WISERTrade.

Exhibit 2.10: Market Shares by Mode of Total Imports to the U.S. (by Value), 2008-2012



Source: WISERTrade International Trade Database.

Notes: "Other" includes rail and road transport. Rail and road transport are not separately identified by WISERTrade.

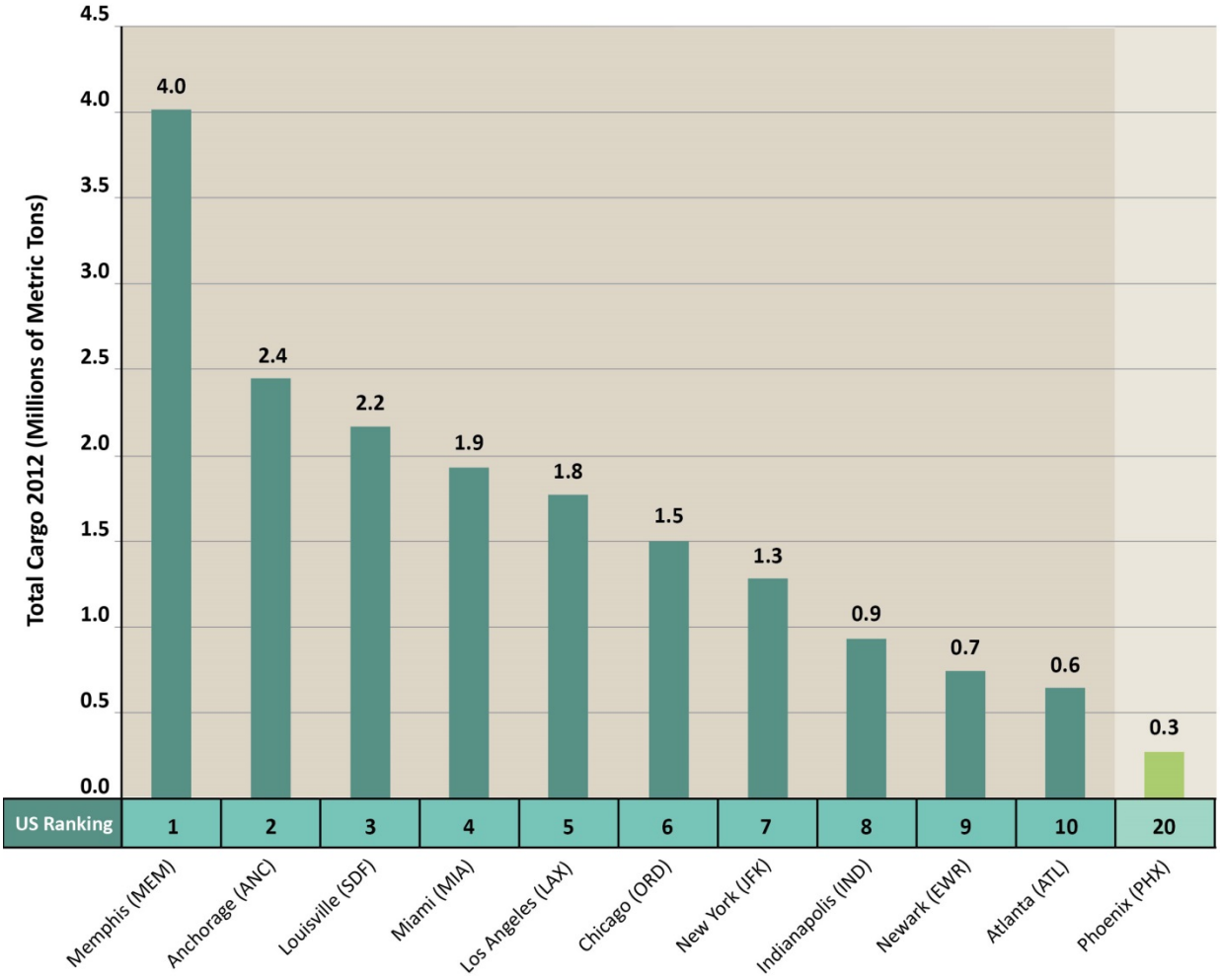
2.3.3 Key U.S. Cargo Hubs

A brief overview and discussion of each of the Top 10 U.S. air cargo hubs illustrates the unique characteristics of each airport, such as whether they are integrator hubs, key gateways served, and passenger traffic levels. Phoenix Sky Harbor International Airport is also reviewed relative to the key U.S. cargo hubs for comparison.

The top 10 U.S. air cargo hubs ranked by total cargo handled in 2012 are Memphis, Anchorage, Louisville, Miami, Los Angeles, Chicago, New York ("JFK"), Indianapolis, Newark, and Atlanta. Of the top 10 cargo airports in North America, Memphis was one of the four to experience an increase in cargo traffic (2.5%) in 2012. The other airports that experienced a year-over-year growth in cargo tonnage in 2012 were Indianapolis (2.7%), Los Angeles (3.7%), and Miami (4.9%). Two of the airports that handled an increase in cargo traffic, Memphis and Indianapolis, are integrator hubs. Los Angeles and Miami serve as the gateway to Asia-Pacific and South America, respectively, geographic areas that have continued to do relatively well despite the global recession.

Phoenix Sky Harbor International Airport ranked 20th amongst all U.S. airports and 74th amongst all airports globally, with over 273,000 metric tons handled in 2012.[7]

Exhibit 2.11: Top 10 U.S. Air Cargo Hubs by Total Cargo Handled, 2012



Source: Airports Council International North America, 2012 Airport Traffic Report.

Memphis (4.0 million metric tons in 2012) ranks first, as a result of it being the main hub of FedEx. (FedEx refers to it as the Super-Hub and/or Memphis World Hub.) In 2012, Memphis reported a 2.5% cargo volume increase over 2011. Volume is not driven primarily by origin/destination traffic, but is so high in large part simply because packages are routed through Memphis International Airport ("MEM"). This is not something that is easily replicated elsewhere, other than the major hubs of the other integrated carriers. Note that while MEM

[7] Airports Council International North America, 2012 Airport Traffic Report.

cargo volume is not driven by origin/destination traffic, many firms that rely on integrated carrier services (e.g. distribution operations) have located in the Memphis area to benefit from later cut-off times at the hub for outbound shipments.

Anchorage (2.4 million metric tons in 2012) is ranked second based on weight of traffic on board aircraft that are essentially refueling due to the long transpacific distances for heavily laden freighters. There is also some transshipment activity due to special traffic rights granted to Alaskan airports. Thus, activity at Ted Stevens Anchorage International Airport ("ANC") is not driven by the local economy – it is based on locational and regulatory advantages. Compared to 2011, ANC cargo traffic decreased by 3.7% year-over-year.

Louisville (2.2 million metric tons in 2012) is the UPS counterpart to Memphis. Similar to MEM, freight volume at Louisville International Airport ("SDF") is comprised of packages routed through the airport and not origin/destination cargo. Because SDF is the main hub of UPS, firms that rely on the integrated carrier for delivery service have also moved to the area to benefit from later cut-off times for outbound goods. SDF experienced a small decline of 0.9% from 2011 to 2012 despite the airport's initiatives to expand its global outreach.

Miami (1.9 million metric tons in 2012) plays a dominant role in trade with Latin America. Houston and Dallas have been working hard to make inroads into this market, and have had some success; nevertheless, Miami International Airport ("MIA") is by far the dominant gateway and is likely to remain so. It has a critical mass of carriers (particularly Latin American carriers), forwarders, and other services that know and understand the Latin American market. Discussions with carriers suggest that even those that would prefer another airport to MIA recognize they need to stay there to compete. MIA draws traffic from most of North America to serve the Latin American market and vice versa. For example, fresh flowers are flown from Columbia and other Latin American countries to Miami and distributed from there by truck to points as far away as Canada. As the dominant hub for traffic to the fast growing Latin American region, MIA was able to increase its cargo volume by 4.9% year-over-year in 2012, despite continued global economic uncertainty. MIA handled over 39 million domestic and international passengers in 2012, ranking as the 12th busiest airport in the U.S. based on passenger traffic.

Los Angeles (1.8 million metric tons in 2012) is a major Asia-Pacific gateway, as well as a major origin/destination market. Its location, and the size of the California economy, places Los Angeles International Airport ("LAX") at a competitive advantage. LAX has been able to rely on its large Asian traffic to support its growth. In 2012, LAX cargo volume increased by 3.7%. During the same period, LAX experienced a 3.0% year-over-year growth in passenger traffic to nearly 64 million passengers and is ranked third in passenger traffic among U.S. airports.

Chicago (1.5 million metric tons in 2012) is another key international cargo gateway, serving Asia and Europe. Again, the size of the local market is a key driver, as well as its location near the U.S. industrial heartland. There are some congestion issues at Chicago O'Hare International Airport ("ORD") which results in relatively slow processing of goods, but the critical mass of carriers and market size have kept carriers serving the market. Even large markets with relatively strong hubs, such as Minneapolis-St. Paul, have much of their international air cargo moved via ORD. The volume of cargo traffic handled at ORD decreased by 3.0% year-over-year. In 2012, ORD ranked as the second busiest U.S. airport based on passenger traffic, with nearly 67 million passengers travelling through the airport.

New York (1.3 million metric tons in 2012) is a key gateway, serving both Europe and Asia. It is the largest international gateway in the U.S. The sheer size of the market supports a high level of service. Moreover, the high level of passenger service at John F. Kennedy International Airport ("JFK") means a significant amount of available belly-space. This leads to highly competitive pricing, which attract shippers and forwarders from a large catchment area. JFK cargo traffic decreased by 5.5% year-over-year, from nearly 1.4 million metric tons in 2011. In part, this decline stemmed from weakness in the European market. JFK also ranks among the top U.S. airports based on passenger traffic, ranking sixth, and serving over 49 million passengers in 2012.

Indianapolis (0.9 million metric tons in 2012) is another FedEx hub. It is FedEx's second largest hub in the U.S. Again, the role of Indianapolis International Airport ("IND") as an integrator hub dominates the competitive environment. Similar to FedEx's Memphis hub Indianapolis, experienced a cargo volume increase of 2.7% in 2012 compared to 2011. Handling over 7 million passengers in 2012, IND ranked as the 50th busiest airport in the U.S. based on passenger traffic.

Newark (0.7 million metric tons in 2012) is also a key gateway, serving both Europe and Asia. The high level of service at Newark Liberty International Airport ("EWR") is supported by the sheer size of the market in the region. With a high level of passenger service, EWR offers a significant amount of available belly-space. Shippers and forwarders from the large catchment area are attracted to the highly competitive pricing in the region. Cargo tonnage handled at EWR decreased by 7.5% from 0.8 million tonnes in 2011 to 0.7 million tonnes in 2012. Again, this is in part driven by weakness in many European Union economies. In 2012, EWR experienced a 0.9% year-over-year growth in passenger traffic to nearly 34 million passengers and ranked 15th in passenger traffic among other U.S. airports during the same period.

Atlanta (0.6 million metric tons in 2012) is a major origin/destination market that has enjoyed an economic boom over the last decade. (Population in the region grew by over a million people from 2000 to 2008.) It has attracted new Asian and European services and acts as a regional distribution center. However, from 2011 to 2012 cargo volumes at Hartsfield-Jackson Atlanta International Airport ("ATL") declined by 2.5%. ATL, as the world's busiest passenger airport, benefits from substantial belly-space capacity. ATL handled over 95 million passengers in 2012.

Phoenix (0.3 million metric tons in 2012) was ranked 21st among North American airports in Airports Council International North America's 2012 results. Phoenix is a smaller community than those listed above (with the exception of Anchorage and the three integrator hubs) from a population perspective, although it does rank 10th in North America based on passenger traffic. In 2012, PHX served 40 million passengers. In comparison, Denver which has higher passenger volumes than Phoenix (Denver ranks 5th in the U.S.), it has lower cargo volumes (ranked only 22nd).

2.3.4 Recent and Developing Air Cargo Industry Trends

Since there are many factors that influence air cargo and significant structural changes have occurred recently in the air cargo industry, this section outlines key recent and developing industry trends that are important and relevant to the Phoenix and Arizona regions. These trends are grouped into two main categories: Air Cargo Industry Trends; and, Innovation and Technology Trends; as listed in **Exhibit 2.12** and described more fully below.

Exhibit 2.12: Overview of Recent and Developing Air Cargo Industry Trends

Air Cargo Industry Trends

- Security Regulations since 9/11
- Modal Shifts and Road Feeder Services
- Expanded Use of Passenger Aircraft Belly Space
- Consolidation of US Domestic Air Cargo Services
- Nearshoring
- International Air Cargo Services
- Changing Role of Freight Forwarders
- Third-party Air Cargo Facilities

Innovation and Technology Trends

- E-Freight Initiatives
- Security / Screening Technologies
- GPS, RFID, and ITS
- Green Technology
- More Flexible Manufacturing Strategies

2.3.5 Security Regulation Since 9/11

The Department of Homeland Security ("DHS") has primary oversight of air cargo as it relates to security. The Department's mandate is to promote the efficient and secure movement of goods, and to secure the global supply chain to ensure that it is prepared for and can recover from threats, hazards, and disruptions. The screening and inspection of cargo moving on all modes of transportation, including cargo on freighter and passenger aircraft, is under the charge of the Transportation Security Administration ("TSA"). The U.S. Customs and Border Protection ("CBP") is the component responsible for border security and facilitation of lawful international trade and travel, by enforcing U.S. laws and regulations to prevent the illegal entry of people and goods.

Since the terrorist attacks of September 11, 2001, tighter security regulations have been implemented for tracking, screening and inspecting air cargo both in the U.S. and in other foreign countries. Prior to 9/11, only imported goods were screened by customs authorities upon arrival at the border. Following 9/11, 100% screening of all freight on passenger aircraft leaving U.S. airports has been required, similar to screening of passenger checked baggage. Likewise, 100% of identified high risk international air cargo entering the U.S. is also being screened. New programs require customs documentation to be sent by exporters to the importing country in advance of the shipment of goods. These new security measures have implications on costs and processing times which impact air cargo activity. The new measures have been designed to accelerate customs processing and augment international trade.[8] However, the limited screening technology for inspecting air cargo goods, the lack of funding, and the fact that airlines are approaching their screening capability, make the 100% air cargo screening mandate challenging to the air cargo environment.[9] In order to address this, the TSA has implemented a Certified Cargo Screening Program ("CCSP"), which offers freight forwarders and shippers the option to pre-screen cargo prior to arrival at the airport.[10]

2.3.6 Modal Shifts

The negative and flat growth of air cargo in recent years due to slow economic conditions exacerbated an established trend of air freight shifting to alternative transportation modes. Shippers that once moved goods primarily by air have found other options that meet their needs at lower costs and with acceptable trade-offs in terms of shipment time and service reliability. For intercontinental shipments, shifts away from air to maritime through use of containerships

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[8] Journal of International Commerce and Economics, Peterson and Treat, The Post-9/11 Global Framework for Cargo Security, 2008.

[9] The International Air Cargo Association, Department of Homeland Security Public Forum on Air Cargo, 2009.

[10] U.S. Department of Homeland Security – Transportation Security Administration, Certified Cargo Screening Program (www.tsa.gov/certified-cargo-screening-program).

have become common. For intra-continental and domestic shipments, trucks have become viable alternatives to air transport as trucking networks have expanded and service levels have markedly improved for this lower priced mode.

The modal shifts away from air have been driven by a variety of factors. The primary factor is directly related to the high cost of shipping via air. In tough economic times and in a highly competitive global marketplace, costs are watched closely and efficiencies are aggressively sought. Higher fuel prices have led to even higher rates for air cargo services already priced at a premium to competing modes. Additionally, air cargo security regulations have brought about more complexity and costs to air cargo systems which may be reflected in higher rates.

Meanwhile, global supply chains and production schedules have been altered to allow for more time for goods in-transit. This, in turn, leads to the viability of modes other than air. While air transportation will always be in demand for certain commodities and to meet critical, time-sensitive needs, shippers that can plan well and seek to control costs have found acceptable transportation alternatives.

2.3.7 Expanded Catchment Area through Road Feeder Service

Trucking services have improved in recent years through increased reliability and service quality, such as the ability to track shipments, reduced theft/damage/pilferage rates, and more consistent schedules. These improvements, together with rates that are lower than that offered by air carriers, have put trucking in a position where it both competes with and complements air services. This complementary role means that any given airport could serve as an international gateway for more distant points. Similarly, more distant points can serve as gateways for any given airport's home market. The ability of trucks to move goods quickly and economically between competing airport gateways also means that minor price variations between air services at different airports will result in traffic shifts, often on a day to day basis. Goods will move to/from more distant gateways if they offer services at lower prices than the local gateway. The competition for air cargo services between airports, as a result, is much higher now than it had been in the past. While passengers have a limit to how far they will drive to access less expensive air services, shippers have shown a great willingness to send goods great distances to another airport to get a better rate or service.

The loss of traffic to distant gateways, or "cargo leakage" has become a key issue impeding the development of international cargo services at non-gateway points. This issue is particularly linked to the role and interests of freight forwarders – if forwarders are incentivized financially to reach a threshold volume at key, established gateway airports, they will tend to flow traffic over these airports, even when options are available at closer local airports.

2.3.8 Improvements in Passenger Aircraft Cargo Capacity and Cargo Handling

Historically, the majority of international air cargo has been carried in the belly-hold of passenger aircraft. The prevailing view was that freighter aircraft would be the answer to accommodating future growth as cargo growth was outpacing passenger growth. In other words, growth in belly-space capacity would not be sufficient to meet market needs, and this surplus cargo growth could only be handled by dedicated freighters.

The air cargo industry, however, has benefitted substantially from improvements in passenger aircraft cargo capacity. The newer versions of passenger aircraft are able to carry larger cargo volumes than their less cargo-friendly predecessors. For example, the new Boeing 787 Dreamliner offers carriers a 20%-45% increase in cargo revenue capacity over the older aircraft it is designed to replace. Moreover, service levels have also improved through better capabilities for cargo handling, such as increased capacity to handle palletized and containerized cargo. Given that belly space can be priced aggressively relative to freighter space (since the cost of the flight is primarily paid for by onboard passengers) the new passenger aircraft will place additional stress on pure freighter operators. While growth in the worldwide freighter fleet will continue, that growth will likely be at lower levels than anticipated a decade ago. Undoubtedly, belly space of passenger aircraft will continue to be a key element of air cargo development moving forward.

2.3.9 Consolidation of US Air Cargo Services

In some markets, air cargo capacity has been reduced, in effect forcing shippers to use other modes. For example, in the U.S. domestic market, several all-cargo airlines have ceased operations and passenger airlines have phased out many cargo-friendly widebody aircraft on domestic routes in favor of narrowbody aircraft. In this case, less domestic air cargo capacity has led to increased demand for surface options like trucks.

Of course, this air cargo trend has also had an impact on airports. In the United States, many airports that are not traditional international gateways have lost cargo air services from both passenger airlines and all-cargo carriers. The aforementioned reduction of widebody passenger aircraft on domestic routes, coupled with air service losses related to consolidation in the U.S. airline industry, has resulted in declining cargo capacity at many airports.

2.3.10 Nearshoring

Over the past few decades, lured by the low labor rates in countries such as China, many U.S. and other firms have outsourced manufacturing to overseas locations ("offshoring"). As the relative cost of labor continue to rise in China and other Asian countries and as firms gain a better understanding of the other costs they face from having lengthy, and hence, less reliable and slower responding supply chains, there is an emerging trend for North American firms to shift activity to locations nearer to home ("nearshoring"). In some instances, manufacturing is shifting to places such as Mexico, but in other cases there is evidence of a return of some manufacturing back to the U.S. This is not simply a response to wage increases in many Asian markets, as there are still low labor rates in countries such as Indonesia. Businesses and manufacturing processes are returning to areas close in proximity to consumer markets to cut transport costs and time to market, as well. Increased reliability and responsiveness of these shorter supply chains are also important factors. Thus, Mexican sites (in particular, "maquiladoras," or Mexican manufacturing facilities in free trade zones) are now increasingly viewed as more competitive relative to Asian locations. This is especially relevant to the State of Arizona, which has a shared border with Mexico.

This trend will not mean the end or even decline in transpacific air cargo, as China continues to attract new manufacturing operations and other lower cost sites are increasingly viewed as alternatives to China. However, it does suggest the potential moderation of growth in transpacific cargo volumes. On the other hand, it does open the door to potential growth in shorter haul air cargo movements, either domestic or from Mexico or other regional locations. The nearshoring trends in Mexico and the potential impacts on the Phoenix/Arizona air cargo market will be discussed more fully in Chapter 3.

2.3.11 Changing Role of Freight Forwarders

The shift in market power from air carriers to freight forwarders in recent years is important in understanding competition for air cargo services. Three main developments have occurred in recent years that are changing the role of freight forwarders: considerable consolidation in the freight forwarding industry; provision of dedicated freighter services; and mergers between freight forwarders and air carriers.

In the past, numerous small local operators comprised the freight forwarding industry, each providing similar services in a very competitive environment. The industry included a few global operators; however, these firms had a small market share. Due to the considerable number of individual firms and high degree of competition, collective action was not viable and each freight forwarder had limited influence over air carrier decisions regarding routes and service times. This has changed in recent years, with the industry now comprised of large international forwarding operators that control a significant amount of traffic. In addition, forwarders are now offering services deeper into the supply chain, including chartering aircraft on behalf of customers with large shipments. Given the amount of traffic these large freight forwarders currently control, they can have considerable influence over air carrier routing decisions, and

are using that influence to develop cargo services at airports where they have strategic advantages.

Over and above their traditional role of booking space with air carriers, some forwarders have started offering their customers dedicated freighter services. Panalpina, a large Swiss-based forwarder, pioneered this trend in September 1990 by offering scheduled freighter services between Luxembourg and Huntsville, Alabama referred to as the "Dixie Jet" route. Panalpina now controls its own air network (operated under contract by Atlas Air) that connects Huntsville with Luxembourg, Dubai, South Africa, Hong Kong, Mexico and Brazil. This serves to emphasize the growing power of freight forwarders in airline routing decisions.

A few freight forwarders have also merged with key air service providers, altering the traditional lines that had separated these two parties in the past. For example, the freight forwarder Danzas combined with global integrated carrier DHL to become a major force in global air cargo.

Consequently, the changing role of freight forwarders has implications on airports. In addition to attracting air carriers, airports now must broaden their business strategy to attract forwarders. By attracting a forwarder, the activity the forwarder handles will be a key element in attracting (or even providing) air services, as forwarders bring with them hundreds, if not thousands, of shippers who rely on them to arrange their transportation, distribution, and logistics functions. This opens the door to non-traditional international gateways and hubs based on changing forwarder market needs rather than relatively unchanging airline passenger needs. The case of Huntsville Alabama, which became the U.S. cargo hub for Panalpina's air services, illustrates this potential.

2.3.12 Provision of Air Cargo Facilities

An increasingly important factor for airports has been the provision of quality air cargo facilities, either at airports or off airport land. Particularly in the case of freight forwarders, the provision of infrastructure and facilities either by the airport or a third-party provider is key to securing significant air cargo activity. In the past, the need to make capital investments at an airport may have hindered developments at all but the largest gateway airports, since investors would have to be assured of long-term commitments on airport charges and facilities, as well as have comfort in the level of air service that will be offered in the future, in order to recoup the capital costs. Sinking capital into an airport ties the investor to that airport, making change more difficult.[11] Although many airports still own and develop cargo facilities that are leased to cargo carriers, a common trend has been toward the lease of airport land to third-party developers for them to develop, lease and manage air cargo facilities. Logistics and cargo facilities located off-

[11] It should be noted that significant shifts in air cargo operating locations sometimes occur. DHL's move from Brussels to Leipzig is a recent example.

airport are also important, as these facilities reduce the delay in the movement of air cargo by relieving congestion on airport premises. At the same time, off-airport cargo facilities reserve on-airport land for more critical development needs.

Other than the integrated carriers, which have dedicated highly-automated facilities, most airport cargo facilities are basic, low-productivity facilities. While this has sufficed in the past, global supply chain pressures are suggesting a need for higher productivity centers. Few operators, however, can justify the investment in a high-productivity facility based on their individual traffic volumes. Declining cargo air services and cargo volumes at many U.S. airports has also led to a situation where some airports have excess capacity at on-airport air cargo buildings. Passenger airline consolidation has translated to combined carriers that do not require multiple cargo facilities at the same airport and, as discussed, fewer cargo-only air carriers are operating which translates to fewer requirements for on-airport cargo facilities.

2.3.13 Growth Areas by Commodity

Major product categories for air cargo are medical equipment and pharmaceuticals, apparel, industrial machines, computers, cut flowers, fresh fish, fruits and vegetables, automotive parts, aerospace parts, semiconductors, telecommunications equipment, mobile phones, and precision instruments. Most of these items have high value to weight ratios and/or are highly perishable.

A few of these products appear to have reached their peak and are trending downwards. According to a presentation made at the 2011 ACI-NA Cargo Conference, air penetration rates for most air cargo products peaked in the 1990s. This suggests growth in these areas will reflect organic growth (i.e. growth in the market for these products) rather than modal transitions from surface transport to air.

Certain air cargo categories reached their historic peak volumes in 2010 including pharmaceuticals, industrial machines, computers, electrical apparatus, automotive parts, and cellular phones. Products that were near their historic peak in 2010 included cut flowers, vegetables, industrial supplies, medical equipment, and engines. These commodities represent the strongest potential for both volume and growth. Pharmaceuticals and biomed/medical equipment are key air cargo categories for the Phoenix and Arizona markets.

2.3.14 E-Freight Initiatives

The International Air Transport Association (“IATA”) has been an advocate of a paperless transportation process for the air cargo industry and has been promoting a global e-freight initiative, wherein paper documents are replaced with the exchange of electronic data.[12] Similarly, the U.S. Department of Transportation (“DOT”) has sponsored an Electronic Freight

[12] International Air Transport Association, e-freight fundamentals, 2013.

Management ("EFM") initiative, which makes use of web technologies to improve data transmissions and facilitate business transactions.[13] The use of e-freight aims to improve the safety, security, reliability, and efficiency of the movement of goods. At the same time, the use of e-freight documents is expected to eliminate the cost and time involved in paper handling, transportation and processing. Both groups, as well as others in favor of e-freight, agree that the use of electronic data will help air cargo become more productive, and thus, able to better compete with other modes of transportation.[14]

However, e-freight has only been adopted by a few locations. By January 2013, only 467 airports in 47 countries around the globe made use of e-freight initiatives.[15] In the U.S., there are 16 airports that are e-freight capable, including Houston Intercontinental, Minneapolis-St. Paul, Portland, San Francisco and Seattle-Tacoma.[16] IATA aims to implement the initiative at other U.S. gateways, including Phoenix Sky Harbor International Airport. E-freight has not yet caught on for a variety of reasons, despite its apparent benefits. Although cost reduction is a major benefit of the initiative, not all stakeholders along the air cargo global supply chain are in the position to adopt electronic trade facilitation at the same time or in the same manner.[17] Among the hindrances to the adoption of e-freight is the question of cost, as many small- and medium-sized freight forwarders are concerned about the costs of entry and have little incentive to invest in technology platforms given the size of their firms.[18] Another challenge is the lack of multilateral customs harmonization, which means that paper documents would still be required. Different mandates in different countries could also lead to higher costs and less incentive to harmonize.

2.3.15 Security/Screening Technologies

In addition to the new regulations to screen air cargo, new security/screening technologies to inspect goods moving by air have been deployed and are currently under development. Among the different security and screening technologies used to inspect air cargo are: X-Ray, Explosive Trace Detection, Explosive Detection System, TSA Canine and physical search.[19] However, according to The International Air Cargo Association ("TIACA"), improvements to screening

[13] U.S. Department of Transportation – Federal Highway Administration, The Electronic Freight Management Initiative, 2006.

[14] Air Cargo News, Conway, Technology is the Answer, 2013.

[15] International Air Transport Association, e-freight Global Project Scorecard, January 2013.

[16] International Air Transport Association, Cargo Network Service (www.cnsc.net/about/Pages/e-freight-expands-usa.aspx).

[17] American Airlines Cargo Business Insights, Keeble, Getting E-freight to Flow, 2011.

[18] American Airlines Cargo Business Insights, Additional Perspectives on E-Freight, 2011.

[19] The International Air Cargo Association, Department of Homeland Security Public Forum on Air Cargo, 2009.

technologies for the air cargo environment are needed in order to meet air cargo screening mandates.[20]

Investment in the necessary equipment at airports with low cargo volumes may be daunting to individual carriers or freight forwarders. In many cases, these investments are substantial, and duplicating the investments at multiple airport locations can materially add to the cost of doing business. Therefore, some freight forwarders that operate at multiple airports in the U.S. have decided to concentrate screening activities at their major airport stations in order to minimize security related expenditures and inefficiencies. In this manner, it is likely that air cargo volumes will shift further to the existing major cargo gateway airports and away from the smaller airport stations where the costs of complying with security regulations cannot be easily justified. Common use facilities also offer a way to spread out the costs and risks of investment.

2.3.16 GPS, RFID, and ITS

Transformative changes in the transportation industry have been facilitated by improvements in information technology and communication systems, which have also influenced the role of geography in the industry. Shippers and network transportation providers can track and manage their fleets, cargo and/or passengers in real time through the use of Global Positioning System ("GPS") tools and other state of the art systems. Not only does this technological advancement result in more efficient logistics management, but it also facilitates the globalization of organizational activities since companies can outsource/offshore with greater cost and delivery reliability. This has been an important factor in the ability of trucking to provide the value-added service level that enables it to compete effectively with air. Goods handed over to a trucking firm are no longer invisible to the shipper, as they can be tracked. The implication for air cargo is that the surface modes of transport can use this technology to provide a high quality service at a lower price than air transportation. This is evident in the significant growth in the use of Road Feeder Services by air carriers.

Technology is also used to increase throughput and convenience of goods and people movement through transportation facilities and border check points. New technologies are deployed in many transportation environments, including self-serve kiosk check-in and radio frequency identification ("RFID") baggage systems at airports, and wireless applications across all modes.

Intelligent Transport Systems ("ITS") applications encompass a broad range of wireless and wire line communications-based information and electronics technologies. The systems aid in relieving congestion, improving intermodal efficiency, maximizing system capacity, and enhancing safety by integrating the management of vehicles, drivers and infrastructure. Key

[20] The International Air Cargo Association (www.tiaca.org/tiaca/Screening_Technologies.asp).

ITS features include freight tracking, freeway management, traveler information, and emergency assistance deployment.

2.3.17 Green Technology

Technology also plays an important role in the development and introduction of more efficient vehicles with lower greenhouse gas emissions. This is particularly important in today's society, especially since the transportation sector is facing increased pressure from environmental stakeholders to reduce its impact on global climate change. Aviation has come under considerable attention not only due to the amount of emissions produced, but also because of the concern that emissions at altitude are more harmful than emissions at ground level.

Going forward over the next 30 years, it is expected that the transportation industry will continue to embrace new technologies as it has in the past to address environmental concerns. Aviation has succeeded in reducing its footprint per revenue passenger kilometer; the issue is that the growth in aviation is leading to a larger overall emissions level.

2.3.18 More Flexible Manufacturing Strategies

In the past, the trend in logistics had been to minimize inventory costs. With rising fuel costs in recent years, and current low interest rates, this trend has shifted towards one of keeping larger inventories and using larger shipment sizes to gain transportation efficiencies. Load integration and multi-modality become key issues; especially given an increasing trend to use fuel efficient alternatives, like rail and short sea services. For certain products and industries, there has been noted a shift from international air cargo to ocean container shipping and many believe that it will be very difficult for air cargo providers to recapture the lost volume.

To address these issues, a recent logistics industry survey revealed that companies are starting to develop more flexible manufacturing strategies.[21] For example, locating manufacturing near the ultimate destination market helps to optimize inventories and to avoid shipping delays. Solutions to counterbalance rising fuel prices include automation and standardization, as well as the use of effective information systems and new technologies to optimize routes and supply chains. Different options include centralizing warehousing and distribution to reduce capital costs (which would favor existing air cargo gateways) or increasing the number of regional facilities in order to reduce transportation costs (which may open opportunities at other airports). In all likelihood, the approach will vary by industry.

[21] Eyefortransport, the Impact of High Fuel Prices on the Logistics Industry Report 2008/09, August 2008.

Phoenix Regional
Air Cargo Planning Study

CHAPTER 3

Chapter 3: Analysis of Regional Air Cargo Market

In order to develop reliable development plans for air cargo at the Phoenix area airports, it is critical to analyze the existing conditions at the major airports in the Study Region as they relate to air cargo. The air cargo market analysis includes a review of historical data and gathering of information from stakeholder groups via primary research. This work enables the identification of logical catchment areas for relevant airports, a comparison of air cargo terminal costs and an understanding of the amount of cargo that is moving on passenger flights versus all-cargo flights. Finally, air cargo opportunities for the Phoenix metropolitan area will be assessed and findings will inform the forecasts developed in Chapter 4.

3.1 Review of Historical Data

3.1.1 Current Situation at the Study Region Airports

In performing market analysis for the Study, it is important to review the available historical data of the airports in the Study Region. The data review helps to define the landscape for air cargo in the Study Region and identifies the most relevant airports in the region for further analysis. The objectives of the historical data review are to:

- Assess the air cargo volumes flowing via airports in the Study Region;
- Identify the trends of air cargo in the Study Region over time;
- Describe the respective roles and air services of the Study Region airports as they relate to air cargo; and
- Understand the types of goods shipped via air, the types of carriers involved in the shipping process and the geographic areas served by selected airports in the region.

The approach to the review of historical data is driven by the availability of and access to publicly available information. There are a limited number of sources for detailed, credible, and timely aviation industry data and this is especially true for air cargo data. In contrast to the passenger aviation industry, the air cargo industry is noted for its overall lack of transparency when it comes to reporting traffic levels and other operational and market details. For instance, the U.S. Department of Transportation requires passenger airlines operating in U.S. domestic and U.S. international markets to submit frequent detailed data on the origin and destination points of travelers, the actual itineraries of their trips, and the fares paid for tickets. Conversely, the U.S. DOT collects information on air cargo loaded and unloaded at U.S. airports, but does not require data showing actual cargo origins or destinations, detailed routing information or shipping cost data.

The known and trusted sources of air cargo data related to the U.S. market include the U.S. DOT's T-100 traffic reports which provide information for air freight and mail tonnage by air carrier, aircraft type, and airport. The U.S. Census Bureau also collects information from shipping documents (i.e. air waybills) that provide information on U.S. air imports and exports by

U.S. states and foreign country markets in terms of weight, value, and commodity type. Other general air cargo information is reported by individual U.S. airports and industry associations such as the Airports Council International – North America (ACI-NA) and the International Air Transport Association (IATA).

For purposes of the Study, the latest available data was reviewed to determine the current situation at relevant airports to identify air cargo trends. For the Study Region airports, air cargo data was analyzed by carrier type (i.e. passenger carrier, integrated express carrier, and freighter operator) as well as by category (i.e. international versus domestic and freight versus mail). In general, the term air cargo is defined as being comprised of two elements: air freight and air mail. The separate elements of air freight and air mail will also be referred to specifically throughout this report.

The initial phase of the market analysis involved a review of the total air cargo tonnage statistics at the Study Region airports. As discussed in Chapter 1, the Study Region includes a total of 15 commercial airports in the states of Arizona, California, Nevada, New Mexico and Texas. (Note: Phoenix Deer Valley Airport and Phoenix Goodyear Airport do not report air cargo statistics in any of the data sources reviewed.) **Exhibit 3.1** shows published data for the 13 airports with reported air cargo tonnage between 2006 and 2012.

Exhibit 3.1: Air Cargo Tonnage at Study Region Airports (metric tons)

Airport Code	Airport Name	2006	2007	2008	2009	2010	2011	2012	CAGR 2006-2012		North American Airport Ranking - 2012
LAX	Los Angeles International Airport	1,907,497	1,884,317	1,629,408	1,509,236	1,747,629	1,696,115	1,780,998	-1.1%		5
ONT	LA/Ontario International Airport	493,952	483,309	436,524	354,691	355,932	378,728	412,661	-3.0%		16
PHX	**Phoenix Sky Harbor International Airport**	**286,618**	**251,925**	**250,491**	**223,664**	**250,704**	**274,046**	**273,605**	**-0.8%**		**21**
SAN	San Diego International Airport	188,649	140,304	121,461	110,235	115,426	136,321	141,233	-4.7%		32
LAS	McCarran International Airport (Las Vegas)	101,369	91,205	85,088	85,547	82,764	85,494	91,356	-1.7%		41
ELP	El Paso International Airport	76,891	74,963	62,165	58,833	82,190	82,903	85,408	1.8%		47
ABQ	Albuquerque International Sunport	76,181	69,598	61,788	55,799	56,264	55,063	58,386	-4.3%		61
BUR	Bob Hope Airport (Burbank)	52,292	48,818	38,920	42,263	45,122	46,293	48,821	-1.1%		66
TUS	Tucson International Airport	38,397	36,634	33,350	28,658	31,297	26,870	33,877	-2.1%		78
LGB	Long Beach Airport	45,527	47,079	42,169	31,797	26,261	25,610	24,470	-9.8%		90
SNA	John Wayne Airport	21,684	19,852	16,921	15,075	13,547	15,612	16,179	-4.8%		102
SBA	Santa Barbara Municipal Airport	3,090	2,696	2,578	1,964	1,964	1,872	1,711	-9.4%		130
IWA	**Phoenix-Mesa Gateway Airport**	**153**	**27**	**48**	**26**	**9**	**64**	**100**	**-6.8%**		**151**

Source: ACI-NA.

As expected, LAX is by far the largest cargo airport in the Study Region. At 1.8 million metric tons, LAX is almost 50% larger than all of the other airports in the region combined. LA/Ontario, Phoenix Sky Harbor and San Diego are the only other airports that consistently handle more than 100,000 cargo tons annually. LA/Ontario International Airport is home to a large UPS hub and the vast majority of the airport's reported air cargo tonnage relates to that operation. Phoenix Sky Harbor, San Diego and Las Vegas all have high air service levels, particularly by U.S. carriers, but all three airports also have international passenger services with widebody aircraft that have the ability to carry substantial cargo volumes.

Trends at the airports are consistent - with most airports showing a decline in cargo tonnage in the 2008-2009 period as the U.S. and global economies struggled and with historic trends showing air cargo growth highly correlated to economic growth. Accordingly, most airports in the Region experienced increasing cargo volumes in 2010 as economies improved and inventories were re-stocked. Since 2010, airports generally saw slow growth as the economy continued to recover - likely due to the impacts of shifts to less expensive, but still reliable, modes of transportation such as trucking, rail and containerized ocean shipping.

Notably, the Tucson International Airport, while relatively small in terms of air cargo tonnage, showed tremendous positive movement in percentage growth in 2012. Between 2011 and 2012, Tucson grew its air cargo volume by 120%. This compares to most other airports' growth in the same time period of less than 7%. This outlier statistic shows the wide variation that individual airports can experience in terms of air cargo growth. While broader economic activity certainly influences air cargo volumes overall, individual airports can grow in ways very different from the macro trends often due to factors such as local business activity (e.g. a new manufacturer locates close to an airport) or expanded air services (e.g. a new international flight brings high-quality air cargo capacity to a market).

Air service levels for 2012 at the Study Region airports are summarized in **Exhibit 3.2** along with the reported air cargo tonnage levels. An overall positive correlation between air service levels and air cargo tonnage can be observed from this data. The top five cargo airports listed have a good mix of services by geographic region (i.e. domestic and international services) as well as by aircraft type (i.e. narrowbody, widebody, and all-cargo services). The smaller cargo airports tend to be dominated with narrowbody aircraft services and fewer all-cargo operations.

Exhibit 3.2: Air Services at Study Region Airports (2012)

	LAX	ONT	PHX	SAN	LAS	ELP	TUS	ABQ	BUR	LGB	SNA	SBA	AZA
Air Cargo (Metric Tons)	1,771,907	413,322	272,537	130,616	91,374	85,746	59,275	58,306	48,821	24,471	16,050	N/A	74
Number of Passenger Airlines	**61**	**11**	**17**	**18**	**33**	**6**	**8**	**9**	**8**	**4**	**11**	**5**	**3**
U.S. Domestic Markets													
Nonstop Destinations	103	17	86	47	130	14	17	32	15	14	21	6	39
Total Weekly Departures	228,626	22,063	184,106	77,963	158,640	20,476	21,066	34,135	25,601	14,323	39,754	10,904	4,868
Widebody Departures	12,370	-	393	950	1,601	-	-	-	-	-	-	-	-
Narrowbody Departures	193,691	22,063	180,450	72,293	153,068	20,476	21,066	32,108	25,402	14,323	39,754	5,302	4,868
Regional Jet / Turboprop Departures	22,565	-	3,263	4,720	3,971	-	-	2,027	199	-	-	5,602	-
International Markets													
Nonstop Destinations	64	1	21	9	25	-	-	-	-	-	5	-	-
Total Weekly Departures	44,239	251	10,718	2,198	9,479	-	-	-	-	-	1,137	-	-
Widebody Departures	22,842	-	305	376	1,460	-	-	-	-	-	-	-	-
Narrowbody Departures	21,012	251	10,083	1,822	8,019	-	-	-	-	-	-	-	-
Regional Jet / Turboprop Departures	385	-	330	-	-	-	-	-	-	-	1,137	-	-
Number of All-Cargo Airlines *	**29**	**6**	**8**	**4**	**2**	**9**	**1**	**3**	**2**	**2**	**2**	**2**	**-**
Annual Departures	12,078	8,428	4,365	2,459	1,661	1,839	458	3,109	865	520	460	508	-
Jet Freighter Departures	11,884	5,855	3,141	1,828	1,122	1,596	458	1,630	865	520	460	-	-
Regional Jet / Turboprop Departures	194	2,573	1,224	631	539	243	-	1,479	-	-	-	508	-

Source: U.S. DOT, T-100 Carrier Reports, and ACI-NA.

While total cargo tonnage is a valuable metric for analyzing airports, it is also useful to understand the composition of air cargo. **Exhibit 3.3** shows the Study Region airports in terms of the separate components of air cargo – freight and mail. The clear interpretation of this data is that, overall, mail is a very minor part of the air cargo make-up, and that air freight is what drives volume and trends. At twelve of the airports in the Study Region, mail represents less than 6% of total cargo. PHX is the lone exception with 9.5% of its cargo tonnage devoted to mail. In the case of PHX, the vast majority of mail is carried by the largest carrier – US Airways, and mail volumes have been steady for many years. Like many airport traffic categories, mail tonnage at airports is obviously driven by demand, but it is also influenced by how the U.S. Postal Service administers its contracts amongst individual air carriers. In this manner, contracts may stipulate how mail is transported, including the specific airports utilized. This analysis serves to focus the Study on the core component of air cargo, which is air freight.

Exhibit 3.3: Air Freight and Mail Shares by Airport (2012)

Airport		Freight	Mail
ABQ	Albuquerque International Sunport	98.0%	2.0%
BUR	Bob Hope Airport (Burbank)	96.6%	3.4%
ELP	El Paso International Airport	100.0%	0.0%
IWA	**Phoenix-Mesa Gateway Airport**	**100.0%**	**0.0%**
LAS	McCarran International Airport (Las Vegas)	95.3%	4.7%
LAX	Los Angeles International Airport	96.9%	3.1%
LGB	Long Beach Airport	99.2%	0.8%
ONT	LA/Ontario International Airport	96.8%	3.2%
PHX	**Phoenix Sky Harbor International Airport**	**90.5%**	**9.5%**
SAN	San Diego International Airport	96.0%	4.0%
SBA	Santa Barbara Municipal Airport	100.0%	0.0%
SNA	John Wayne Airport (Orange County)	94.2%	5.8%
TUS	Tucson International Airport	100.0%	0.0%
Weighted Average		**96.4%**	**3.6%**
Weighted Average (without LAX)		**95.6%**	**4.4%**

Source: U.S. DOT, T-100 Carrier Reports.

With the focus on air freight, domestic and international movements were then analyzed. **Exhibit 3.4** shows the Study Region freight broken down by geography of movement to/from the individual airports. Given the high influence of LAX on the Region's collective air freight tonnage, the Weighted Average (without LAX) was calculated to determine a truer sense of the airports' freight profiles by geography.

Exhibit 3.4: Domestic and International Air Freight Shares by Airport (2012)

Airport		Domestic	International
ABQ	Albuquerque International Sunport	100.0%	0.0%
BUR	Bob Hope Airport (Burbank)	100.0%	0.0%
ELP	El Paso International Airport	98.0%	2.0%
IWA	**Phoenix-Mesa Gateway Airport**	**0.3%**	**99.7%**
LAS	McCarran International Airport (Las Vegas)	92.0%	8.0%
LAX	Los Angeles International Airport	49.4%	50.6%
LGB	Long Beach Airport	99.9%	0.1%
ONT	LA/Ontario International Airport	100.0%	0.0%
PHX	**Phoenix Sky Harbor International Airport**	**98.3%**	**1.7%**
SAN	San Diego International Airport	95.8%	4.2%
SBA	Santa Barbara Municipal Airport	100.0%	0.0%
SNA	John Wayne Airport (Orange County)	100.0%	0.0%
TUS	Tucson International Airport	99.9%	0.1%
Weighted Average		**68.9%**	**31.1%**
Weighted Average (without LAX)		**98.4%**	**1.6%**

Source: U.S. DOT, T-100 Carrier Reports.

At the airports other than LAX, air freight is dominated by Domestic U.S. movements, representing, on average, over 98% of total air freight handled. LAX, with its abundance of international flights by both passenger and all-cargo carriers, has a much different profile whereby over 50% of its air freight is oriented to international movements.

In interpreting this data, it is important to note the manner in which air freight is designated as "International" or "Domestic" air freight. In this case, the source of the data is the U.S. DOT's T-100 Carrier Report, which compiles information from both U.S. and foreign-flag air carriers, by airport and nonstop destination from the respective airports. Therefore, air freight is only designated as "International" in the T-100 report if it is onboard a foreign-flag carrier or it is onboard a U.S. aircraft that is flying nonstop to/from international points. However, it is very common for air freight to move on a domestic U.S. flight and then transfer to another flight with an international destination. Thus, while the T-100 report accurately designates the movement of freight between airports, it does not capture detail as to the true origin or destination of that freight. In practice, only airports with existing international air services (schedule or non-scheduled) would show International air freight in the T-100 report. Due to the hub-and-spoke operations of many U.S. passenger and cargo airlines, it would be extremely difficult to record and report the movement of air freight by true origin and destination, as is the case with air passenger data.

It is also helpful to understand how air freight is carried at airports in the Study Region. For purposes of this analysis, air carriers are categorized in three ways: Integrators, Freighter

Operators and Passenger Carriers. Integrators refer to integrated express carriers such as FedEx and UPS. Freighter Operators include air carriers that operate all-cargo, freighter aircraft which do not carry commercial passengers. Passenger Carriers are airlines that carry commercial passengers, but can also utilize their belly space to carry cargo. No U.S.-based passenger airlines operate freighter aircraft in addition to their passenger aircraft, but there are several large foreign-flag carriers that continue to operate both types of aircraft in their fleets.

Exhibit 3.5 displays the distribution of air freight by carrier category at the Study Region airports. Again, it is useful to segment LAX from the other 12 airports when analyzing the information. LAX is a clear outlier in this analysis in that only 22% of LAX freight is carried by Integrators and the majority (54%) is carried by Passenger aircraft. Meanwhile, the Weighted Average (without LAX) calculation shows that close to 90% of all freight at the other 12 airports is carried by Integrators and only 9% is carried by Passenger aircraft.

Exhibit 3.5: Total Air Freight by Airport and Carrier Category Shares (2012)

		Air Carrier Category		
Airport		**Integrator**	**Freighter**	**Passenger**
ABQ	Albuquerque International Support	92%	1%	7%
BUR	Bob Hope Airport (Burbank)	96%	0%	4%
ELP	El Paso International Airport	80%	13%	6%
IWA	**Phoenix-Mesa Gateway Airport**	**0%**	**100%**	**0%**
LAS	McCarran International Airport (Las Vegas)	64%	0%	36%
LAX	Los Angeles International Airport	22%	24%	54%
LGB	Long Beach Airport	96%	0%	4%
ONT	LA/Ontario International Airport	98%	1%	1%
PHX	**Phoenix Sky Harbor International Airport**	**76%**	**9%**	**15%**
SAN	San Diego International Airport	84%	5%	11%
SBA	Santa Barbara Municipal Airport	50%	50%	0%
SNA	John Wayne Airport (Orange County)	92%	0%	8%
TUS	Tucson International Airport	95%	1%	5%
Weighted Average		49%	16%	36%
Weighted Average (without LAX)		87%	4%	9%

Source: U.S. DOT, T-100 Carrier Reports.

This analysis indicates a fundamental difference amongst the airports in the Study Region and LAX. All of the airports other than LAX are dominated by narrowbody, regional jet and turboprop aircraft flying to largely domestic U.S. points. While these aircraft can and do carry freight, the type of belly space and destinations served limit the overall appeal to select customers. The abundance and diversity of cargo capacity at LAX (widebody aircraft, narrowbody aircraft, and freighters) defines a much different profile for that airport than the rest of the Study Region's airports. LAX's mix of carriers and aircraft types serving numerous nonstop destinations allows it to service a wider array of customers than airports with less varied air services.

Further, a time series review of carrier category shares at the Study Region airports points out another important trend in the U.S. air cargo market. As mentioned previously, in the past 10-15 years, there has been substantial consolidation in the U.S. all-cargo industry. Numerous all-cargo carriers have ceased operations as the U.S. economy, modal shifts, high fuel prices and inefficient operations worked against their business models. At the same time, passenger carriers have chosen to service airports like those in the Study Region with fleets comprised almost exclusively of narrowbody, regional jet and turboprop aircraft. The changes have generally led to fewer service options offered to the shipping public at most airports.

Exhibit 3.6 shows a clear trend over a 10-year period between 2003 and 2012 in the way cargo is carried at the Study Region airports. For the majority of airports, the Integrators have increased their dominance of cargo tonnage. Integrated express carriers have experienced double-digit percentage increases at many airports during this period - to the point where they are nearing 100% at several airports. Granted, many of these airports are simultaneously experiencing overall lower cargo volumes than in the past, but the interpretation remains the same – without varied, cargo-friendly aircraft (passenger or all-cargo), the integrated carriers will likely continue to dominate and drive air cargo levels at the Study Region airports, other than LAX.

Exhibit 3.6: Total Cargo by Airport and Carrier Category Shares (2003 v. 2012)

		Share of Airport Total Cargo		
Airport	Year	Integrator	Freighter	Passenger
ABQ	2003	82%	3%	15%
	2012	92%	1%	7%
BUR	2003	86%	0%	14%
	2012	97%	0%	3%
ELP	2003	52%	29%	19%
	2012	80%	13%	6%
IWA	**2003**	**N/A**	**N/A**	**N/A**
	2012	**0%**	**100%**	**0%**
LAS	2003	40%	4%	56%
	2012	61%	0%	38%
LAX	2003	21%	20%	59%
	2012	21%	23%	56%
LGB	2003	78%	22%	1%
	2012	96%	0%	3%

		Share of Airport Total Cargo		
Airport	Year	Integrator	Freighter	Passenger
ONT	2003	92%	6%	2%
	2012	98%	1%	1%
PHX	**2003**	**55%**	**15%**	**30%**
	2012	**69%**	**8%**	**23%**
SAN	2003	60%	15%	25%
	2012	81%	5%	14%
SBA	2003	82%	0%	18%
	2012	50%	50%	0%
SNA	2003	66%	0%	34%
	2012	87%	0%	13%
TUS	2003	50%	14%	36%
	2012	95%	1%	5%

Source: U.S. DOT, T-100 Carrier Reports.

3.1.2 Summary of Air Cargo Roles of Study Area Airports

Based on this initial level of historic data analysis, the general roles of the airports in the Study Region as they relate to air cargo are determined and an assessment is made of their applicability moving forward in the Study. Factors considered in this process include: historic tonnage levels, types of air services and aircraft operating at the airports, degree of dominance by integrated carriers, ability to serve international flights and other elements.

Los Angeles International Airport (LAX)

A key Asia-Pacific gateway, Los Angeles International Airport (LAX) is the fifth busiest cargo airport in North America, and the thirteenth busiest cargo airport in the world. It is a major origin-destination market, with more than 50% of the airport's air cargo shipments originating or destined from an international market. LAX is the primary international cargo airport serving Southern California – one of the world's largest economies. An estimated 79% of the region's air cargo is handled through LAX. Because of its strategic location, the size of the California economy, and its ability to attract freight from across the U.S., LAX has a competitive advantage, which supports continued growth of air cargo activity at the airport. The growing numbers of air carriers, presently a total of 88 passenger and all-cargo airlines, and their worldwide service area have created an extensive air cargo network at LAX. In 2012, the airport handled nearly 1.8 million metric tons of cargo, equivalent to a 4.7% increase from 2011.

With more than half of the air cargo handled at LAX transported in belly space of passenger aircraft, LAX relies heavily on its role as a dominant passenger hub to the Asia-Pacific region to

support its air cargo growth. LAX ranks as one of the top three U.S. airports in terms of passenger traffic. In 2012, the airport served nearly 64 million passengers.

LA/Ontario International Airport (ONT)

In 2012, LA/Ontario International Airport (ONT) handled 454,800 tons of cargo and mail. Air cargo traffic at ONT grew by 8.2% in 2012 compared to 2011. ONT's position among the top 16 air cargo airports in North America and its location between three major freeways makes it a preferred location for companies active in the air-freight industry. With two runways in excess of 10,000 feet and a 24-hour operating environment, ONT has the potential to become a premier international cargo gateway. LA/Ontario is owned and operated by the Los Angeles World Airports ("LAWA") which also own LAX.

Freight carriers that serve ONT include UPS, FedEx, Ameriflight, West Air, and Empire Airlines. LA/Ontario is a major southwestern gateway hub for UPS. In addition to serving intra-regional traffic, the ONT hub links to UPS's global hub in Louisville. The Ontario hub processes inbound UPS Next Day Air and UPS 2nd Day Air packages destined for Los Angeles, San Bernardino, Orange, San Diego, Riverside and Ventura counties. It provides outbound package delivery service from homes and businesses in the Inland Valley for delivery to destinations around the world and serves as the gateway for UPS cargo flights to and from the Pacific Rim, including China.

Finally, LA/Ontario has aspirations of becoming a major air cargo gateway for general freight as well. The airport has the necessary infrastructure and on-airport developable land to accommodate air cargo growth. In the recent past, LAWA had plans to shift freighter activity from LAX to ONT to relieve congestion at LAX. Although this plan was never enacted, it shows the potential that ONT has to handle cargo operations and viably compete for air cargo in the Study Region.

McCarran International Airport (LAS)

With cargo volumes of over 91,000 metric tons in 2012, McCarran International Airport (LAS) is ranked as the 41st airport in North America for air cargo. Cargo tonnage at LAS rose by 6.4% in 2012 from 85,000 metric tons in 2011. As the main airport serving the Las Vegas region, LAS has continued to expand its air cargo business through its local economy, even though the region is largely services driven and lacks a major manufacturing industry. Air cargo growth at the airport is supported by continued new developments and reinvestments in the area, with Las Vegas slowly being recognized as a leading business center. In support of the increasing air cargo potential at LAS, the airport has opened a new cargo terminal to increase cargo capacity at the airport and serve additional cargo operators. Current tenants of its new air cargo facility include UPS, US Airways, Airport Terminal Services, Allegiant, Worldwide Flight Services, Inc., Southwest Airlines, and FedEx. In addition, LAS ranked 9th in passenger traffic among other U.S. airports, handling close to 41 million passengers in 2012. The high level of passenger service at the airport enables LAS to offer a significant amount of available belly space for air cargo.

Notably, LAS has widebody passenger service from several airlines including Hawaiian Airlines, British Airways, Korean Air, Condor, and Virgin Atlantic. The abundance of belly cargo capacity available due to these air services gives LAS the potential to effectively compete for air cargo in the Study Region. Further, the location of LAS, bordering Arizona and just a 6 hour drive from the Phoenix area, makes it a legitimate competitor for air cargo demand generated in Arizona and the broader Study Region.

San Diego International Airport (SAN)

San Diego International Airport (SAN) ranks fourth in terms of air cargo volumes within the Study Region and 32nd for air cargo in North America. SAN has numerous international services including nonstop, widebody service to Europe and Asia and several narrowbody services to Canada and Mexico. The airport has abundant U.S. domestic air service by all of the major U.S. airlines. In addition, FedEx and UPS offer services at SAN. Geographically, SAN is located approximately 2 hours from LAX where numerous air cargo services are available for shippers in the San Diego and Northern Mexico region. In addition, SAN has severe constraints on developable on-airport property which restricts the level of air cargo growth at the airport. Further, noise curfews at the airport limit the operational hours of certain aircraft at SAN which can negatively impact the growth of cargo airlines.

Albuquerque International Sunport (ABQ)

In the past decade, cargo at Albuquerque International Sunport (ABQ) has increased by more than 190%. In 2012, shippers moved almost 59,000 metric tons of goods through ABQ's air freight center. Though experiencing growth, cargo volumes at ABQ are still relatively low in addition to an air service profile that is not supportive of significant air cargo growth. The air services at ABQ are largely regional jets and smaller narrowbody equipment. These air services are indicative of the size of the passenger market and ABQ's role as a spoke airport. Air cargo service is currently provided by FedEx and UPS. It is unlikely that this profile will change in the near term to bring additional services and cargo capacity to the area.

El Paso International Airport (ELP)

El Paso International Airport (ELP) is currently ranked 47th in North America for air cargo tonnage. The airport experienced a 2.9% growth in air cargo traffic, handling more than 85,000 metric tons of air cargo in 2012. ELP continues to develop as a key site for U.S.-Mexico commerce, with El Paso serving as a centralized intermodal hub. The airport's location along the U.S.-Mexico border and proximity to the Latin America region enables ELP to play an important role in facilitating the movement of goods to and from the U.S.

In recent years, ELP has developed its air cargo facilities with the final objective to create a fully integrated transportation center. This development included two 144,000 square foot air cargo buildings and over 34 acres of aircraft parking. ELP is the only modern air cargo complex on the border with immediate expansion capabilities, allowing a clear advantage in border trade and associated economic development issues. These new facilities are centered in a future industrial park designed to fit the "just in time" nature of U.S.-Mexico trade. Although ELP has adequate cargo-related infrastructure, its air services are not conducive to cargo growth as the

cargo community prefers larger aircraft with more frequent flights than are currently available at ELP.

Tucson International Airport (TUS)

As Arizona's second largest airport, Tucson International Airport's (TUS) status as a designated U.S. Port of Entry with 24-hour Customs and Immigration services combined with its close proximity to I-10 and I-19 leading to Nogales, Mexico puts TUS in a key position to grow cargo operations. Cargo growth opportunities can be accommodated on-airport as there is land available for airside industrial development and TUS is a designated Foreign Trade Zone. The air services at TUS are largely regional jets and smaller narrowbody equipment. These air services are indicative of the size of the passenger market and TUS's role as a spoke airport. Air carriers currently operating at TUS are American Airlines, Delta Air Lines, Southwest Airlines, FedEx, Ameriflight and Sierra Pacific Airlines. In 2012, integrated carriers (FedEx and UPS feeder carrier Ameriflight) handled 95% of the air cargo at TUS.

Phoenix-Mesa Gateway Airport (IWA)

Phoenix-Mesa Gateway Airport, located in Mesa, Arizona, is a thriving commercial airport that has experienced tremendous growth in passenger services in recent years. While the current passenger services have not led to meaningful cargo activity, there is an interest and plans to grow cargo volumes at the airport. In 2004, a third-party developer constructed an on-airport cargo facility adjacent to IWA's 11-acre cargo apron. The airport handles periodic cargo charter flights for Phoenix-area businesses and its three long runways (two over 10,000 feet long and one over 9,000 feet long) are able to accommodate the world's largest cargo aircraft. Phoenix-Mesa Gateway has excellent access to the interstate highway system and has designated on-airport property for future cargo-related development. The airport is located within a Foreign Trade Zone and has on-airport U.S. Customs which facilitate international trade activities.

Phoenix Goodyear Airport (GYR)

Phoenix Goodyear Airport is located in Goodyear, Arizona just 20 miles west of downtown Phoenix. The airport is designated as a general aviation reliever airport to Phoenix Sky Harbor International Airport. GYR has no commercial airline activity and is a center for flight training, aircraft maintenance, repair and overhaul, and aircraft storage. The airport has a runway measuring 8,500 feet in length. Phoenix Goodyear Airport is owned and operated by the City of Phoenix. There are no plans to add cargo-related services, infrastructure or facilities at the airport.

Phoenix Deer Valley Airport (DVT)

Phoenix Deer Valley Airport is located 25 miles north of Phoenix Sky Harbor International Airport. Like Phoenix Goodyear Airport, DVT is designated as a general aviation reliever airport PHX. The airport has no commercial airline activity and is a center for flight training, general aviation and business aviation. The airport has a runway measuring 8,200 feet in length. Phoenix Deer Valley Airport is owned and operated by the City of Phoenix. There are no plans to add cargo-related services, infrastructure, or facilities at the airport.

Other Southern California Airports

Considering the smaller airports in the Los Angeles Basin, a primary determinant in their relevance is the air cargo volumes they handle. Of the airports identified in the Study Region, Bob Hope Airport (BUR), Long Beach Airport (LGB), John Wayne Airport (SNA), and Santa Barbara Municipal Airport (SBA) handle the lowest levels of air cargo – with the exception of Phoenix-Mesa Gateway Airport. Collectively, these four Southern California airports are limited in their abilities to materially expand their air cargo levels due to proximity to LAX, lack of appropriate facilities and infrastructure, the profile of air services they attract, and their focus on the passenger markets of Southern California. For these reasons, the four smaller airports of the Los Angeles Basin are deemed less relevant to this Study and will not be analyzed further. Brief profiles of these four airports as they relate to air cargo are provided below.

Burbank Bob Hope Airport (BUR):

- BUR is surrounded by residential development. The airport has noise abatement procedures and restrictions in place for certain types of aircraft and activities between 10 p.m. and 7 a.m. Curfews have a disproportionate effect on air express carriers whose delivery commitments generally require arrivals and departures during hours when curfews are in effect.
- BUR has little desire to nurture air cargo growth and has noise abatement programs and other limitations that constrain the ability of express carriers to operate effectively.
- Both FedEx and UPS provide service to BUR. Several other commercial passenger airlines provide belly cargo services.
- Although convenient access to several highways exists, heavy traffic in the vicinity creates delays.

Long Beach Municipal Airport (LGB):

- FedEx and UPS operate service at LGB.
- LGB has one of the strictest ordinances in the nation for noise and number of commercial flights per day.
- Local community groups are vocal about operational and physical changes made at the airport.
- Heavy surface transportation bottlenecks near the airport create freight delivery delays.

John Wayne Airport Santa Anna (SNA):

- FedEx and UPS operate service at SNA.
- Air cargo facilities were recently relocated and no other air cargo projects are currently planned.
- SNA has little desire to nurture air cargo growth and has noise abatement programs and other limitations that constrain the ability of express carriers to operate effectively.

- SNA has one of the most stringent aircraft access and noise monitoring programs in the United States which presents some constraints to air carriers from reaching optimal efficiency.
- Surface transportation networks north of SNA experience major traffic congestion which is considered among the worst in California.

Santa Barbara Municipal Airport (SBA):

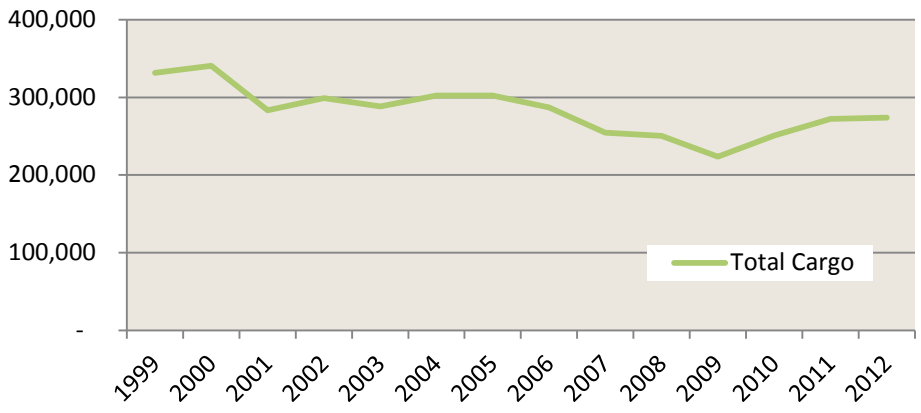
- SBA's all-cargo services are solely comprised of FedEx and UPS feeder flights with small, turboprop aircraft.
- SBA's location and facilities encourage trucking of cargo to other area airports.

Phoenix Sky Harbor International Airport (PHX)

Detailed air cargo data supplied by Phoenix Sky Harbor was utilized to perform additional analysis of the airport's cargo operations.

In 2012, PHX carriers handled over 270,000 metric tons of air cargo, nearly the same amount handled in 2011. As noted previously for the Study Region airports, PHX experienced a substantial decline (-11%) in air cargo between 2008 and 2009 due to the impacts of the U.S. recession. However, **Exhibit 3.7** below shows that prior to 2009, there had been an overall trend of declining cargo volumes at PHX. Air cargo tonnage peaked in 2000 at 340,000 metric tons and, after a significant drop in 2001, remained relatively flat between 2001 and 2006. The peak in 2000 corresponds with the internet boom that led to high activity in the electronics and semiconductor sectors which are prevalent in the Phoenix region. By 2001, the internet boom cooled and U.S. economic growth slowed. The combined effect of these factors (along with the after-effects of the September 11 terrorist attacks) was quickly seen in declining air cargo volumes that year. While tonnage has recovered at PHX since the 2009 dip, flat growth - like that experienced between 2011 and 2012 - is anticipated for the near future by most industry observers.

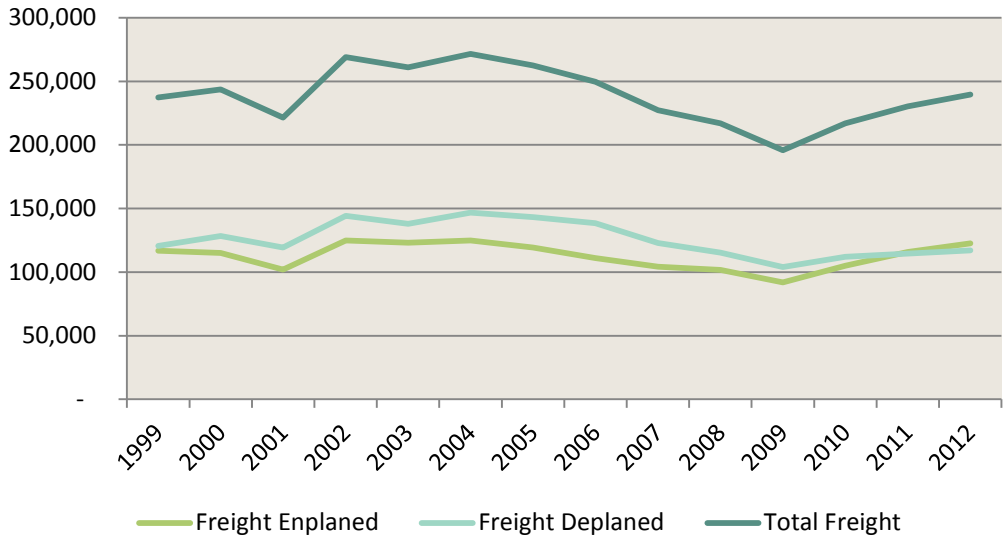
Exhibit 3.7: Total Air Cargo at PHX (Metric Tons)



Source: Phoenix Sky Harbor International Airport.

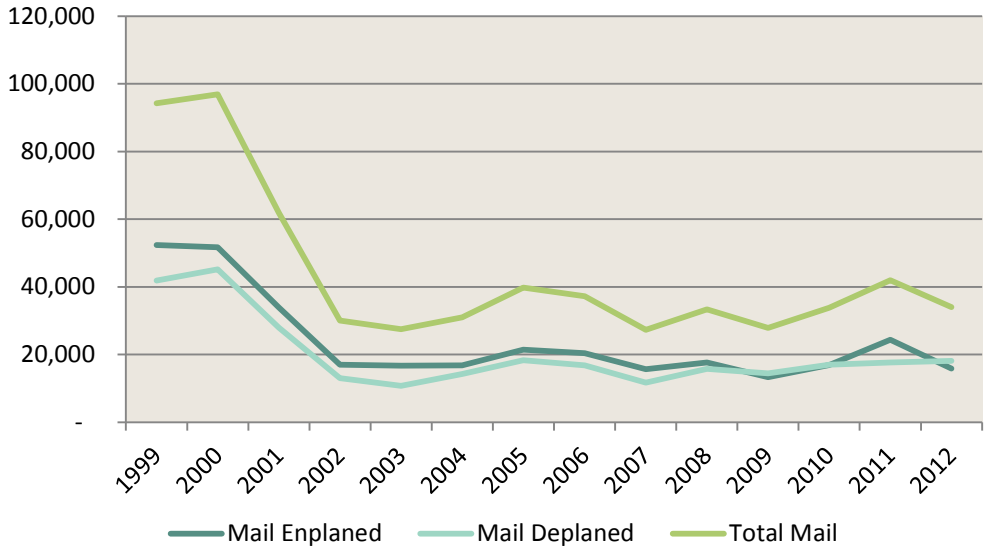
Further analysis of the PHX air cargo data reveals other interesting dynamics during the period 1999-2012. Looking at air freight (**Exhibit 3.8**) and air mail (**Exhibit 3.9**) separately, it is clear that PHX tonnage was severely impacted by changes in the way air mail was transported. In 2001, the U.S. Postal Service signed a long-term contract with FedEx to provide air capacity for U.S. mail in the domestic market. As FedEx took control of those operations, it also shifted the way mail was routed at airports. The effects of these decisions at PHX are shown in **Exhibit 3.9** where mail tonnage dropped almost 70% (or 67,000 metric tons) between 2000 and 2002. Substantial mail volume was diverted from belly capacity of passenger airlines and into the FedEx system. Since the major changes in 2001-2002, mail tonnage has remained stable, but at much lower levels than pre-2001. Notably, the high levels of air mail previously experienced at PHX will likely not return as the U.S. Postal Service just signed another 7-year contract with FedEx in April 2013 for carrying mail in the U.S. domestic market. Importantly, it should also be noted that between 2001 and 2002, air freight at PHX grew by over 21%. This is likely a result of passenger airlines having more belly space available for the market after the mail volumes were lost to FedEx. In fact, the 47,000 metric ton increase in air freight from 2001-2002 more than offset the 32,000 metric ton loss of air mail during the same period. This is significant in that it shows that the general air freight market is responsive to capacity availability at PHX.

Exhibit 3.8: Air Freight at PHX (Metric Tons)



Source: Phoenix Sky Harbor International Airport.

Exhibit 3.9: Air Mail at PHX (Metric Tons)



Source: Phoenix Sky Harbor International Airport.

Air cargo is carried by a variety of airlines at PHX, including integrated express carriers, passenger airlines and operators of freighter aircraft. **Exhibit 3.10** identifies the top cargo carriers at PHX in 2012 in terms of share of total cargo handled at the airport. Not surprisingly FedEx and UPS lead the way due to their concentration on express freight and the operation of large all-cargo airplanes. US Airways and Southwest have robust service levels at PHX and, while it is narrowbody aircraft capacity, their service appeals to many shippers who like the high frequency and variety of direct destinations to/from PHX. Notably, British Airways ("BA") captured 1.2% of total air cargo at PHX, despite operating less than daily service at PHX in 2012. While the British Airways' share of cargo may seem modest, the share of cargo relative to its low level of operations is evidence of the appeal of a widebody international service to the air cargo market.

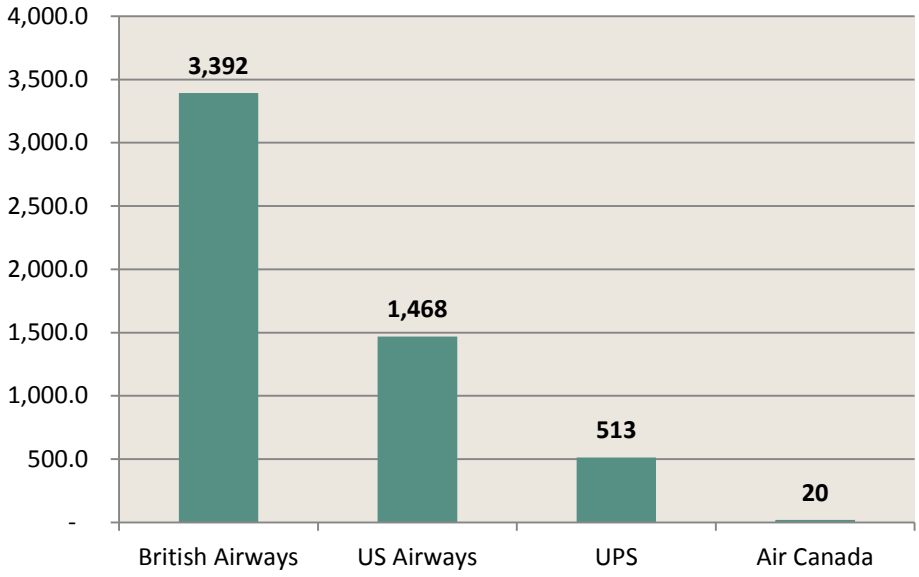
Exhibit 3.10: PHX Air Cargo by Carrier

Air Carrier	2012 Share of PHX Total Air Cargo
FedEx	41.1%
UPS	24.0%
US Airways	16.4%
Southwest Airlines	5.6%
DHL	5.5%
Ameriflight	1.7%
United / Continental	1.5%
British Airways	1.2%
Delta Air Lines	1.2%
All Other Carriers	1.8%
Total	100.0%

Source: Phoenix Sky Harbor International Airport.

Exhibits 3.11 and **3.12** below show tonnage designated as international air cargo designated at PHX in 2012. Four airlines carried a total of 5,400 metric tons, with the majority 3,392 tons (or 63% of the international total) being carried by BA alone. US Airways' direct international services at PHX accounted for another 27% of the total. Again, the tremendous impact of widebody passenger services on cargo volumes can be seen in this data. British Airways' Boeing 747 operated just six days per week through November 2012, but carried 130% more cargo than US Airway's combined international freight. Further, with daily service by BA commencing in December 2012, the cargo figures at PHX for the airline should increase substantially.

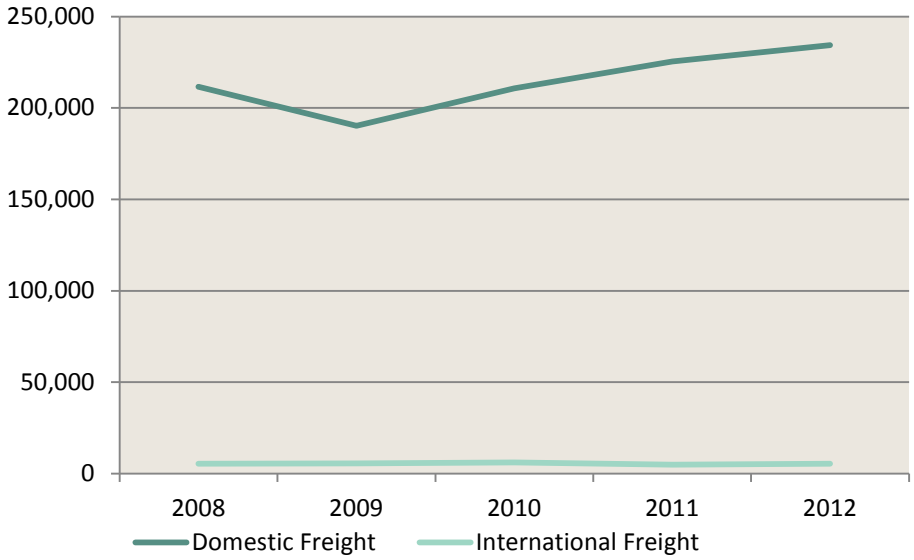
Exhibit 3.11: 2012 International Air Cargo at PHX by Carrier (Metric Tons)



Source: Phoenix Sky Harbor International Airport.

As discussed previously, international air cargo is designated as cargo moved on flights at PHX to/from points outside of the U.S. Based on this definition, just 2% of PHX's total freight was international. Again, this is mainly driven by the dominance of domestic air services at PHX and is not indicative of the amount of international air freight being generated in the Phoenix/Arizona region. This data can, however, signal upside opportunity at PHX in that direct international air freight capacity is relatively scarce at the airport, although there is demand for inbound and outbound international shipments.

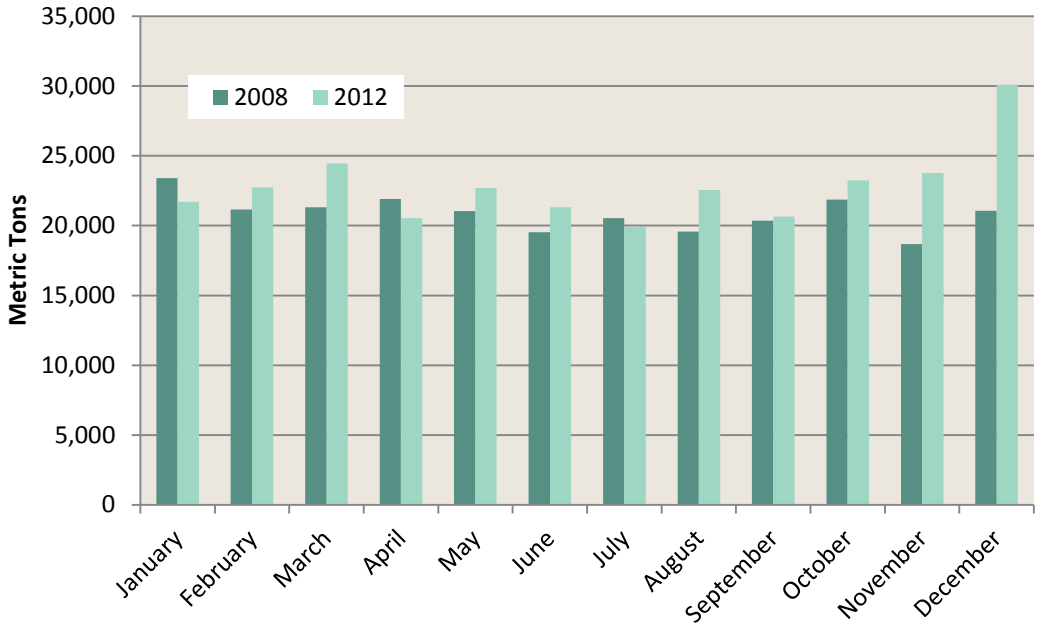
Exhibit 3.12: PHX Air Freight – Domestic versus International (Metric Tons)



Source: Phoenix Sky Harbor International Airport.

A final review of historic data for PHX analyzes air cargo volume by month at the airport (**Exhibit 3.13**). This analysis is performed to determine the potential seasonality of the PHX air cargo market. From a planning perspective, seasonality is important as it can often drive peak levels of traffic at an airport that are quite different from other times of the year. In 2008, PHX cargo levels were relatively even from month to month. However, in 2012, a noticeable peak can be seen in December, when tonnage reaches 30,000 metric tons versus an average of 22,000 metric tons in the preceding eleven months. The December tonnage translates to a 35% increase over the average tonnage from January to November. Assuming this seasonal peaking pattern continues, it may have implications on facility and infrastructure requirements at PHX. In fact, much of the December volume is attributable to the relatively new and large presence of online retail distribution centers in the Phoenix metropolitan area. These retailers, including Amazon and Macy's, ship goods year round via PHX, but activity spikes during the Holiday shopping season in December. While many airlines are carrying online retail shipments at PHX, the integrated carriers handle the majority of the volume – and particularly during the Holiday period when on-time deliveries are extremely important to customers.

Exhibit 3.13: PHX Air Cargo by Month (2008 v. 2012)



Source: Phoenix Sky Harbor International Airport.

3.1.3 International Air Trade Data

To complete the review of historic data, air trade from the U.S. Census Bureau's Foreign Trade Statistics database was analyzed. For this Study's objectives, it was determined that the focus would be on international air trade in markets that could be relevant to the airports in the Phoenix metropolitan area. As shown in the previous section of this report, domestic air cargo markets are readily served by passenger airlines and cargo carriers who already have an established presence at PHX. Also, domestic cargo markets are increasingly well-served by surface modes that limit growth opportunities for potential new entrant air cargo carriers or even existing passenger airlines that carry freight in the bellies of their aircraft. Finally, the U.S. domestic market is mature and forecasts predict slow growth in the market for the foreseeable future.

On the other hand, international air cargo markets are forecast to experience healthy growth over the next two decades. International cargo markets are served by a variety of passenger and all-cargo air carriers that can then link many other markets via their vast networks. By better understanding international air cargo markets relevant to the Phoenix area airports, trends and potential opportunities can be identified for air imports and exports.

3.1.4 State Level Analysis

The Census Bureau's Foreign Trade Statistics database is, by far, the most robust data source for analyzing U.S. air trade with international markets. This database reports air imports and exports based on air waybills filed by shippers for goods entering into or exiting from the U.S. The data is highly granular and includes commodity level trade detail by individual states and foreign country markets. Both value and weight are reported for the commodities. Further, the Foreign Trade Statistics include port level information thereby allowing for some analysis of air cargo routing patterns.

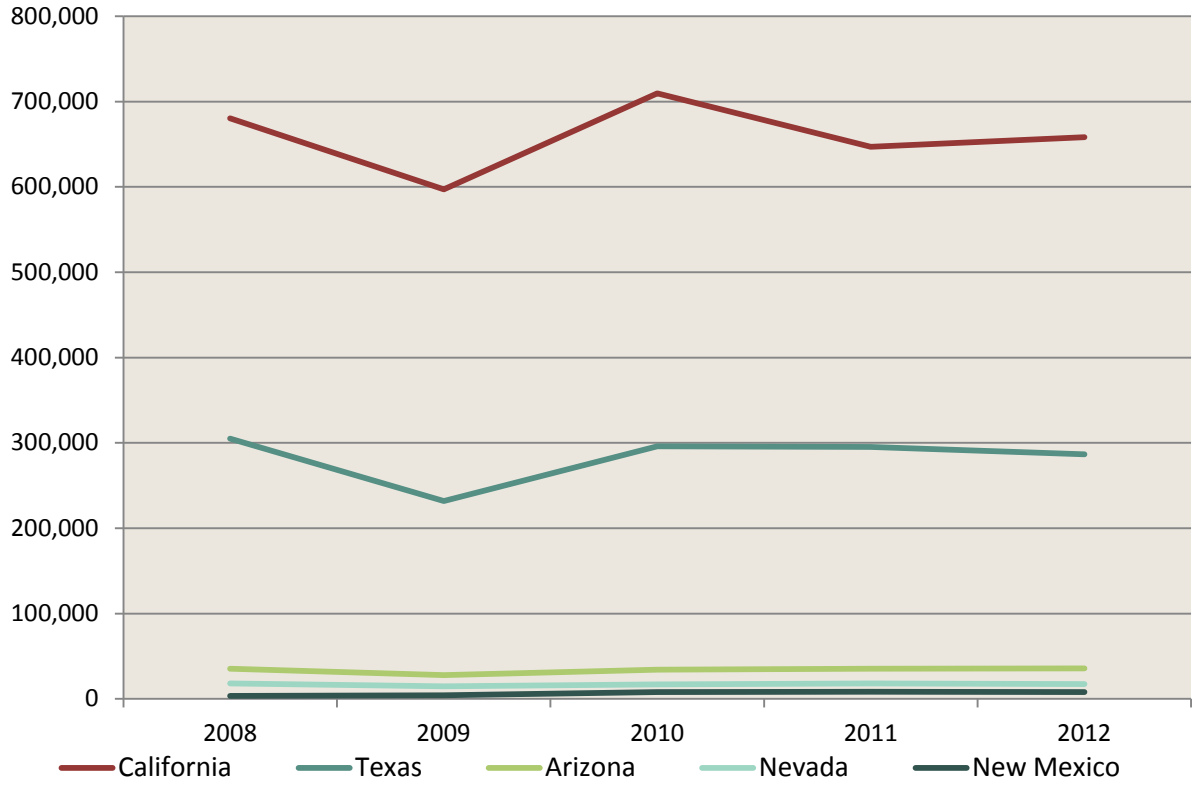
Because the foreign trade data is primarily reported at the state level, it is reasonable to begin this analysis with a focus on the states that are included (or partially included) within the Study Region. Accordingly, air trade data was reviewed for the states of Arizona, California, Nevada, New Mexico, and Texas. As the core market for the Phoenix area airports, air trade for Arizona will receive additional treatment in terms of historic data review and analysis.

In this section, a series of data sets are presented to describe the relevant air cargo markets. Data is available for air imports by state from 2008 while air export data is available from 1996.

Air Imports and Exports by State

Exhibits 3.14 and **3.15** below show the import and export tonnage by state in both graphical and tabular formats. This data enables an understanding of the relative market sizes and how the states compare overall in terms of air trade trends.

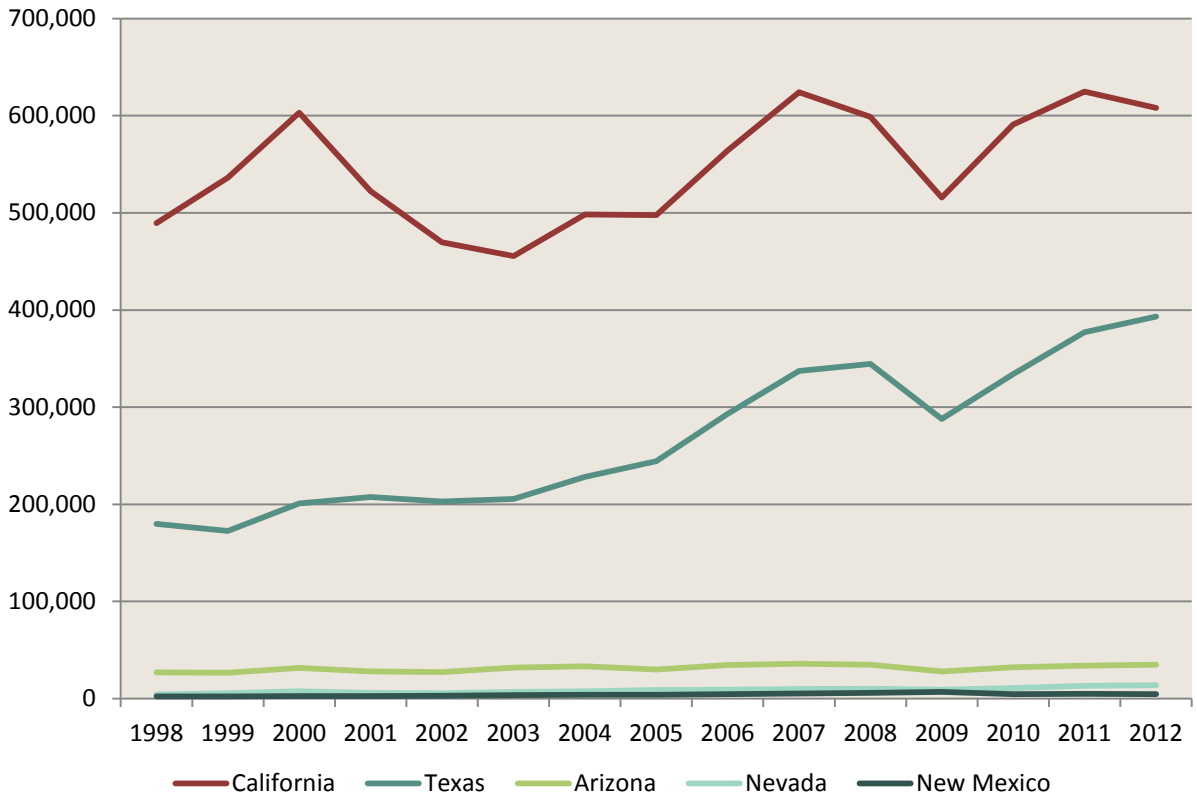
Exhibit 3.14: Air Imports by State (Metric Tons)



	2008	2009	2010	2011	2012
USA	3,832,526	3,194,752	4,020,913	3,831,632	3,747,333
California	680,346	597,074	709,437	647,130	658,293
Texas	304,960	231,816	296,148	295,252	286,773
Arizona	35,467	27,736	34,104	35,408	35,912
Nevada	18,087	14,553	16,793	18,150	17,458
New Mexico	3,579	4,408	8,119	8,394	8,157

Source: U.S. Census Bureau, Foreign Trade Statistics.

Exhibit 3.15: Air Exports by State (Metric Tons)



	1998	2000	2002	2004	2006	2008	2010	2012
USA	2,569,245	2,800,669	2,311,831	2,693,253	3,050,004	3,350,332	3,432,527	3,408,302
California	489,391	603,263	469,544	498,497	564,385	598,672	590,869	607,905
Texas	179,726	200,815	202,875	228,119	293,199	344,540	334,127	393,410
Arizona	26,922	31,570	27,277	33,171	34,592	34,904	32,094	34,823
Nevada	4,284	7,515	5,423	7,554	9,149	10,104	10,923	13,859
New Mexico	2,370	2,480	2,938	3,821	4,571	5,913	4,527	4,534

Source: U.S. Census Bureau, Foreign Trade Statistics.

Both Exhibits clearly show the discrepancies between states with respect to air trade. California and Texas have the two largest economies in the United States and are leaders when it comes to international trade, in general. Indeed, in terms of Gross Domestic Product ("GDP"), these two states rank very high when compared to entire countries. Given their dominant economic positions, it is not surprising that they are, by far, the largest states for air trade of the states considered in the analysis.

Further, both California and Texas have large international airports and cargo hub airports that facilitate their global trade activities. In California, Los Angeles International Airport and San Francisco International Airport ("SFO") are amongst the country's largest passenger airports and they rank 5th and 19th, respectively, amongst North American airports for air cargo tonnage. Two other California airports also handle substantial cargo volumes with Oakland International ("OAK") and LA/Ontario International ranked 13th and 16th, respectively in North America. FedEx operates a hub at OAK and UPS operates a hub at ONT. In Texas, Dallas/Fort Worth International Airport ("DFW") and Houston's George Bush Intercontinental Airport ("IAH") are home to large passenger airline hubs for American Airlines and United Airlines, respectively. Dallas/Fort Worth and Houston are both served by foreign carrier freighter aircraft as well. Amongst North American airports, DFW ranks 11th and IAH ranks 14th in terms of cargo tonnage. While it may be difficult to argue that the presence of large international airports or cargo hubs leads companies to produce or demand more import/export commodities, it stands to reason that these types of airports help attract the kinds of companies that import and export goods by air.

In 2012, Arizona ranked 25th in the U.S. in terms of air trade tonnage. Amongst the five states shown in **Exhibits 3.14** and **3.15**, Arizona falls in the middle – it is several times smaller than California and Texas for both imports and exports. However, for air imports, Arizona is 50% larger than Nevada and 650% larger than New Mexico. For air exports, Arizona is 150% larger than Nevada and almost 700% larger than New Mexico.

Despite the wide variations in the size international air trade amongst these states, it is interesting to observe that all five states had similar trends between 2009 and 2012. All experienced double-digit declines in air trade in 2009, similar recoveries in 2010 (except New Mexico), and similar flat trade levels since 2010. While import and export levels vary from state to state, the effects of the global economy are felt equally by all participants in international trade.

3.1.5 Airport of Exit Data

A second analysis of the states in the Study Region looked at the way in which U.S. air freight is routed to international markets. The Census Bureau's Foreign Trade Statistics report this information for U.S. exports only, but it is assumed that import routings would occur in similar ways and proportions. The data allows for an analysis of the "airports of exit" (defined as the last U.S. airport freight departs from prior to entering a foreign country) for the air exports of each state. Essentially, the analysis provides information as to where a state's air freight is "leaking" to airports in other states and the amount of that leakage.

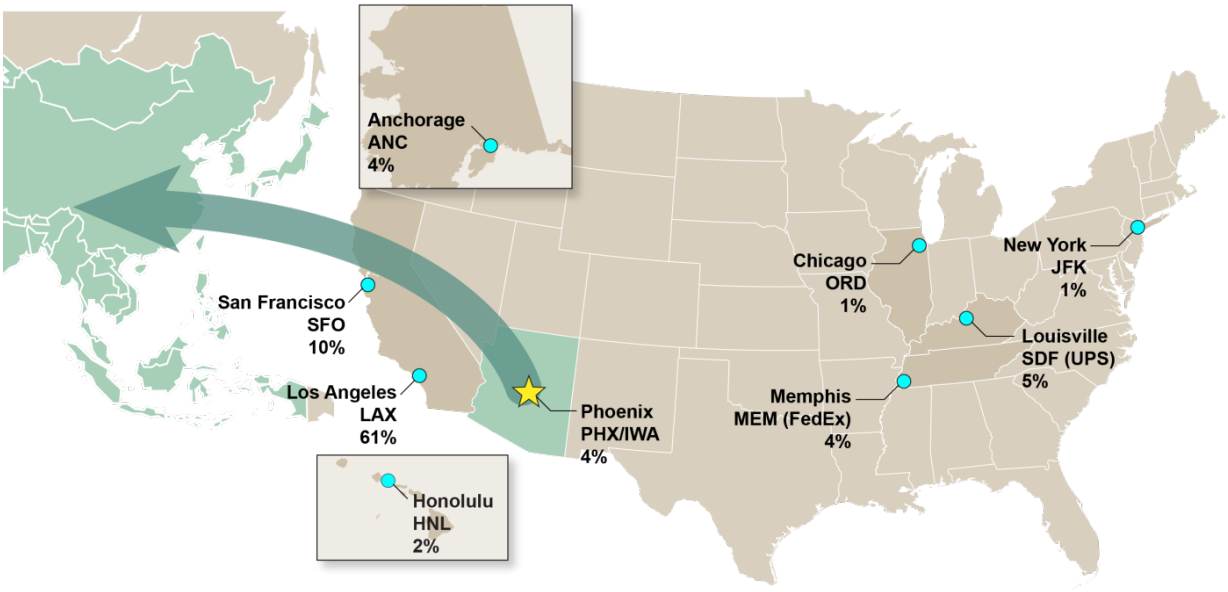
Exhibits 3.16 and **3.17** below provide examples of the output of this analysis for Arizona's exports to Asia and Europe. In this example, it can be observed that LAX handles 61% of Arizona's air exports to Asia and 43% of Arizona's exports to Europe. Other airports capture varying amounts of Arizona's exports – often in relation to their distance from Arizona and the amount of direct international air cargo services available (via both passenger and freighter aircraft). In 2012, the data shows that the Phoenix area airports handled 12% of Arizona's

exports to Europe. While this share of exports to Europe may seem negligible, it is largely the result of British Airways' nonstop London services at PHX. Again, this international air route was only operated six days per week in 2012, but it clearly has a tremendous impact on PHX's ability to capture shipments of Arizona goods bound for foreign markets.

The airport of exit analysis also shows the many options available to shippers in moving air-eligible goods. Depending on a multitude of factors (including ultimate destination, preferred air carrier, time sensitivity, use of trucks versus airplanes to reach the airport of exit etc.), an air freight shipment can be routed via more than ten U.S. gateway airports. In this manner, it is legitimate for airports to consider other airports as competitors for air cargo, even if they are separated by thousands of miles.

Finally, it should be noted that the Foreign Trade Statistics' port of exit data contain certain characteristics that require explanation. First, anomalies in the data show that the Phoenix airports handled 4% of the State's exports to Asia – which would be unlikely without direct services to Asia. This data point is likely a result of miscoding's by shippers on air waybills. Second, the port of exit data correctly shows integrated express carrier hubs such as Louisville and Memphis as the last U.S. airport for many Arizona exports. However, it is important to understand that these shipments were actually handled at PHX via the FedEx and UPS sort facilities and onward flights to their respective U.S. hub airports.

Exhibit 3.16: Arizona Air Exports to Asia by Airport of Exit (2012)

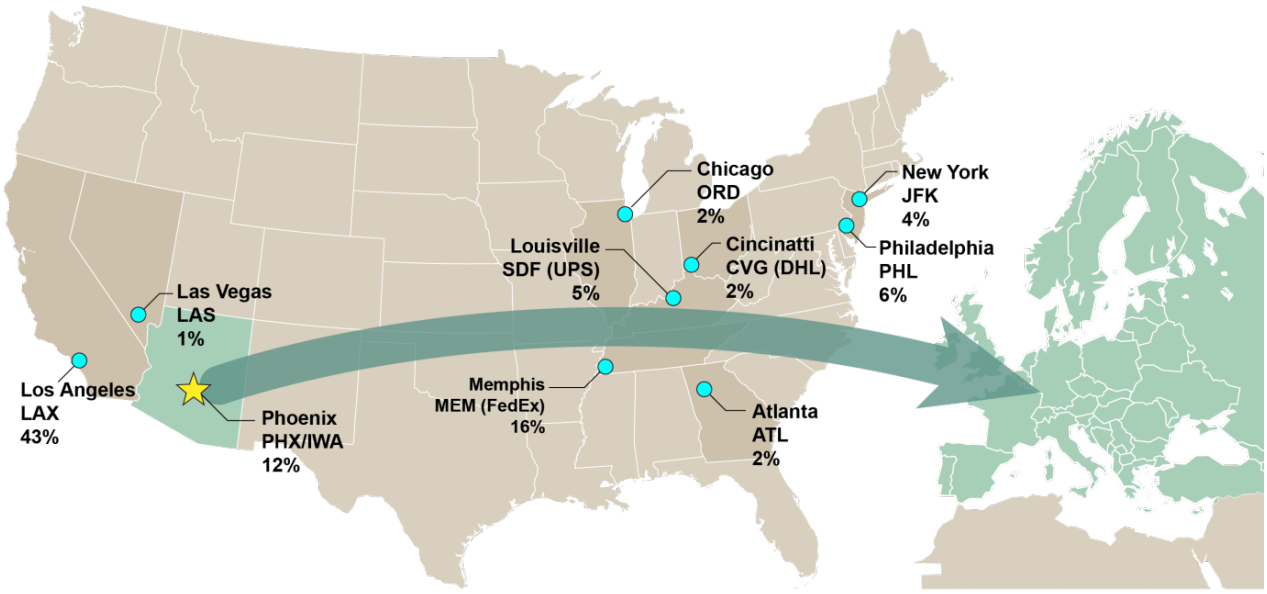


City/Airport = Gateway City for Arizona Air Exports to Asia
% = Share of Arizona Air Exports to Asia

All Other U.S. Gateways 8%

Source: U.S. Census Bureau, Foreign Trade Statistics.

Exhibit 3.17: Arizona Air Exports to Europe by Airport of Exit (2012)



City/Airport = Gateway City for Arizona Air Exports to Europe
% = Share of Arizona Air Exports to Europe

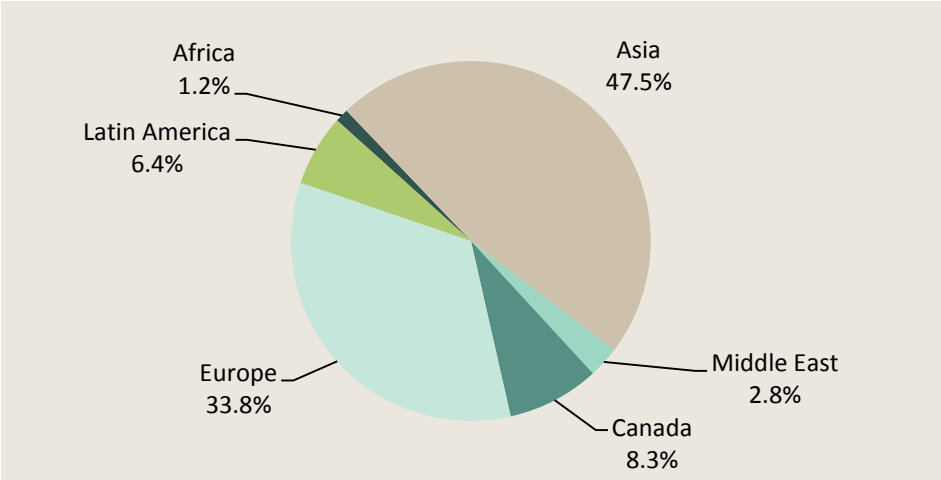
All Other U.S. Gateways 7%

Source: U.S. Census Bureau, Foreign Trade Statistics.

3.1.6 Arizona's International Trade by Geography

The Census Bureau's Foreign Trade Statistics allows for analysis of Arizona's international air cargo market by the foreign origins and destinations of commodities shipped by air. As introduced in Chapter 1, Arizona's air trade is dominated by Asia and Europe (see **Exhibit 3.18**). Asia alone accounts for almost one-half of Arizona's combined air imports and exports, while Europe represents one-third of the State's total trade volume. It is logical that Asia is Arizona's largest trading partner, given the State's location in the Western U.S. where supply chains with Asia are strong. Also, many of the types of products manufactured in Arizona, including semiconductors, electronics and aerospace parts, have natural ties with the Asian markets. Canada and Latin America also represent significant air trade partners with Arizona, albeit at much lower levels than Asia and Europe. Latin America is a particularly interesting market given the large and fast-growing economies of South America.

Exhibit 3.18: Shares of Arizona Air Trade Weight by World Region (2012)

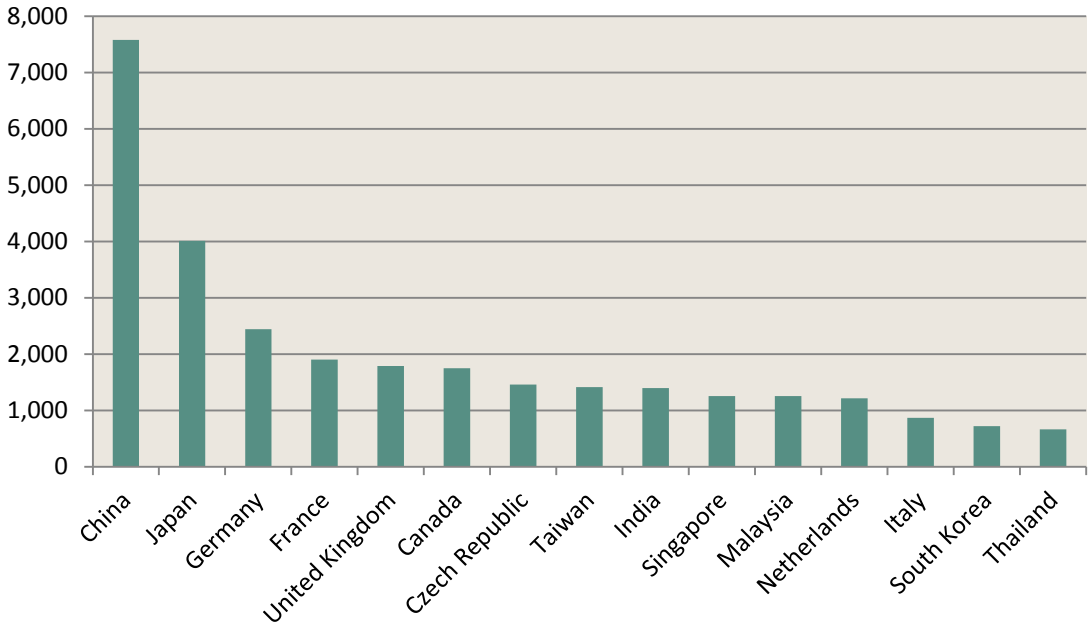


Source: U.S. Census Bureau, Foreign Trade Statistics.

Arizona's air trade is analyzed further at the country level in **Exhibits 3.19** and **3.20**.

As with most U.S. states, China is Arizona's largest trading partner for air imports. While much has been reported about China's rising labor costs and its declining production levels, the country remains a vast supplier of goods to the U.S. market. By itself, China accounts for 21% of Arizona's total air imports. Even with the structural changes occurring in China, it is highly unlikely that the country will cede its dominant trading position in the foreseeable future. Behind China, for Arizona's imports, is a list of some of the world's largest economic engines – including Japan, Germany, France, and the United Kingdom. Notably, aside from China, Japan and Germany, there appears to be a level of parity amongst the State's partner countries for imports.

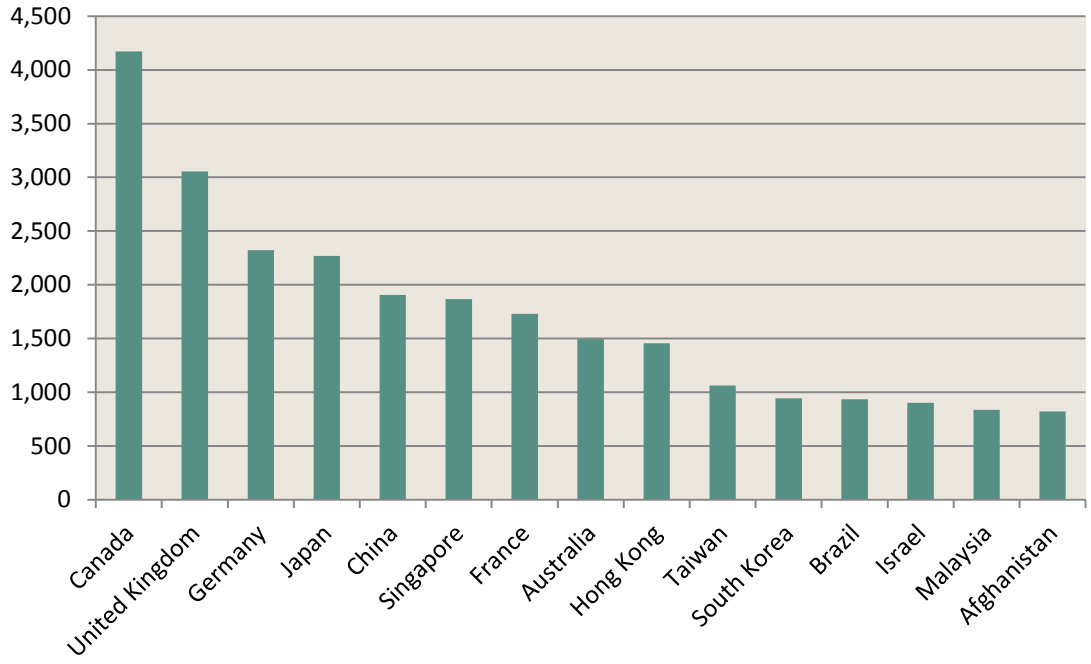
Exhibit 3.19: Top Country Markets for Arizona's Air Imports (2012)



Source: U.S. Census Bureau, Foreign Trade Statistics.

Interestingly, Arizona's leading partner for air exports is not located in Asia or Europe, but rather Canada. Canada has always been one of the United States' largest trading partners, but most of that trade is simply trucked across the border. With Arizona located well south of the Canadian border, it is reasonable that air transportation is a viable alternative for shipments originating in the State. After Canada, the list of export trading partners is very similar to the list of import trading partners. A comparison of the tonnage levels for imports and exports shows that several countries have relatively balanced trade flows with Arizona. This is important in that trade imbalance is one of the biggest challenges for air cargo, where aircraft fly almost full in one direction, but largely empty in the other direction. As stated in Chapter 1, Arizona has overall balance between import and export volumes and this is a very positive attribute from the viewpoint of air cargo service providers.

Exhibit 3.20: Top Country Markets for Arizona's Air Exports (2012)



Source: U.S. Census Bureau, Foreign Trade Statistics.

An analysis of Arizona's air trade commodities is of interest because it provides insights into the types of industries and companies in the State that are producing and consuming air-eligible goods. **Exhibits 3.21** and **3.22** provide lists of the top Arizona commodities for imports and exports, respectively. As noted previously, many of these are commodities that can be characterized as high-value, low-weight goods that are typically shipped by air. Both imports and exports are led by Electric Machinery and Industrial Machinery/Computers. Combined, these two commodity categories account for roughly one-half of Arizona's air imports and exports by weight. Interestingly, the imports include vegetables and the exports include metals like iron, steel and copper. Given the large presence of semiconductor manufacturers in the Phoenix area who are known to utilize air cargo, it should be noted that Semiconductors fall under the leading category of Electric Machinery.

Exhibit 3.21: Top 10 Arizona Air Import Commodities (2012)

Rank	Description	Metric Tons	Share of Total
1	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	10,988	31%
2	Industrial Machinery, Including Computers	7,142	20%
3	Special Classification Provisions	3,505	10%
4	Optic, Photo Etc, Medic Or Surgical Instruments Etc	1,974	5%
5	Vehicles, Except Railway Or Tramway, And Parts	1,293	4%
6	Edible Vegetables & Certain Roots & Tubers	915	3%
7	Ceramic Products	840	2%
8	Oil Seeds Etc.; Misc Grain, Seed, Fruit, Plant Etc	816	2%
9	Arms And Ammunition; Parts And Accessories	735	2%
10	Plastics And Articles Thereof	671	2%
Other	All Other Commodities	7,052	20%
	TOTAL ALL COMMODITIES	**35,931**	**100%**

Source: U.S. Census Bureau, Foreign Trade Statistics.

Exhibit 3.22: Top 10 Arizona Air Export Commodities (2012)

Rank	Description	Metric Tons	Share of Total
1	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	7,642	22%
2	Industrial Machinery, Including Computers	7,623	22%
3	Aircraft, Spacecraft, And Parts Thereof	3,055	9%
4	Plastics And Articles Thereof	2,227	6%
5	Optic, Photo Etc, Medic Or Surgical Instruments Etc	1,981	6%
6	Articles Of Iron Or Steel	1,268	4%
7	Copper And Articles Thereof	942	3%
8	Aluminum And Articles Thereof	776	2%
9	Miscellaneous Articles Of Base Metal	602	2%
10	Miscellaneous Edible Preparations	480	1%
Other	All Other Commodities	8,144	23%
	TOTAL ALL COMMODITIES	**34,740**	**100%**

Source: U.S. Census Bureau, Foreign Trade Statistics.

Additional details of Arizona's air trade by geographic area are provided in air trade statistics found in **Appendices A-E**.

3.2 Air Cargo Community Interviews

As part of the market analysis phase of the Study, interviews were conducted with several key stakeholders regarding the region's air freight market. Through personal interviews and surveys, detailed information on market dynamics can be obtained that is not available in any published sources. Importantly, reliable forward-looking information on a market's potential growth can also be gathered from stakeholders who intimately understand the market in which they work on a daily basis.

Early in the primary research process, it was determined that the personal interviews would be targeted to larger companies and organizations believed to produce or handle significant volumes of air freight. A conscious effort was also made to include companies from industries known to use air freight services – including high-tech manufacturers, aerospace companies, bio-medical firms, and online retail companies.

The primary research phase entailed the identification of relevant stakeholders, scheduling interview dates and times and conducting the interviews. This process was completed with over 40 companies and organizations with interests in the Phoenix/Arizona air cargo market. Those interviewed represented a diversity of industries and included some of the largest companies in the State of Arizona. A breakdown of the number of interviews by category is shown in **Exhibit 3.23**.

Exhibit 3.23: Number of Completed Interviews by Category

Category	Number of Interviews
Air Carriers	9
Freight Forwarders	7
Shippers / Manufacturers	11
Others (associations, transportation services, real estate etc.)	13

Air Carriers
US Airways
Southwest Airlines
British Airways
Lufthansa Cargo
FedEx
UPS
DHL Airlines (via handler IAS Group)
JetBlue Airlines
Hawaiian Airlines

Freight Forwarders
NNR
DHL Global Express
Nippon Express
DB Schenker
Kuehne & Nagel
Mach 1 (trucking)
ShipHaus

Shippers/Manufacturers
Amazon
Boeing
Intel
SUMCO
AVNET
ON Semiconductor
Freescale
Western Digital
Pivot Manufacturing
Mayo Clinic
PCT International

Others
DMB Properties
CBRE
Knight Transportation
Hanjim (ocean container shipping)
Union Pacific
Local Phoenix/Arizona Organizations:
- Greater Phoenix Economic Council
- Maricopa Association of Governments
- Arizona Commerce Authority
- Arizona Chamber of Commerce
- Arizona Manufacturers Council
- Arizona Technology Council
- Arizona Mexico Commission
- Science Foundation Arizona

3.2.1 Objectives and Summary of Key Findings

There were several objectives related to the air cargo stakeholder interview efforts, including: 1) validating the findings of the secondary research and analysis; 2) acquiring local information and data to inform the required air cargo forecasts, 3) performing community outreach, and 4) gauging interest within the cargo community of the Study's initiatives.

The information gathered via the interviews was consistent with and validated the secondary research findings. The key findings of the interviews are summarized with the following statements:

- There is a high interest amongst the Phoenix air cargo community in additional widebody aircraft services at the Phoenix area airports. Widebody aircraft provide cargo-friendly capacity and it is assumed that the aircraft would likely serve international markets - where direct cargo capacity is needed the most.
- Shippers are increasingly sophisticated and powerful, making the competitive environment of the air cargo industry even more intense. For their outsourced supply chain functions, shippers are utilizing tools such as customized software, performance audits, monetary penalties, and Request for Proposal ("RFP") processes to lower costs, while simultaneously raising service standards. These business practices by shippers put pressure on freight forwarders and air carriers to ship goods in the most efficient and reliable ways.
- The integrated express carriers based at Phoenix Sky Harbor are focused on the core Phoenix market and do not foresee expanding air services to other airports in the metropolitan area. The air express operators, like other sectors of the air cargo industry, are looking to reduce investments and complexity as the overall market continues to stagnate and as operational costs rise. Opening new airport stations in the U.S. will be very much the exception for these carriers moving forward.
- Infrastructure issues related to air cargo security/screening and temperature controlled shipments are concerns for some members of the Phoenix air cargo community. While solutions to these issues have been identified, some of those interviewed believe other alternatives should be explored.
- The regional air cargo market is projected to experience stable, but soft growth over the next 5 years. The majority of interviewees predicted growth in the range of 1% to 3% per year in the coming 5 year period. One exception to the slow growth sentiments relates to the online retail distribution segment which is viewed as having great potential for higher levels of growth, especially for the integrated express carriers. Detailed notes from the personal interviews conducted for this Study are provided in **Appendix F**.

3.3 Surveys of Shippers

In order to obtain information on current business practices and forward-looking trends related to the shipment of air freight, a survey of Arizona shippers was conducted for this Study. The online survey consisted of 24 questions and was accessed via website links in emails sent directly to members of companies and organizations in Arizona. The online survey tool was kept active for a period of 8 weeks during which time over 950 companies were invited to participate. In addition, numerous follow-up contacts were made by stakeholders to these companies encouraging their involvement. A copy of the survey questionnaire is provided in **Appendix G**.

Despite the efforts of many involved in the Study and a lengthy extension to the originally planned timeline for the survey, response rates were relatively low with a total of 28 surveys submitted. Of these, 20 were fully completed and 8 were partially completed. Based on these figures the response rate was in the 2-3% range, which is similar to the response rate for another Arizona freight transportation survey recently conducted. Given the modest response rate, the survey results may not reliably reflect the business practices and trends of the Arizona shipping community. However, to be complete, the responses to 11 quantitatively-oriented survey questions are presented below. Many of the results are self-explanatory, but where appropriate, commentary and interpretations have been added.

Exhibit 3.24:

Does your company currently ship goods by air freight? Please exclude use of air express for shipment of documents (e.g., FedEX or UPS for legal documents etc.)

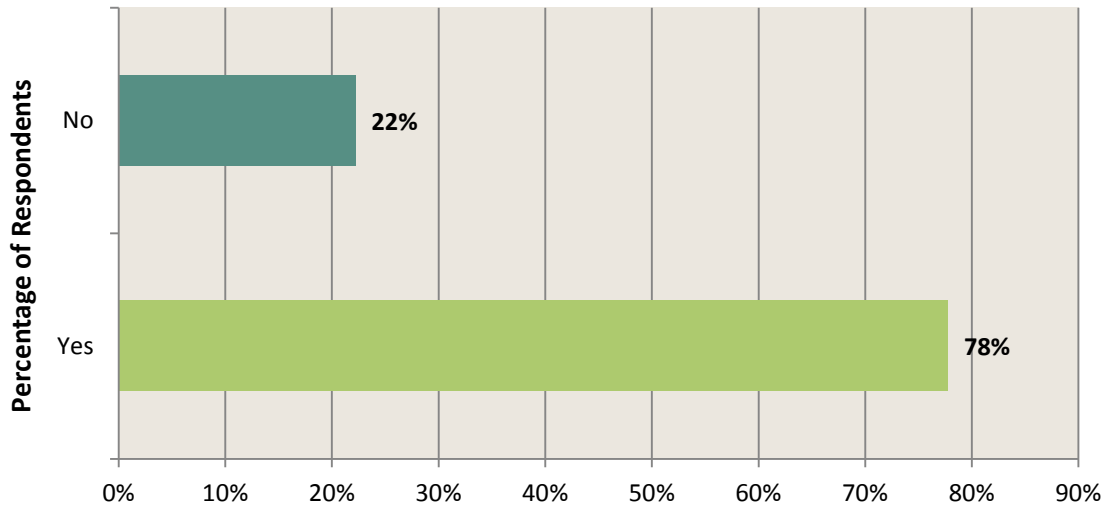


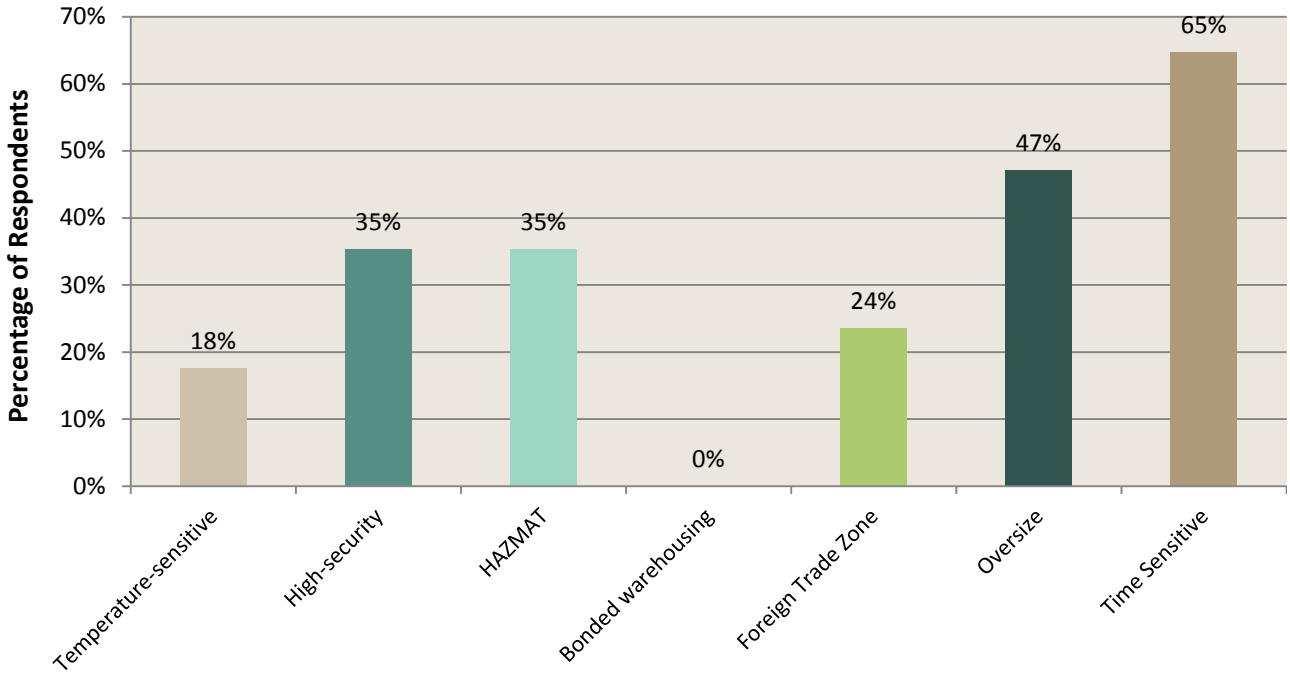
Exhibit 3.25:

Who primarily directs the movement of air shipments?

- The use of internal corporate resources to direct shipments likely also reflects the trend toward more sophisticated shippers who are leveraging various tools to gain advantages in their supply chain operations.

Exhibit 3.26:

Which of the following special handling needs do your products or source materials have? Please select all that apply



- The need for handling of oversize shipments suggests the need for widebody or freighter aircraft.

Exhibit 3.27:

What is the estimated portion of your total freight volume that moves via air transportation?

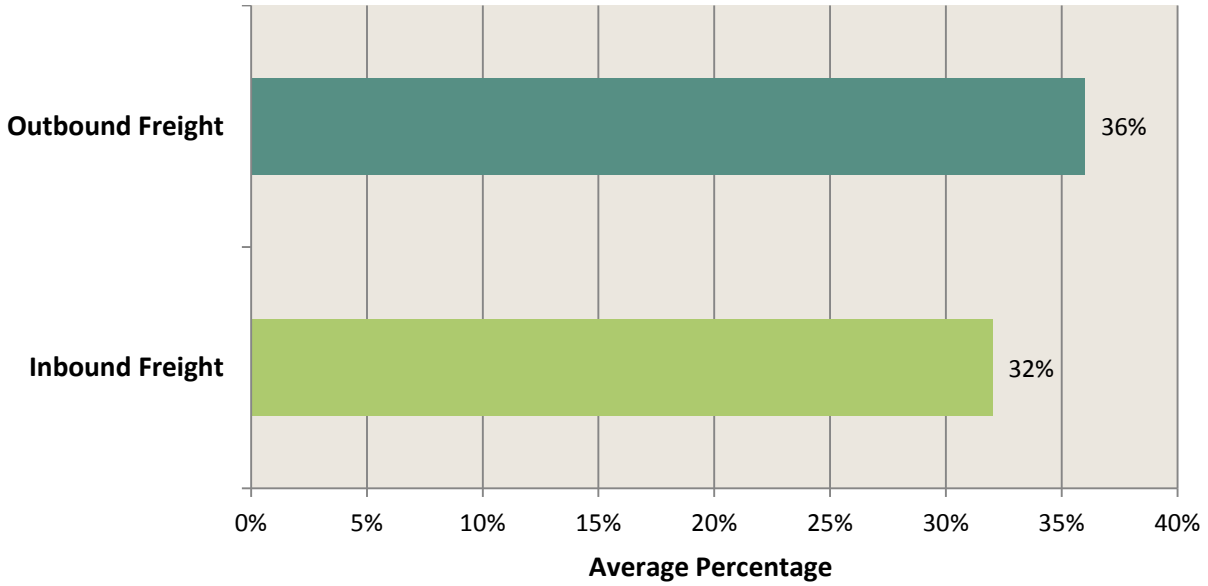
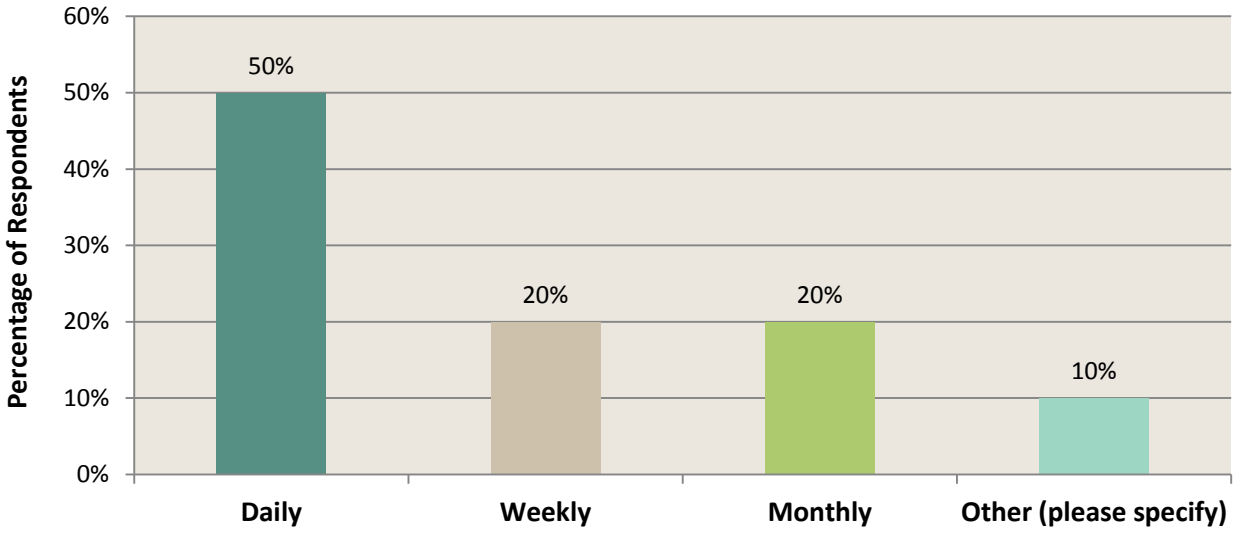


Exhibit 3.28:

How frequently do you utilize air transportation for inbound and outbound shipments?



- 70% of respondents use air cargo services on a weekly or daily basis.

Exhibit 3.29:

Thinking about your air shipments from your local facility, what is the estimated portion related to domestic versus international destinations?

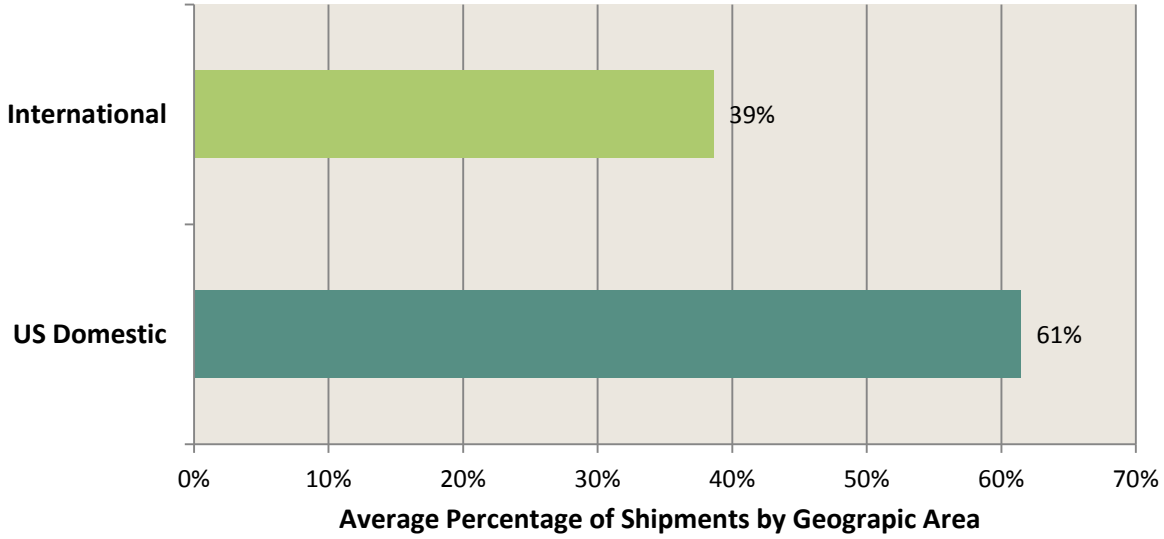
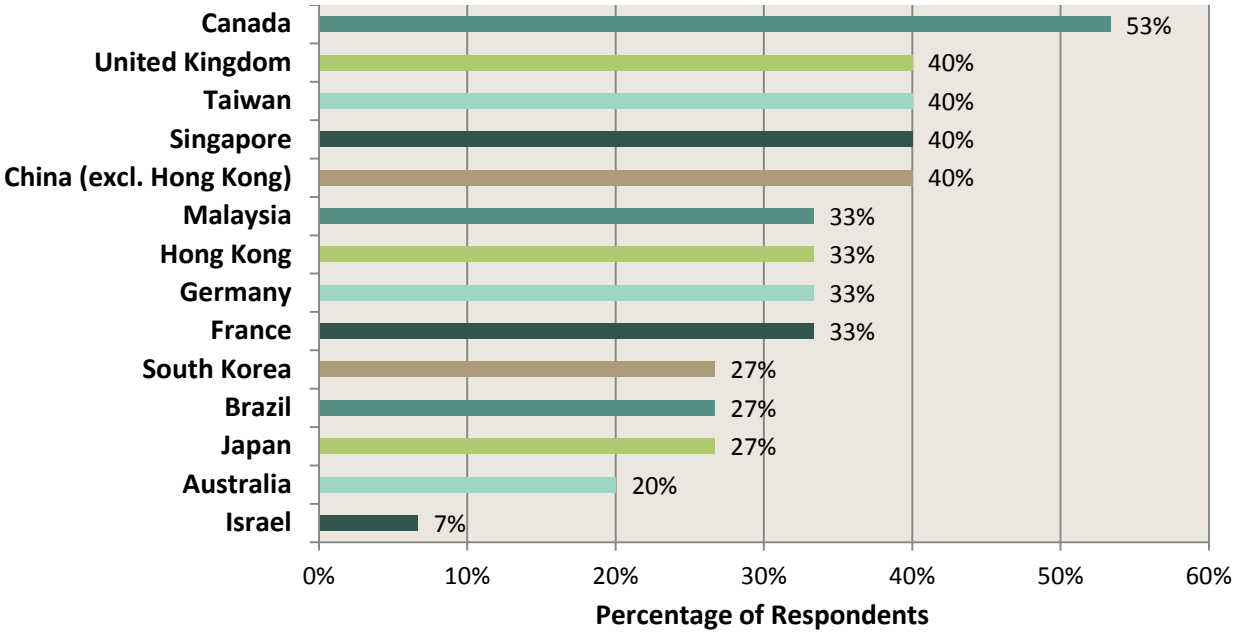


Exhibit 3.30:

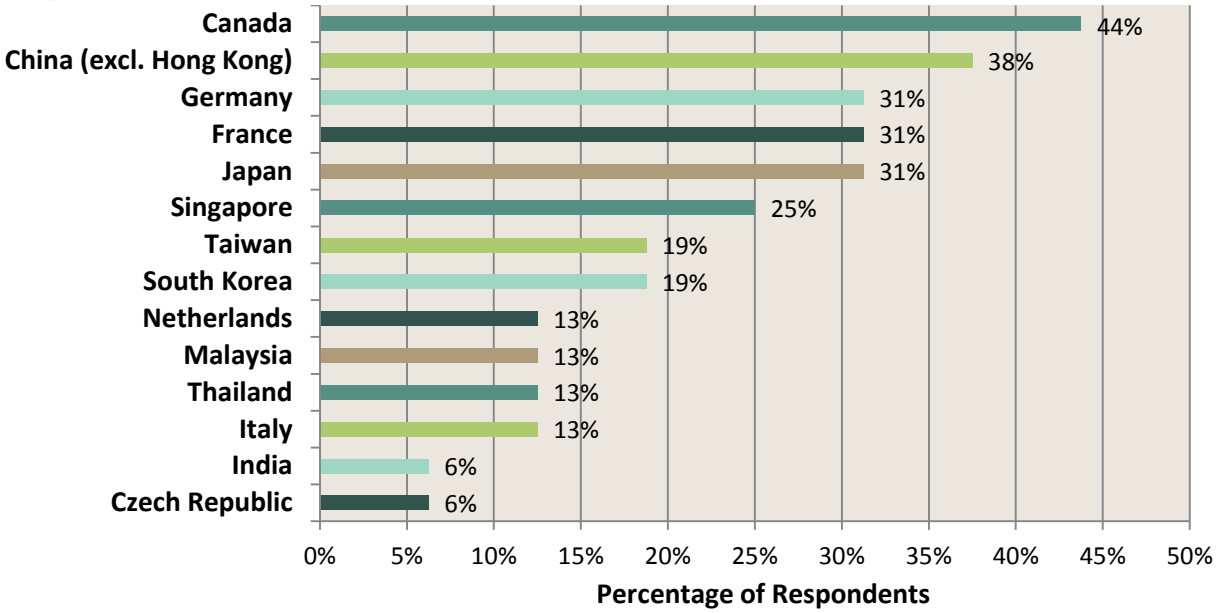
What are the destination countries of OUTBOUND international air freight? Please select all that apply.



- The country markets listed are consistent with the findings from the cargo community interviews and the secondary research from the Market Analysis.

Exhibit 3.31:

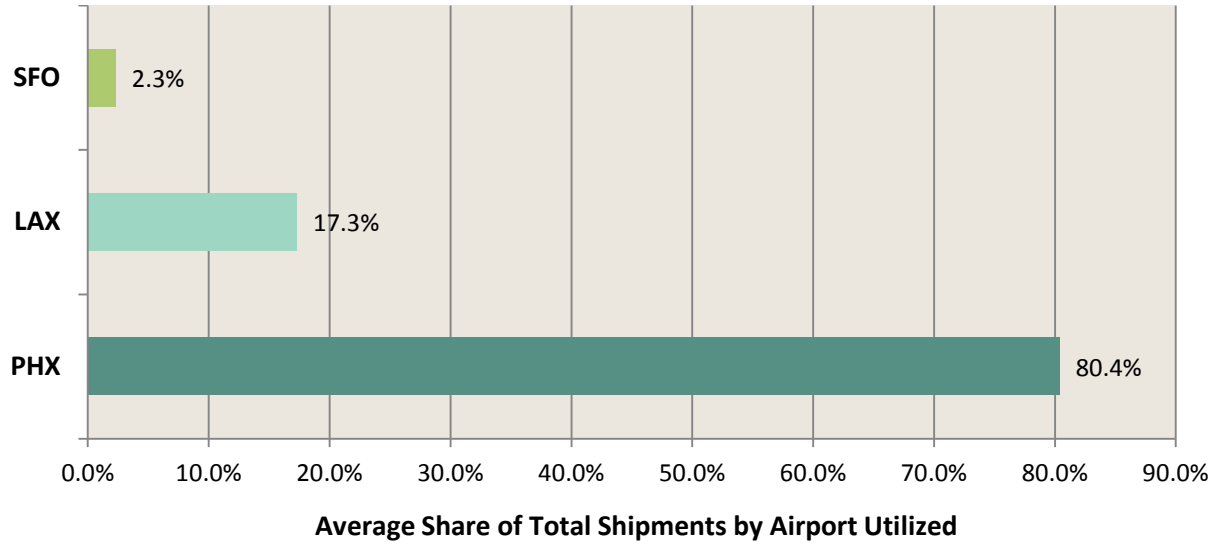
What are the origin countries of INBOUND international air freight? Please select all that apply.



- The country markets listed are consistent with the findings from the Phoenix-area cargo community interviews and the secondary research from the Market Analysis.

Exhibit 3.32:

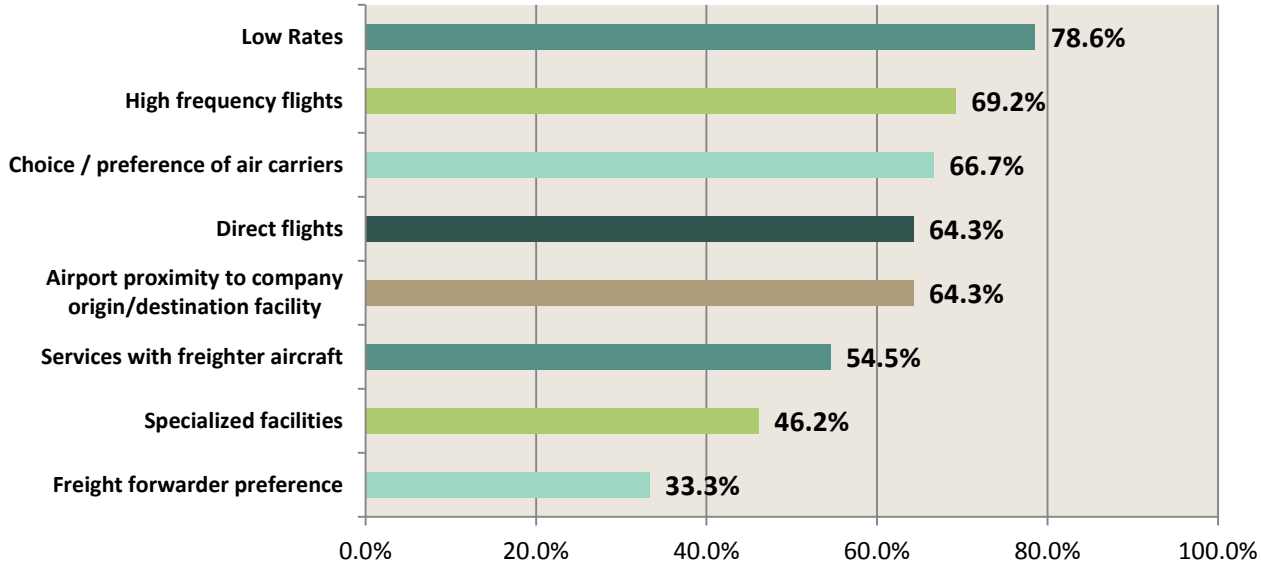
What are the main airports utilized for your outbound and inbound air shipments? Please identify percent (%) share of your total air shipments for each airport listed.



- The response rate for utilization of PHX is likely driven by the high use of domestic air cargo services by the survey respondents as noted in the earlier **Exhibit 3.29**.

Exhibit 3.33:

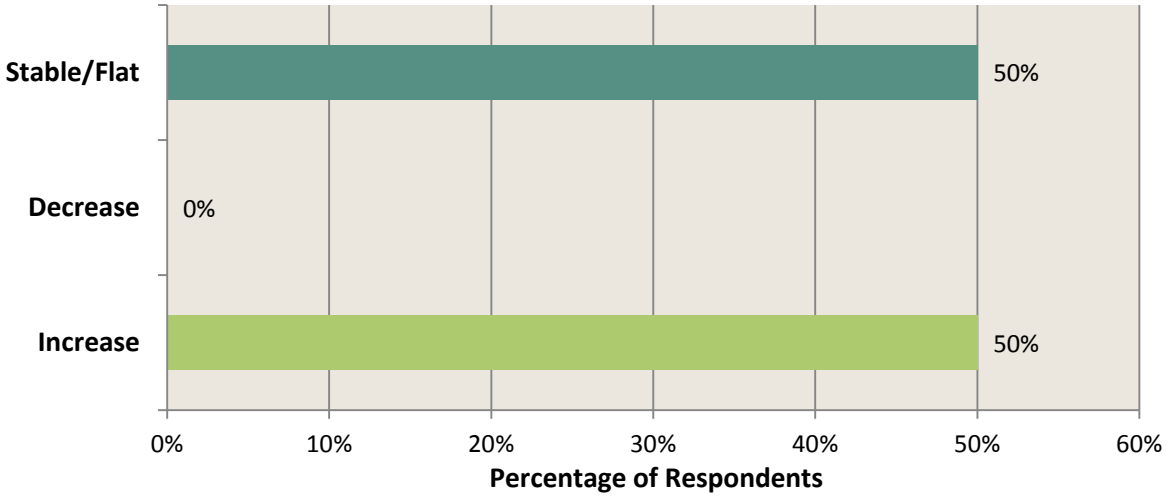
Please share some information about the reasons for the airport choices you make.



- The preference for Low Rates is clearly the top reason for airport choice when shipping by air. Low Rates also suggest availability of cargo capacity on aircraft and a competitive environment amongst air cargo service providers.
- The preference for Low Rates is also consistent with responses from the Phoenix-area cargo community interviews.

Exhibit 3.34:

Over the next 5 years, do you think air freight usage related to your company's Phoenix/Arizona region operations will increase, decrease, remain stable? Please provide a percentage estimate for any expected change



3.4 Sonora, Mexico Market Research and Analysis

In order to fully analyze the air cargo potential and relevant markets of the Phoenix area airports, an assessment of the Mexico market is necessary. In particular, the burgeoning economy of the State of Sonora creates possibilities for the Phoenix airports to capture air cargo traffic generated by the expanding industries in this Northern Mexican region. Importantly, the State of Arizona and the State of Sonora have existing strong relations and a clear understanding of their common economic interests. Further, the geographic proximity and shared border of Arizona and Sonora allow for natural synergies related to trade and the transportation of goods. The Sonoran border lies just 200 miles south of Phoenix and a short 3 hour truck drive via Interstate highways.

The State of Sonora continues to rank as one of the healthiest economies in Mexico, with its developed transportation infrastructure, vibrant business environment, solid and abundant labor force, and diverse established industries. While other Mexican states had stagnant economies, Sonora's economy grew by 7% in 2012. Industries such as aerospace, automotive, electronics and information technology, and medical device manufacturing, as well as a strong agribusiness are the hallmark of the increasing Sonora economy. Coincidentally, these same industries are known to be heavy users of air cargo services.

The proliferation of maquiladoras (manufacturing operations where factories import material and equipment on a duty-free and tariff-free basis for assembly, processing, or manufacturing and then export the assembled, processed and/or manufactured products) in Sonora offers a particular opportunity for Phoenix area airports to engage in discussions on air cargo transport to and from the region. Another emerging trend that must be analyzed for its significance to Phoenix air cargo possibilities is that of "near-shoring," as multi-national companies continue to bring off-shore production and manufacturing back to North America from Asia. The State of Sonora has become a specific destination for near-shoring by international and multinational companies because of the competitiveness of the Sonoran market to the large U.S and Canadian markets. That competitiveness includes an educated and abundant labor force, business-friendly state policies, lower shipping costs, and an established infrastructure.

The following sections of this report provide a synopsis of the major industries in Sonora that currently utilize air and surface transport modes for the movement of goods to the United States and other international markets. These industries include those that have the potential for partnership with the Phoenix metro area for air cargo transport based on current trends, trade policies, and types of products manufactured.

Methodology and Approach

A variety of research methods were employed to identify current economic trends of the Sonoran market as they relate to air cargo. Interviews were conducted with experts in both Mexican-American trade relations, and in the Sonoran economy and Mexican economy, in general. In addition, Sonora-based companies attending the 2013 Arizona-Mexico Commission's Plenary Session were provided with survey questionnaires aimed at ascertaining their air cargo-related shipping practices and trends. However, there was a clear reluctance on the part of targeted Mexican companies to offer potentially sensitive information via a survey instrument. The resultant low survey response rate, led to the use of alternative sources in order to gain pertinent Mexico-related information for the Study. A copy of the survey questionnaire is provided in **Appendix H**.

Alternatively, interviews were conducted with two organizations with specific expertise in the Sonoran economy: Arizona-based Ramirez Advisors Inter-National, LLC, and the Comision de Formento al Turismo del Estado de Sonora (Sonora's Tourism Commission, which includes experts in Arizona's trade relationship with Mexico). The personal interviews with the principals of these organizations were highly successful in garnering important information on the Sonora market and proved to be an effective research method. Finally, the Study benefitted from institutional knowledge of the Molera Alvarez firm, which specializes in Sonora/Mexico-related projects.

In addition, secondary research was conducted to quantify the information obtained through the primary sources. This research was informed via on-line resources that were recommended by the Sonora experts including websites managed by the State of Sonora, industry-specific information websites, economic trend analysis websites, and international trade websites.

Findings and Results

Sonora, Mexico presents an abundance of current and imminent opportunities for Phoenix's air cargo market. The Sonoran economy is centered on the automotive, aerospace, mining, technology, agriculture, and medical manufacturing industries. Production in Sonora is anticipated to steadily grow over the next 13 years due to increased wealth creation, foreign direct investment, and plans to attract other manufacturing industries. The strategic proximity of Sonora to Phoenix, the increasing trend of near-shoring and the rise of maquiladoras makes the State of Sonora an ideal focus for strengthening and expanding the air cargo transport market in the Phoenix region.

Informational highlights of the State of Sonora include:

- Second largest State in Mexico
- Population of 2.6 million residents
- Home to the largest automotive project in northwestern Mexico
- Home to the largest aerospace machining cluster in the country
- Top agricultural, livestock and mining producer

- Top IT infrastructure investment destination
- Length of border with U.S. is 368 miles
- Easy access to commercial traffic between the East & West Coasts of the U.S.
- Port of Guaymas is the closest deep water seaport to Arizona and New Mexico

Proximity of Sonora to U.S., reduces risk in the supply chain and increases security for northbound shipments

- Sonora has five international airports with flights to major cities in Mexico and the U.S.
- Sonora has six modernized ports of entry along the U.S.-Mexico border

3.4.1 Trends and Logistics-Related Factors in the Sonoran Economy

Several significant factors are driving the growth potential of Sonoran industries that produce air cargo-eligible goods. A discussion of near-shoring, the Port of Guaymas, and maquiladoras is provided below. Each of these factors has possible implications on the air cargo at the Phoenix area airports looking forward.

Near-Shoring

Sonora and other Northern Mexico States have become desired manufacturing locations for U.S. and international companies that have experienced rising labor and production costs in overseas manufacturing centers, like Asia, in recent years. The attractiveness of business-friendly policies, an educated and stable workforce, established infrastructure, and proximity to the U.S. market have made Sonora a hub for near-shoring of many high-growth industries.

Mexico continues to benefit from U.S. companies and other foreign investors who see it as an attractive manufacturing destination. In fact, 63% of those surveyed by AlixPartners, a business advisory firm, named Mexico the most attractive country for siting manufacturing operations closer to the United States. Near-shoring is likely to continue for large multi-national companies and become a more prominent option for medium- and small-sized U.S. companies, due to rising transportation costs, product-to-market delays, and labor wages in Asia. Also, near-shoring in Mexico is becoming a more preferred manufacturing option due to plant safety and growing concerns over intellectual property protection in Asian manufacturing sites. Finally, Mexico is producing highly skilled workers and engineers that are available to companies at far lower wages than American workers of similar skill levels.

Port of Guaymas

With the opening and continued development of the Port of Guaymas, there is great potential for stronger links to form between Arizona and Sonora. In February 2012, Guaymas received its first shipment of ocean containers carried on a ship operated by Switzerland-based Mediterranean Shipping Company ("MSC"). Ocean container shipments to and from Guaymas have continued since then, proving the significant value that results from direct transportation links to international markets. In fact, the Port of Guaymas is now the fastest growing seaport in Mexico. The promise of the Port is judged to be so great that plans are well-underway to expand the Port through activities such dredging the seafloor and constructing new shipping terminals. MSC has said that cargo shipped out of Guaymas can be destined for 145 countries in five continents.

Arizona has long seen Guaymas as a logical seaport for imports and exports because of its proximity to the border and access to rail lines and Interstate 10. The rail line between Guaymas and the Arizona border can support double-stacked containers because there are no bridges or tunnels on the route. Interestingly, there may even be a possibility of opening a direct rail link between the Port of Guaymas and an area near the Phoenix-Mesa Gateway Airport.

While the Port of Guaymas is clearly focused on the trade and transportation of commodities more appropriate for ocean containers and railroads, it is possible that the overall increase in activities related to international trade near Guaymas will stimulate activity by industries producing air-eligible freight. This, in turn, could spur air cargo activity between the Guaymas area and the Phoenix area airports. Aviation linkages already exist, with US Airways currently offering nonstop flights between PHX and the Guaymas airport.

Maquiladoras

Maquiladoras, also known as maquilas, are factories that produce goods for export, primarily on the basis of assembly or conversion of components and raw materials imported from abroad. These facilities are not required to pay duties on the goods they import, provided that these imported inputs are included in the export shipments. Most of Mexico's maquilas are located at or near the border where they have access to U.S. supplies, transportation, and communications.

The maquiladora industry is highly dependent on the U.S. economy. It is estimated that over 60 percent of all Mexican imports are from the U.S., with over half of them destined for maquiladoras. Most of the U.S. export commodities mentioned above end up in maquiladoras for assembly, after which they are exported back to the U.S. as final goods. According to Sonora's Tourism Commission, most maquiladoras use surface freight for both inbound components and parts, and for outbound of the finished products. However, air cargo could be utilized in lieu of and/or in conjunction with surface freight to improve speed and efficiency for production and export. Further, there is also the potential that the Phoenix area commercial airports could be utilized to handle the Mexico-bound imports of mauquiladora components from markets in Asia and Europe. Likewise, finished goods outbound from the maquiladoras could utilize the Phoenix airports for onward transportation to their ultimate international destinations.

Industry

As mentioned above, several of the major industries operating in Sonora generate inbound and outbound demand for goods that are typically shipped internationally via air cargo. While these goods also often travel long distances via surface transportation (i.e. trucks), their attributes - such as origin/destination, time-sensitive, high-value, low-weight, temperature sensitivity – require the services provided by air cargo at some point on their journeys. The relevant industries include aerospace, automotive, electronics and information technology, medical manufacturing, and agriculture.

Aerospace

Sonora currently has 45 aerospace manufacturing plants with 7,500 employees, the majority of which are operated by American, French, and British companies. With secured and pending contracts, the number of aerospace plants is expected to grow to 60 by 2015. Sonora, particularly the Guaymas area, is home to Mexico's most important engine component manufacturing cluster where 12 companies produce turbine engines. This cluster is already acknowledged as one of the leading aerospace clusters in Mexico. Rolls Royce, General Electric, Honeywell, Pratt & Whitney, Boeing and Airbus are some of the industry leaders that drive demand of aerospace products manufactured in this region.

Automotive

Mexico's automobile production has grown significantly in the past few years, contributing to nearly 6% of Mexico's GDP and approximately 9.7% of the State of Sonora's GDP. Auto manufacturers currently have 87 plants with 22,000 employees and will grow to 90 plants with 31,000 employees by 2015. Sonora's geographical location has positioned the region to take over a large part of the world's automotive manufacturing, as it has become a destination for automakers seeking access to North American markets.

In 2008, Mexico became the largest supplier of auto parts to the United States. In 2010, Mexico was the 6th ranking automotive exporter in the world. Mexico exports 80% of its vehicles to the U.S. and 11 out of every 100 automobiles sold in the U.S. are made in Mexico. By 2017, auto exports are expected to rise to 4 million vehicles according to the Mexican Automobile Industry Association. In addition:

- By 2014, automotive production is expected to reach 2.4 million units.
- In 2014, Mazda plans to open an $800 million factory.
- Eight of the 10 leading Original Equipment Manufacturers (OEM's) have assembly plants in Mexico.
- More than 300 Tier 1 suppliers have plants in Mexico, including: Chrysler, Ford, GM, Honda, Nissan, VW and Toyota. Heavy truck manufacturers include Dina, Navistar, Kenworth, Daimler, Volvo, Isuzu and Scania.
- Automotive production in Sonora is valued at more than $6.5 billion (USD) annually, positioning Sonora as one of the top states in manufacturing production value in Mexico.

- The state has over 50 Tier 1 and 2 suppliers and, with Ford's presence in Sonora, the automotive industry has grown into the primary industry of the state – which is recognized for its quality and innovation. The companies take pride in achieving necessary certifications, such as ISO.

Today, Sonora is home to the production of vehicle platforms including the Ford Fusion, Mercury Milan and the Lincoln MKZ, as well as the new hybrid models for Ford's Fusion and Mercury Milan. The current production is around 300,000 vehicles per year.

Numerous companies from the United States, Canada, Japan, and Europe are located in Sonora's automotive industry, like Magna, Martinrea, Takata, Lear, Delphi, and Goodyear.

The steel industry in Mexico is growing as a result of automotive production. To keep up with demand for steel, Mexican steelmakers are expected to invest almost $3 billion in new and improved factories.

Electronics and Information Technology

Growth in the electronics and information technology industry of Mexico is continually fueled by demand from the U.S. market. The industry encompasses five main sectors: consumer electronics, personal computers, telecommunication equipment, electronic components, and industrial and medical equipment. Sonora also offers the possibility of supplying the automotive, aerospace and medical industries as well as research and development for new electronics products and it is recognized for the quality workforce that meet manufacturing standards like those established by the International Organization for Standardization ("ISO") and U.S. Food and Drug Administration ("FDA").

The main players in this industry include companies like AMP Amermex, Arrow Electronics, Amphenol Alden Products, Bose, GE, Delphi, Daewoo Electronics, EDS International, Lanix, Magnetic Metals, ITT Canon of Mexico, and others.

Medical Manufacturing

Many companies are turning to Sonora as the ideal location to establish medical device and equipment manufacturing sites as well medical-related research and development facilities. The medical industry of Sonora is cost-effective and offers high quality manufacturing processes. The growth of medical manufacturers in Sonora is primarily driven by the State's tremendous infrastructure, strong work force, and location near the U.S. border. Research and development for medical products is also performed by skilled engineers located in Sonora. The medical device industry of Sonora is the second-largest employer in the State by headcount, generating almost 8,000 jobs in Nogales alone.

Companies in Sonora supporting the medical industry range from those who manufacture high quality instruments to the assembly of integrated parts. Industry leaders such as Kimberly Clark, Becton Dickinson, CR Bard, Westmed and APON create a range of products, from catheters and intra-venous devices to feminine care and pharmaceutical goods. Medical devices manufactured include surgical needles and staples, catheter equipment, anatomical

devices, dental parts, medical attire, transfer pipettes and glass equipment as well as pharmaceutical products.

Agriculture

Sonora's significant agriculture industry may also offer significant air cargo opportunities for the Phoenix area airports. With the perishable nature of agricultural items, and the need for timely shipping, the proximity of the two regions make air transport to Phoenix an attractive option for distribution to all regions of the United States and beyond. Sonoran growers produce a variety of air-eligible crops including lettuce and table grapes. Further, fresh seafood is a common commodity that requires air transportation. Sonora is the number one seafood producer in Mexico and is among the leading agricultural producers of several commodities. Sonora's agribusiness sector employs almost 150,000 workers and is home to the first aquaculture institute established in Mexico. The United States, Japan, the European Union, and the Mexican domestic market are the main consumers of the Sonoran fresh produce.

Conclusions and Recommendations

With the proliferation of high tech manufacturing and agribusiness production, existing transportation infrastructure and proximity to Arizona, the State of Sonora, Mexico stands poised to become a partner in increasing air cargo transport at Phoenix area airports.

Currently, Sonora utilizes surface and ocean transport for the majority of its international trade – mostly exports bound for the U.S. market. However, a case could be made that certain Sonoran/Mexican inbound and outbound air-eligible commodities may be handled most effectively via Phoenix area airports. These commodities may originate in or be destined for the U.S. market as well overseas markets.

It should be noted that while the potential may exist for Sonoran/Mexican market goods to transit Phoenix area airports, further quantification and details will be required to validate the case. Should additional work be done in this area, recommendations include: organizing meetings with officials from both the public and private sectors in the States of Sonora and Sinaloa, Mexico who are involved in promoting and managing the development of the manufacturing of goods, including operators of maquiladoras. These face to face meetings would generate more specific information regarding the methods of transportation currently being utilized for the shipment of goods, the type of products being shipped, and trends in the market that may signal opportunities for the Phoenix area airports with respect to air cargo flows.

3.5 Identification of Logical Catchment Areas

When identifying logical catchment areas, attention focused on the Phoenix area's commercial airports and the airport which handles the majority of the Phoenix/Arizona region's air freight – Los Angeles International Airport. Based on the secondary data research and analysis as well as the stakeholder inputs, it was determined that the other airports in the Study Region do not significantly participate in the core markets for the Phoenix area airports.

To begin, it should be noted that airport catchment areas are not easily defined due to the high number of variables involved in air cargo shipments. Airport catchment areas can vary widely based on the ultimate origins and destinations of shipments, the geographical location of airports, the types of freight being shipped and, of course, the levels of available air services at individual airports. Airport catchment areas can even vary by time of year as seasonal air services impact air cargo lift capacity and even seasonal temperatures can impact operational aspects of aircraft (including their allowable take-off weights) which can impact cargo lift as well.

The goal of this effort is to generally define the catchment areas for both domestic and international shipments relevant to the Phoenix area airports. The definitions are based on analyses of available data as well as the inputs from air cargo stakeholders such as air carriers and freight forwarders.

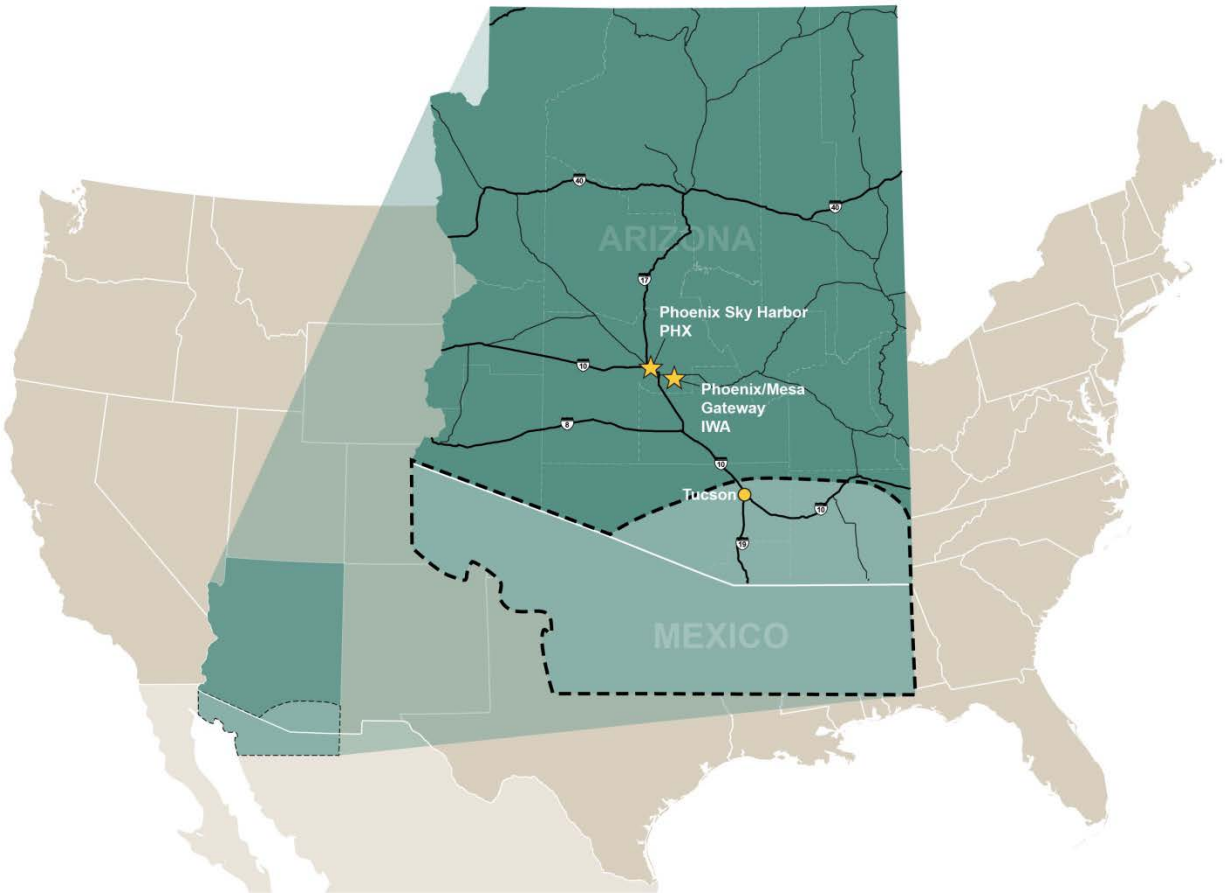
3.5.1 Domestic Catchment Area

An airport's catchment area for U.S. domestic air freight shipments is largely driven by the requirements of the actual shipper, the available air service at individual airports and the service areas of freight forwarders serving the airport. As mentioned previously in this report, the U.S. domestic air freight market is in a slow growth mode and there is little reason to believe that trend will reverse. The availability of high-quality trucking services and the consolidation that has occurred in the domestic cargo airline sector has led many shippers and forwarders away from air transportation. However, there will always be some level of demand for domestic air freight services due to urgent, time-definite needs of shippers, pricing of capacity by airlines and related factors.

Given the alternative modes (i.e. trucking and railroads) for transporting domestic freight and the premium pricing of air transportation, it is clear that the goods moving domestically by air have a high degree of time sensitivity. This urgency factor drives demand to get those goods to airports and onto airplanes at the earliest time possible. Assuming that an airport has appropriate aircraft types and scheduled operations, domestic shipments will default to the airport nearest the ultimate origin for outbound shipments and the airport nearest the ultimate destination for inbound shipments.

This dynamic was reported by air cargo professionals interviewed for this Study. Of course, the specific catchment areas vary somewhat amongst service providers depending on their respective corporate practices, location of other regional offices etc. However, there was some commonality in the geographic definitions of domestic catchment areas and this area is represented in the map shown in **Exhibit 3.35** below.

Exhibit 3.35: Phoenix Area Airports' Catchment Area for Domestic Air Freight Shipments



Source: InterVISTAS Consulting analysis.

As shown in the map above, the catchment area for domestic shipments covers the State of Arizona and portions of Northern Mexico. Given the fact that the Tucson International Airport has domestic passenger and integrated carrier air services, some air cargo service providers treat the Tucson area and Northern Mexico somewhat differently. In these areas, domestic shipments transit via TUS as much as possible and via the Phoenix area airports when other air services or more capacity is required. It should be noted that the integrated carriers operate turboprop feeder flights to markets such as Yuma and Flagstaff into PHX which meet their jet aircraft services that fly onward to their respective hub airports. Trucks are also utilized to cover this core region in a timely fashion for domestic shipments via the Phoenix area airports.

With the robust levels of domestic air service at PHX, the conclusion is that this defined domestic catchment area is reasonable and should remain stable over time.

3.5.2 International Catchment Area

An airport's catchment area for international shipments is primarily driven by the types and amounts of direct international capacity at the airport as well as the geographic location of the airport in relation to the ultimate origin or destination of freight shipments. International markets can be served at airports by a variety of aircraft types (including narrowbodies, widebodies and freighters) as well as air carriers (passenger airlines and all-cargo airlines). Each of these options has an associated profile that the market (i.e. shippers and forwarders) considers when determining where to tender freight.

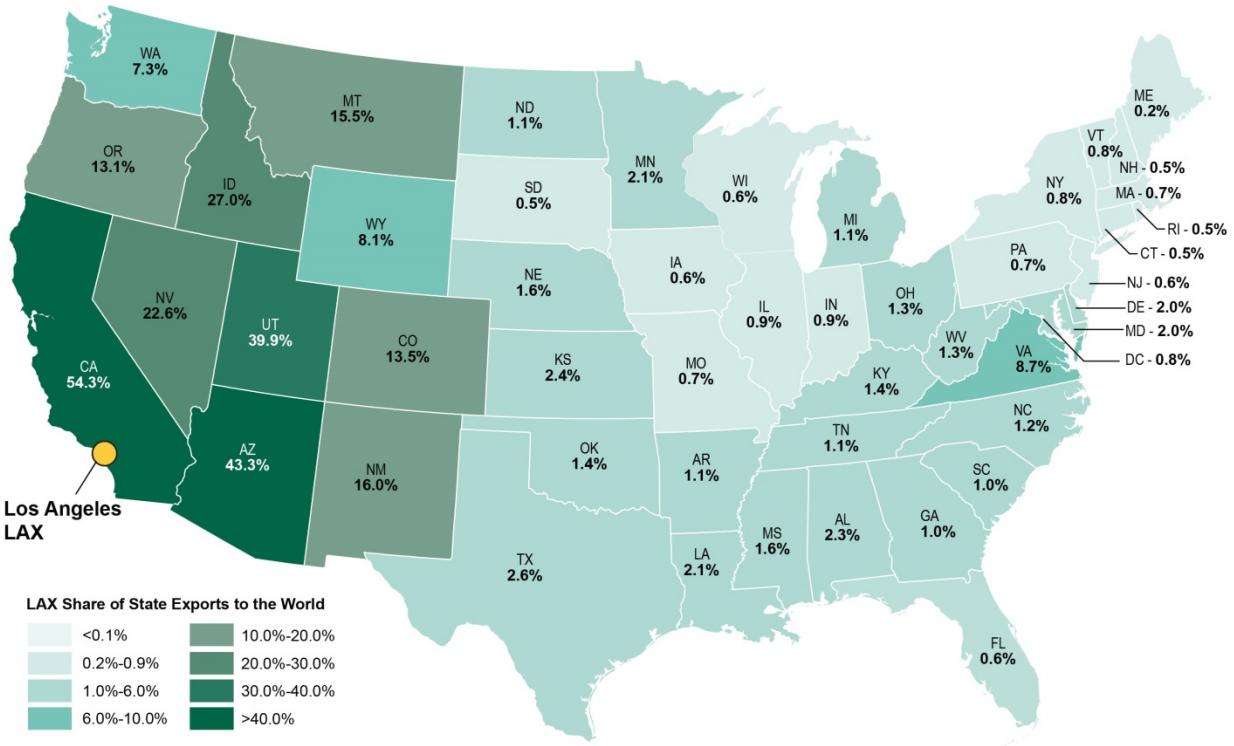
For example, the appeal for narrowbody aircraft to a certain international destination may be limited based on belly capacity constraints and lack of containerization capabilities. On the other hand, a widebody aircraft to the same destination will have broader appeal to the cargo community due to the flexibility and options presented with additional capacity and the use of belly hold containers. Accordingly, an airport with the widebody service can expect deeper geographic penetration within its region than it would for the narrowbody service.

The presence of freighter aircraft add a wholly different dimension to this dynamic as they have the ultimate level of flexibility in what can be carried and their flight schedules often cater to manufacturer production schedules versus passenger preferences and airline network requirements. In this manner, freighter aircraft are known to influence the largest catchment areas for an airport – at least for that particular international service.

From these examples, it is clear that the catchment areas for international shipments are both fluid and complex. However, by reviewing air trade data at airports and incorporating information from air cargo professionals, it is possible to generally define current catchment areas at PHX and LAX for international shipments.

Exhibits 3.36 and **3.37** display maps that characterize the way in which U.S. exports, by state, flow over the respective airports. **Exhibit 3.36** shows the power of LAX in attracting air freight from across the country to be transported to international destinations. The data shows LAX penetrates each of the Lower 48 states' international air freight markets to varying degrees. Further, it can be observed that states closer to LAX generally contribute higher shares of total air exports to the Southern California airport. Notably, LAX's highest percentage capture rate is for Arizona at 43% of the state's total air exports. This map indicates that LAX, with its high levels of direct international air services has an almost unlimited catchment area for U.S.-international air freight with a core catchment area of the Western States.

Exhibit 3.36: LAX's Catchment Area for U.S. International Air Exports to the World

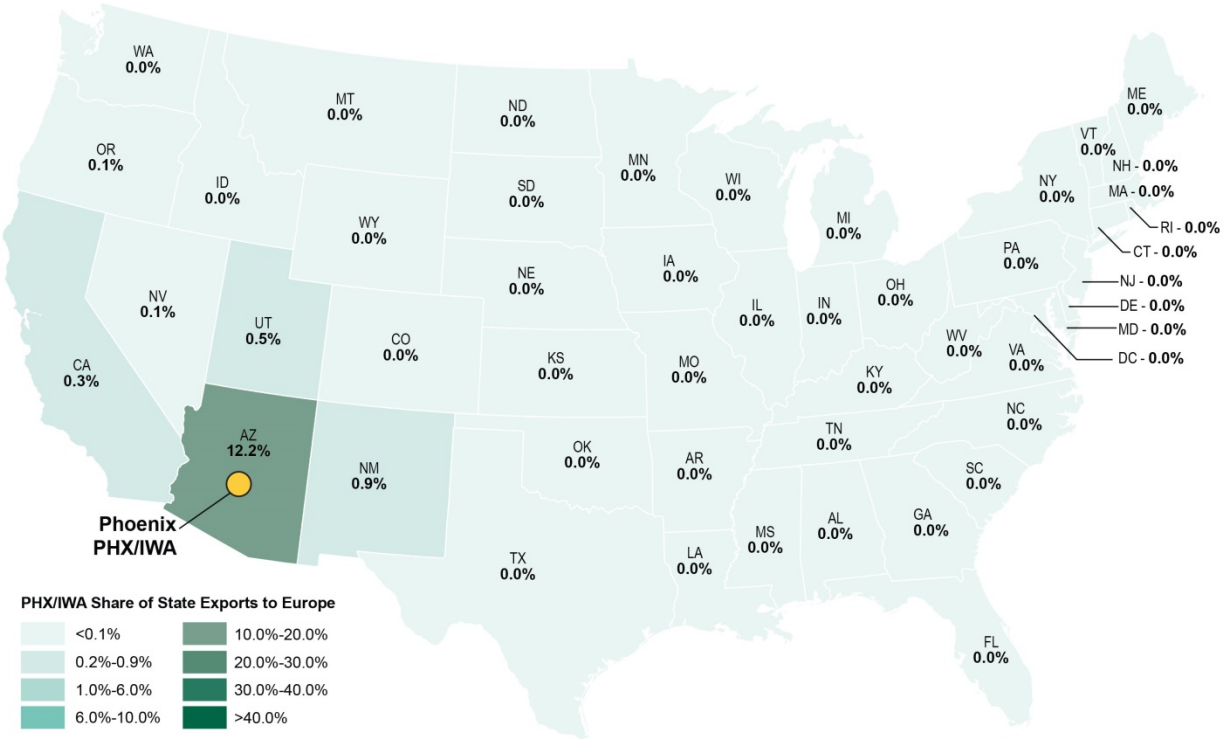


Source: U.S. Census Bureau, Foreign Trade Statistics.

Exhibit 3.37 displays the current PHX catchment area for international shipments to Europe. The map shows that the current catchment area is much more limited (compared to LAX) due to the presence of a sole European widebody service operated between PHX and London. Due to this service, PHX is able to capture over 12% of Arizona's air exports to Europe and a small percentage of Europe exports from California, Nevada, Utah, and New Mexico. As shown on the map, no other state's exports are captured. Again, part of this is due to the extreme Southwestern location of Arizona whereby there is limited appeal for shippers to significantly backhaul freight to airports in the west for ultimate destinations in the east (i.e. Europe). In the case, of LAX, much of the freight captured by LAX from Eastern states is likely destined for Asia where the westward movement must occur anyway. Moreover, the limited penetration by PHX for other states' exports is influenced by the relatively low capacity available on the PHX-London flights – most of which is consumed by Arizona shippers, leaving little remaining capacity for shipments from other states even if the service is attractive.

In discussions with Arizona-based freight forwarders, there was wide agreement that if additional direct, international air services (passenger or all-cargo) are added at Phoenix Sky Harbor or Phoenix-Mesa Gateway, the catchment area would likely increase. This could allow PHX to possibly capture exports from more states as well as higher shares of states it already penetrates. However, it was also noted that, due to the overall lack of current international air cargo capacity at PHX, incremental additions of widebody international capacity could simply lead to higher capture rates of the states (particularly Arizona) in the current catchment area –. Of course, this would all be dependent on the destination, type of aircraft, and flight frequencies of any new international services.

Exhibit 3.37: PHX's Catchment Area for U.S. International Air Exports to Europe



Source: U.S. Census Bureau, Foreign Trade Statistics; InterVISTAS Consulting analysis.

3.6 Comparison of Air Cargo Terminal Costs

3.6.1 Background

As part of the Study's task work, air cargo terminal costs were reviewed at selected airports in the Study Region to understand the environment within which the Phoenix area airports compete for air cargo traffic. Based on the assessments performed in the market analysis phase, the airports outside the Phoenix area selected for the cost comparison included:

- Los Angeles International Airport (LAX)
- LA/Ontario International Airport (ONT)
- McCarran International Airport (LAS)

The methodology for conducting the air cargo terminal cost analysis included the following tasks:

- Collect information on typical rents for warehouse and distribution buildings in the Los Angeles, Ontario, Las Vegas, and Phoenix areas. Where data is available, information was collected on buildings that are proximate to the identified airports. Information was collected from surveys conducted by major commercial real estate brokerage companies.
- Analysis of information on the cost to conduct business in each of the competitor states. Cost elements include taxes, labor, energy, and similar information. Review of initial data sources indicates that business cost information by metro area is limited, with most sources comparing statewide costs. Where information is available on metro area data, it is referenced in this report.
- Collect information on air cargo terminal costs at competitor airports.
- Provide an opinion on the opportunities and challenges for the Phoenix area airports and the Greater Phoenix area related to growth of air cargo business relative to competing metro areas and airports.

3.6.2 Warehouse/Distribution Rents

Information on the warehouse and distribution industrial market was collected from surveys of vacancies and rents prepared by national commercial brokerage companies. Two sources were referenced: CBRE, the world's largest commercial real estate brokerage firm, and Jones Lang LaSalle (JLL), an international commercial real estate brokerage firm.

The methodology for collecting information on the industrial market by each firm varies to some extent. For instance, CBRE collects information on buildings larger than 20,000 square feet while JLL only collects information on buildings larger than 30,000 square feet. The classification of building types can also vary and effect the information provided in the broker surveys. For this Study, more detail is available from the JLL database which separates

warehouse and distribution buildings from other types of industrial uses. To be consistent across the metro areas, JLL information was used for this study.

The following table shows the average lease rates for warehouse and distribution space in the four relevant market areas. Rent is stated as NNN or triple net, meaning that the tenant is responsible for the operating expenses associated with the building in addition to rent. These expenses typically include property taxes, maintenance, insurance, and utilities.

The market area identified as the Inland Empire on **Exhibit 3.38** is located in the far eastern part of the Los Angeles metro area and includes the sub-markets of Riverside, San Bernardino, and Ontario. The exhibit shows the cost difference between the three competitive market areas and the Phoenix market.

According to JLL, the Inland Empire has a nearly 19% advantage in average rent to the Phoenix market. Vacancy rates are low as well. However, Phoenix has a 20% cost advantage to the Los Angeles market and a 24% advantage when comparing the two airport sub-markets. This area around LAX is "supply constrained" according to JLL because of the cost of land and lack of available land for new development. Phoenix also has a small 5% cost advantage to the Las Vegas market.

Exhibit 3.38: Warehouse and Distribution Space Vacancy and Rents First Quarter 2013

Market Area	Vacancy Rate	Monthly Rent (NNN)	Annual Rent (NNN)	Cost Difference To Phoenix
Phoenix Market	11.0%	$0.43	$5.16	
Airport Submarket	12.4%	$0.45	$5.40	
Inland Empire Market	6.8%	$0.35	$4.20	-18.6%
Los Angeles Market	5.3%	$0.52	$6.24	20.9%
Airport Submarket	5.9%	$0.56	$6.72	24.4%
Las Vegas Market	12.8%	$0.45	$5.40	4.7%

Source: Jones, Lang, LaSalle.

It should be noted that CBRE reports slightly different results for rents in the Phoenix market. CBRE's First Quarter 2013 market report indicates that distribution rents in Phoenix are lower than those reported by JLL as follows:

- Distribution buildings: $0.36 per square foot per month
- Multi-tenant buildings: $0.63 per square foot per month
- General industrial buildings: $0.59 per square foot per month
- Flex/back office buildings: $0.94 per square foot per month

Multi-tenant buildings are often considered small warehouse buildings and could skew the JLL data to some extent if included in the warehouse/distribution category. However, assuming consistency in the JLL data for the four market areas, the Inland Empire would still have a cost advantage over the Phoenix market.

Warehouse and distribution space in the Inland Empire is driven by the lack of supply in the Los Angeles Basin, particularly for modern, high bay buildings. Vacancies in the Inland Empire have continued to decline over the last four years and construction activity has increased. Over 6.7 million square feet of building space was constructed in 2012 and 9.7 million square feet are currently under construction. The Inland Empire market area is considered one of the strongest industrial markets in the country. Much of the leasing and construction activity is driven by e-commerce businesses that are establishing fulfillment centers to serve California and the Western U.S. markets. JLL points out the competitive advantages of the Inland Empire as:

- Being within reasonable proximity to the nation's busiest seaport complex,
- Offering development-ready land sites, and
- Offering an affordable, predominantly blue collar labor force.

The vacancy rate for the Phoenix market has been on the decline, but is still above historic levels. Vacancies hit 16% in 2009 and have been on a downward trend since, leveling off at 11% at the current time. Leasing activity is still strong with 6.7 million square feet of space under construction in the First Quarter of 2013.

Overall, the Inland Empire situated around Ontario International Airport (ONT) is a significant competitor for air freight and cargo traffic. However, passenger service at ONT has declined dramatically from 7.2 million passengers in 2007 to 4.3 million in 2012 and negotiations have been ongoing regarding the sale of the airport from Los Angeles World Airports (LAWA) to the City of Ontario. The challenge for small and medium size airports has been the recent recession and the trend in the airline industry of capacity discipline whereby airlines are consolidating service at the largest airports with fewer flights available at the smaller airports. While passenger traffic has declined at ONT, freight traffic has started to rebound to some extent since 2010, particularly driven by the activities of the UPS hub at ONT.

Cost of Doing Business

A wide variety of information was collected on the cost of doing business in Arizona, California, and Nevada. In some cases, the conclusions vary widely, depending on the methodology of the Study and the factors considered in the analysis. This section will provide the results of several studies, followed by a general conclusion on the relative costs for business operations in Arizona compared to the other two states. While these costs are not specific to the air cargo industry, they do provide a relevant way to analyze how costs compare between states.

Relative Cost of Doing Business

A leading U.S. economics firm, Economy.com (a unit of Moody's Analytics), prepared a cost index and ranking of three key factors for the 50 states including:[22]

- Labor costs
- Energy costs
- State and local taxes

The results of the analysis are provided on **Exhibit 3.39** and rank the states from the highest cost to the lowest cost (most rankings list the inverse, showing the least costly to the most costly states). Arizona falls in the middle of the range, ranked as the 22nd most costly state or 29th least costly state. Nevada is ranked 18th most costly and California is the second most costly state.

Arizona has a large cost advantage over California and a small advantage over Nevada. Based on the overall ranking, Arizona's business costs are 15% lower than California's. For labor, the cost advantage is 9%, for energy 36% and for taxes 11%. Compared to Nevada, Arizona's labor costs are approximately the same, but energy costs are much lower in Arizona. Nevada has a tax advantage, primarily because it does not have a corporate income tax. Utah, Texas, and New Mexico are states with relatively close proximity to Arizona that have competitive cost advantages to Arizona.

[22] The "Relative Cost of Doing Business" study was prepared by Economy.com, a unit of Moody's Analytics.

Exhibit 3.39: Relative Cost of Doing Business (Ranked from Most Costly to Least Costly)

			Labor		Energy		State and Local Tax	
Overall		Index Score	Index	Cost	Index	Cost	Index	Cost
Rank	State		Rank	Index	Rank	Index	Rank	Index
1	Massachusetts	121.6	1	119.5	4	148.9	26	96.1
2	California	117.0	6	109.1	2	160.9	8	110.0
3	New Jersey	116.0	3	113.7	8	137.1	18	101.9
4	Hawaii	113.5	36	94.3	1	204.2	3	121.8
5	Michigan	113.2	2	116.7	14	102.6	15	103.3
6	Connecticut	111.6	7	108.6	9	135.6	23	98.3
7	Maine	110.1	13	104.5	11	129.7	2	122.4
8	Vermont	108.6	19	101.7	5	147.2	17	102.5
9	New York	105.9	28	97.8	10	132.5	1	126.8
10	Alaska	105.7	26	99.2	7	142.2	20	100.0
11	Maryland	104.6	4	110.0	29	84.6	30	94.9
12	Colorado	103.7	5	109.9	39	80.7	41	91.0
13	Florida	103.7	10	106.9	21	95.4	39	91.9
14	Pennsylvania	103.4	15	103.8	13	109.3	38	91.9
15	West Virginia	103.2	9	107.5	45	73.7	4	114.9
16	Washington	103.1	8	107.5	43	78.0	12	107.8
17	Illinois	103.0	12	104.5	16	101.2	29	95.0
18	Nevada	102.2	22	100.9	12	115.0	34	93.1
19	Ohio	101.8	21	101.2	18	99.1	7	110.5
20	Minnesota	101.7	14	104.2	30	84.5	9	109.0
21	Wisconsin	100.1	20	101.5	31	84.3	6	113.0
22	Arizona	99.9	25	99.6	15	102.4	24	97.9
23	Virginia	99.3	11	104.6	38	80.8	42	87.8
24	New Hampshire	99.2	42	90.5	3	157.9	50	75.9
25	Mississippi	98.3	24	100.3	23	88.2	22	98.4
26	South Carolina	98.0	17	101.8	34	82.4	37	92.6
27	Kansas	97.9	23	100.5	27	85.6	25	97.3
28	Missouri	97.9	16	102.7	37	81.2	43	87.3
29	Indiana	97.2	18	101.7	42	78.4	40	91.9
30	Rhode Island	97.2	46	86.1	6	146.4	13	106.8
31	Texas	97.1	27	99.0	20	96.8	47	82.5
32	Georgia	95.4	29	97.5	25	86.3	33	93.8
33	Montana	94.8	30	96.7	41	79.5	16	103.1
34	Louisiana	94.4	38	93.7	19	98.2	32	94.1
35	Utah	94.3	32	96.7	47	72.6	11	108.7
36	Nebraska	93.0	31	96.7	46	72.6	28	96.0
37	Arkansas	92.8	37	94.2	32	83.7	27	96.1
38	Idaho	92.8	34	95.1	48	70.6	10	109.0
39	Iowa	92.6	39	93.2	28	84.9	21	99.6
40	Alabama	92.0	35	95.0	33	83.4	48	82.5
41	Tennessee	91.8	33	96.6	44	77.8	49	77.3
42	Oregon	91.0	41	91.1	40	80.1	14	106.4
43	Delaware	90.4	40	92.0	26	86.3	46	85.0
44	North Carolina	89.7	43	89.9	24	86.4	35	92.8
45	North Dakota	89.0	45	87.0	35	82.4	5	113.5
46	Oklahoma	87.5	44	88.0	36	81.3	36	92.6
47	Kentucky	83.8	47	85.9	50	66.1	31	94.8
48	South Dakota	80.8	49	78.0	22	90.5	44	87.1
49	Wyoming	79.9	48	80.7	49	70.0	45	87.0
50	New Mexico	73.1	50	64.0	17	99.9	19	101.3

Source: North American Business Cost Review, prepared by Economy.com, Inc.

3.6.3 State Economic Performance Rankings

The American Legislative Exchange Council ("ALEC") produced its sixth edition of the report entitled Rich States, Poor States in 2013. The report was prepared in conjunction with Laffer Associates, a leading economic research and consulting firm. The methodology of the report is based on measuring economic competitiveness and the fiscal policies of each of the states.

Two competitiveness indices have been created:

- The state economic competitiveness index which measures past performance, and
- The state economic outlook which forecasts future growth and opportunity. This latter forecast is heavily based on 15 tax policy areas which state lawmakers can control in determining a state's future. The policy areas include corporate and personal income tax, property tax burden, sales tax burden, debt service, minimum wage, and expenditure limits, to name a few.

Arizona ranks high in both indices even with the effects of the recent recession. The Economic Performance Rankings from 2001 to 2011 show Arizona ranking 7th and Nevada ranking 2nd. California by comparison is ranked 43rd, just above some of the large East Coast and Midwest states (See **Exhibit 3.40**).

Exhibit 3.40: ALEC-Laffer State Economic Performance Rankings (2001-2011)

Rank	State		Rank	State
1	Texas		26	Delaware
2	Nevada		27	Louisiana
3	Utah		28	Maryland
4	Wyoming		29	Kentucky
5	North Dakota		30	Alabama
6	Idaho		31	Georgia
7	Arizona		32	New Hampshire
8	Alaska		33	Pennsylvania
9	Montana		34	Minnesota
10	Washington		35	Kansas
11	Oregon		36	Vermont
12	Oklahoma		37	New York
13	Virginia		38	Maine
14	Florida		39	Indiana
15	North Carolina		40	Mississippi
16	South Dakota		41	Wisconsin
17	Hawaii		42	Missouri
18	New Mexico		43	California
19	West Virginia		44	Rhode Island
20	Colorado		45	Massachusetts
21	Nebraska		46	Connecticut
22	Arkansas		47	Illinois
23	Tennessee		48	New Jersey
24	South Carolina		49	Ohio
25	Iowa		50	Michigan

Source: Rich States, Poor States; American Legislative Exchange Council.

For the Economic Outlook Index, Arizona moves up one spot to 6th while Nevada drops to 13th. California moves down to 47th position (see **Exhibit 3.41**).

Exhibit 3.41: ALEC-Laffer State Economic Outlook Rankings (2013)

Rank	State		Rank	State
1	Utah		26	Ohio
2	North Dakota		27	New Hampshire
3	South Dakota		28	Louisiana
4	Wyoming		29	Massachusetts
5	Virginia		30	Delaware
6	Arizona		31	South Carolina
7	Idaho		32	West Virginia
8	Georgia		33	New Mexico
9	Florida		34	Pennsylvania
10	Mississippi		35	Maryland
11	Kansas		36	Washington
12	Texas		37	Nebraska
13	Nevada		38	Kentucky
14	Indiana		39	New Jersey
15	Wisconsin		40	Hawaii
16	Colorado		41	Maine
17	Alabama		42	Montana
18	Tennessee		43	Connecticut
19	Oklahoma		44	Oregon
20	Michigan		45	Rhode Island
21	Alaska		46	Minnesota
22	North Carolina		47	California
23	Missouri		48	Illinois
24	Arkansas		49	New York
25	Iowa		50	Vermont

Source: Rich States, Poor States; American Legislative Exchange Council.

While the outlook and competitiveness rankings are based primarily on tax policy, Arizona is considered a significant competitive force amongst all states, particularly in the West. Indeed, Arizona competes well with Utah, which has garnered high rankings in most business cost and competitive studies. Combined with Nevada, the Mountain Region states are among the leaders in past performance as well as future outlook.

State Business Tax Climate Index

The Tax Foundation, an independent non-partisan tax research group, has prepared a ranking of states by business tax burden. Because of the methodology used for the Tax Foundation study, the rankings somewhat conflict with the studies described above. However, the Study only considers the tax impact on businesses. Five different taxes were evaluated and ranked by state, then combined into an overall ranking. The five tax components of the Study are listed below and are weighted in the following manner:

1. Individual income tax: 33.1%
2. Sales tax: 21.5%
3. Corporate tax: 20.1%
4. Property tax: 14.0%
5. Unemployment insurance tax: 11.4%

The weightings are designed to identify those states that have significant competitive advantages. Some tax categories have high variability while others are more closely clustered together around the mean. To a business, the clustered tax categories are given little weight because the differences between states are minimal. Those categories with high variability (significant differences between state tax policies) are more important to a business's bottom line. In addition, the Tax Foundation study is only a relative ranking of state tax policy (i.e. it only ranks the states against each other). It does not provide an estimate of the disparity or difference in tax costs between the states.

As shown in **Exhibit 3.42**, Nevada ranks 3rd overall in the country, while Arizona rates at the midpoint at 25th. California is well down the list at 48th position. The weighting of the tax components provides Nevada with the high ranking again because it does not have a corporate or individual income tax. Arizona's and Nevada's overall sales tax rates are similar, but Arizona is among the leaders in unemployment insurance and property taxes. If the tax components were unweighted, Arizona would be among the leaders in overall tax burden.

While the results of the Tax Foundation study conflict to some extent with other studies, the outcome demonstrates that Arizona is about average in its business tax burden relative to other states. While Arizona could certainly improve its position related to business taxes, there are other factors that enter into business location decisions, and those are reflected in studies that take into account labor costs, energy costs and other considerations. It is here that Arizona shows its competitive advantages, leading to strong employment growth throughout most of its history.

Exhibit 3.42: 2013 State Business Tax Climate Index Ranks and Component Tax Ranks

State	Overall Rank	Corporate Tax Rank	Individual Income Tax Rank	Sales Tax Rank	Unemployment Insurance Tax Rank	Property Tax Rank
Wyoming	1	1	1	12	29	35
South Dakota	2	1	1	33	35	20
Nevada	3	1	1	42	41	16
Alaska	4	27	1	5	28	13
Florida	5	13	1	18	10	25
Washington	6	30	1	48	18	22
New Hampshire	7	48	9	1	42	43
Montana	8	16	20	3	21	7
Texas	9	38	7	36	14	32
Utah	10	5	14	22	20	3
Indiana	11	28	10	11	11	11
Michigan	12	7	11	7	44	31
Oregon	13	31	32	4	37	10
Delaware	14	50	29	2	3	14
Tennessee	15	14	8	43	26	41
Missouri	16	8	24	27	6	6
Mississippi	17	11	19	28	7	29
Colorado	18	20	16	44	39	9
Pennsylvania	19	46	12	20	36	42
Idaho	20	19	23	23	47	2
Alabama	21	17	18	37	13	8
Massachusetts	22	33	15	17	49	47
West Virginia	23	25	22	19	27	24
Kentucky	24	26	26	9	48	18
Arizona	25	24	17	50	1	5
Kansas	26	36	21	32	9	28
Virginia	27	6	38	6	38	27
North Dakota	28	21	35	16	17	4
Illinois	29	47	13	34	43	44
Maine	30	41	27	10	32	39
Nebraska	31	34	30	26	8	38
Louisiana	32	18	25	49	4	23
Arkansas	33	37	28	41	19	19
Georgia	34	9	40	13	25	30
Oklahoma	35	12	36	39	2	12
South Carolina	36	10	39	21	33	21
Hawaii	37	4	41	31	30	15
New Mexico	38	39	34	45	15	1
Ohio	39	22	42	29	12	34
Connecticut	40	35	31	30	31	50
Maryland	41	15	45	8	46	40
Iowa	42	49	33	24	34	37
Wisconsin	43	32	46	15	23	33
North Carolina	44	29	43	47	5	36
Dist. of Columbia	44	35	36	42	48	24
Minnesota	45	44	44	35	40	26
Rhode Island	46	42	37	25	50	46
Vermont	47	43	47	14	22	48
California	48	45	49	40	16	17
New Jersey	49	40	48	46	24	49
New York	50	23	50	38	45	45

Source: The Tax Foundation.

Cost of Labor and Electricity

As part of this Study, independent research was conducted on the cost of labor and electricity for Arizona, California and Nevada as reported by federal government studies. The data demonstrates that Arizona is highly competitive in both circumstances as reflected in some of the previously described studies.

In terms of labor costs, the average annual wages for the truck transportation and warehousing/storage industries was collected from the U.S. Bureau of Labor. The 2011 data (the most current available) demonstrates that the U.S. average wage for truck transportation is nearly 11% higher than in Arizona. Arizona also has a smaller advantage over both California and Nevada for these costs (see **Exhibit 3.43**).

For the warehousing and storage industry, wages in Arizona are slightly higher than the U.S. and Nevada average wage. However, Arizona has a large 14% advantage over California. These results are generally consistent with other studies presented in this section.

Exhibit 3.43: Average Annual Wage – 2011 by Industry

Industry & State	Wage	% Difference to Arizona
Truck Transportation		
Arizona	$41,528	
California	$42,744	2.9%
Nevada	$44,410	6.9%
United States	$45,980	10.7%
Warehousing and Storage		
Arizona	$39,557	
California	$45,228	14.3%
Nevada	$36,980	-6.5%
United States	$39,109	-1.1%

Source: U.S. Bureau of Labor Statistics.

The average price of electricity by customer type for the U.S., Arizona, California, and Nevada was collected from the U.S. Energy Information Administration for 2013 and 2012 (see **Exhibit 3.44**). In general, Arizona has less expensive electricity costs than the U.S. by a fairly large margin, although that difference has declined from 2012 to 2013. Arizona has a significant advantage over California of close to 40% overall and nearly 62% for industrial users. Nevada has the advantage in commercial and industrial energy costs, particularly for industrial users at rates that are 14% lower than in Arizona.

Exhibit 3.44: Average Retail Price of Electricity to Ultimate Customers by End-Use Sector (Cents per Kilowatthour – as of March 2013 & 2012)

Cents per Kilowatthour								
	U.S.		Arizona		California		Nevada	
Sector	2013	2012	2013	2012	2013	2012	2013	2012
Residential	$11.59	$11.72	$10.87	$10.39	$15.34	$14.98	$11.90	$12.16
Commercial	$9.99	$9.88	$9.30	$8.77	$12.25	$11.86	$8.76	$8.75
Industrial	$6.59	$6.48	$6.13	$5.74	$9.91	$9.75	$5.26	$5.54
All Sectors	$9.69	$9.56	$9.26	$8.78	$12.86	$12.53	$8.13	$8.41
Percentage Difference Compared to Arizona								
	U.S.		Arizona		California		Nevada	
Sector	2013	2012	2013	2012	2013	2012	2013	2012
Residential	6.6%	12.8%	---	---	41.1%	44.2%	9.5%	17.0%
Commercial	7.4%	12.7%	---	---	31.7%	35.2%	-5.8%	-0.2%
Industrial	7.5%	12.9%	---	---	61.7%	69.9%	-14.2%	-3.5%
All Sectors	4.6%	8.9%	---	---	38.9%	42.7%	-12.2%	-4.2%

Source: U.S. Energy Information Administration.

3.6.4 Air Cargo Terminal Costs at Competitor Airports

A survey of air cargo terminal costs at ONT, LAX, LAS, and PHX was conducted for this analysis. The results are presented below.

LA/Ontario International Airport (ONT)

As noted previously in this chapter, ONT is undergoing a significant structural change with reduced commercial airline service and rapidly declining passenger traffic. According to the Los Angeles World Airports ("LAWA") – the owner and operator of ONT, there are limited cargo facilities on the airport, all of which are obsolete. Prior to the recession, an agreement was reached with a private company, Aeroterm, to demolish the existing buildings and reconstruct a new cargo facility. However, as the recession took hold, the agreement was not consummated and the obsolete buildings are still standing. The only current all-cargo activity at the airport is related to UPS and FedEx, both of which are technically located off-airport on private property. As mentioned earlier, UPS operates one of its major hubs at ONT with both domestic and international flights. These two express carriers handle 98% of all air freight while UPS handles 91% of all mail. The remaining air freight at ONT is carried by commercial passenger airlines. **Exhibit 3.45** shows historical cargo and passenger traffic at the airport.

Exhibit 3.45: LA/Ontario International Airport Cargo and Passenger Traffic

	Freight (Tons)	Mail (Tons)	Total Freight (Tons)	Passengers
2007	520,381	12,484	532,865	**7,207,150**
2008	464,986	16,298	481,284	**6,232,761**
2009	373,301	17,632	390,933	**4,886,695**
2010	374,127	18,300	392,427	**4,808,241**
2011	400,465	16,830	417,295	**4,551,875**
2012	437,187	17,694	454,881	**4,305,426**

Source: Ontario International Airport.

Negotiations on the sale of the airport from LAWA to the City of Ontario have been ongoing for a few years with major disagreements over the value of the airport. Privatization is now being considered which could lead to new marketing efforts for expanded commercial service.

Los Angeles International Airport

LAX has an extensive cargo handling network that includes both passenger and all-cargo airlines. There are approximately 2.1 million square feet of cargo related buildings on airport property with another 4.0 million square feet around the airport. There are two main cargo handling areas at the airport. The Imperial Cargo Complex includes tenants such as Lufthansa, Japan Airlines, Korean Air, FedEx, China Airlines, Delta, Air Canada, and Cargo Services Center (a service provider to several air carriers). A modern U.S. Customs headquarters is also located there. The Century Cargo Complex includes American, United, Virgin Atlantic, Asiana, Alaska, British Airways, Southwest, and US Airways.

Most cargo buildings at LAX are on 30-year land leases and the airport is now seeing some 1980s buildings reverting to airport ownership. LAX then leases these buildings out, however the older buildings are often in poor condition or are not constructed according to modern design standards with low ceiling heights, interior columns and other obsolete features.

Some of the recent cargo leases at LAX include United Airlines in 2002 (180,000 square feet) and Virgin Atlantic Airways and Asiana Airlines that together lease a 122,000 square foot building. For buildings owned by LAX, the lease includes a rental rate for the building, the land and a charge for asphalt replacement. All buildings are leased on a triple net basis, whereby the tenant is responsible for all expenses related to the building.

LAX cargo building rental rates average approximately $26 per square foot of building space on a triple net type lease. Land at the airport is currently leased at a rate of $3.10 per square foot. That rate will increase each year based on inflation. Building expenses could add another $4.00 to $5.00 per square foot to the cost of leasing for a total near $30 per square foot. **Exhibit 3.46** below summarizes recent leasing activity of cargo buildings by LAX.

Exhibit 3.46: Cargo Building Rents at LAX

	Asiana	Virgin Atlantic	Swissport
Building Age (Years)	13	13	30
Building SF	71,631	72,544	50,819
Rent/SF	$19.50	$19.50	$17.50
Land SF	144,149	144,479	144,514
Land Rent/SF	$3.10	$3.10	$3.10
Asphalt Paving SF	80,436	80,466	n/a
Paving Charge/SF	$0.36821	$0.36821	n/a
Total Rent	$1,873,284	$1,892,121	$1,337,326
Total Rent/Building SF	**$26.15**	**$26.08**	**$26.32**

Source: LAX.

Note: All rents are triple net - tenant pays all costs of maintenance, utilities, insurance, etc.

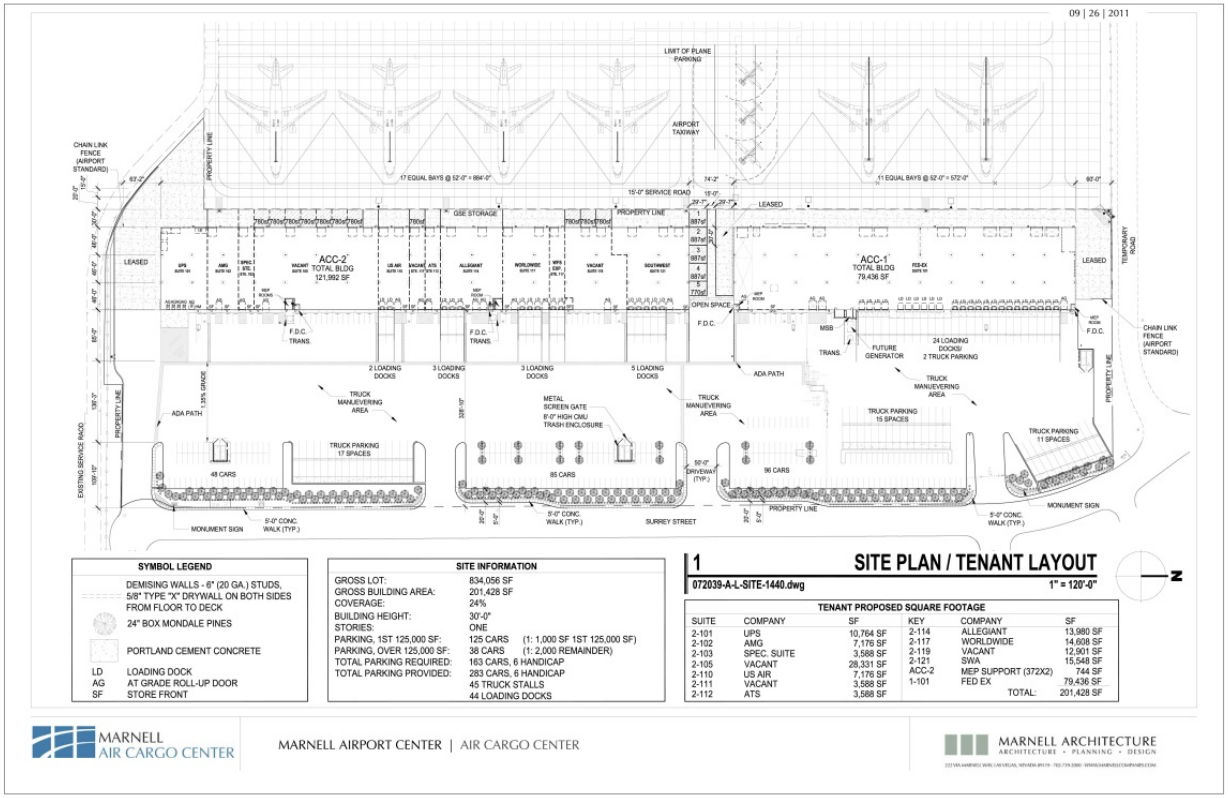
LAX is clearly the leader in terms of air cargo handling on the West Coast of the U.S. Every major airline has a cargo handling operation there for both domestic and international freight. More than 400 freight forwarders and over 100 customs brokers are located in the Los Angeles area to facilitate air cargo movements.

McCarran International Airport (LAS)

Las Vegas' primary airport - McCarran International - has partnered with a private developer, Marnell Properties, to develop a modern 210,000 square foot freight and distribution facility on 19 acres just east of Terminal 3. The complex was constructed in 2010 and has 22 foot clearance heights and modern technology (card readers, etc.). Current tenants include UPS, US Airways, Airport Terminal Services, Allegiant Air, Worldwide Flight Services, Southwest Airlines, and FedEx. Bays start at 3,588 square feet in size. **Exhibit 3.47** below provides a diagram of the Marnell Air Cargo Center.

Lease rates are $18 per square foot per year with triple net fees of $3.00 per square foot. Each bay comes with 780 square feet of Ground Service Equipment ("GSE") space on the tarmac side of the building. Rent for the GSE space is $1.50 per year. When all elements of the lease are calculated together, the lease rate is $21.33 per square foot per year.

Exhibit 3.47: Diagram of the Marnell Air Cargo Canter at McCarran International Airport



Phoenix Sky Harbor International Airport

Phoenix Sky Harbor International Airport's air cargo building lease rates are significantly less than those at LAX and LAS. Lease rates were quoted on a square foot basis for three buildings at PHX. The rates are essentially full service, meaning that the airport pays most of the expenses related to maintenance of the building including utilities. Tenants are primarily responsible for maintenance of the interior of the buildings as well as any tenant improvements. Annual lease rates are as follows:

- West Air Cargo: $12.84 per square foot
- West Air Cargo GSE Bays: $14.64 per square foot
- South Air Cargo: $15.96 per square foot

Survey of Logistics Buildings Occupancy Costs

Additional research uncovered a survey of occupancy costs for logistics buildings prepared by DTZ Research.[23] Logistics buildings are defined in the survey as large-scale industrial premises in which a range of logistic activities are performed such as storage and transshipment. The survey was conducted for buildings located in prime industrial areas with good transportation links. A typical building consists of a minimum of 50,000 square feet with office space occupying 5% to 10% of the building. Rent was assumed to be the highest that could be achieved for the highest quality building in the best location. Occupancy costs include rent, property taxes, and service charges for security, site maintenance, and landscaping.

Exhibit 3.48 shows building costs for logistics operations for 14 metropolitan areas in the U.S. for 2011, 2012 and a forecast for 2017. While the report does not provide information for California's Inland Empire or Las Vegas, it does evaluate building costs for Los Angeles and San Diego as well as Denver. It also provides a relative ranking for Phoenix among the major metro areas in the country.

For 2012, building costs for Phoenix are below the U.S. average and are expected to remain at that level over the next five years. According to this survey, Phoenix logistics buildings are less expensive on average than Los Angeles by a factor of approximately 10%. Interestingly, industrial building costs in San Diego are among the most expensive in the country. Rent and associated costs for San Diego logistics buildings are 27% more expensive than in Phoenix. Conversely, building costs in Denver are approximately 9% less expensive than in Phoenix.

Overall, the occupancy cost survey is consistent with the results outlined in the previous sections of this study. For air cargo and logistics facilities, Phoenix is neither the highest cost metro area, nor is it the lowest. Similar to other cost indices for housing, food and other expenses, Phoenix is comparable to the national average. However, the results of the occupancy cost survey are somewhat surprising in that larger metro areas such as Atlanta, Dallas, Houston and Chicago are all less expensive than Phoenix. This may be the result of competition, their positions as major logistics hubs, and the amount of freight originating from or passing through these cities.

[23] Milena Kuljanin and Karine Woodford, DTZ Research, "Occupier Perspective: Global Occupancy Costs – Logistics 2013", (July 17, 2013).

Exhibit 3.48: Logistics Occupancy Costs (Annual Cost per Square Foot)

Metro Area	2011	2012	Forecast 2017
Atlanta	$5.39	$5.48	$6.13
Dallas	$6.13	$6.22	$6.78
Houston	$6.32	$6.41	$7.15
Denver	$6.50	$6.60	$7.25
Chicago	$6.78	$6.87	$7.71
Philadelphia	$6.87	$6.97	$7.53
Phoenix	$7.15	$7.25	$7.99
U.S. Average	**$7.67**	**$7.76**	**$8.53**
Los Angeles	$7.90	$7.99	$8.83
Boston	$8.45	$8.55	$9.20
Minneapolis	$8.64	$8.73	$9.57
Seattle	$9.01	$9.10	$10.03
San Diego	$9.20	$9.20	$10.03
Miami	$9.38	$9.48	$10.59
San Francisco	$9.66	$9.75	$10.68

Source: DTA Research, 2013.

3.6.5 Conclusions

Competitive Summary

From the research performed for this Study, Arizona is clearly an important and highly competitive state in the warehouse/distribution real estate market as well as from the perspective of labor, energy, and tax costs. Among the three states evaluated in terms of air cargo terminal costs, Arizona clearly has a competitive advantage over California and is at least equal to Nevada in most respects. Many observers and economists recognize that Arizona is among the country's top ten states for future growth and prosperity.

This does not mean that Arizona's tax policies cannot be improved. Clearly there is a balance that must be achieved between tax revenues and the needs of the State and its businesses. Arizona has moved in that direction over the past decade without sacrificing too much (in terms of incentives and funding) in its desire to expand its employment base. However, by placing itself in the upper half of the states in terms of lowest business costs, it is able to use its other assets of climate, natural resources and proximity to California to grow employment. Clearly Arizona is positioned to take advantage of the tax, regulatory, labor and utility costs associated with doing business in California.

The Inland Empire of California is the region that is most competitive to Arizona from a cost of business perspective. As noted in this report, with its proximity to the Los Angeles metro area and the Long Beach and Los Angeles seaports, available and less expensive land, and an

affordable labor force, the area surrounding LA/Ontario International Airport will continue to be a logistics hub. While ONT is undergoing significant structural changes in its passenger service, freight traffic appears to be maintaining a relatively strong base – especially due to the presence of the UPS. However, LAWA's plans to shift some of the passenger and cargo traffic from LAX to ONT did not pan out and that plan does not seem to have any chance of being revived. The loss of passenger service at the airport is not likely to affect cargo service in the near term. Any change of ownership of the airport will likely result in renewed cargo and passenger marketing efforts.

Las Vegas shares many of the same cost advantages as Phoenix and is slightly more accessible to Southern California. McCarran International Airport's international flights are a potential competitive advantage for belly cargo, but in 2012, the Airport handled only one-third of the freight and mail tonnage handled by Phoenix Sky Harbor. Overall, Las Vegas has a similar warehouse and distribution cost structure as Phoenix.

Airport Leasing Summary

LAX is clearly the major air cargo/logistics hub of the West Coast. By virtue of this fact, it has the ability to set lease rates for cargo buildings that are significantly higher than warehouse buildings outside of the airport boundaries. Airlines and all-cargo carriers are essentially a captured audience. As a result, LAX cargo buildings are leased for approximately twice the rates charged at PHX. This certainly is a competitive advantage for PHX.

In its current condition, ONT is not a major competitor to the Phoenix area airports. Aside from UPS and FedEx, cargo operations are minimal at ONT. Further, the airport does not have an inventory of available on-airport cargo buildings. However, the area surrounding ONT is an important logistics hub that supports the distribution of goods within the Los Angeles region. This geographical advantage could help to drive the demand for air cargo services at ONT in the future even though passenger traffic would remain at low levels.

LAS has a modern cargo facility that serves a number of airlines and freight companies. While its lease rates are higher than Sky Harbor's cargo facilities, higher ceiling heights, and modern security systems make for efficient handling of cargo. The Marnell Air Cargo Center is superior to the West Cargo facility at Sky Harbor because of its modern design. The biggest question for LAS is the amount of air cargo that is produced in its natural market area. Currently, the Las Vegas metro area and Nevada are not large producers of air freight, which limits the market's attractiveness from an operational perspective.

3.7 Air Cargo Opportunities

Air cargo opportunities for the Phoenix metropolitan area airports should be assessed in the context of overall international and domestic cargo market trends and the current business practices of companies participating in the air cargo industry (including shippers, freight forwarders, air carriers and other service providers). As such, the opportunities for the Phoenix area identified at this stage of the Study should be considered preliminary. In many cases, further analyses may assist in determining the potential viability of opportunities discussed here.

Air cargo market opportunities for consideration and further evaluation as discussed in this section fall into four general categories:

- Integrated Express Carrier Operations;
- Air Cargo Business Model Evolution;
- Airline Capacity; and
- Facilities, Infrastructure and Services.

3.7.1 Integrated Express Carrier Operations

A consistent and important observation from the market analysis was the recent and potential future growth of online retail distribution operations in the Phoenix area. Companies like Amazon, Macy's and Dick's Sporting Goods have established major operations in the Phoenix area in recent years and those facilities are creating significant demand for air cargo services in the region. While these distribution centers are creating opportunities for almost all carriers at PHX, none are carrying more volume than the integrated express carriers.

Although it is unclear what level of growth should be expected from Phoenix's online retail sector, it seems that the existing solid base of operations and investment in the region will at least be maintained for the foreseeable future. Further, this base can be readily expanded upon suggesting potential upside.

Arizona's competitiveness in the warehouse/distribution real estate market and attractive labor, energy and tax environments provide the State and the Phoenix area with substantial advantages to pursue growth by online retail distributors. While the domestic U.S. air cargo market is likely to experience slow growth moving forward, U.S. online retail sales are expected to continue their rapid growth. Meanwhile, the delivery standards for those sales will increase. To the extent that the Phoenix region can facilitate growth of the online retail distribution sector, they will also likely aid growth of air cargo activity in the region.

3.7.2 Air Cargo Business Model Evolution

The evolution of certain air cargo business models presents another possible opportunity for the Phoenix metropolitan area airports. Specifically, changes in the way shippers manage and procure outsourced logistics services, including air cargo, are forcing service providers to re-think their own business practices. As service providers, like freight forwarders, adapt to a new environment, there may be opportunities for airports like Phoenix Sky Harbor and Phoenix-Mesa Gateway.

In recent years, shippers have increased their use of sophisticated analytic software tools and instituted highly competitive procurement processes for their inbound and outbound shipments. These business processes have the effect of driving down shipper costs while simultaneously increasing service standards. On the other side, service providers, including freight forwarders and air carriers, are finding themselves increasingly squeezed to achieve profits at low margins and are seeking ways to reduce their own costs and variability in operations. From an air cargo perspective, this means simplifying processes as much as possible, to include the flexibility to use airports and air services that help achieve service standards and avoid shipper-imposed penalties associated with underperformance.

This dynamic makes airports, like those in the Phoenix area, attractive to forwarders to the extent that appropriate services are available at competitive rates and with quality standards found at larger gateway airports. While the large cargo gateway airports will always maintain significant advantages in the air cargo industry due to long-standing business practices, infrastructure, and air services, the substantial evolution of business models in the industry may work to the advantage of certain alternative cargo airports, including those in the Phoenix area. Further, findings from the Market Analysis suggest that PHX and IWA can attract some of the air freight trucked through the Phoenix area on the way to/from LAX, given the right mix of services and pricing levels at Phoenix area airports. While there are challenges to this identified opportunity (in terms of air services and potentially air cargo-related infrastructure and facilities), it should be a candidate for additional consideration.

3.7.3 Airline Capacity

The assessment of Arizona's air exports indicated substantial leakage to other non-Arizona cargo gateway airports. In the Western United States, the presence of LAX and its robust logistics services is an impediment to attracting regularly scheduled freighter services at the Phoenix area airports. LAX offers a mix of widebody passenger services that complement scheduled all-cargo freighter services creating an optimal mix of capacity and schedules for a wide variety of air cargo users. The Phoenix area airports are currently not in the position to replicate this service model, which has developed over many decades at LAX and is highly dependent on a very large local passenger market and the business models of airlines. However, greater access to international widebody services at the Phoenix area airports would be well-received and supported by the local freight forwarder community.

Secondary research and direct input from the Phoenix air cargo community indicate that there is unmet demand for widebody international service - from a cargo belly capacity perspective - in the Phoenix area market. Freight forwarders seeking to meet customer delivery requirements indicated that if greater international widebody capacity were available at the Phoenix area airports, it would be utilized without question. To bolster this case, one airline has completed an internal analysis which showed that additional widebody capacity would be easily filled at PHX.

Further, many freight forwarders have the discretion to utilize widebody nonstop services where it is available and meets the company's contractual requirements with its customers. Some forwarders noted that as widebody international capacity increased at Western U.S. airports such as Las Vegas, Seattle, San Francisco, and Denver, freight from local freight forwarder stations in those areas shifted away from other traditional cargo airports to utilize these new services.

Of course, the opportunity for domestic widebody services enhancements is extremely limited. The trend among U.S. passenger airlines has been to utilize narrowbody and regional jet equipment on most domestic routings. Therefore, a full assessment of the opportunity for increased scheduled passenger widebody services should be focused on international markets where passenger demand warrants consideration of a nonstop service.

3.7.4 Facilities, Infrastructure and Services

Airport operators provide key facilities, infrastructure, and services to customers in the air cargo sector of the economy. Aligning an airport's cargo business plan to meet market demands and the requirements of its customers is a pre-requisite to positioning the airport to capture greater shares of the regional cargo market. For airports like PHX and IWA to successfully counter some of the challenges presented by dominant cargo gateway airports, they may require facilities, infrastructure, and services that are competitive with other offerings in the market. From this perspective, two potential development opportunities may be considered: a temperature controlled facility and a centralized air cargo screening facility.

Temperature Controlled Facilities

The movement of temperature sensitive air shipments requires airports to offer appropriately sized, temperature-controlled facilities as well as necessary equipment to ensure that correct temperatures are maintained from origin to destination – including during short-term airport storage and on the airport ramp during loading and unloading. In the primary research phase of the Market Analysis, some stakeholders (air carriers and forwarders) mentioned that there are potential needs in this area that could be attractive to the broader market.

There is recognition in the forwarder community that the Phoenix area airports do not currently offer an optimal environment for the movement of temperature-controlled shipments. Forwarders noted that there is demand for the transport of temperature sensitive fruits and vegetables from the United States and Mexico as well as the chemicals, adhesives, and pharmaceutical sectors of the market. Currently, these commodities are not being handled via Phoenix area airports due to a lack of reliability and certainty that the shipments' temperature requirements can be maintained.

Of course, there are inherent and real risks with these types of facilities developments. As such, further analysis is recommended to qualify or disqualify this potential opportunity. Further consideration of a temperature controlled facility requires a complete due diligence in the context of market demand and the Phoenix area airports' overall business plans achieving for air cargo growth.

Centralized Air Cargo Screening Facility

In addition to comments regarding temperature-controlled facilities, there is some interest within the cargo community to have access to a centralized air cargo screening facility in order to comply with TSA security requirements. Air cargo security issues continue to challenge some members of the air cargo community and additional solutions are being sought.

Freight forwarders face complex decisions when it comes to security screening in that there is a high investment required to obtain air cargo screening equipment and to employ certified personnel. Many forwarders have chosen to limit their capital investments and place screening equipment only at major cargo gateway airports. Others have decided to invest in screening equipment at each of their stations around the country.

When screening equipment is not available at non-gateway airports such as PHX and IWA, there is a natural incentive for forwarders to route cargo to the nearest large cargo gateway airports where investments in screening equipment have been made. However, this practice may potentially be challenged as forwarders seek flexible options to ship goods for customers with contracted high-service standards. In these cases, forwarders may prefer to ship at airports closer to their customers' locations, thereby ensuring that shipments enter the air transportation system earlier, which reduces the risk of late deliveries.

On this point, some Phoenix-area forwarders noted that shipments routed to large cargo airports (like LAX) can be at risk of missing airline cut-off times for tendering cargo prior to flight departures. As unscreened shipments arrive at large gateway airports via truck throughout the day, backups can occur with screening processes. In this manner, unscreened freight can be delayed which triggers penalties by shippers. The forwarders suggest that one way to avoid these risks is to screen cargo locally (e.g. at airports nearest to their customers' locations) in preparation for air transportation at the local airports or even at the large cargo gateway airports. While a centralized cargo screening facility at an airport may help to capture more cargo from the local market, there is the possibility that it may also further facilitate the leakage of cargo to other airports as certain risk factors are reduced once the shipments are screened. Like the temperature-controlled facility, consideration of a centralized air cargo screening facility must go through a full due diligence process prior to being considered a qualified opportunity.

Phoenix Regional
Air Cargo Planning Study

CHAPTER 4

Chapter 4: Air Cargo Demand Forecasts for Phoenix Area Airports

One of the key aspects of the Phoenix Regional Air Cargo Planning Study is the development of air cargo forecasts for the relevant Study Region airports. Specifically, air cargo forecasts are required for the two major commercial airports in the Phoenix metropolitan area - Phoenix Sky Harbor International Airport ("PHX") and Phoenix-Mesa Gateway Airport ("IWA"). Forecasts of air cargo volumes provide the basis for subsequent analyses by airport planners in determining potential needs for future cargo-related facilities and/or infrastructure at these airports.

A variety of techniques can be utilized in the development of air cargo forecasts and the chosen approach is very much dependent on the specific circumstances of the markets at issue as well as the intended use of the forecasts. For some situations, a broad market forecast is required where macro-economic factors are studied in depth and industry-wide forecasts (such as those produced by Boeing and Airbus) are utilized heavily. In other situations, forecasts are required for marketing purposes and may entail estimates of air cargo for a certain aviation route or for a prospective air service by a defined airline with a specific type of aircraft. Air cargo forecasts for individual airports (especially those that are not major cargo gateway airports) are often best formulated using a service-based approach or a scenario-based approach.

A service-based approach to air cargo forecasts is established under the premise that airports can only realize cargo volumes to the extent that adequate supply of air cargo capacity (from air carriers) is present and available at those airports. In fact, for an airport level forecast, supply of air cargo capacity is just as important as the "demand-pull" created by economic growth and activity. For the service-based approach, estimates of future aircraft operations (both passenger and all-cargo operations) are required to impute air cargo tonnage on those flights. The future aircraft operations are a function of historical operations at the airport as well as any forward-looking information regarding possible net new operations or anticipated changes in the profile of existing operations. The summation of cargo tonnage via this methodology, along with other related assumptions and analyses, produces an airport-level air cargo forecast.

A scenario-based approach to air cargo forecasts is similar to the service-based approach, but is particularly useful for airports with little history with air cargo operations and for airports pursuing specific types of air cargo development that have particular profiles from the perspective of airline operations and service patterns. As the name implies, the scenario-based approach relies on the definition of specific cargo-related scenarios at airports (including assumptions of operational details and service development over time) and the cargo volumes associated with those scenarios. While this approach can be seen as somewhat prospective, its value from a planning perspective lies in quantifying possible levels of cargo activity should those types of scenarios come to fruition. From this standpoint, it is important to ensure that the scenarios are as realistic as possible, but for planning purposes, also encompass a wide-range of possible air cargo development environments that could be faced by an airport during the forecast period.

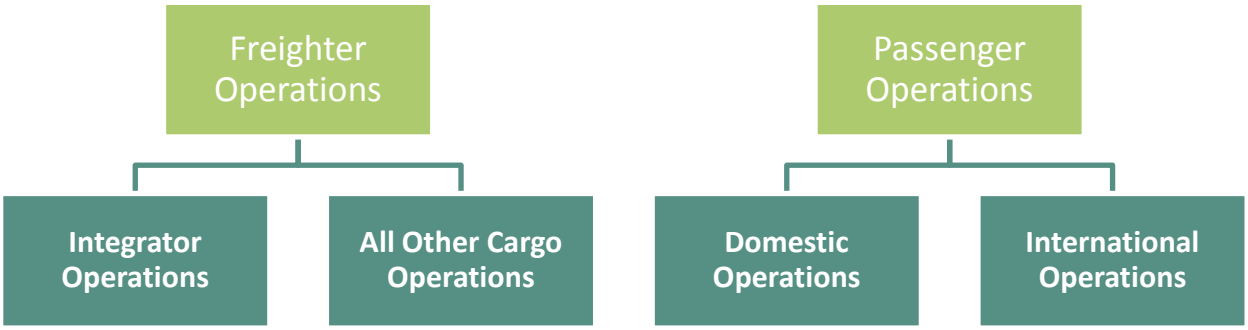
4.1 Phoenix Sky Harbor International Airport Forecasts

Given that Sky Harbor is not considered a major air cargo gateway, but does have significant amounts of air cargo volume and a long history of both passenger and cargo operations, the service-based approach was employed for the PHX forecasts. This approach allows for the incorporation of local, micro- level information regarding aircraft operations and air cargo levels, while also enabling use of quantitative and qualitative information obtained during the primary and secondary research phases of this Study's market analysis. Further, the industry forecasts produced by Boeing, Airbus and the FAA can be used for comparative purposes against the PHX-specific forecasts to check for reasonableness.

It is also important to re-state here that air mail is a relatively minor component of air cargo at PHX and is largely driven by the practices of the U.S. Postal Service and its contracted carriers. Therefore, attention for this Study and the PHX forecasts is focused on the air freight component. To be complete, PHX air mail is forecasted separately and, then, added to the air freight totals derived from the service-based approach.

The first step in the PHX air freight forecast process involved an analysis of the relationship between air freight tonnage and aircraft movements over time. Knowing that different types of airline operations and aircraft have different capacities for carrying cargo, aircraft movements and freight tonnage were categorized by type of operation/aircraft and analyzed within these categories. For purposes of this forecast, PHX operations were categorized first as either Freighter Operations or Passenger Operations. Freighter Operations were segmented into Integrator Operations and All Other Cargo Operations. Passenger Operations were segmented into Domestic Operations and International Operations. Finally, each of these categories was further sub-divided in terms of Narrowbody Aircraft, Widebody Aircraft and Other Aircraft (e.g. regional jets and turboprops).

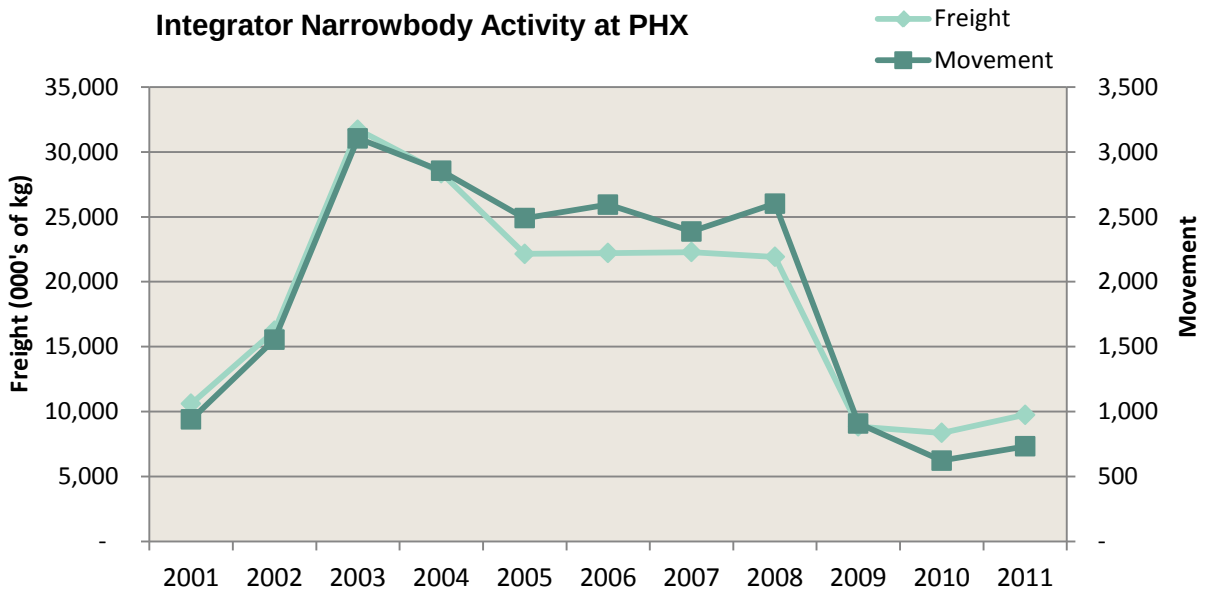
Exhibit 4.1: Types of Carriers and Aircraft Types Analyzed in PHX Forecasts



Using the U.S. DOT's T-100 database, PHX air freight was analyzed by type of operation and aircraft from 1994 through 2011.[24] This lengthy 18-year time series is appropriate in order to capture the impacts of long-term trends (such as modal shifts) as well as impacts from extraordinary events like the 9/11 terrorist attacks and the U.S. recession of 2008-2009. To understand possible relationships between air freight and various airline operations, regression analysis was employed to test for correlations and statistical significance.

Of the twelve categories of PHX operations studied, ten were shown to have high correlations and statistical significance. The valid regressions included all six categories of Freighter Operations (Integrator and All Other Cargo), as well as four out of the six categories of Passenger Operations. The only regressions that were not found to be statistically significant were the Passenger Operations for Narrowbody Domestic and Narrowbody International. It is believed that the lack of statistical significance for these operations is related to factors such as: changing airline passenger loads that vary the space and weight capacity available for freight and modal shifts to trucks that can easily accommodate most freight that fits in a narrowbody aircraft belly. **Exhibits 4.2** and **4.3** below display sample output of the analysis of airline operations and tonnage carried and the inter-relationships of these factors.

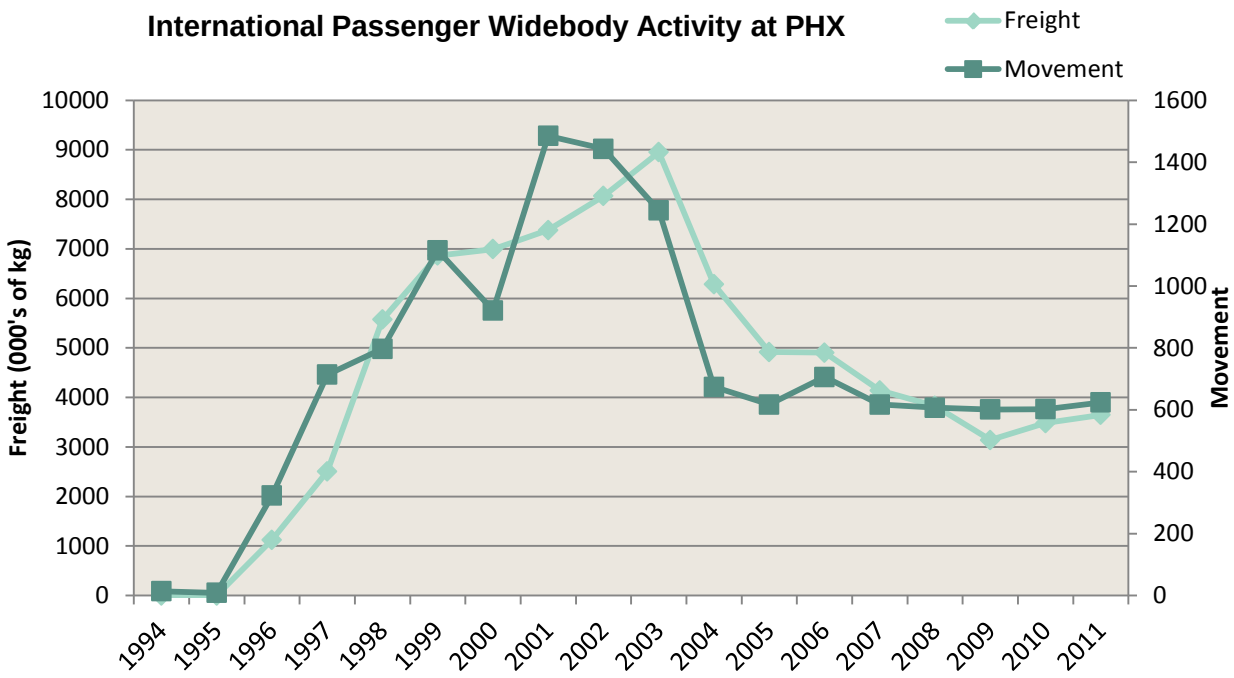
Exhibit 4.2: Analysis of Relationship between Aircraft Movements and Air Freight at PHX (Integrator Narrowbody Movements)



Source: U.S. DOT, T-100 Carrier Reports.

[24] Integrated carriers, such as FedEx and UPS, did not report data at PHX in the U.S. DOT, T-100 reports prior to 2001.

Exhibit 4.3: Analysis of Relationship between Aircraft Movements and Air Freight at PHX (International Passenger Widebody Movements)



Source: U.S. DOT, T-100 Carrier Reports.

Having confirmed overall high correlations and statistical significance between PHX air freight and airline operations, it was determined that the service-based approach was valid and appropriate for the PHX forecasts.

The next step in the forecast process was aided by the 2012 Terminal Area Forecasts developed by the FAA. The Terminal Area Forecasts include projected operations (or aircraft movements) for the top U.S. airports (including PHX), broken down by type of operation: air carrier operations, general aviation operations and military operations. For these forecasts, focus was placed on projected cargo freighter operations and passenger operations at PHX which are part of the FAA's air carrier operations category. Under the service-based forecast approach, once future operations by type are determined, a related air freight tonnage per operation can be estimated to then derive a freight forecast for the airport.

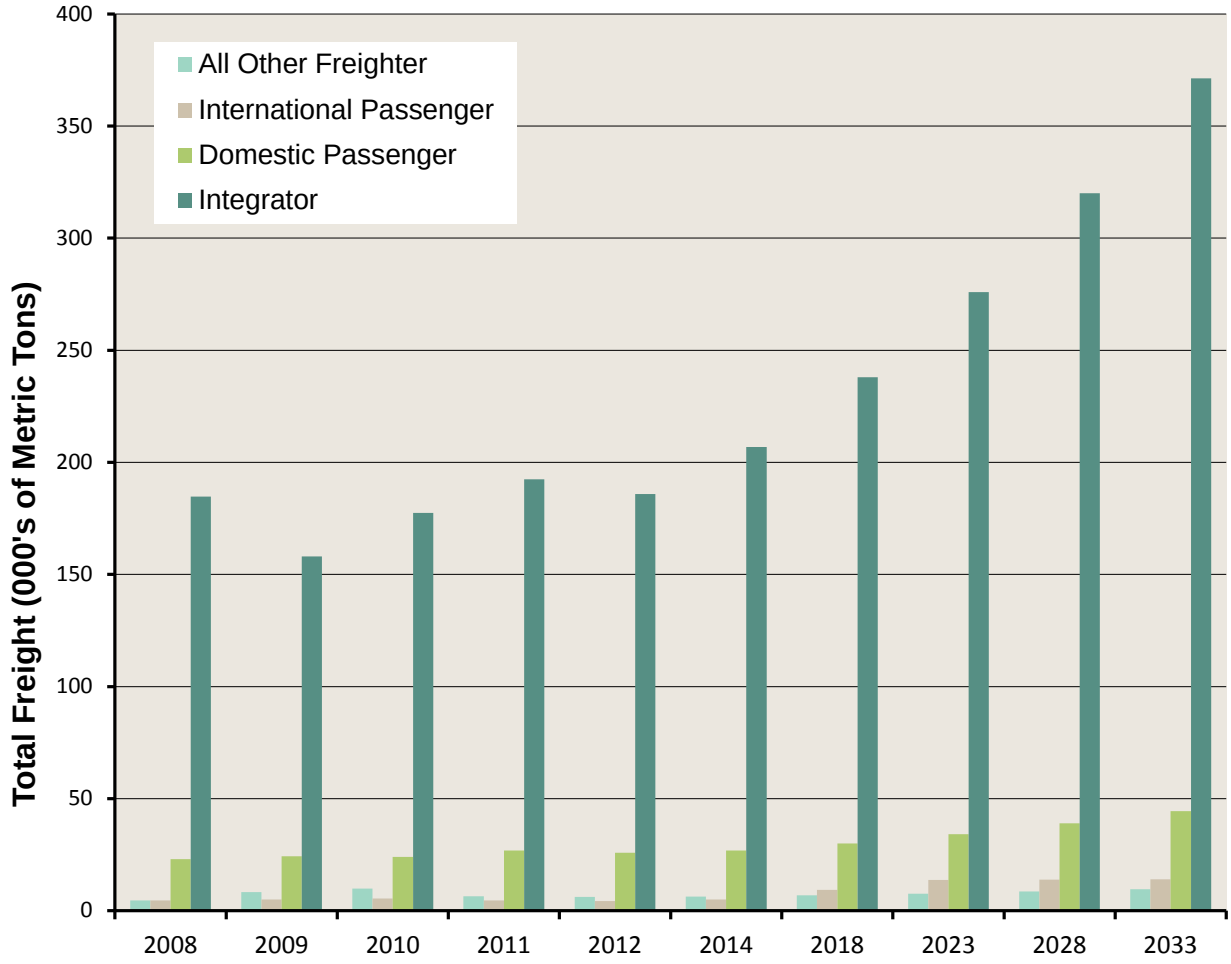
Using data from the U.S. DOT's T-100 air carrier reports, the percentage share of total air carrier movements and the average tonnage per operation over the past five years were analyzed for each of the types of carriers and aircraft types summarized in **Exhibit 4.1** above. The percentage share of total movements and the average tonnage per operation were adjusted based on research conducted for this study, and then applied to the projected operations estimated by FAA for PHX in the Terminal Area Forecasts to determine the total air freight forecasts for PHX through 2033.

After establishing the base PHX forecast primarily utilizing the Terminal Area Forecasts for movements and their related onboard cargo per operation, micro- adjustments were made to certain forecast elements based on information obtained during the market analysis phase. During that phase, stakeholders were queried on their estimates of air freight market growth over the next five years as well as qualitative factors that could drive (or suppress) demand for air freight services. Using these inputs, the cargo volumes and growth rates were checked for consistency and adjusted as necessary. Specifically, air freight for Integrator Operations was expected to grow somewhat faster in the initial five years of the forecast which reflects anticipated further growth by the online retail shippers as well as a new Intel fabrication plant which will come on-line in 2014. Further, information obtained from PHX regarding air service development priorities were explicitly included in the forecasts – specifically related to additional international passenger widebody services.

A summary of the air freight forecast results by type of carrier are provided in **Exhibit 4.4** and **Exhibit 4.5**. Total air freight tonnage handled at PHX is projected to increase from 222,400 metric tons in 2012 to more than 439,300 metric tons in 2033. In the next 20 years, freighter operations will handle over 380,900 metric tons of total cargo shipments at PHX (87% of total cargo), with 97% of those cargo shipments comprised by integrators and the remaining 3% comprised by other cargo operators. On the other hand, passenger operations will handle more than 58,400 metric tons (13% of total cargo), with domestic operations comprising the largest share (76%) of those belly space shipments.

Overall, PHX air freight is expected to grow at an average annual rate of 3.3% over the forecast period. Integrators will grow at an average of 3.3% annually through 2033, while belly freight carried on domestic passenger flights will grow an average of 2.6% per year. Belly freight carried on international passenger flights at PHX is forecasted to grow at an average annual rate of 5.6%. The higher rate of growth for international versus domestic freight stems, in part, from a slightly higher overall rate of growth for international versus domestic passenger aircraft movements. The key factor, however, is the significantly higher rate of increase in the category of international widebody movements, which includes the passenger aircraft that are most cargo friendly.

Exhibit 4.4: PHX Air Freight Forecast Summary by Type of Carrier



Source: InterVISTAS Consulting.

Exhibit 4.5: PHX Air Freight Forecast Summary, 2014-2033

Year	Freighter Operations			Passenger Operations			Grand Total
	Integrators	Other	Total	Domestic	International	Total	
Historical Freight Tonnage (Metric Tons)							
2008	184,839	4,717	189,557	22,950	4,553	27,503	**217,060**
2009	158,140	8,361	166,500	24,311	5,055	29,366	**195,867**
2010	177,472	9,882	187,354	23,994	5,523	29,517	**216,870**
2011	192,443	6,482	198,925	26,881	4,578	31,459	**230,385**
2012	185,905	6,206	192,111	25,881	4,430	30,310	**222,421**
Forecast Freight Tonnage (Metric Tons)							
2014	206,912	6,378	213,290	26,901	5,071	31,972	**245,263**
2018	238,012	6,950	244,962	29,960	9,410	39,370	**284,332**
2023	276,027	7,721	283,748	34,164	13,772	47,936	**331,684**
2028	320,139	8,591	328,730	38,957	13,874	52,831	**381,561**
2033	371,333	9,571	380,904	44,424	13,984	58,408	**439,312**

Source: InterVISTAS Consulting.

Air mail forecasts at PHX were determined by estimating projected total mail volumes at PHX using data from the U.S. Postal Services' ("USPS") Five-Year Business Plan released in April 2013 and from a report conducted by the Boston Consulting Group for the USPS in March 2010 on mail volume projections to 2020.[25] Based on the USPS' business plan, U.S. mail volume is forecasted to decrease at an annual decline of -2.8% from 2012 to 2017. The Boston Consulting Group report predicts mail volume in the U.S. to decrease at an annual rate of -1.5% from 2009 to 2020. The expected decline by the USPS was applied to current mail volumes handled at PHX to determine forecast total mail volumes from 2012 to 2017. For the remaining forecast periods (2018 to 2033), the expected decline by the Boston Consulting Group was used.[26] The forecast volumes were then broken down by type of operation at PHX based on

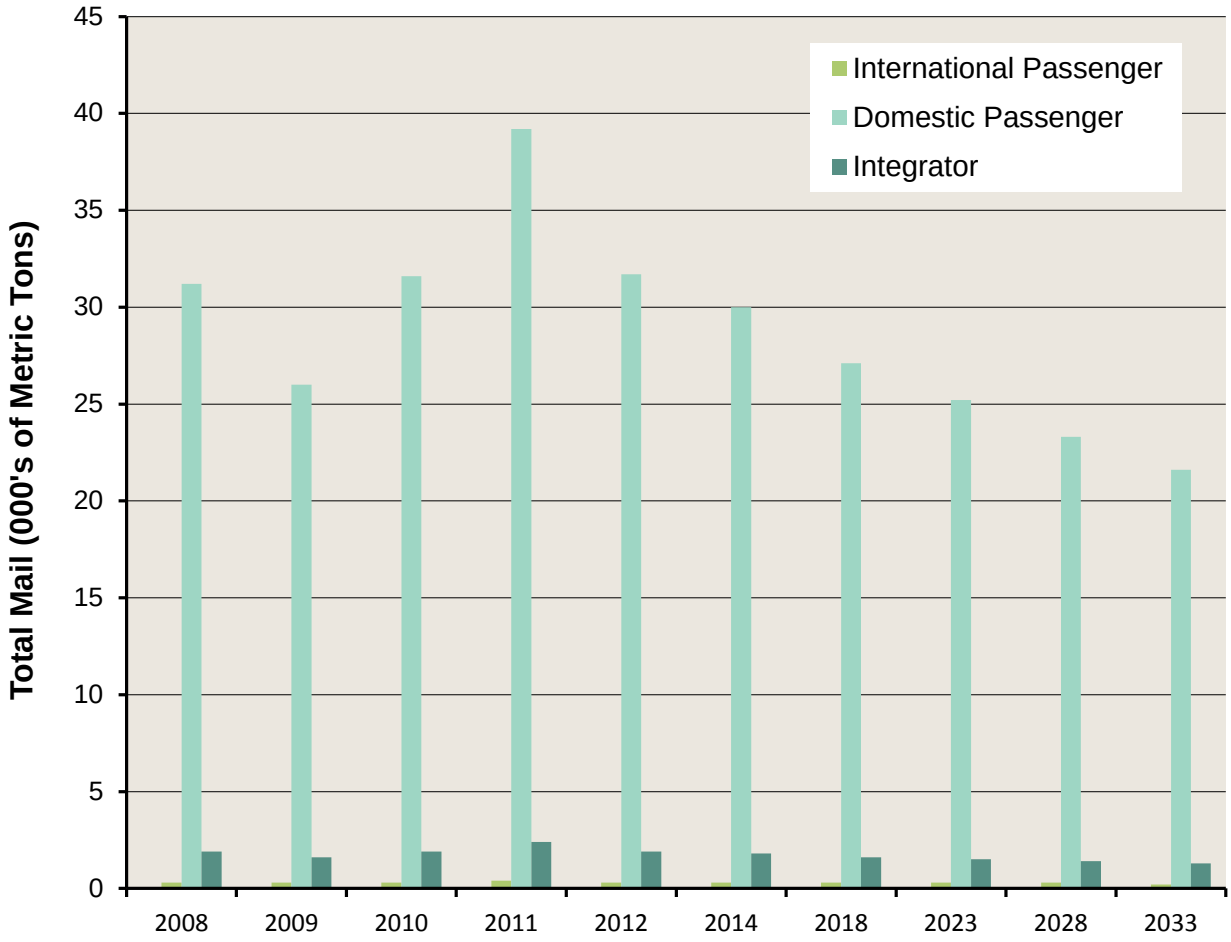
[25] USPS and the Boston Consulting group estimate forecasted volumes for all mail, regardless of mode of transportation. However, as this is the best publicly available data, the estimates shown should be considered conservative.

[26] Data from the Boston Consulting Group was utilized for the remaining periods instead of the USPS data, because the decline in mail volumes is expected to taper off in future years, as there are some items that will constantly be shipped by mail.

average shares of total mail volumes from 2008-2011, taken from PHX cargo statistics and U.S. DOT T-100 data.

Exhibit 4.6 and **Exhibit 4.7** provide a summary of the air mail forecast results by type of carrier. By 2033, total mail tonnage handled at PHX is projected to decrease to nearly 23,200 metric tons from more than 34,000 metric tons in 2012. In the next 20 years, freighter operations will handle over 1,300 metric tons of total mail shipments at PHX (6% of the total), with 100% of the mail shipments on freighters carried by integrators. Passenger operations will handle close to 21,900 metric tons (the remaining 94%), with domestic operations comprising the largest share (99%) of mail shipments. Over the forecast period, PHX air mail is expected to decline at an average annual rate of 1.8%. This decline reflects the nationwide reduction in postal volumes.

Exhibit 4.6: PHX Air Mail Forecast Summary by Type of Carrier



Source: InterVISTAS Consulting.

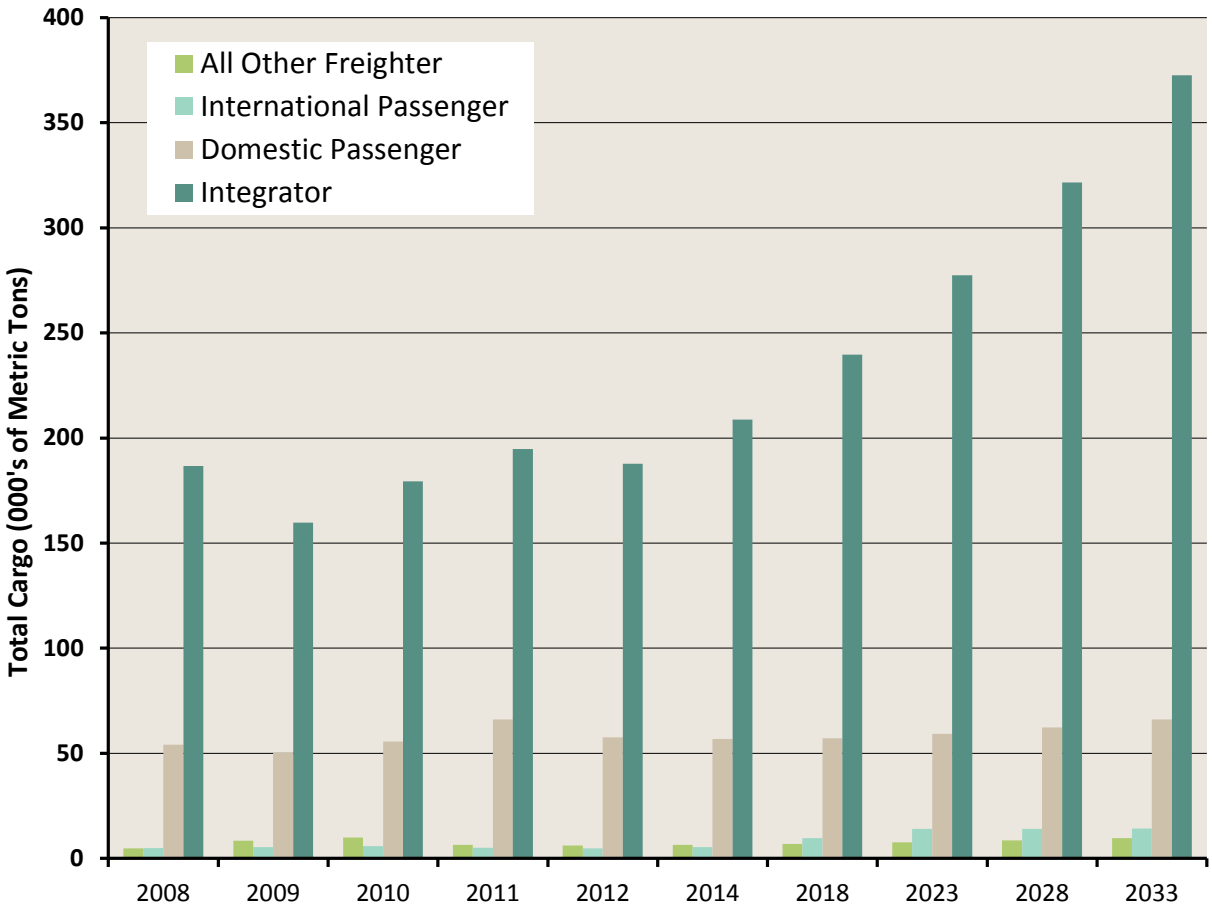
Exhibit 4.7: PHX Air Mail Forecast Summary, 2014-2033

Year	Freighter Operations			Passenger Operations			*Grand Total*
	Integrators	Other	Total	Domestic	International	Total	
Historical Mail Tonnage (Metric Tons)							
2008	1,886	-	1,886	31,151	339	31,490	**33,376**
2009	1,573	-	1,573	25,986	283	26,269	**27,843**
2010	1,915	-	1,915	31,626	345	31,970	**33,885**
2011	2,374	-	2,374	39,208	427	39,635	**42,009**
2012	1,922	-	1,922	31,746	346	32,092	**34,014**
Forecast Mail Tonnage (Metric Tons)							
2014	1,816	-	1,816	29,993	327	30,320	**32,136**
2018	1,642	-	1,642	27,130	296	27,426	**29,068**
2023	1,523	-	1,523	25,156	274	25,430	**26,953**
2028	1,412	-	1,412	23,325	254	23,579	**24,991**
2033	1,309	-	1,309	21,627	236	21,863	**23,172**

Source: InterVISTAS Consulting.

Forecasts of freight volumes and mail volumes handled at PHX were then added together to determine the forecast for total air cargo volumes handled at PHX. A summary of the total air cargo forecast results by type of carrier are provided in **Exhibit 4.8** and **Exhibit 4.9**. Total air cargo tonnage handled at PHX is projected to increase from over 256,400 metric tons in 2012 to almost 462,500 metric tons in 2033. By 2033, freight tonnage will continue to make up the majority of total air cargo volumes at PHX. However, its share of total air cargo tonnage will increase from 87% in 2012 to 95% in 2033, while air mail tonnage's share will decrease from 13% in 2012 to 5% in 2033. Freighter operations will handle more than 382,200 metric tons of total cargo shipments at PHX (83%) in the next 20 years, with 97% of those cargo shipments carried by integrators and the remaining 3% carried by other cargo operators. On the other hand, passenger operations will handle nearly 80,300 metric tons (17%), with domestic operations comprising the largest share (82%) of those belly cargo shipments.

Exhibit 4.8: PHX Total Air Cargo Forecast Summary by Type of Carrier



Source: InterVISTAS Consulting.

Exhibit 4.9: PHX Total Air Cargo Forecast Summary, 2014-2033

Year	Freighter Operations			Passenger Operations			*Grand Total*
	Integrators	Other	Total	Domestic	International	Total	
Historical Cargo Tonnage (Metric Tons)							
2008	186,725	4,717	191,443	54,101	4,892	58,993	**250,436**
2009	159,713	8,361	168,073	50,297	5,339	55,636	**223,709**
2010	179,387	9,882	189,268	55,619	5,868	61,487	**250,755**
2011	194,817	6,482	201,299	66,089	5,006	71,094	**272,393**
2012	187,827	6,206	194,032	57,627	4,776	62,402	**256,435**
Forecast Cargo Tonnage (Metric Tons)							
2014	208,728	6,378	215,106	56,894	5,398	62,292	**277,398**
2018	239,654	6,950	246,604	57,090	9,705	66,796	**313,400**
2023	277,550	7,721	285,271	59,319	14,046	73,366	**358,637**
2028	321,551	8,591	330,142	62,282	14,128	76,410	**406,552**
2033	372,642	9,571	382,213	66,051	14,220	80,270	**462,484**

Source: InterVISTAS Consulting.

Overall, PHX air cargo is expected to grow at an average annual rate of 2.8% during the forecast period. Integrators will grow at an average of 3.3% per year through 2033, while other cargo operators will grow at an average of 2.1% per year. Belly freight carried on domestic passenger flights will grow an average of 0.7% per year. Belly freight carried on international passenger flights at PHX is expected to grow at an average annual rate of 5.3%.

In comparison to growth levels of the Boeing and Airbus industry forecasts for world air cargo traffic discussed previously (ranging from 4.9%-5.2%), the average annual growth rate at PHX is expected to be slightly lower.[27] This is largely due to the lower volumes of international cargo expected to be handled at PHX, whereas the Boeing and Airbus growth rates are highly influenced by overall higher growth expected in international trade. Importantly, the international air cargo that is forecasted at PHX will grow at 5.3% per year which is very much in line with the Boeing and Airbus forecasts.

[27] Boeing, World Air Cargo Forecast, 2012-2013 and Airbus Global Market Forecast 2012-2031.

Similarly, the FAA predicts that total air cargo traffic in the U.S. will increase at an average annual rate of 4.6%, below that of both Airbus and Boeing.[28] The FAA's overall air cargo forecast growth rate is somewhat higher than that expected for PHX, likely due to the inclusion of major cargo gateway airports in the growth rate calculated from the FAA forecasts. A comparison of PHX's cargo forecasts with forecasts of other airports in the Study Region is provided later in this chapter.

4.2 Phoenix-Mesa Gateway Airport Forecasts

The cargo forecasts for Phoenix-Mesa Gateway Airport were developed using the scenario-based approach. This was deemed appropriate given the overall lack of consistent air cargo-related operations at IWA and the types of operations that may be envisioned at the airport. The following scenarios were developed to estimate projected cargo traffic at IWA:

- **Additional low cost carrier (LCC) passenger operations:** This scenario reflects continued high LCC growth at IWA, which could be expanded to an additional airline and additional destinations, such as the addition of a B737-type service with infrequent operations. Unlike IWA carriers, Allegiant Air and Spirit Airlines[29], it is anticipated that this additional LCC carrier will carry belly cargo.
- **Additional B737 passenger operations by a network carrier:** This scenario reflects air service by a domestic network carrier at IWA that does not have a major presence at PHX. After entering the IWA market, this carrier may conservatively add destinations over time, using B737-type aircraft with service primarily to existing hubs in the airline's network.[30]
- **Additional freighter cargo operations:** This scenario includes an air cargo operation eventually consisting of multiple weekly flights with a B747-8F. Air cargo on these freighter flights would likely consist of origin and destination cargo movements, with no anticipation of plane-to-plane transfers found at air cargo hubs.

Assumptions on capacity were based on available industry data. In addition, key assumptions were made on the frequency of each of the services throughout the forecast period. Other

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[28] U.S. Federal Aviation Administration, FAA Aerospace Forecast Fiscal Years 2013-2023. It is worth noting that although global air cargo volumes recovered to pre-recession levels by 2010, growth since then has been flat, even declining somewhat. There has yet to be a return to pre-recession growth rates. A more modest growth rate reflects this slower than anticipated recovery.

[29] In October 2013, Spirit ceased operations at IWA. During the forecast period, it is assumed that Allegiant will continue its policy to not carry cargo on any of its aircraft.

[30] Air service development plans for IWA include the potential for adding a U.S. network air carrier with services to hub airports.

factors such as the conditions of the regional economy, operations at PHX and air service development goals of IWA were also taken into consideration.

For the scenario with an additional LCC passenger operation, the carrier is assumed to operate a 162-seat B737-800 aircraft with a 75% load factor year-round, with roundtrip flights increasing over the forecast period from two flights per week in the first two years to five flights per week by 2033.[31] The scenario with an additional B737 network carrier passenger operation is estimated with the addition of a domestic carrier operating a 124-seat B737-700 aircraft with a 90% load factor.[32] Roundtrip flights would operate year-round, with increasing frequency from seven weekly flights in the first four years to 14 weekly flights in the remaining years. In the additional freighter cargo operation in the third scenario, it is assumed that regular all-cargo flights at IWA will be part of a multi-stop itinerary where a portion of the total B747-8F aircraft capacity (140 metric tons) is devoted to IWA.[33] During the forecast period, the portion of total aircraft capacity available for IWA will increase from 30% to 50%, and it is assumed that all of the devoted capacity will be utilized. The cargo operation begins with one flight per quarter in the first year (i.e., eight annual round trip flights). Additional flights are then added during the forecast period in a progressive, step-wise fashion. In 2020, flights are operated once weekly for 12 weeks per year, and in 2022, flights are operated twice weekly for 26 weeks per year. Year round flights commence in 2027 with two weekly roundtrips, and building up to 3 weekly roundtrips in 2032 and 2033.

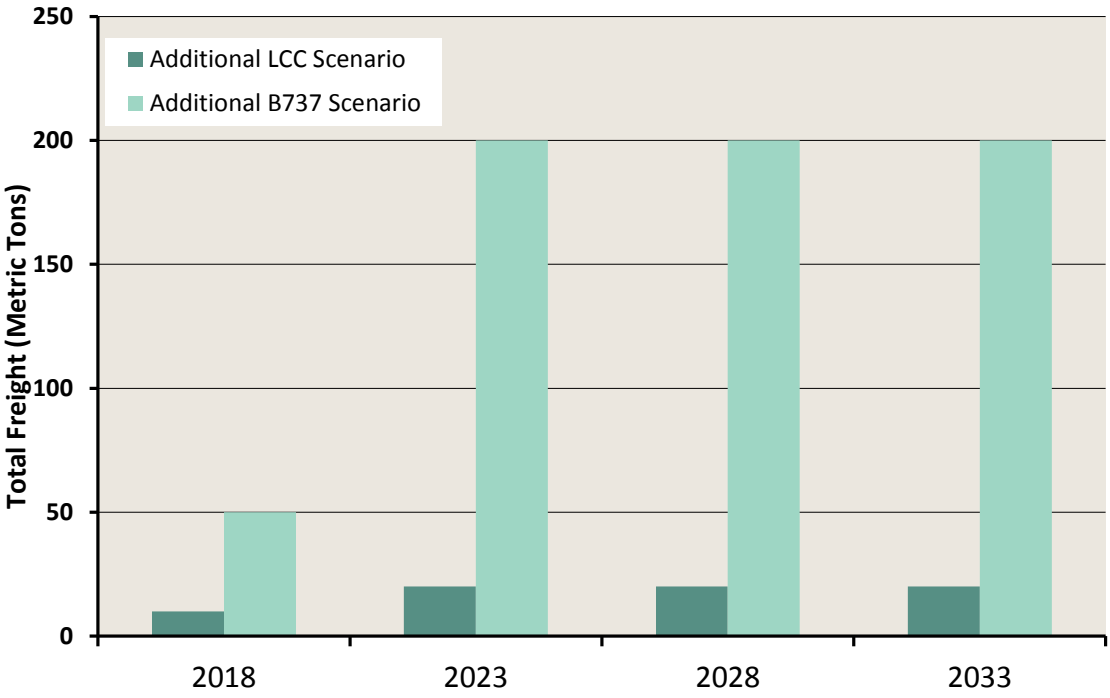
Exhibits 4.10 and **4.11** show graphical depictions of the air cargo forecasts for IWA by scenario. **Exhibit 4.12** provides a numeric table on the projected estimates for all three defined scenarios. The additional freighter operations scenario is forecast to have the fastest growth in air cargo, followed by the network carrier passenger operation scenario. By 2033, a total of approximately 21,840 metric tons of cargo is projected for the freighter operations scenario, while a total of more than 20 metric tons is predicted for the LCC passenger operations scenario. The scenario with an additional B737 network carrier passenger operation is estimated to handle a consistent volume of air cargo throughout the last 10 years of the forecast period, with nearly 200 metric tons by 2033.

[31] Aircraft type and load factor for this scenario are sourced from the Diio aviation schedules database and based on Sun Country Airlines services.

[32] Ibid.

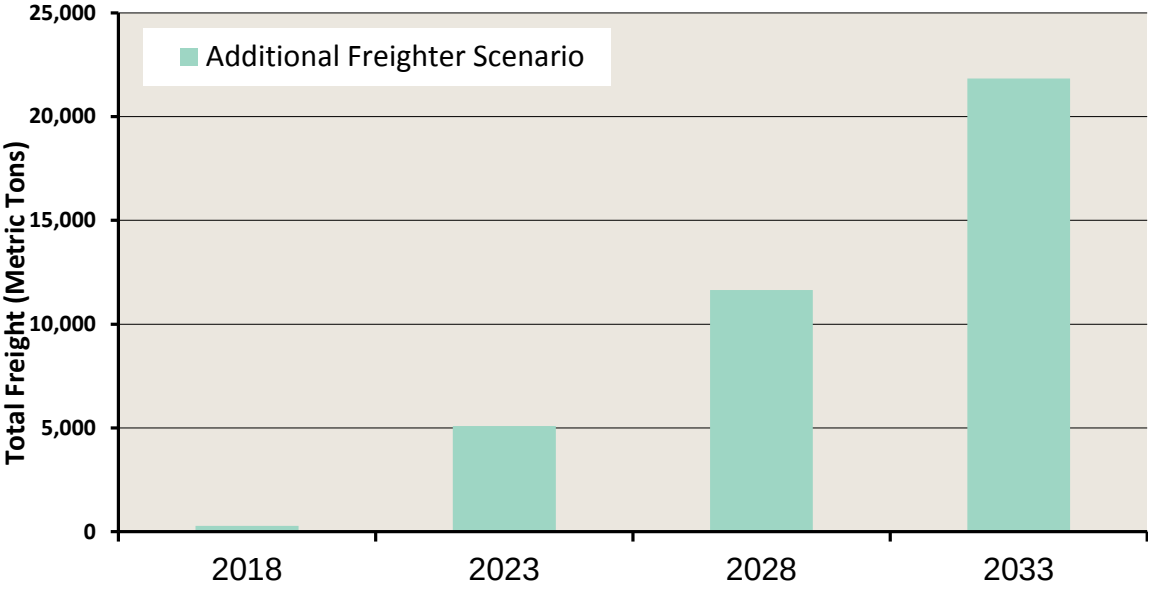
[33] Average capacity of B747-8F sourced from the Boeing website.

Exhibit 4.10: IWA Air Cargo Forecast Summary by Scenario – Passenger Operations



Source: InterVISTAS Consulting.

Exhibit 4.11: IWA Air Cargo Forecast Summary by Scenario – Freighter Operations



Source: InterVISTAS Consulting.

Exhibit 4.12: IWA Air Cargo Forecast Summary, 2014-2033

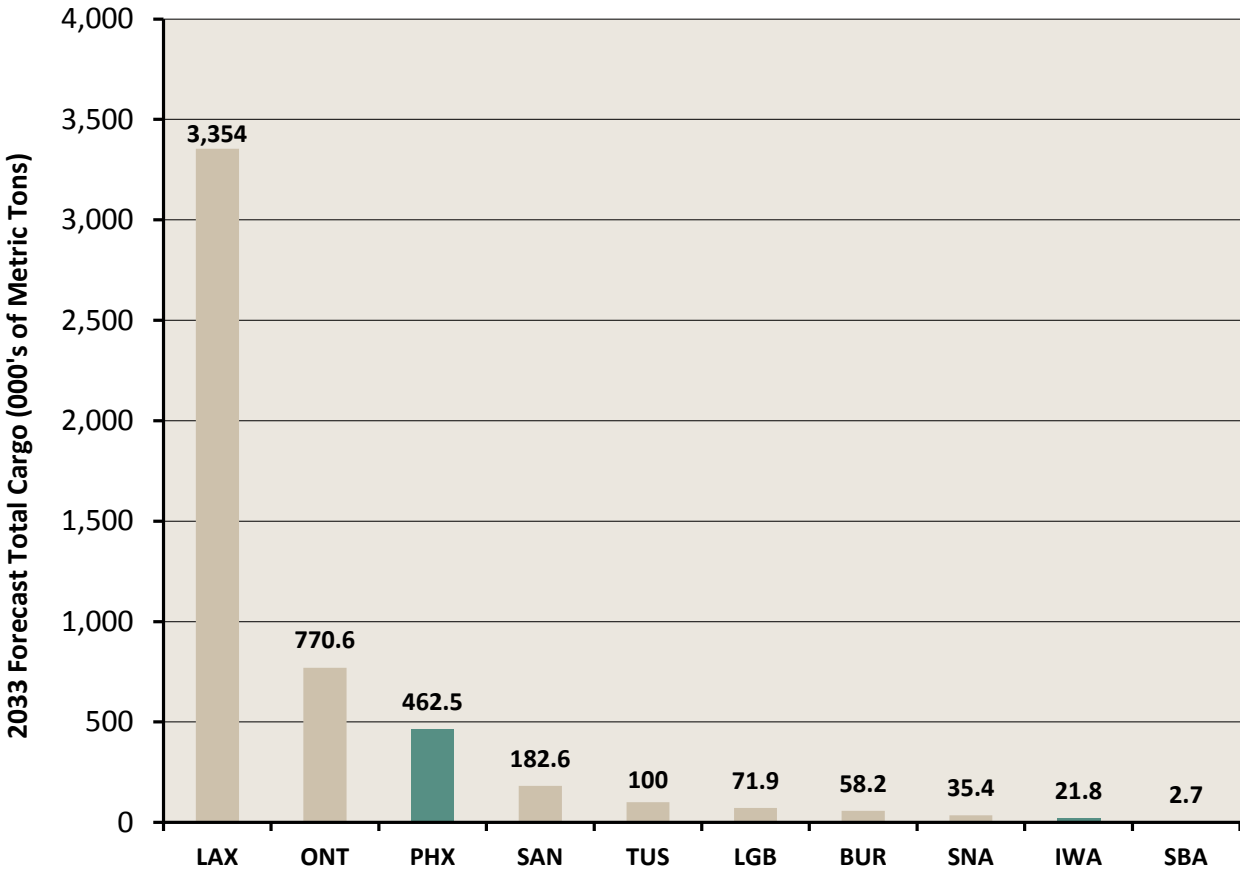
Year	Potential Scenario		
	Additional LCC	Additional B737	Additional Freighter
Forecast Freight Tonnage (Metric Tons)			
2018	10	50	280
2023	20	200	5,100
2028	20	200	11,650
2033	20	200	21,840

Source: InterVISTAS Consulting.

4.3 Comparison with Forecasts of Other Airports in Study Region

In order to benchmark forecasts at PHX with future air cargo projections at other airports in the Study region, a comparison of the forecast air cargo volumes at the different airports is presented in **Exhibit 4.13**. Cargo forecasts of other airports in the Study Region were obtained from respective airport master plans and other published studies. Compared to projected air cargo forecasts of select airports in the Study Region, PHX ranks third in 2033, following Los Angeles International Airport and LA/Ontario International Airport. For illustrative purposes, the freighter scenario forecasted for IWA has been included in this comparison and predicts that nearly 22,000 metric tons of cargo will be handled at the airport in 2033.

Exhibit 4.13: Comparison of Forecasts of Select Airports, Total Air Cargo - 2033



Source: InterVISTAS Consulting analysis.

Note: PHX total cargo forecast is taken from Inter*VISTAS*' analysis, while the cargo forecasts for the other airports are taken from respective airport master plans and a study conducted for the State of California Department of Transportation. Where forecasts did not extend to 2033, compound annual growth rates for the respective airport forecast periods were used to extrapolate to 2033.[34]

Exhibit 4.14 provides a comparison of the forecasted annual air cargo growth rates of select airports in the Study region. With a compound annual growth rate of 2.8%, PHX has a higher growth rate for forecasted air cargo than other California airports, which ranges from 0.8% for San Diego to 2.4% for Long Beach.[35] On the other hand, PHX has a lower forecasted growth

[34] TranSystems. (July 2010). *Air Cargo Mode Choice and Demand Study.*

[35] Ibid.

rate than Tucson, AZ at 4.1%.[36] The differences in the forecasted air cargo growth rates of these airports can be accounted for by varying factors, such as the local context of the airport and the timeframe of when the forecasts were conducted. The lower growth rate for the forecasts for the California airports is likely due to the substitution from air freight transport to surface modes. Compared to other U.S. airports, California had a greater impact from this change as the principal gateway for trade with Asia, wherein many goods previously transported by air to Asia are now transported by sea on container ships. Tucson's forecasts are taken from the airport's master plan completed in 2005, prior to the economic recession. Moreover, Tucson's higher rate of growth reflects a smaller traffic base to start with. Since the global economic downturn, air cargo growth forecasts have been declining. IWA has a significantly higher forecasted air cargo growth rate of 33.7% as this scenario includes the addition of a large air cargo operation not existing at the airport currently. In addition, IWA has a very small cargo traffic base at the start of the forecast period from which the growth rates were calculated.

Exhibit 4.14: Comparison of Forecast Growth Rates of Select Airports, Total Air Cargo – 2033

Airport	Forecast Tonnage – 2033 (Metric Tons)	Forecast Compound Annual Growth Rates
Los Angeles, CA	3,354,300	1.5%
Ontario, CA	770,600	1.5%
PHX	**462,500**	**2.8%**
San Diego, CA	182,600	0.8%
Tucson, AZ	100,000	4.1%
Long Beach, CA	71,900	2.4%
Burbank, CA	58,200	2.2%
Orange County, CA	35,400	2.1%
IWA	**21,800**	**33.7%**
Santa Barbara, CA	2,700	1.3%

Source: InterVISTAS Consulting analysis.

Note: PHX total cargo forecast is taken from Inter*VISTAS*' analysis, while the cargo forecasts for the other airports are taken from respective airport master plans and a study conducted for the State of California Department of Transportation. Where forecasts did not extend to 2033, compound annual growth rates for the respective airport forecast periods were used to extrapolate to 2033.[37]

[36] Tucson Airport Authority. (June 2005). *Tucson International Airport Master Plan Update Summary*.

[37] TranSystems. (July 2010). *Air Cargo Mode Choice and Demand Study.*

Phoenix Regional
Air Cargo Planning Study

CHAPTER 5

Chapter 5: Synopsis of Existing Facilities

5.1 Introduction

This Chapter presents the existing cargo facilities at the Phoenix area airports, an understanding of regional cargo activity and infrastructure at airports within the 500-mile radius Study Region, and ultimately the facility requirements and development needs to accommodate forecasted cargo activity.

5.2 Synopsis of Existing Facilities

In order to understand the existing infrastructure's capacity to accommodate cargo volumes, an inventory and assessment of existing air cargo facilities and supporting infrastructure has been gathered for the following airports in the Phoenix Region:

- Phoenix Sky Harbor International Airport;
- Phoenix-Mesa Gateway Airport;
- Phoenix Deer Valley Airport; and
- Phoenix Goodyear Airport.

Sources for the inventory included but were not limited to: existing airport master plans, airport layout plans, regional and statewide system plans, and previous cargo related studies. Additionally, telephone interviews, facility site visits, and face-to-face meetings with cargo carriers, developers, and other stakeholders were conducted to gain further insight into existing and planned facilities, and the needs and desires of the cargo community with respect to facility development at the fore mentioned airports.

For the purposes of this Study, the inventory includes a comprehensive review of the Phoenix area airports and, to a lesser extent, those Study Region airports deemed comparable in terms of cargo facilities or their ability to undertake cargo activities. These additional airports include:

- Tucson International Airport
- Albuquerque International Sunport
- El Paso International Airport
- Las Vegas McCarran International Airport
- Los Angeles International Airport
- LA/Ontario International Airport
- San Diego International Airport
- Long Beach Airport
- John Wayne Airport
- Burbank Bob Hope Airport
- Santa Barbara Airport

The synopsis of cargo infrastructure focuses on the four airports in the Phoenix area followed by the additional airports listed above.

5.2.1 Phoenix Sky Harbor International Airport

Phoenix Sky Harbor International Airport is located in the heart of the southwestern United States, and is one of the top ten busiest airports in the U.S. Fifteen airlines provide more than 100 nonstop flights out of PHX each day to domestic and international destinations and provide connecting service to points around the world. Customer service amenities include the new PHX Sky Train providing a seamless connection between the Airport and METRO light rail, free Wi-Fi, a consolidated Rental Car Center, and an award-winning mobile website.

Air cargo services are provided by a segmented group of air carriers that provide differing services based upon wide-ranging customer demands. The basic types of carriers that provide these services include integrated express operators (i.e. FedEx, UPS, DHL) and commercial service passenger airlines (i.e. Southwest, US Airways, etc.) that use belly space of commercial passenger aircraft to move cargo from airport-to-airport.

PHX has two designated cargo operation areas, these include:

- South Air Cargo Complex
- West Air Cargo Complex

In addition, there are two areas in and near the passenger terminal complexes to support the exchange/sorting of belly cargo that is inbound and outbound on passenger aircraft. US Airways' sorting facility is located on the north side between Terminals 3 and 4. Southwest's sorting facility is located in the southeast corner of Terminal 4. These areas are identified within the following:

- **Exhibit 5.1** – Sky Harbor's Cargo Areas;
- **Exhibit 5.2** – Sky Harbor's South Cargo Area; and
- **Exhibit 5.3** – Sky Harbor's West Cargo Area.

A summary of these cargo facilities follows.

Exhibit 5.1: Phoenix Sky Harbor International Airport - Cargo Area

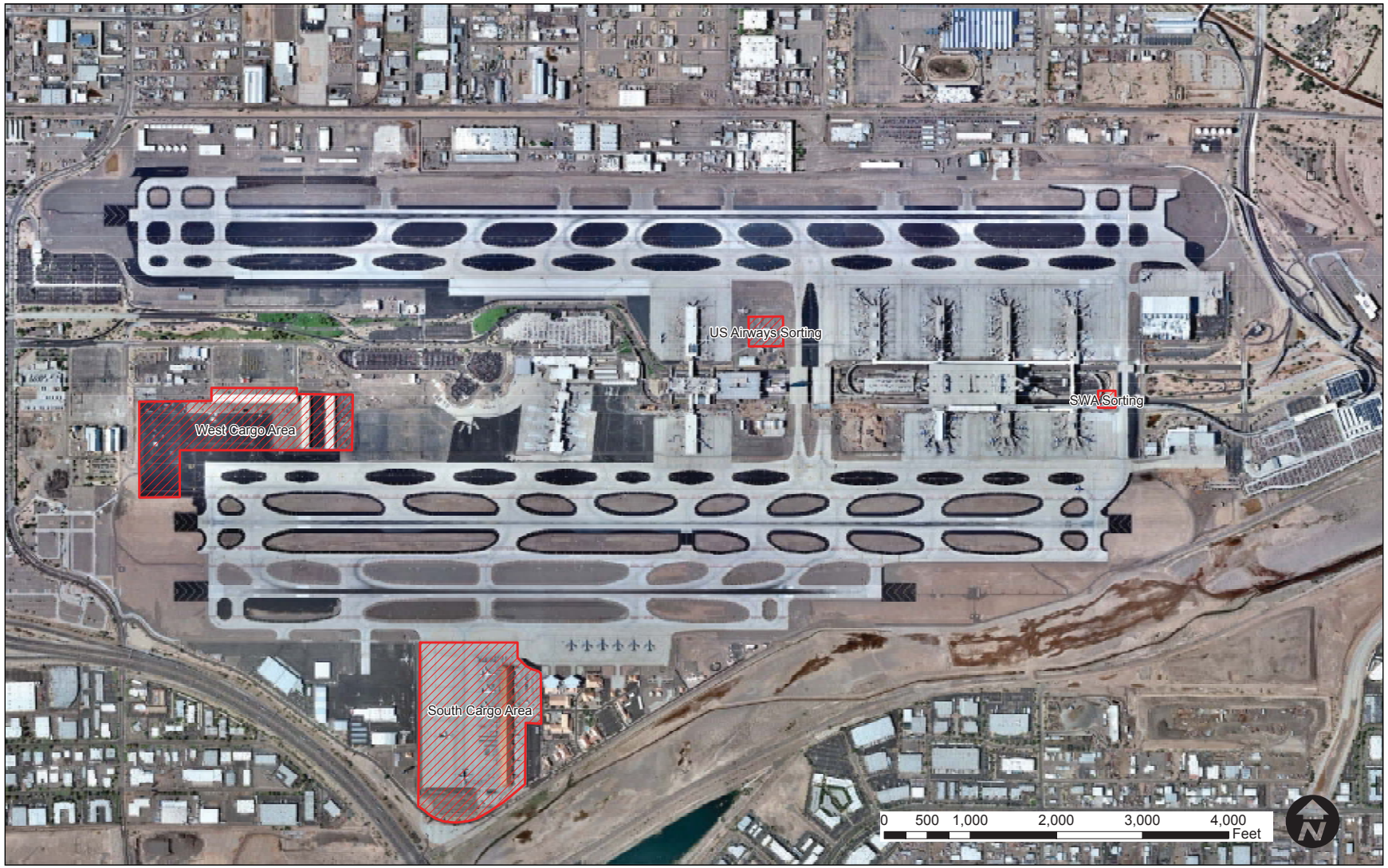


Exhibit 5.2: Phoenix Sky Harbor International Airport - South Cargo Area

Exhibit 5.3: Phoenix Sky Harbor International Airport - West Cargo Area

South Air Cargo Complex

The South Air Cargo Building is a multi-tenant building with three tenants, and is owned by the Airport. Landside access to the South Air Cargo Complex is via the intersection of Interstates 10 and 17, S. 24th Street and E. Old Tower Road. The Complex is just over 173,000 square feet with contiguous access to nearly 1.2 million square feet of shared aircraft apron. The apron consists of 18 aircraft parking positions currently made up of 3 positions designated for Group V cargo aircraft, 10 positions designated for Group IV cargo aircraft, and 5 positions for single and multi-engine general aviation aircraft. The facility also has dedicated truck parking of nearly 237,000 square feet. A breakdown of the space occupied by each tenant is shown in **Exhibit 5.4**. The South Air Cargo Building also includes 2,155 square feet of space that is utilized by the City of Phoenix.

Exhibit 5.4: Inventory of South Cargo Complex

Facility	Warehouse Sq. Feet	Apron Sq. Feet	Aircraft Park. Pos.	Truck Bays
FedEx	107,540	1,200,000	18	29
UPS	57,541			16
US Customs	5,898			-
City of Phoenix	2,155	0	0	0
Vacant	0	0	0	0
South Air Cargo Total	173,134	1,200,000	18	45

According to Airport Administration, the Airport currently plans to expand the South Air Cargo apron by approximately 288,000 square feet.

West Air Cargo Complex

The West Air Cargo Complex is made up of three primary buildings and associated aircraft parking aprons that include Buildings A, B and C. Landside access to the West Air Cargo Complex is via Interstate 10 and multiple local roads that include S. 24th Street, E. Buckeye Road, E. Sky Harbor Boulevard, S. 27th Street, and E. Yuma Street. A description and inventory of each of these facilities is presented below.

West Air Cargo – Building A

West Air Cargo Building A is a multi-tenant building currently with five tenants. It is nearly 50,000 square feet and has contiguous access to the aircraft apron which is nearly 110,000 square feet. The facility also has 28 truck bays that cover approximately 60,000 square feet. A breakdown of the space occupied by each tenant is shown in **Exhibit 5.5**. The facility includes 1,440 square feet of Ground Service Equipment (GSE) support space that includes a GSE Wash Rack and break room, and a 960 square feet Utility Room that is used by the City. Currently, the West Air Cargo Building A Facility has 22,560 square feet of vacant space that can accommodate additional tenants.

Exhibit 5.5: Inventory of West Air Cargo – Building A

Facility	Warehouse Sq. Feet	Office/Admin Sq. Feet	GSE Sq. Feet	Total Sq. Feet	Truck Bays
Delta	5,760	1,920	3,840	11,520	7
Oxford	0	1,920	0	1,920	1
Integrated	0	1,920	0	1,920	1
American	4,800	0	2,880	7,680	5
Service Air	0	1,920	0	1,920	0
GSE Support Space	0	0	1,440	1,440	0
City of Phoenix Utility Room	0	960	0	960	0
Vacant	22,560	0	0	22,560	14
West Air Cargo Building A Total	33,120	8,640	8,160	49,920	28

West Air Cargo – Building B

The West Air Cargo Building B is a multi-tenant building currently being occupied by only one tenant, DHL. It is nearly 50,000 square feet and provides contiguous access to the aircraft apron which is nearly 175,000 square feet. The facility also has 27 bays dedicated for truck parking. A breakdown of the space occupied in West Air Cargo Building B is shown in **Exhibit 5.6**. Currently, the West Air Cargo Building B facility has 34,560 square feet of vacant space to accommodate additional tenants, and a 960 square foot Utility Room that is utilized by the City.

Exhibit 5.6: Inventory of West Air Cargo – Building B

Facility	Warehouse Sq. Feet	Office/Admin Sq. Feet	GSE Sq. Feet	Total Sq. Feet	Truck Bays
DHL	10,560	0	0	10,560	6
City of Phoenix Utility Room	0	960	0	960	0
Vacant	34,560	0	0	34,560	21
West Air Cargo Building B Total	45,120	960	0	46,080	27

West Air Cargo – Building C

The West Air Cargo Building C is another multi-tenant building with two current tenants. It is nearly 79,000 square feet with contiguous access to the aircraft apron which is 112,000 square feet. The facility also has dedicated truck parking made up of nearly 97,000 square feet. A breakdown of the space occupied by each tenant is shown in **Exhibit 5.7**. Currently, the West Air Cargo Building C facility has 39,680 square feet of vacant space to accommodate additional tenants, and a 640 square foot Utility Room that is utilized by the City.

Exhibit 5.7: Inventory of West Air Cargo – Building C

Facility	Warehouse Sq. Feet	Office/Admin Sq. Feet	GSE Sq. Feet	Total Sq. Feet	Truck Bays
Southwest	17,280	0	0	17,280	7
US Airways	21,120	0	0	21,120	11
City of Phoenix Utility Room	0	640	0	640	0
Vacant	39,680	0	0	39,680	21
West Air Cargo Building C Total	78,080	640	0	78,720	39

Exhibit 5.8 summarizes the aircraft apron space of the West Air Cargo Complex.

Exhibit 5.8: Inventory of West Air Cargo – Aircraft Parking Apron Space

Facility Apron Area	Apron Sq. Feet	Aircraft Parking Positions
Building A	110,000	8
Building B	175,000	
Building C	112,000	
West Cargo Apron Areas Total	397,000	8

Exhibit 5.9 summarizes the facilities in both the South and West Air Cargo Complexes.

Exhibit 5.9: Summary Inventory of the South and West Air Cargo Complex's

Facility	Total Building Sq. Feet	Apron Sq. Feet	Aircraft Park. Pos.	Truck Bays
South Air Cargo Complex	173,134	1,200,000	18	45
West Air Cargo Complex	77,920	397,000	8	94
Vacant Space	96,800	0	0	0
Expansion in Progress	0	288,000	2	0
Total Cargo Space	347,854	1,885,000	28	139

Considerations for Cargo Development at PHX

Based on information received during the course of the data collection and site visits, the following items should be taken into account and explored further when considering cargo development options and recommendations. These include:

- **South** Employee parking during peak periods
- **South** Trailer storage offsite
- **South** Constrained expansion ability, FBO's to west, military to east
- **West** Aging infrastructure
- **West** Impact of future terminal development that includes terminal, parallel taxiways, PHX SkyTrain alignment

5.2.2 Phoenix-Mesa Gateway Airport

The Phoenix-Mesa Gateway Airport Authority ("Authority") owns and operates the Phoenix Mesa-Gateway Airport (formerly Williams Gateway). The Authority currently consists of the City of Mesa, City of Phoenix, Town of Gilbert, Town of Queen Creek, the Gila River Indian Community, and the City of Apache Junction. Located about 30 miles southeast of Phoenix Sky Harbor, Phoenix-Mesa Gateway Airport hosts over 40 companies on airport property, and serves approximately 40 cities with nonstop service via Allegiant Air, as well as continuing service to many more destinations. Access to the Airport is via the Santan Freeway (Loop 202) and the Superstition Freeway (U.S. 60). State Route 24 is currently under construction and will provide additional access to the north side of the Airport. Local access is from S. Power Road, E. Ray Road, E. Pecos Road, and S. Sossaman Road. Access to the Cargo Area (Alpha Apron) is via E. Velocity Way. Gateway Airport has been designated as Foreign Trade Zone #221.

There is no existing scheduled cargo activity at the Airport. The Airport does receive cargo via unscheduled deliveries to support Boeing and military activities. The existing building in the Alpha Apron area that could support cargo operations currently houses Immigration and Customs Enforcement ("ICE"), a non-cargo tenant.

The Alpha Apron is approximately 440,000 square feet and can accommodate 3 Group V aircraft (see **Exhibit 5.10**).

Exhibit 5.10: Inventory of Alpha Apron Aircraft Parking Space

Facility Apron Area	Apron Sq. Feet	Aircraft Parking Positions
Alpha Apron	440,000	4
Expansion in Design (Phase III)	240,000	2
Apron Areas Total	680,000	6

The existing Alpha Apron cargo area at the Airport is shown in **Exhibit 5.11**. A phase III expansion project is currently under design and, once constructed, it will provide approximately 240,000 square feet of additional cargo apron. In addition, according to the latest Master Plan for the Airport, the area south of the existing Alpha Apron was determined to be suitable for future cargo development and will be considered in the development options of this planning study.

Exhibit 5.11: Phoenix-Mesa Gateway Airport - Cargo Area

5.2.3 Phoenix Deer Valley Airport

The City of Phoenix purchased and began operating Deer Valley Airport in 1971 and today it serves to relieve air traffic from Phoenix Sky Harbor International Airport. Deer Valley is comprised of approximately 914 acres of property located 15 miles north of downtown Phoenix. As such, the Airport is capable of accommodating all segments of civil aviation except commercial passenger service. The Airport offers a complete range of services including fueling, avionics repair, maintenance, parts, flight training, new and used aircraft sales, aircraft rentals, a pilot shop, and a restaurant. It has two fixed-based operators and as of July 2013 is home to 1,045 aircraft. The Airport is located near the intersection of Interstate 17 and Loop 101. South side access is from Deer Valley Road. North side access is via Airport Road and Seventh Street.

The Airport does not currently have cargo activity or dedicated cargo infrastructure. An aerial photograph of the Airport is shown in **Exhibit 5.12**.

5.2.4 Phoenix Goodyear Airport

The City of Phoenix purchased and began operating Phoenix Goodyear Airport in July 1968. Prior to that, the Airport was built and operated by the United States Navy. The Airport is classified as a General Aviation reliever airport for Phoenix Sky Harbor International Airport. With one of the best general aviation runways in the country, Phoenix Goodyear Airport provides quality aeronautical services to tenants. Phoenix Goodyear Airport is 2.2 miles south of Interstate 10 on Litchfield Road.

The Airport does not currently have cargo activity or dedicated cargo infrastructure. An aerial photograph of the Airport is shown in **Exhibit 5.13**.

Exhibit 5.12: Phoenix Deer Valley Airport

Exhibit 5.13: Phoenix Goodyear Airport

5.3 Study Region Airport Cargo Information Synopsis

Other Study Region airports considered for comparative purposes regarding their physical facilities' throughput and capacities against that of this Study's focal airports in the Phoenix area are:

- Tucson International Airport
- Albuquerque International Sunport
- El Paso International Airport
- Las Vegas McCarran International Airport
- Los Angeles International Airport
- LA/Ontario International Airport
- San Diego International Airport

For this effort, data was gathered through publicly available documents (Master Plans, FAA reporting data, airport websites, etc.) and through telephone interviews with representatives of the Airports, except for Albuquerque, where repeated attempts to contact staff were unsuccessful. Available data from these sources varied with respect to depth and breadth, and the information reported here reflects this. Certain data that is consistent across all airports was desired to compare against each other and the Phoenix area airports.

In addition to a general description of each airport and its setting, specific items inventoried for this effort include: airside cargo facilities (aircraft parking, cargo ramp space, GSE storage, etc.); cargo building space (warehousing, processing, etc.); and landside facilities (access, employee and customer parking, truck staging, etc.).

Cargo facilities for these airports are described below.

5.3.1 Tucson International Airport

Comprised of 7,938 acres at an elevation of 2,643 feet above mean sea level (MSL) in southern Arizona, 6 miles southeast of downtown Tucson and south of Interstate 10, Tucson International Airport ("TUS") handles its region's air cargo operations.

TUS is served by three (3) runways as detailed in the **Exhibit 5.14** below.

Exhibit 5.14: Runways at Tucson International Airport

Runway	Length
11L/29R	10,996' x 150'
11R/29L	8,408' x 75'
03/21	7,000' x 150'

TUS's dedicated (integrated and charter) cargo services are provided by FedEx and Ameriflight, as well as charter cargo services and operations on demand. American, Delta, and Southwest Airlines provide belly cargo services. UPS does not operate from TUS.

TUS' integrated cargo operations are handled on 54 acres of the Airport located southeast of the passenger terminal.

Airside Facilities

The Cargo Ramp is 23 acres and consists of 18 aircraft parking positions. The Cargo Ramp is designed to Group III standards, although larger aircraft can be accommodated through special operational considerations. GSE is stored on the ramp.

Landside Facilities

TUS reports a total of five (5) acres of property dedicated to landside support of cargo operations. This area is comprised of employee and customer parking, circulation, and truck staging.

Located in southern Arizona, the Airport's proximity to Interstate 10 and Interstate 19 provide for the ready movement of goods both domestically and internationally.

Cargo Building Space

There are four (4) cargo buildings for processing and warehousing at TUS. FedEx operates from a 16,000 square foot building it owns. The Tucson Airport Authority owns the other three (3) buildings, two of which are used for air carrier belly cargo processing (19,400 square feet and 30,000 square feet) and the other is dedicated for integrated carriers. These facilities are outlined in **Exhibit 5.15**.

Exhibit 5.15: Summary Inventory of Tucson International Airport Cargo Facilities

Facility	Warehouse Sq. Feet	Apron Sq. Feet	Aircraft Park. Pos.
FedEx	16,000	1,001,880	18
TAA Owned 1	19,400		
TAA Owned 2	30,000		
Other Integrated Carriers*	Not Reported		
Total	65,400+	1,001,880	18

*This building is currently vacant

5.3.2 Albuquerque International Sunport

Comprised of 2,039 acres at an elevation of 5,355 feet above MSL in central New Mexico, 3 miles southeast of downtown Albuquerque, Albuquerque International Sunport ("ABQ") handles the region's air cargo operations.

ABQ is served by four (4) runways as detailed in **Exhibit 5.16**.

Exhibit 5.16: Runways at Albuquerque International Sunport

Runway	Length
08/26	13,793' x 150'
03/21	10,000' x 150'
12/30	6,000' x 150'
17/35	10,010' x 150'

ABQ's dedicated cargo services are provided by FedEx, UPS, and DHL. Other air carriers serving ABQ include, American Airlines, Delta Air Lines, Frontier Airlines, JetBlue Airways, Southwest Airlines, United Airlines and US Airways.

Located in north-central New Mexico, ABQ is positioned near the intersection of Interstate 40 and Interstate 25, and provides quick access to the region's ground transportation network.

ABQ's cargo facilities are summarized in **Exhibit 5.17**.

Exhibit 5.17: Summary Inventory of the Albuquerque International Sunport Cargo Facilities

Facility	Warehouse Sq. Feet	Apron Sq. Feet
Cargo Building	52,000	1,348,200
Air Mail Facility	49,800	
Air Freight (Belly Cargo)	39,900	
Total	141,700	1,348,200

Source: Albuquerque International Sunport Master Plan Executive Summary, September 2002

5.3.3 El Paso International Airport

El Paso International Airport ("ELP") is served by the three (3) runways indicated in **Exhibit 5.18**.

Exhibit 5.18: Runways at El Paso International Airport

Runway	Length
4/22	12,020' x 150'
8R/26L	9,028' x 150'
8L/26R	5,499' x 75

The Airport is located on the far western tip of Texas along the border of Mexico. The City of Juarez is located across the international border adjacent to the City of El Paso. ELP occupies 6,670 acres at an elevation of 3,962' above MSL.

ELP's dedicated cargo services are provided by FedEx, UPS, and DHL, while belly cargo services are provided by passenger carriers at the Airport. The ELP Air Cargo Complex, located on the north side of the airfield, is comprised of two (2) dedicated cargo buildings, a dedicated cargo apron, and associated landside facilities. This cargo area handles all dedicated cargo operations at ELP. Currently, six cargo operators utilize the dedicated cargo facilities. These operators are: FedEx, UPS, DHL, Cargo Force, USA Jet, and an unnamed international carrier from Mexico.

Belly cargo is processed in the Airport's old cargo area near the passenger terminal.

Airside Facilities

The cargo ramp area associated with the dedicated cargo facilities at ELP is 610,084 square feet and has 16 Group IV aircraft parking positions. The breakdown of ramp space per carrier is shown in **Exhibit 5.19** below. The ramp can handle larger aircraft on both a scheduled or an on-demand basis, as necessary.

Exhibit 5.19: El Paso International Airport Cargo Airside Facilities

Carrier	Apron Sq. Feet	Aircraft Parking Positions
FedEx	156,020	16
UPS	97,180	
DHL	53,360	
Cargo Force	39,000	
Unassigned	264,524	
Total	610,084	16

Landside Facilities

It is reported by the Airport that landside facilities to support the cargo operation at ELP are adequate for existing and anticipated automobile parking (employees and customers), truck staging, and access to and from the cargo area.

ELP access is provided by Interstate 10 (I-10) from the south along Airport Road and Airway Boulevard. Additionally, cargo ground traffic to and from the cargo area on the north side of the Airport can access I-10 via Global Reach Drive and Montana Avenue /US-62/US-180.

Cargo Building Space

ELP has two (2) buildings totaling 288,000 square feet for processing cargo for its dedicated cargo operations. Each of the two buildings is 144,000 square feet and made up of cargo processing and warehouse space. The space dedicated to each carrier is shown in the table below. Belly cargo is processed in the Airport's old cargo area located near Terminal 1. **Exhibit 5.20** shows the breakdown of cargo building space by carrier.

Exhibit 5.20: El Paso International Airport Cargo Building Space

Carrier	Warehouse Sq. Feet
FedEx	59,774
UPS	31,460
DHL	6,292
Cargo Force	9,470
Unassigned	181,004
Total	288,000

ELP is also home to the EPIA Perishables Center, a consolidated full-service processing facility specifically designed to meet the unique requirements of handling perishables such as certain fresh foods and flowers. The Perishables Center is located between the two cargo buildings and contains three (3) large refrigeration units.

The cargo facilities at ELP are summarized in **Exhibit 5.21**.

Exhibit 5.21: Summary Inventory of the El Paso International Airport Cargo Facilities

Facility	Warehouse Sq. Feet	Apron Sq. Feet	Aircraft Park. Pos.
FedEx	59,774	156,020	16
UPS	31,460	97,180	
DHL	6,292	53,360	
Cargo Force	9,470	39,000	
Unassigned*	181,004	264,524	
Total	288,000	610,084	16

*This building is currently vacant

5.3.4 Las Vegas McCarran International Airport

Las Vegas McCarran International Airport ("LAS") is located on the eastern side toward the southern end of the Las Vegas Strip. The Airport covers 2,800 acres at an elevation of 2,181 feet above MSL in the far southern tip of Nevada near the Arizona and California borders. LAS handles the region's air cargo operations. The Airport is served by four (4) runways as detailed in **Exhibit 5.22**.

Exhibit 5.22: Runways at Las Vegas McCarran International Airport

Runway	Length
1L/19R	8,985' x 150'
1R/19L	9,775' x 150'
7L/25R	14,510' x 150'
7R/25L	10,526' x 150'

Air cargo at LAS is processed at the Marnell Air Cargo Center located east of Terminal 3. It is comprised of over 200,000 square feet of privately developed freight and distribution facilities on 19 acres. The center opened in 2010.

Airside Facilities

The cargo ramp area associated with the cargo facilities at LAS has 7 Group IV aircraft parking positions. The ramp can handle larger aircraft either scheduled or on demand as necessary. The apron associated with Building 1 is configured for three Group IV aircraft and the apron for Building 2 provides 4 Group IV parking positions.

Landside Facilities

Landside facilities at LAS' cargo center include 283 automobile parking spaces for customers and employees, 44 loading docks, and 45 parking spaces for trucks. The landside area provides adequate room for truck maneuvering and staging.

The Marnell Air Cargo Center is located near Surrey Street and Russell Road, just east of Terminal 3 at LAS. The Center's location provides close access to Interstate 15, linking Las Vegas to Southern California and Salt Lake City, Utah, and to U.S. 93 and U.S. 95 major roadway linkages to Reno, Nevada; and many southwestern destinations including Phoenix, Arizona; and Albuquerque, New Mexico.

Cargo Building Space

LAS has two (2) buildings for processing cargo for its dedicated and belly cargo operations. The total square footage of cargo building space at LAS is 201,428 square feet. One building is 79,436 square feet and is solely occupied by FedEx. The other building is 121,992 square feet and houses the remainder of the Airport's cargo handling tenants including UPS, Southwest Airlines, US Airways, Allegiant and smaller servicers. The space dedicated to each carrier is shown in **Exhibit 5.23**.

Exhibit 5.23: Cargo Buildings at Las Vegas McCarran International Airport

Facility	Tenant	Warehouse Sq. Feet
Building 1	FedEx	79,436
Building 2	UPS	10,764
	Southwest	15,548
	US Airways	7,176
	Allegiant	13,980
	Others	26,116
	Unassigned	48,408
Total		201,428

Exhibit 5.24 summarizes the cargo facilities at LAS.

Exhibit 5.24: Summary Inventory of Las Vegas McCarran International Airport Cargo Facilities

Facility	Warehouse Sq. Feet	Apron Sq. Feet	Aircraft Park. Pos.
Building 1	79,436	1,268,675	3
Building 2	121,992		4
Total	201,428	1,268,675	7

5.3.5 Los Angeles International Airport

At 125' above MSL, Los Angeles International Airport ("LAX") covers 3,500 acres in Southern California. It is situated adjacent to the Pacific Ocean to the west, and the cities of Inglewood and El Segundo to the east and south respectively. The Airport's location allows easy access to a comprehensive network of highways and interstates. Interstates 105 and 405 are located directly to the south and east of LAX. Cargo operations at LAX supply destinations far beyond the reaches of the passenger market catchment area. LAX is the largest international cargo airport serving Southern California.

LAX is served by four (4) runways as outlined below in **Exhibit 5.25** below.

Exhibit 5.25: Runways at Los Angeles International Airport

Runway	Length
6L/24R	8,925' x 150'
6R/24L	10,285' x 150'
7L/25R	12,091' x 150'
7R/25L	11,095' x 150'

LAX has four discreet cargo areas that service dedicated cargo, including both integrated carriers and scheduled freight, and belly cargo activity. These complexes contain over 2.1 million square feet of processing and warehousing space. The four cargo areas include:

- Century Cargo Complex;
- Imperial Cargo Complex;
- South Cargo Complex – East; and
- South Cargo Complex – West.

The Century Cargo Complex is comprised of ten (10) buildings with associated apron and landside facilities. These buildings total approximately 898,000 square feet and serve varied freighter activity. The complex's apron area measures approximately 3.6 million square feet and has 19 aircraft parking positions.

The Imperial Complex contains eight (8) processing/warehousing buildings which total approximately 498,000 square feet. The Imperial Cargo Apron is served by a single Group V taxi lane and contains 10 Group V parking positions. This complex is Group VI capable through operational procedures. The apron for this complex is approximately 1 million square feet.

The South Cargo Complex – East is made up of seven (7) buildings and associated apron and landside facilities. These buildings total approximately 692,000 square feet and serve integrated and dedicated cargo operations. FedEx is located in this area and has 20 aircraft parking positions. The apron for this complex is approximately 2 million square feet.

The South Cargo Complex – West is made up of two (2) buildings and associated apron and landside facilities. These buildings total approximately 100,000 square feet. The complex's apron area measures approximately 600,000 square feet and has 8 aircraft parking positions.

Exhibit 5.26 below summarizes cargo facilities at LAX.

Exhibit 5.26: Summary Inventory of Los Angeles International Airport Cargo Facilities

Cargo Complex	Warehouse Sq. Feet	Apron Sq. Feet	Aircraft Park. Pos.
Century	898,000	3,618,250	19
Imperial	498,000	1,041,250	10
South Cargo – East	692,000	1,962,000	20
South Cargo - West	100,000	615,000	8
Total	2,188,000	7,236,500	57

In addition to the on-airport facilities, an estimated additional four million square feet of cargo warehousing, processing, and distribution space exists in the immediate vicinity of the Airport.

5.3.6 LA/Ontario International Airport

LA/Ontario International Airport ("ONT") is located 55 miles east of LAX and 20 miles west of San Bernardino and is comprised of 1,741 acres at an elevation of 944 feet above sea level ("ASL") in southern California. The Airport is served by two (2) runways as outlined below in **Exhibit 5.27**.

Exhibit 5.27: Runways at Ontario International Airport

Runway	Length
8L/26R	12,197' x 150'
8R/26L	10,200' x 150'

There are three (3) designated cargo areas at ONT: UPS Ramp; FedEx Ramp; and Hangar 20. The UPS facility is located off airport property and operates at the Airport by a through-the-fence agreement. Hangar 20 is used by passenger airlines for belly cargo processing and does not have aircraft parking at the facility.

Airside Facilities

The UPS ramp is 2,874,960 square feet and is configured to accommodate 20 Group V aircraft. The FedEx ramp is 720,300 square feet and is configured for four (4) Group IV aircraft and seven (7) smaller FedEx feeder aircraft (Group II). These facilities are presented in **Exhibit 5.28**.

Exhibit 5.28: Ontario International Airport Cargo Airside Facilities

Carrier	Apron Sq. Feet	Aircraft Parking Positions
UPS	2,874,960	20 Group V
FedEx	720,300	4 Group IV + 7 Group II
Total	3,595,260	31

Landside Facilities

ONT reports adequate space for customer and employee parking and truck maneuvering and staging. The UPS facility is off-airport and has excess capacity for landside activities. Access from ONT to regional roadway transportation networks is provided by the proximity of Interstate 10 just to the north of the Airport.

Cargo Building Space

The UPS freight building is 49,000 square feet and the FedEx building is 37,413 square feet. Hangar 20 is 30,154 square feet and houses exclusive space for US Airways and Southwest Airlines as well as common use space for others. The breakdown of cargo building space at the Airport is shown in **Exhibit 5.29**.

Exhibit 5.29: Cargo Buildings at Ontario Airport

Facility	Tenant	Warehouse Sq. Feet
FedEx	FedEx	37,413
UPS	UPS	Unknown
Hangar 20	Southwest	14,439
	US Airways	10,646
	Common Use	5,069
Total		67,567+

There are no Federal Inspection Station ("FIS") or perishables facilities at the Airport. FIS services are available at the UPS facility, and both UPS and FedEx provide perishables storage off-airport.

Exhibit 5.30 summarizes the cargo facilities at ONT.

Exhibit 5.30: Summary Inventory of Ontario Airport Cargo Facilities

Facility	Warehouse Sq. Feet	Apron Sq. Feet	Aircraft Park. Pos.
UPS	Unknown	2,874,960	20
FedEx	37,413	720,300	11
Hangar 20	30,154	-	-
Total	67,567+	3,595,260	31

5.3.7 San Diego International Airport

San Diego International Airport (SAN) is located near downtown San Diego on a capacity constrained site. It is constrained by waterways, roadways and urban development on all sides. The Airport covers 614 acres at an elevation of 17 feet above MSL. SAN handles the region's air cargo operations. The Airport is served by a single runway (Runway 09/27) as detailed in **Exhibit 5.31**.

Exhibit 5.31: Runways at San Diego International Airport

Runway	Length
9/27	9,400' x 200'

Airside Facilities

The apron for dedicated cargo carriers FedEx, UPS, and DHL at SAN is located on the north side of the airfield and is 918,500 square feet. It has 13 aircraft parking positions of varied Aircraft Design Groups (see **Exhibit 5.32**). GSE is stored on the apron.

Exhibit 5.32: San Diego International Airport Cargo Airside Facilities

Carrier	Apron Sq. Feet	Aircraft Parking Positions
UPS	918,500	13
FedEx		
DHL		
Total	918,500	13

Landside Facilities

The north-side cargo area is reported to have adequate truck staging and access for the limited operations. This area is accessed directly from Interstate 5. Interstate 8 is approximately one mile north of this operation. These interstates provide direct access to the region and beyond. There are no dedicated parking spaces for customers or employees at the north-side facility.

Access to the belly cargo providers is via Washington St. from exiting Interstate 5. There are approximately 40 parking spaces for employees and customers at the Airlane facility.

Cargo Building Space

Processing and warehouse facilities for SAN's dedicated cargo carriers are located off-airport. Their sizes were not reported.

Cargo building space for passenger airlines providing belly cargo services is located on the south side of the airfield on Airlane Road and consists of 63,017 square feet of warehouse and office space (see **Exhibit 5.33**). Airlines in this space include: Delta Air Lines, American Airlines, United Airlines, Southwest Airlines, and Hawaiian Airlines. There are 12 truck bays at this facility. The breakdown of space allocated to each carrier was not provided.

Exhibit 5.33: Cargo Buildings at San Diego International Airport

Facility	Tenant	Warehouse Sq. Feet
Airlane Road	Delta Air Lines, American Airlines, United Airlines, Southwest Airlines, and Hawaiian Airlines	63,017
Total		63,017

Exhibit 5.34 summarizes the cargo facilities at SAN.

Exhibit 5.34: Summary Inventory of San Diego International Airport Cargo Facilities

Facility	Warehouse Sq. Feet	Apron Sq. Feet	Aircraft Park. Pos.
Cargo Apron	0	918,500	13
Airlane Road	63,017	0	0
Total	63,017	918,500	13

5.4 Summary of Regional Airports

The following table summarizes the information presented above from the seven Study Region airports outside of the Phoenix area. This summary also presents summary data on the four additional Southern California airports that are in the Study Region, but have limited infrastructure and capability to accommodate air cargo. Details on each of these airports is shown in **Exhibit 5.35**.

Exhibit 5.35: Summary of Regional Airport Cargo Facilities

	Tucson	Albuquerque	El Paso	Las Vegas	Los Angeles	Ontario	San Diego	Orange County	Long Beach	Santa Barbara	Burbank
Number of Runways	3	4[38]	3	4	4	2	1	2	5	3	2
Longest Runway	10,996'	13,793'	12,020'	14,510	12,091'	12,197'	9,400'	5,701'	10,003'	6,052'	6,885'
Airport Elevation	2,643'	5,355'	3,962'	2,181'	125'	944'	17'	56'	63'	13'	778'
Airport Acreage	7,938'	2,039	6,670	2,800	3,500	1,741	614	504	1,166	948	610
Dedicated Cargo Carriers	FedEx	FedEX, UPS, DHL	FedEX, UPS, DHL	FedEX, UPS, DHL	FedEX, UPS, DHL	FedEX, UPS	FedEX, UPS, DHL	FedEx, UPS	Unknown	1 unnamed	FedEx, UPS
Cargo Building Space[39] (sq ft)	65,400+[40]	141,700	288,000	201,428	2,188,000	67,567	63,017 (belly cargo only)				
Cargo Apron Area (sq ft)	1,001,880	1,348,200	610,084	1,268,675	7,236,500	3,595,260	918,500				
Aircraft Parking Positions	18	10	16	7	57	31	13				

[38] Airport records indicate RWY 17/35 closed permanently. Visual records do not indicate runway closure/decommissioning and runway operating conditions and NAVAIDS remain published.

[39] Does not include passenger carrier belly cargo space for El Paso, Las Vegas, Tucson.

[40] Does not include vacant space for (previous UPS space).

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CHAPTER 6

Chapter 6: Development Needs

The Phoenix area airports must plan and prioritize future cargo development in a constrained environment. To accomplish this, many factors should be considered to include the Phoenix area airports' goals, future development plans, airport development constraints, stakeholder needs, facility utilization/allocation, and impacts to the region among others. This section assesses the Phoenix area airport's existing cargo facility utilization and determines the facility requirements through a gap analysis as a result of the forecasted demand including both quantitative and qualitative factors that may need to be addressed.

6.1 Facility Requirements and Gap Analysis

6.1.1 Space Utilization

Industry planning axioms indicate that processing one ton of cargo per square foot of warehouse per year is an acceptable norm for looking at an airport's cargo throughput in total. This ratio is a generic guideline for physical planning and is not typically applicable to individual carrier practices which can vary space requirements substantially.

Cost issues are just as important to leasing cargo space as the factors described. Since cargo operates on small profit margins, a carrier will typically lease the minimum amount of space necessary to sustain its operations. As a result most airlines tend to operate in environments that are very congested. Nevertheless, they are financially driven to lease space that conservatively meets their needs. This inclination toward self-policing of space utilization is sometimes countered by other corporate objectives such as space "banking."

In a typical cargo facility, 10% of the space can be allocated to office and counter use and another 5% may be allocated to supply storage, and miscellaneous. The result is less useable space for cargo handling and a usage ratio that in practice pushes the one ton per square foot per year guideline.

Utilization ratios vary based on a number of factors including, but not limited to:

- Domestic throughput is generally faster than international.
- Time of arrival for international goods may delay processing through federal agencies.
- Authorized and filled staffing levels of federal agencies affect the processing of international cargo.
- Perishables have a very high throughput.
- Customs Brokers may request that carriers use the airport warehouse to hold international cargo for several days for consignees.

- Delivery of cargo to consignees may include built in delays based on retailing and/or wholesaling operations.
- Containerized freight typically moves through a facility faster than palletized freight.
- The age and configuration of a building may mitigate or enhance mechanization of throughput. A more modern building with higher ceilings and greater clear spans tends to be more efficient.

Air cargo industry utilization planning guidelines by cargo type are shown in **Exhibit 6.1** along with the historical utilization rates at PHX from the last five years of actual cargo tonnage activity by type. Phoenix-Mesa Gateway Airport does not have consistent/scheduled cargo throughput, therefore utilization rates are not available for that airport.

Exhibit 6.1: Cargo Facility Planning Utilization Rates

Type of Cargo	Ratio (Tons per sq. ft. per Year)
Integrated – PHX Historical 5-Year Average	1.03 to 1.00
Integrated – Industry Standard	1.50 to 1.00
Belly and Other – PHX Historical 5-Year Average	1.41 to 1.00
Belly and Other – Industry Standard	1.00 to 1.00

Both the historical and industry ratios identified above will be used throughout the facility requirements analysis to develop a range of warehouse space requirements that will drive the cargo infrastructure needed for the planning period. This range will account for some level of cargo activity that does not get processed through a warehouse. Specifically, US Airways and Southwest process various amounts of cargo through facilities within the terminal complex. During site visits it was noted that this can be as much as 50% of the cargo they process. The ranges utilized for this planning process incorporates this shift.

6.1.2 Building Facility Requirements – Phoenix Sky Harbor International Airport

To determine future facility needs, an average utilization rate for cargo processing must be assumed. To use one average for all cargo would not be an accurate method of assessing future facility needs. As presented above, a utilization range will be used to determine future facility requirements. The integrated cargo range will be 1.03 (historical average) to 1.50 (industry standard), while belly and other cargo will be 1.41 (historical average) to 1.00 (industry standard).

The following represents forecasted cargo tonnage by type at PHX through the planning period of 2033:

Integrator Tonnage	372,642
Passenger/All Other Tonnage	89,842

Applying the utilization ranges previously presented by type, a warehouse square footage need through 2033 is calculated and presented below:

Industry Standard Need	338,270	square feet
Historical Average Need	423,929	square feet

Phoenix Sky Harbor currently has warehouse infrastructure totaling 321,401 square feet. Based on this existing infrastructure, additional warehouse space will be needed in 2023 under the historical average calculation; and 2031 utilizing the industry standard rate. This sets up a space needed range from 16,869 square feet to 102,528 square feet from 2023 to 2031 where the Airport will need to increase warehouse infrastructure to accommodate the demand if it is realized. The average of the two space range needs sets up a need of approximately 60,000 square feet of warehouse space by 2033.

6.1.3 Building Facility Requirements – Phoenix-Mesa Gateway Airport

Since a historical utilization rate was not available for the Airport a 1.00 to 1.00 ratio was applied to the forecasted cargo tonnage for the Airport. A projected tonnage of 21,840 in 2033 would result in the need for a 21,840 square foot warehouse facility. It is important to note that because of the smaller projected volume, this activity could be handled offsite, or within other available buildings at the Airport that were built for other operations, but may be available for cargo activity and processing.

6.1.4 Aircraft Ramp Space and Parking Requirements

Aircraft ramp space can vary based on the type of aircraft being operated. For purposes of air cargo, most aircraft fall into one of three categories determined by the FAA's Airport Reference Code. Group III aircraft, a 737 or similar, requires 2,300 square yards of ramp space. Group IV aircraft, a 767 or DC10, requires 3,900 square yards of ramp space. Group V aircraft, a 747, requires 6,500 square yards of ramp space. Alternatively, when specific aircraft operations are not forecasted, an industry planning guideline for aircraft ramp space requirements assumes a ratio of six square feet of ramp space for each one square foot of available building space.

Currently, PHX has 28 aircraft parking positions and is able to accommodate existing and forecasted cargo operations in the South Cargo and West Cargo complexes. Utilizing the 6 to 1 planning ratio, the Airport has adequate air cargo ramp space for the planning period, but may need additional parking in the 20-year timeframe subject to aircraft gauge and operational considerations. During peak periods, the West Cargo parking positions as well as parking at the Fixed Based Operators just west of the South Air Cargo complex serve as overflow areas for

the integrated carriers. These carriers also adjust their aircraft gauge to larger aircraft to accommodate the peak periods.

Phoenix-Mesa Gateway Airport currently has 440,000 square feet of cargo apron space on the Alpha Apron. Based on the 6 to 1 ratio applied to the forecasted activity, the Airport will need approximately 132,000 square feet of apron space in the planning period; therefore no additional apron space is needed.

6.2 Additional Considerations

West Air Cargo Building C

West Air Cargo Building C is located within the footprint of a future airfield capacity improvement project to add twin parallel taxiways that will open airfield access for aircraft between the north and south sides. This type of access already exists in the central terminal area between Terminals 3 and 4, as well as on the east side of Terminal 4.

Planning for the future, if Building C were to be relocated, approximately 78,000 square feet of cargo building space will need to be accommodated and/or relocated. One potential scenario would retain approximately 50% of the existing Building C. These needs will be tallied with the future cargo building needs.

US Airways Potential C-Point Relocation

Terminal area improvement projects related to the Phoenix Sky Train south airfield service roadway alignment will restrict surface crossings to the US Airways C-Point cargo transfer area. There is an ongoing discussion about the potential to relocate this cargo transfer area. If this change occurs, approximately 20,000 square feet of space will be needed. This will be tallied with the future cargo building needs. If this does occur, it is also assumed that US Airways space in Building C would be co-located with the relocated C-Point. This would account for a need of up to 21,000 square feet. This would provide a total need of approximately 41,000 square feet to accommodate US Airways cargo operations.

Operational and Split Operation Considerations

Given that the cargo carriers in the South Cargo Complex are likely to see the most growth in the planning period, but operate in the most constrained cargo area with limited expansion capability; operational considerations will need to be factored into any new proposed cargo development. Overflow operations already exist and create split operations. Most carriers that were interviewed during this planning study do not favor split operations. Within the infrastructure recommendations that are made, the Airport should consider the location and/or relocation of cargo tenants to minimize or eliminate the splitting of tenants' cargo operations, but must also consider that development constraints are high within the limited future development areas.

Employee Parking

Cargo tenant employee parking continues to be a challenge in the South Cargo complex during peak operating periods requiring off-site parking and the shuttling of the employees to the cargo building areas. The industry standard recommends 2 to 8 auto parking spaces per 1,000 square feet of warehouse based on the type of operation. With approximately 173,000 square feet of warehouse space in the South Cargo Complex, this would define a need range of approximately 346 to 1,384 auto parking spaces. The existing employee auto parking in the South Cargo Complex consists of 380 auto spaces. This falls within the low end of this range, but stakeholder interviews revealed that the current parking spaces adequately serve the cargo area during non-peak periods. Considering that there currently are no areas to expand employee parking in the South Cargo Complex, the shuttling to off-site lots will likely need to continue during peak periods.

6.3 Summary of Facility Requirements and Gap Analysis

Future cargo facility requirements for the Phoenix Region will be used to propose future development of air cargo facilities. Since both PHX and IWA have existing cargo infrastructure capacity, both facilities are poised to meet immediate cargo demand within the next 10 years.

Future development should only occur when the market demands. Changes in market trends can speed up or slow down when new facilities will be needed. These facility estimates, along with the forecasts, should be used as a trigger for when to implement any future development.

A summary of cargo facility requirements for PHX and IWA are:

2033 PHX Warehouse Space Based on Forecast (this is the average of the range identified and likely needed)	60,000 square feet
2033 IWA Warehouse Space Based on Forecast (there is adequate infrastructure to accommodate)	0 square feet [41]
West Air Cargo Building C Redevelopment (based on how much of Building C can be maintained)	39,000 to 78,000 square feet
US Airways Potential C-Point Relocation (this assumes co-location of US Airways Building C space)	41,000 square feet

PHX and IWA aircraft ramp space is adequate for the planning period, but operational considerations must be reviewed and incorporated accordingly.

Cargo facility layout opportunities are presented in Chapter 7.

[41] Although no vacant cargo warehouse space is currently available at IWA, existing vacant land could accommodate facilities ranging from 50,000 to 200,000 square feet.

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CHAPTER 7

Chapter 7: Financial Feasibility Analysis and Cost-Benefit Analysis

7.1 Introduction

Having completed the identification of cargo-related needs at the Phoenix area airports in the gap analysis, the potential development projects are evaluated from a standpoint of cost, size, location, and financial and economic feasibility. Further, an environmental overview is included to identify known environmental issues related to the potential opportunities. The Financial Feasibility Analysis and Cost-Benefit Analysis follow FAA guidelines and the methodologies have been employed on many airport investment projects. The objective of the Financial Feasibility Analysis and Cost-Benefit Analysis is to provide conclusions and recommendations regarding the feasibility of the investments required to meet the cargo-related infrastructure needs of the Phoenix area airports.

7.2: Potential Infrastructure Projects and Improvements

The results of the cargo demand forecasts, facility requirements, and gap analysis have defined the potential need for the future development of air cargo facilities over the 20-year planning period. The recommended projects are presented below along with the potential layouts of the proposed facilities, the timeframe when the development may need to occur, and the estimated cost of the facilities.

A review of the Study airports and discussion with the management at each facility identified areas to consider for air cargo development as defined below:

- Phoenix Sky Harbor – 42nd Street Area
- Phoenix Sky Harbor – West Air Cargo Area
- Phoenix-Mesa Gateway – Alpha Apron, South Industrial Area

This section will discuss the recommend options by potential timeframe of implementation.

2018 – Consideration of US Airways Cargo Warehouse and C-Point Operations

In the near future, US Airways C-Point operation will have restricted access. The 42nd Street Area has been preliminarily proposed as an option to relocate the C-Point operation. A further consideration is to combine the US Airways Building C and C-Point operation in this 42nd Street Area on the east side of Phoenix Sky Harbor International Airport.

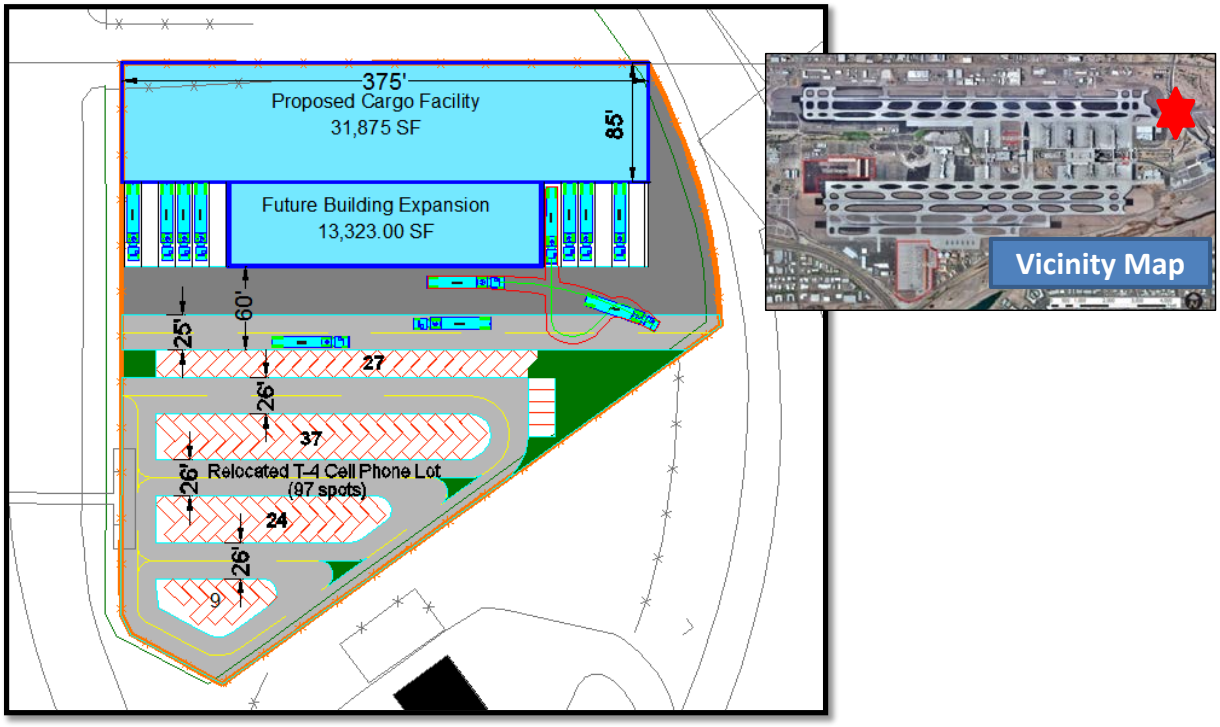
As presented in Chapter 5, US Airway's current Building C operations are approximately 21,000 square feet. This amount would reduce the Building C redevelopment footprint by the same amount possibly delaying or pushing out the timeframe for new cargo warehouse space in the West Cargo Area. Combined with the estimated need of approximately 20,000 square feet to accommodate the C-Point operation would result in a total need of approximately 41,000 square feet.

The City of Phoenix provided an initial potential layout of the 42nd Street Area that this study effort reviewed. Small modifications were made to this drawing to accommodate spacing requirements in the truck queuing area. The City's initial layout also included a cell phone auto parking lot adjacent to this cargo operation. This area was left within the figure for planning purposes to be consistent with other planning and development being considered by the City.

The proposed layout is shown in **Exhibit 7.1** below.

Estimated Cost: $3,996,000

Exhibit 7.1: Potential Cargo Development – 42nd Street Area



2023 – West Air Cargo Area Development Considerations

The three main projects considered for the 2023 planning horizon are presented in this section. There are a few factors that could affect this implementation schedule, notably if US Airways relocates its cargo warehouse operation as presented above, or other airfield development projects occur (i.e., west side cross-field parallel taxiways), and their ultimate impact on Cargo Building C. For the purposes of this effort, it is assumed that approximately 50% of Building C would be retained.

As a result, the following cargo infrastructure improvements for the West Cargo Area may need to be considered in the 2023 timeframe.

New 78,000 sf Cargo Warehouse

Estimated Cost: $6,235,000

Air Cargo Apron Associated with New Warehouse Above

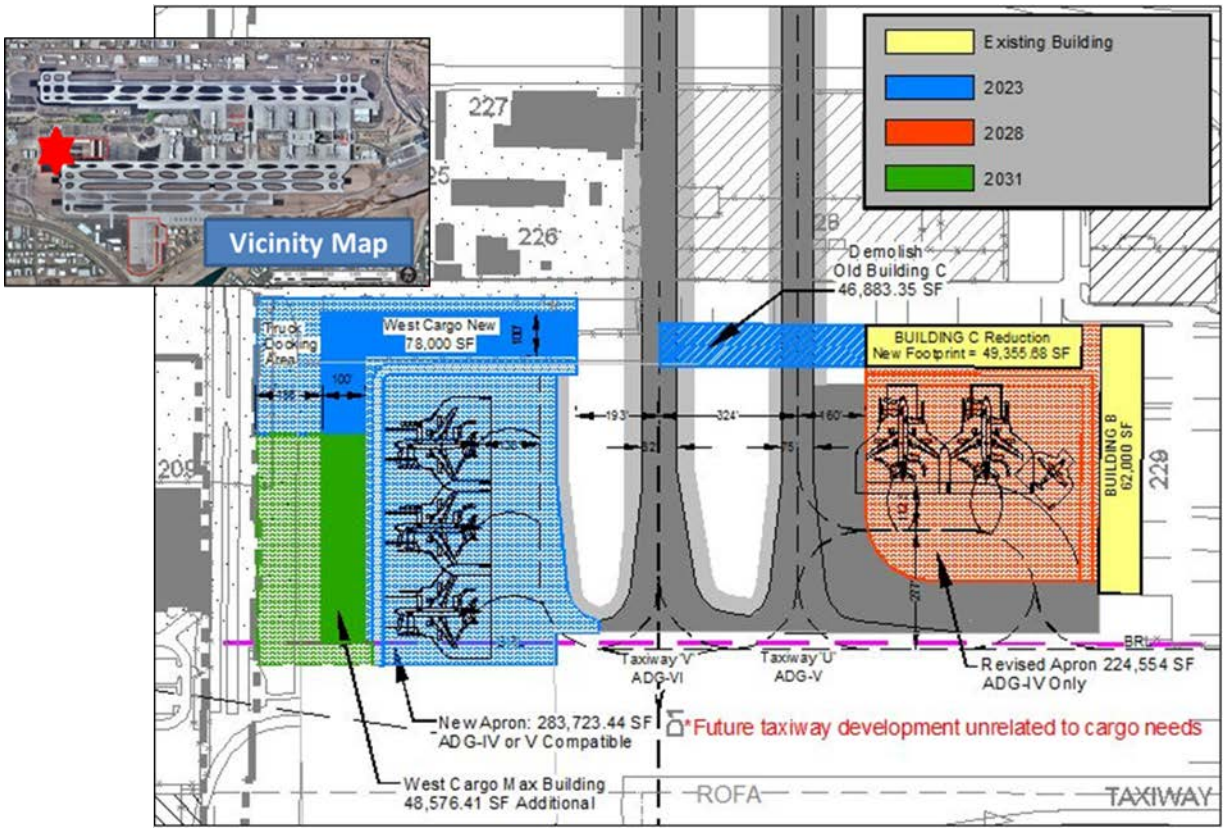
Estimated Cost: $6,098,000

Demolition of a Portion of Building C in Lieu of New Parallel Taxiways

Estimated Cost: $62,000

The proposed layout is shown in **Exhibit 7.2**.

Exhibit 7.2: West Air Cargo Area Development Considerations



2028 Air Cargo Apron Rehabilitation (Remaining Building C)

As a result of the Building C reduction, it is assumed that the aircraft apron area that remains will need to be rehabilitated in the 2028 timeframe.[42] The estimated cost to complete this rehabilitation is approximately $2,980,000.

2031 and Beyond – Maximum Build-Out of West Air Cargo Area

As an optional layout to accommodate for potential changes to the assumptions used above such as cargo activity that may occur in advance of the forecasted timeframe or impacts from other development that may occur at the Airport, a maximum build-out of the new warehouse building space in the West Cargo Area is shown. This would provide for an approximately 48,500 square feet in additional cargo warehouse space. This space is shown in the figure above. The estimated cost to complete this build-out is approximately $4,319,000.

[42] PHX conducts a pavement study every three years to determine pavement maintenance priorities.

Phoenix-Mesa Gateway – Alpha Apron, South Industrial Area

The results of the analysis in Chapter 6 indicated that the cargo infrastructure in place at the Airport can accommodate the forecasted demand through their existing Alpha Apron and other available infrastructure. Should demand advance ahead of the forecasted timeframe, the Airport's Master Plan identifies a significant area of land adjacent to the Alpha Apron that encompasses a majority of the South Industrial Area of the Airport (see **Exhibit 7.3**).

Exhibit 7.3: IWA's South Industrial Area and Proposed Future Cargo Areas

Summary of Potential Cargo Infrastructure Projects

2018 – Consideration of US Airways Cargo Warehouse and C-Point Operations.

- Estimated Cost: **$3,996,000**

2023 – West Air Cargo Area Development Considerations

- New 78,000 sf Cargo Warehouse

  Estimated Cost: **$6,235,000**

  - Air Cargo Apron Associated with New West Air Cargo Warehouse

  Estimated Cost: **$6,098,000**

- Demolition of a Portion of Building C in Lieu of New Parallel Taxiways
  Estimated Cost: **$62,000**
- Total Estimated Cost**: $12,395,000**

2028 – Air Cargo Apron Rehabilitation (Remaining Building C)

- Estimated Cost: **$2,980,000**

2033 and Beyond – Maximum Build-Out of West Air Cargo Area

- Estimated Cost: **$4,319,000**

The total estimated cost of potential cargo infrastructure projects is: $23,690,000

7.3 Environmental Overview

The purpose of this section is to identify known environmental considerations in the context of the proposed development projects and present the potential extent of future environmental planning requirements to implement those projects.

This overview considers the environmental elements described in FAA Advisory Circular 150/5070-6B, FAA Order 5050.4B, Airport Environmental Handbook, and relevant State of Arizona environmental regulations and procedures. Unless otherwise identified as "Categorically Exempt" per Federal Aviation Administration Order 5050.4B, Section 602, the proposed projects will require an Environmental Assessment (EA) to be performed and a Finding of No Significant Impact issued by the FAA prior to commencing construction.

None of the proposed improvements would rise to the level of requiring an Environmental Impact Statement (EIS); a very robust environmental analysis.

The overview provided here is not intended to satisfy the NEPA documentation requirements for a categorical exclusion, EA, or EIS; rather it is intended to outline requirements to advance the proposed projects from an environmental standpoint.

7.3.1 Impact Categories

Impacts to be considered in environmental planning studies under NEPA are arranged by the 23 categories shown in **Exhibit 7.4**.

Exhibit 7.4: NEPA Impact Categories

- Air Quality
- Biotic Resources
- Coastal Barriers
- Coastal Zone Management
- Compatible Land Use
- Construction
- Section 4(f)
- Federally-listed Endangered and Threatened Species
- Cumulative Impacts
- Energy Supplies; Natural Resources, and Sustainable Design
- Environmental Justice
- Farmlands
- Floodplains
- Hazardous Materials
- Historic and Archeological
- Induced Socioeconomic
- Light Emissions and Visual Effects
- Noise
- Social Impacts
- Solid Waste
- Water Quality
- Wetlands
- Wild and Scenic Rivers

Many of the categories above would be, to a great extent, irrelevant in the context of the proposed projects. These include, but are not limited to, Coastal Barriers, Coastal Zone Management, and Farmlands. The remainder of this Environmental Overview will focus on the impact categories that are anticipated to require the most scrutiny for the recommended projects.

Known Conditions at PHX

Recent development at PHX has required varied degrees of environmental documentation. Review of this available documentation and discussions with Airport staff have revealed that the following categories are known to require special attention:

- Air Quality
- Historic and Archeological
- Noise

Air Quality

Although the projects recommended in this study are not anticipated to generate a large overall increase in the total percentage of traffic at PHX, there are a few factors that elevate air quality concerns for any project at PHX.

The United States Environmental Protection Agency (EPA) has designated Maricopa County a non-attainment area for the following:

- 8-Hour Ozone (1997 Standard)
- PM-10
- 8-Hour Ozone (2008 Standard)

An emissions inventory may be required to determine conformity with the State Implementation Plan. Additionally, a traffic impact analysis may be required as the volume of truck trips will increase and has the potential to negatively impact air quality if the roadway level of service is diminished.

Historic and Archeological

There are previously documented archaeological sites in the vicinity of the proposed projects at PHX. The sites include the Dutch Canal Ruins and the Pueblo Salado on the west side of the Airport and the Pueblo Grande Ruins to the east of the Airport. These sites are well documented in many previous environmental studies including the PHX Airport Development Program (ADP) EIS.

Although the projects identified in this Study are not expected to disturb these known sites of significance, archaeological monitoring during construction would be prudent due to the proximity of these known sites. Should artifacts be found during construction, monitoring would enable proper handling of artifacts and the overall site.

Noise

Again, although a significant increase in the total operations at the Airport is not expected because of the proposed projects, the characteristics of cargo activity (i.e., nighttime operations) may cause these projects to be watched more closely by the community. It is not likely that the level of increased operations would by themselves materially change the Airport's noise impacts. However, to defend this assertion some level of analysis may be required. This analysis could include use of advanced methods and tools such as the FAA's Area Equivalent Method or the Integrated Noise Model.

7.4: Financial Feasibility Analysis and Cost-Benefit Analysis

This section includes the Financial Feasibility Analysis and Cost-Benefit Analysis for the identified cargo development opportunities. Together, the Financial Feasibility Analysis and Cost-Benefit Analysis provide the economic assessments for the opportunities identified and, thus, support decision-making.

Financial Feasibility Analysis and Cost-Benefit Analysis were done for each of the identified cargo development opportunities in a three-step approach.

First, a validation of business rationale was done in order to qualify the opportunity. Those opportunities that could not be qualified after analyzing the case from a business perspective were excluded from further quantitative analysis.

Second, for qualifying opportunities, the financial feasibility was assessed from an "investor perspective" and take into account recurring revenues, recurring costs, and capital costs that can be expected from the opportunity. Based on these cash flows, relevant investment criteria (net present value, internal rate of return and payback period) were calculated.

Third, further building on the Financial Feasibility Analysis, from a "public perspective," externalities were added to the financial analysis output resulting in a Cost-Benefit Analysis for the qualifying opportunities. Based on the figures derived from the Cost-Benefit Analysis, the relevant investment criteria were re-calculated.

The evaluation period is the number of years over which the economics of an investment should be considered. For investments in physical assets, the evaluation period is typically the shorter of the physical life or the economic life of the asset created. In order to provide well-rounded results, this evaluation period rule was applied to the cargo-related opportunities for the Phoenix area airports. In cases of investments in non-physical assets (meaning an absence of a depreciable asset), the evaluation period was shorter – approximately 5-10 years.

Even though the economic analysis (Financial Feasibility Analysis and Cost-Benefit Analysis) of these cargo-related opportunities are not anticipated to be part of a formal request for FAA funding in the near term, the Cost-Benefit Analysis is done in accordance with FAA guidelines for such analysis. Reference is made to the following documents distributed by the FAA:

- Airport Cost-Benefit Analysis Guidelines (1999)
- Addendum to FAA Airport Benefit-Cost Analysis Guidance (2010)

One of the key elements in the guidelines provided by the FAA is that when applying for FAA funding, the Cost-Benefit Analysis should be limited to economic effects of the initiative(s) proposed within the "aviation system." This means that wider economic benefits such as job creation or tax payments should not be part of the calculation. In general, these types of tangential benefits are difficult to quantify in an objective manner and the FAA is primarily concerned with identifying benefits that will be experienced by those who use and pay for the proposed projects or initiatives – namely airlines that pay Airport Charges or passengers that pay Passenger Facility Charges. In Phoenix, investments in aviation projects are paid for by the users of the aviation system without any funding from general tax dollars.[43] Therefore, the Cost-Benefit Analysis for this Study will follow the FAA guidelines.

In addition, FAA guidelines are followed with respect to the incremental approach that is employed in this Financial Feasibility and Cost-Benefit Analysis. As such, only the financial impacts of the proposed opportunities are quantified and considered. Further, cash flows that can be expected from the current situation or a base scenario are not included in the equation. Finally, as is appropriate in any investment analysis, financial impacts are expressed in terms of cash flows.

[43] *Source: Phoenix Sky Harbor International Airport website: "How projects are paid for."*

The following general assumptions & inputs have been used in the economic analyses and modeling:

Cargo forecast: Where future cargo volumes are used, the data is sourced from the Demand Forecast discussed in Chapter 4.

Inflation: In the Financial Feasibility Analysis, dollars are typically adjusted for anticipated inflation - resulting in analysis in nominal terms. FAA guidelines on Cost-Benefit Analysis prescribes analysis in real terms (meaning no inflation adjustment), except when it is expected that the real value of one or more of the financial variables is likely to change over the course of the planning period. Therefore, for each opportunity, an assessment will be made as to whether it is desirable to adjust for inflation or not. If an inflation adjustment is required, near term inflation forecasts from the Economist Intelligence Unit are utilized as follows:

- 2013: 1.7%
- 2014: 2.2%
- 2015: 2.2%
- 2016: 2.3%
- 2017: 2.3%

Beyond 2017, an inflation level of 2% is used. This is the higher of the inflation range expected by the Federal Reserve and represents the Federal Reserve's target inflation level.[44]

Discount Rate: In forward-looking analyses such as Financial Feasibility Analysis and Cost-Benefit Analysis, future dollar amounts are discounted to correct for the time value of money. In many cost-benefit analyses, a U.S. public sector discount rate is used, reflecting the cost of capital of a relevant government entity or agency. However, in order to be consistent and concise, the cost of capital of the City of Phoenix Aviation Department is used, since this entity would likely be the principle investor for the identified opportunities. Based on 2011 and 2012 financial statements of the City of Phoenix Aviation Department (which lists all outstanding debt instruments), the weighted average interest rate was calculated at 5.03%. Since there is no equity portion to the funding of projects, the weighted average interest rate is used as the discount rate in net present value calculations.

7.4.1: Cargo Warehouse Capacity

The opportunity for additional cargo warehouse capacity at PHX is made with reference to the findings discussed in Chapters 2, 3 and 4. Based on findings from the Market Analysis, air cargo growth at the Phoenix area airports was projected in long-term, 20-year Demand

[44] *Source: The U.S Federal Reserve website - "Minutes of the Federal Open Market Committee."*

Forecasts. Analysis of these forecasts from a planning perspective identified gaps (or shortfalls) in cargo warehouse capacity during the planning period.

Business Rationale

The following statements define the business rationale for additional cargo warehouse capacity, including the underlying fundamentals and an explanation as to why this initiative was recommended for assessment:

As evidenced in the Demand Forecasts, air cargo users at PHX are expected to grow the volumes they handle over the 20-year planning period – both in terms of general air freight and express freight carried by integrated carriers. Between 2012 and 2033, air freight carried by passenger airlines at PHX is expected to grow by over 28,000 metric tons at an average annual growth rate of 3.3%. During the same period, PHX's integrated express carriers are forecasted to double their air freight tonnage to over 185,000 metric tons at an average annual growth rate of 3.5%.

In the gap analysis, it was determined that given the forecasted cargo volume and existing capacity of current facilities, there will be demand for additional handling capacity at PHX in the future. Therefore, there is a need for the creation of the capacity replacements and new build-outs in order to enable air cargo operators to efficiently accommodate their growing volumes.

Financial Feasibility Analysis

Having qualified the opportunity for additional air cargo warehouse space from a business perspective, Financial Feasibility Analysis was performed to determine whether the proposed investment opportunities could be justified financially from the Airport's perspective. Included in this analysis, are cash outflows associated with required capital expenses as well as additional operating revenues and expenses.

The general assumptions and inputs for the Financial Feasibility Analysis are described below.

In Chapter 5, the current air cargo capacity at PHX, in terms of facilities and infrastructure, was inventoried. Based on this inventory and the cargo forecasts developed in the Demand Forecasts, the need for future cargo-related capacity was assessed. The analysis resulted in the following gap analysis and proposed future capacity additions shown in **Exhibit 7.5.**

Exhibit 7.5: Gap Analysis of PHX Air Cargo Facilities (All Figures in Square Feet)

Year	Requirement	Reduction	Addition	Available	Net Capacity
2013	241,086			321,401	80,315
2014	250,464			321,401	70,937
2015	262,513			321,401	58,888
2016	269,834			321,401	51,567
2017	276,898			321,401	44,503
2018	283,959	-45,000	45,198	321,599	37,640
2019	291,246			321,599	30,353
2020	301,789			321,599	19,810
2021	309,545			321,599	12,054
2022	317,545			321,599	4,054
2023	325,797		78,000	399,599	73,802
2024	334,310			399,599	65,289
2025	343,089			399,599	56,510
2026	352,143			399,599	47,456
2027	361,480			399,599	38,119
2028	371,108			399,599	28,491
2029	381,037			399,599	18,562
2030	391,274			399,599	8,325
2031	401,828		48,576	448,175	46,347
2032	412,710			448,175	35,465
2033	423,929			448,175	24,246

As described earlier in this chapter, the proposed capital expenses required for investments in facilities at PHX and their timing are summarized as follows:

2018 investment: $3,996,453

- Building 1 (building expansion: 31,875 square feet) – $2,285,119
- Building 2 (new building: 13,323 square feet) – $955,126
- Support facilities (cargo trucking area, cargo road, cellphone lot) – $756,208

2023 investment: $12,395,000

- West cargo area warehouse building (78,000 square feet) – $6,235,000
- Apron space including service roads (283,723 square feet) – $6,098,000
- Demolition cost (old cargo building portion) – $62,000

2028 investment: $2,980,000

- Cargo apron rehabilitation remaining Building C (283,723 square feet) – $2,980,000

2033 investment: $4,319,000

- Build-Out of West Air Cargo Area (cargo building: 353,071 square feet) – $3,483,000
- Build-Out of West Air Cargo Area (trucking/operations area) – $838,000

Regarding identification of relevant operating revenue and expense items, it is assumed that the additional air cargo facilities will be leased to tenants in a similar way as is done with current facilities. Therefore, the following cash flows are included in the analysis:

Revenues from Lease Payments Made by Tenants

The revenues from lease payments are based on the rate per square foot for airport facilities set by the City and published in the Phoenix City Code. These rates are periodically adjusted to reflect changes in inflation and market conditions; where in the year 2000 the average rate per square foot for cargo buildings was in the $9-10 range, in 2013, the rate per square foot is in the $12-13 range. With such a key value driver being subject to inflation adjustments, this means that per the FAA guidelines detailed above, the feasibility analysis cannot be done in real terms, and, therefore, all cash flows included in the analysis are adjusted for inflation.

Expenses Incurred for Utilities and Maintenance and Repair of the Facility

The Financial Feasibility Analysis considers typical expenses related to air cargo facilities such as cleaning of apron and parking areas, maintenance, and repair of exterior walls, roofing, foundations, and air conditioning units. Separately, utilities cost are attributable to tenant use of electricity and water. Based on historic records provided by PHX, unit costs for utilities and were calculated at $2.85 per square foot while maintenance/repair costs averaged $0.25 per square foot. These unit costs (adjusted for inflation as described above) are used for the projection of expenses throughout the planning period.

In projecting revenues and expenses from leasing additional air cargo facilities, it would not be realistic to assume that, when constructed, the proposed facilities will be fully occupied immediately. Therefore, assumptions have been made regarding the occupancy rate of the proposed additional facilities over time. The base assumption is that new facilities will be leased in batches of 20% of capacity - meaning that, in effect, the cost of (rational) excess capacity is shared between PHX and the cargo community. In this manner, actual leased square footage increases with 20% of the facilities' size in the year that the cargo community's requirement exceeds the space already leased. For the planning period considered for this Study, **Exhibit 7.6** summarizes:

1) The additional capacity requirement (capacity needed in excess of current capacity);
2) The additional capacity proposed (capacity provided in excess of current capacity); and
3) The additional leased space and occupancy of additional capacity.

It should be noted here that only additional, or incremental, figures are shown because the Financial Feasibility and Cost-Benefit Analysis is an incremental analysis. For this reason, the capital expenses in 2018 needed to replace current US Airways' cargo capacity are included (since these are incremental), but associated lease revenues and expenses not included.

Exhibit 7.6: Incremental Capacity at PHX Air Cargo Facilities (All Figures in Square Feet)

Year	Required	Available	Leased	Occupancy
2013	-	-	-	-
2014	-	-	-	-
2015	-	-	-	-
2016	-	-	-	-
2017	-	-	-	-
2018	-	-	-	-
2019	-	-	-	-
2020	-	-	-	-
2021	-	-	-	-
2022	-	-	-	-
2023	4,396	78,198	15,600	20%
2024	12,909	78,198	15,600	20%
2025	21,688	78,198	31,200	40%
2026	30,742	78,198	31,200	40%
2027	40,079	78,198	46,800	60%
2028	49,707	78,198	62,400	80%
2029	59,636	78,198	62,400	80%
2030	69,873	78,198	78,000	100%
2031	80,427	126,774	87,715	69%
2032	91,309	126,774	97,430	77%
2033	102,528	126,774	107,146	85%

In **Exhibit 7.6** it can be seen that occupancy rates of the initial addition of cargo capacity in 2023 increases stepwise until it is fully utilized. (See 2030 where leased capacity roughly equals available capacity.) Subsequently, more capacity is added in 2031, after which the occupancy rate becomes a blended rate between the phase 1 facility (fully leased) and the phase 2 facility. This second phase of new cargo space is assumed to be leased out in the same manner as the first phase of new cargo space (i.e. in batches of 20% of floor area). More details of this leasing schedule can be found in the financial model that will accompany the Study's other deliverables.

The findings of the Financial Feasibility Analysis are summarized in **Exhibit 7.7** where (accumulated) net cash flow, net present value, and internal rate of return are stated for the planning period. In the last year of the planning period, the remaining value of the facilities' leases is included as a residual. This is done because of the difference in timing of the various capacity developments, whereby the economic life of the facilities extends beyond the 20-year planning period of this Study.

Exhibit 7.7 PHX Air Cargo Facilities – Financial Feasibility Analysis Summary
(All Figures in U.S. Dollars)

Year	Net Cash	Accumulated Net Cash	Net Present Value	Internal Rate of Return
2013	-	-	646,966	5.6%
2014	-	-		
2015	-	-		
2016	-	-		
2017	-	-		
2018	(3,996)	(3,996)		
2019	-	(3,996)		
2020	-	(3,996)		
2021	-	(3,996)		
2022	-	(3,996)		
2023	(12,215)	(16,211)		
2024	184	(16,028)		
2025	375	(15,653)		
2026	382	(15,271)		
2027	584	(14,687)		
2028	(2,185)	(16,872)		
2029	811	(16,061)		
2030	1,034	(15,028)		
2031	(3,135)	(18,163)		
2032	1,343	(16,820)		
2033	30,604	13,785		

Conclusion

The key observation from the Financial Feasibility Analysis is that the proposed air cargo facilities return a positive net present value of almost $650,000. This positive value generates an internal rate of return (5.6%) which is higher than the weighted average cost of capital (5.0%). Thus, the conclusion is that the proposed investments in additional air cargo facilities at PHX are to be considered financially feasible.

Cost-Benefit Analysis

For the Cost-Benefit Analysis of the proposed PHX cargo facilities, external costs and benefits (for users of the aviation system) are considered in addition to the cash flows included in the Financial Feasibility Analysis.

External Benefits

The proposed investments are aimed at maintaining existing cargo handling capacity and providing sufficient additional cargo handling capacity when required for the PHX cargo community. Having sufficient cargo handling space is of paramount importance for users of air cargo facilities as it allows for efficient operations. While operating with less than the ideal amount of space may have the favorable effect of lower leasing costs, those gains are more than offset by the additional costs related to split operations (i.e. operations at multiple locations), loss of economies of scale, and general workarounds. For instance, a lack of cargo space may require a user to process some cargo volumes off-airport or perform certain processes in a non-standard manner – all of which add inefficiency, time and cost to an operation.

Given the competitive nature of the air cargo business - where high service levels are demanded, but profit margins are low – maximizing operation efficiency and minimizing costs is of critical importance. Providing sufficient air cargo handling capacity (in the way of adequate air cargo facilities) is one way airports can accommodate air cargo-related businesses and, in doing so, promote growth of air cargo.

From a practical viewpoint, should PHX make no additions to air cargo facilities as proposed, the capacity shortage would increase to approximately 100,000 square feet in 2033 or, put another way, capacity would be at a 25% shortfall in 2033. This translates to an average capacity shortfall during the planning period of approximately 12.5%.

It is estimated that in cases where capacity shortage is more than 10%, a cargo handlers' cost base can inflate by approximately 5% due to operational inefficiencies. In order to also reflect savings from facility costs in the Cost-Benefit Analysis, the (net) cost base increase is estimated at 3%. For the years of the planning period where there would be a capacity shortage due to lack of investments in cargo facilities, it is estimated that 3% of the cargo users' cost base should be included as a benefit since these are expenses that would be avoided in the case where investments are made.

Although efforts were made to acquire exact figures on the PHX cargo handlers' cost base, obtaining detailed information was not possible due to confidentiality issues. Given this situation, the costs were estimated by assuming that facility costs (lease expenses paid to PHX) make up 50% of the cost base and, conversely, that the cost base is twice the amount the cargo community pays to PHX in leases. Importantly, the estimates are considered to be conservative. Empirical evidence from other analyses of potential airport facilities investments suggests that the cost base could be higher - meaning that the benefit from avoiding PHX cargo capacity shortage costs is potentially higher than calculated.

External Costs

For analytic purposes, it is assumed that the current lease terms for the PHX cargo facilities will be continued and, therefore, no additional user costs will be introduced, nor will existing user costs (lease rates) be increased, in real terms, as a consequence of the proposed investments. Finally, no external costs associated with the proposed investments in new cargo facilities have been identified.

The findings of the Cost-Benefit Analysis are summarized in **Exhibit 7.8** where (accumulated) net cash flow, net present value, and internal rate of return are stated for the planning period. In the last year of the planning period, the remaining value of the facilities' leases is included as a residual. This is done because of the difference in timing of the various capacity developments, whereby the economic life of the facilities extends beyond the 20-year planning period of this Study.

Exhibit 7.8: PHX Air Cargo Facilities – Cost-Benefit Analysis Summary (All Figures in U.S. Dollars)

Year	Net Cash	Accumulated Net Cash	Net Present Value	Internal Rate of Return
2013	-	-	2,292,558	7.1%
2014	-	-		
2015	-	-		
2016	-	-		
2017	-	-		
2018	(3,996)	(3,996)		
2019	-	(3,996)		
2020	-	(3,996)		
2021	-	(3,996)		
2022	-	(3,996)		
2023	(11,919)	(15,916)		
2024	485	(15,430)		
2025	682	(14,748)		
2026	696	(14,052)		
2027	905	(13,147)		
2028	(1,858)	(15,006)		
2029	1,144	(13,862)		
2030	1,374	(12,488)		
2031	(2,789)	(15,277)		
2032	1,697	(13,580)		
2033	30,965	17,385		

Conclusion

The results of the analysis show that when the identified benefits associated with the investment in PHX air cargo facilities are added to the financial analysis, the net present value and internal rate of return of the cash flows further improves. The Cost-Benefit Analysis results in a 7.1% internal rate of return versus the 5.6% rate determined by the Financial Feasibility Analysis

alone. Therefore, the conclusion regarding the investment in PHX cargo facilities is unchanged - the proposed investments are not only financially feasible, but they also add benefits to the users of the aviation system.

7.4.2: Temperature Controlled Facility

The potential development of a temperature controlled facility at the Phoenix area airports for air cargo shipments was identified in the Market Analysis during discussions with various members of the Phoenix air cargo community, including certain airlines, shippers, and freight forwarders. Some of these companies described the market potential for temperature-sensitive, and perishable air cargo.

As described in Chapter 2, perishable cargo are goods that, when transported, will deteriorate over a given period if exposed to adverse temperature, humidity or other environmental conditions. Cargo that is traditionally considered perishable includes commodities such as fresh cut flowers, fresh fruits and vegetables, dairy products, fish, seafood and other meats. In addition to natural perishables, there is also a category of scientific perishables that includes pharmaceuticals, vaccines, biotechnology, medical equipment, and certain electronics that require a temperature controlled environment. Perishable cargo, when transported by air cargo, requires the relevant carriers to provide an environment that is both temperature and humidity controlled throughout the entire journey, which typically necessitates the use of a mechanical cooling system. This cooled transportation and storage supply chain is often referred to as a "cold-chain."

The improving global economy has helped re-energize international trade overall, however, a return to the boom years has not quite materialized for some transportation modes and trade lanes, including air cargo. The perishables business is an exception. While other air cargo business segments dropped significantly in recent years, the perishables segment grew by double digits in 2012 and will likely do the same in 2013.

The movement of temperature-sensitive air shipments requires airlines and airports to offer appropriately sized, temperature-controlled facilities as well as necessary equipment to ensure that correct temperatures are maintained from origin to destination – including during short-term storage at airports and on the cargo ramp during loading and unloading.

As detailed in Chapter 3, freight forwarders noted that the Phoenix area airports do not currently offer an optimal environment for the movement of temperature-controlled shipments. Because of the lack of adequate systems for handling temperature-sensitive goods at the Phoenix area airports, these commodities are largely being handled at airports outside of the Phoenix area – namely LAX.

Business Rationale

The business rationale for a potential temperature controlled air cargo facility is described below, including the underlying fundamentals and an explanation as to why this initiative was recommended for assessment.

The key target of cold storage facilities would center on fresh produce from Mexico and, to a lesser extent, Southern Arizona. Mexico is a major producer of food perishables and many of these perishables are exported to the United States and other foreign countries. Although agriculture's contribution to Mexico's GDP has decreased to approximately 4%, it is still an important sector for Mexico's export. Due to its favorable climate and agricultural expertise, Mexico is an important producer of vegetables and winter fruits. **Exhibit 7.9** below shows that Mexico is among the leading producers for several types of fresh produce.

Exhibit 7.9: Mexico Rank for Production of Selected Fresh Produce

	Asparagus	Avocados	Grapefruit	Lemons/Limes	Oranges	Strawberries
1	China	**Mexico**	China	China	Brazil	USA
2	Peru	Chile	USA	**Mexico**	USA	Turkey
3	Germany	Dom. Republic	South Africa	India	China	Spain
4	**Mexico**	Indonesia	**Mexico**	Argentina	India	Egypt
5	Thailand	USA	Thailand	Brazil	**Mexico**	**Mexico**

The majority of Mexico's agricultural exports (approximately 80%) are destined for the United States, but there is still a substantial trade flow from Mexico to other countries around the world and a portion of that is transported by air.

Given the proximity and developed highway network, perishable food produced in Arizona and Mexico for the U.S. market is transported by truck, while that produced for export is currently transported by air either from Mexico City, Guadalajara, or Los Angeles. For the same reason, perishable food produced in Mexico for neighboring Central American countries are also trucked to their export destinations. For perishables produced is Northern Mexico, LAX is the designated airport to use since the airport has an extensive network of air service as well as temperature controlled facilities. In order to cater for the growing volume of perishables, operators in Los Angeles are investing in expanded facilities. For instance, in 2011, Apollo Freight opened a new 16,000 square foot refrigerated warehouse just outside of LAX. This expansion should enable the Los Angeles cargo community to acquire a greater share of imported perishables; especially for the South American import market, currently dominated by Miami International Airport.

Lacking an extensive network of international air service, the Phoenix area commercial airports do not currently provide a viable option for the handling of perishable produce. If the Phoenix

area airports were able to offer air services with adequate cargo capacity as well as specialized facilities, they would, in principle, offer an attractive option for shipping perishable produce by air. The airports' proximity to Northern Mexico is a particular strategic advantage. Nogales, Arizona borders Sonora, Mexico, and is Arizona's largest international border town. Due to its ideal location on the border and its major ports of entry, Nogales funnels billions of dollars' worth of international trade (including fresh produce) into Arizona and the United States each year. The distance of Nogales to Los Angeles is 550 miles (approximately eight trucking hours) while the distance of Nogales to Phoenix is 180 miles (less than three trucking hours). The combination of closer proximity and less congestion compared to the Los Angeles market would provide potential savings in terms of both delivery time and transportation costs and, therefore, an attractive proposition for Mexico's fresh produce exporters.

The points below summarize the preliminary examination of the business rationale and analysis of potential demand for a Temperature Controlled Facility serving the Phoenix area airports:

In order to economically justify the investment in a temperature controlled facility, a sufficient volume of perishables carried by air is required. Since the objective of such a facility would be to access and facilitate international trade flows, a case for full freighter capacity to carry perishables and other air-eligible, non-perishable cargo to/from the Phoenix area airports would need to be made – particularly in the absence of substantial international passenger air services. While obtaining international air services is a challenging and complex issue for most airports, one key factor in establishing a case for freighter services would be to verify that sufficient and balanced inbound and outbound cargo volume exists in the market. Although fresh produce exports could partially fill outbound freighter capacity, inbound capacity could be comprised of variety of air-eligible commodities. Further, for fresh produce exporters, a minimum of number of weekly flights would be required in order to assure reliability of product delivery. The primary challenge with this issue (as with air cargo development at the Phoenix area airports in general) is the competition from air carriers and service providers serving LAX. As discussed in prior chapters, LAX has daily flights (both passenger services and freighter services) to almost all important international markets, including the major markets of Asia and Europe. The Phoenix area airports do have the advantage of closer proximity to Mexico's agriculture production areas compared to LAX, but the cargo community's need for high-frequency widebody flights to multiple international markets would need to be addressed before large-scale movements of perishables by air occurred.

While outbound perishables from Mexico appear to be the primary opportunity for the Phoenix area airports with respect to temperature-sensitive cargo, potential inbound perishables shipped by air may also be considered. In this respect, the most obvious trade flow to potentially access would be fresh produce that is exported from South America to the United States and other markets. Given its geographic location, infrastructure, and air services, Miami has historically been the primary port of entry for South American perishables. Seventy-three percent of Miami's imported cargo consists of perishable goods and it is reported that this represents more than 80% of the total volume that is imported to the United States. Various airports – including Orlando, Atlanta, Houston and Los Angeles – have attempted to break Miami's hold on the

South American perishables market. As in the case of fresh produce exports from Mexico, the Phoenix airports would have to compete directly with LAX (which has been aggressively pursuing perishables flows) for the inbound perishables air cargo market. Further, without adequate belly capacity to/from South American markets, it would be unrealistic to assume that the Phoenix area airports can attract substantial inbound perishables from South America in sufficient volumes to justify a temperature controlled facility on-airport.

To provide further context regarding investments in temperature controlled facilities and to illustrate the entrepreneurial nature of such investments, it is helpful to review some examples of these types of facilities at other U.S. airports.

- At the end of 2005, the Toledo-Lucas County Port Authority approved an investment to facilitate the operations of the Global Perishable Exchange and Express (or 'Glopexx'). The stated plan of this venture was to fly Ecuadorian roses into Toledo Express Airport ("TOL") and store the flowers in an on-airport temperature controlled facility until they were ready for distribution. The approval included an expenditure of $625,000 to convert 4,400 square feet of Toledo Express' Cargo Building into a refrigerated storage facility. The facility, located next to the passenger terminal, was then to be leased to Glopexx, a local company. The investment was seen as the initial step towards developing Toledo Express into a major cargo hub for perishables. In 2010, the cold storage facility was then leased to BAX Global, a subsidiary of the Deutsche Post Group, which at the time, operated several freighter flights per day at TOL. In 2011, BAX Global ceased air transport operations. Currently, the cold storage facility is available for lease.
- In 2010, the El Paso International Airport converted some refrigerated units donated by a defunct airline catering company into a 900 square foot common-use cold storage facility. The facility was designated as a part of the airport's Foreign Trade Zone. To encourage usage of the facility, the City of El Paso passed an incentive program aimed at attracting carriers and operators active in perishables shipping. While the specialized ELP facility was constructed at low-cost with little downside risk, to date, the facility has not led to a marked change in the handling of perishable air cargo at ELP.
- Houston's George Bush Intercontinental Airport ("IAH") opened a perishables center in 2008. Initially called the International Air Cargo Centre II, the 60,000 square foot facility is marketed as "Fresh Air Cargo — IAH". The facility leverages Houston's close proximity to South America and periodically handles imports from that region, including fresh flowers. Traditionally, the Miami International Airport ("MIA") has dominated trade flows with South America, and there were hopes that the specialized IAH facility coupled with high air service levels from South America by hub carrier United Airlines (formerly Continental Airlines) could influence a change in shipper behavior via Houston versus Miami. To date, the virtual monopoly that MIA has held on South American imports – including perishables has been unchanged. The Houston airport's perishable center has been used for general cargo and other non-cargo related purposes.

Based on the analysis and examples provided above, it is concluded that it will be unlikely that the Phoenix area airports will be able to attract sufficient volumes of perishable air cargo for a temperature controlled facility to operate in a financially sustainable manner.

The potential volume from exports of Mexican perishables would likely be hampered by existing supply chains, intense competition from LAX and lack of direct widebody aircraft capacity to major international markets.

The potential for sufficient levels of inbound perishables is deemed to be unrealistic at this point for the Phoenix area airports, given the history of market leaders like Miami as well as the air service issues described.

Finally, there are many examples of U.S. airport ventures designed to attract perishable air cargo trade flows. Many of these projects begin with investments in temperature controlled facilities with little real understanding of the markets and dynamics involved in capturing that trade. Given the high-risk nature of these specialized facilities, it would seem to be more of an investment opportunity for a private sector investor (such as a third-party airport developer) than for an airport to undertake directly.

Based on the analysis and conclusions detailed above for this development opportunity, no formal financial feasibility and cost-benefit analysis will be executed in this Study for a potential Temperature Controlled Facility.

7.4.3: Centralized Cargo Screening Facility

The potential development of a centralized cargo screening facility at the Phoenix area airports for air cargo shipments was identified in the Market Analysis during discussions with various members of the Phoenix air cargo community, including freight forwarders and shippers. As described in Chapter 3, the air cargo community continues to face challenges related to the relatively new air cargo security regulations. A centralized cargo screening facility at the Phoenix area airports was mentioned as one possible solution to the security challenges that are being faced.

Background

As part of legislation aimed at increasing security in the aviation industry after the terrorist attacks of September 11, 2001, there has been a stepwise increase in the percentage of air cargo transported on passenger planes originating from U.S. airports to be screened. The percentage of cargo to be loaded on these aircraft has increased in the following manner: 30% (2003), 50% (2009), and 100% (2010). Inbound air cargo is screened based on "identified high risk" profiles as defined by the Transportation Security Administration ("TSA").

The 2010 increase to 100% screening requirement for freight loaded on passenger aircraft serving the U.S. market has raised issues and dilemmas in a disproportionate manner for the air cargo industry. When less than 100% of cargo was required to be screened, operators had certain operational degrees of freedom. For instance, with the 50% screening requirement, there was the possibility to screen the cargo of one of two outgoing planes, or part (half) of each plane. In this way, critical and late arriving freight tendered by air carriers could be processed without delaying the flight. With 100% screening, flexibility with respect to cargo screening has largely disappeared, which, at times, creates disproportionate operational problems.

TSA developed the Certified Cargo Screening Program (CCSP) as a solution to help the air cargo industry reach the 100% screening mandate. The program encourages air cargo industry operators to get certified and enables certified freight forwarders and shippers to pre-screen cargo prior to arrival at the airport. The pre-screened cargo is then passed along through the supply chain in a secure manner until it reaches an airport, where it can be loaded directly onto aircraft without undergoing additional screening.

Despite the CCSP initiatives, much air cargo still requires screening at or near airports which must be performed by the freight forwarders or air carriers who tender the shipments from shippers. However, many freight forwarders and air carriers do not have cargo screening equipment and certified personnel at each of the airport stations that they serve. In this manner, access to screening equipment and certified personnel that is both timely and affordable can become a challenge for the air cargo community.

Business Rationale

The business rationale for a centralized cargo screening facility is described below, including the underlying fundamentals and an explanation as to why this initiative was recommended for assessment.

Screening of air cargo on passenger planes is not optional. At the screening level of 100% of freight, it is required by law and thus all air cargo operators must find solutions to incorporate screening in their normal operations.

As mentioned in Chapter 3, freight forwarders face complex decisions regarding security screening due to the high investment required to purchase screening equipment and the necessity to employ certified personnel. Many forwarders have chosen to limit their capital spending and place screening equipment only at major cargo gateway airports.

For most air carriers and freight forwarders, the Phoenix area is typically a non-hub location - meaning that most operators are hesitant to invest in cargo screening infrastructure due to relatively small scale of operations. As a consequence, a centralized screening facility open for common-use by those in the Phoenix air cargo community seems logical in that it would allow for "shared" investment and screening capacity.

The points below summarize the preliminary examination of the business rationale and analysis of potential demand for a Centralized Cargo Screening Facility serving the Phoenix area airports:

Within the supply chain, outbound air cargo typically arrives at the carrier's operational site ("first line") at the airport in pallets or containers. The particular issue with 100% screening of air cargo – when compared with passengers and passenger baggage screening – is that there is no current technology to screen palletized cargo or cargo containers in which air cargo is consolidated. Key issues include the sheer size of cargo pallets and containers as well as the fact that dangerous substances and unwanted objects cannot be easily identified when many individual pieces or units of cargo are grouped together. For that reason the most logical point in the supply chain to screen cargo is the "second line," the site of the forwarder that is typically located nearby, but off-airport, where cargo is consolidated and prepared for transport.

The strength of the CCSP program is that it acknowledges the above issues and effectively creates a distributed screening network, aimed at performing screening activities at the most cost-effective and logical point in the supply chain (at the "second line" location - prior to consolidation and palletizing). This practice tends to mitigate the impact on system performance, thereby expediting the flow of commerce. In this respect, the CCSP is a flexible and voluntary program specifically designed to allow shippers with unique requirements to find solutions that best meet their needs. Of course, participants in the CCSP program must invest in screening equipment and building security (such as cameras and fencing) as well as employ trained/certified staff to oversee the screening process.

For some operators, the investment in CCSP certification may not be justifiable. In those cases, services of third parties are now available as evidenced by the fact that various certified companies offer cargo screening to members of the cargo community. For instance, in Phoenix, there is currently one operator that is authorized to screen air cargo for transport on passenger aircraft - the Phoenix branch of NNR Logistics. The Phoenix location of this operator is located just a few miles from PHX and offers cargo-screening services to third parties. Across the U.S., some 600 private companies are certified to perform air cargo screening.

The need for on-airport screening is often limited to the handling of late shipments; at times when cargo arrives late at an airport for outbound flights and cannot be processed at the second line, it goes immediately to the first line where it is added to already palletized shipments. Currently, in those instances, the air carriers themselves will have to screen the cargo, for which they typically charge high rates. Obviously, in order to avoid these high costs, forwarders and shippers would prefer to have access to a common-use centralized facility where cargo can be screened at lower costs.

Given typical air cargo business models and supply chains, the utilization of a common-use on-airport centralized cargo screening facility would likely be limited to late shipments of forwarders as an alternative for (costly) screening provided by air carriers. Apart from a quantitative analysis (potential volume, operating revenues, operating cost, capital cost, secondary benefits and costs), there are several factors that the Phoenix area airports would want to consider in providing such a facility and services. First, an airport owned/operated cargo screening facility would, in effect, enter into competition with air carriers operating at the airport that provide air cargo screening services to the community. Second, benefits would accrue to forwarders (since they would have an alternative for more expensive air carrier screening) who are not direct users of the aviation system, while potentially impacting air carrier revenues (direct users of the aviation system) in a negative way. So, even in the case where Phoenix area airports would operate a centralized cargo screening facility as a value-added benefit to users of air cargo services, it could actually be counterproductive.

There are no known examples of airports that have created a common-use centralized cargo screening facility as proposed by some during the primary research. This may serve to confirm that such facilities are not viewed as viable solutions to the security-related challenges faced by the cargo community. Rather, off-airport screening, by private sector companies under the CCSP program in combination with on-airport screening of late arriving shipments by air carriers, appears to be a more appropriate solution that fits the business models of both airports and the air cargo industry.

Based on the analysis above, it is determined that an adequate business case cannot be made for a Centralized Cargo Screening Facility at the Phoenix area airports. Due to the limited volume of cargo actually screened at on-airport locations (limited to late shipments with regular shipments screened off-airport by private companies under the CCSP program) and considering the role of the Phoenix area airports, it is not desirable to develop such a facility. Therefore, no formal financial feasibility and cost-benefit analysis will be executed for this development opportunity.

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CHAPTER 8

Chapter 8: Conclusions and Recommendations

The work involved in completing the Phoenix Regional Air Cargo Planning Study has led to several key conclusions and recommendations regarding air cargo development at the Phoenix metropolitan area airports.

The Market Analysis identified potential air cargo development opportunities in four general areas related to: 1) integrated express carrier operations, 2) air cargo business model evolution, 3) airline capacity, and 4) facilities, infrastructure and services. The findings of the Market Analysis aided in the development of long-term 20-year Demand Forecasts for air cargo at Phoenix Sky Harbor International Airport and Phoenix-Mesa Gateway Airport. These forecasts predict slow, but stable growth in air cargo volumes at PHX. Meanwhile, forecasted air cargo growth at IWA is largely a function of the number and types of air services the airport attracts over time – possibly driven by manufacturers of air-eligible goods locating in proximity to IWA where developable land is plentiful. In fact, as this Study was nearing completion in late 2013, Apple Computer announced that it would be establishing a large 1.3 million square foot manufacturing facility in Mesa, very close to IWA. It is foreseeable that this Apple facility will generate additional demand for air cargo services. Further, Apple's decision to locate in the Phoenix-Mesa metropolitan area may influence other high-tech companies to establish manufacturing operations in the region. After analyzing the current inventory of cargo-related facilities and infrastructure at the Phoenix area airports, potential development needs were identified and analyzed in terms of cost, size, location and financial feasibility.

The Study concludes that the Phoenix area airports – namely Phoenix Sky Harbor and Phoenix-Mesa Gateway – are well-positioned to continue serving the regional air cargo market and handle near-term growth. During the planning period analyzed and with the information available at the time of the Study, IWA does not show a need for cargo-related development and the airport is poised to grow air cargo volumes as air services are added. Based on the forecasts and gap analysis, PHX will have medium- and long-term cargo development needs. The financial analysis shows these development projects are feasible and it is recommended that the PHX investments are made at the appropriate time. These investments will enable PHX to facilitate the efficient movement of air cargo to and from the region which should also aid in local economic and business growth.

Finally, due to the long-term nature of the forecasts and the fact that no near-term cargo-related development needs were identified at the Phoenix area airports, it is recommended that elements of this Study be updated in the future – likely in response to new developments in the market. Air cargo growth at the Phoenix area airports should be monitored regularly and the forecasts and gap analysis should be revised accordingly. Similarly, the financial analysis should be refreshed as the timing for the development needs approaches. This will ensure that all assumptions and inputs utilize the most current information available when assessing the feasibility of cargo-related investments.

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APPENDICES

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APPENDIX A

Arizona Air Trade by World Region

Exhibit 1a - AZ Air Trade to/from World Regions for 2012, Air Weight

WEIGHT OF IMPORTS AND EXPORTS COMBINED

Rank	Region	Air Weight (Metric Tons)	% Share of Total
1	Asia	33,546	47.5%
2	Europe	23,878	33.8%
3	Canada & Greenland	5,857	8.3%
4	Latin America	4,543	6.4%
5	Middle East	1,998	2.8%
6	Africa	850	1.2%
	Total	***70,672***	***100.0%***

Exhibit 1b - AZ Air Trade to/from World Regions for 2012, Air Value

VALUE OF IMPORTS AND EXPORTS COMBINED

Rank	Region	Air Value (USD Millions)	% Share of Total
1	Asia	$7,559	52.5%
2	Europe	$4,517	31.4%
3	Canada & Greenland	$1,004	7.0%
4	Latin America	$853	5.9%
5	Middle East	$357	2.5%
6	Africa	$114	0.8%
	Total	***$14,404***	***100.0%***

Exhibit 2a - Top 15 AZ Country Markets for 2012, Air Exports by Weight

Rank	Country	Air Weight (Metric Tons)	% Share of Total
1	Canada	4,105	11.8%
2	United Kingdom	3,056	8.8%
3	Germany	2,321	6.7%
4	Japan	2,271	6.5%
5	China	1,905	5.5%
6	Singapore	1,863	5.4%
7	France	1,730	5.0%
8	Australia	1,496	4.3%
9	Hong Kong	1,456	4.2%
10	Taiwan	1,065	3.1%
11	Brazil	932	2.7%
12	Korea, Republic Of	929	2.7%
13	Israel	902	2.6%
14	Malaysia	836	2.4%
15	Afghanistan	829	2.4%
	All Other	9,044	26.0%
	Total Arizona Exports	***34,740***	***100.0%***

Exhibit 2b - Top 15 AZ Country Markets for 2012, Air Exports by Value

Rank	Country	Air Value (USD Millions)	% Share of Total
1	China	$766	9.6%
2	Canada	$761	9.5%
3	Japan	$662	8.3%
4	United Kingdom	$659	8.2%
5	Germany	$579	7.2%
6	Singapore	$456	5.7%
7	France	$441	5.5%
8	Thailand	$433	5.4%
9	Malaysia	$395	4.9%
10	Brazil	$305	3.8%
11	Hong Kong	$251	3.1%
12	Taiwan	$234	2.9%
13	Switzerland	$186	2.3%
14	Australia	$165	2.1%
15	Netherlands	$160	2.0%
	All Other	$1,561	19.5%
	Total Arizona Exports	***$8,013***	***100.0%***

Exhibit 2c - Top 15 AZ Country Markets for 2012, Air Imports by Weight

Rank	Country	Air Weight (Metric Tons)	% Share of Total
1	China	7,577	21.1%
2	Japan	4,008	11.2%
3	Germany	2,451	6.8%
4	France	1,903	5.3%
5	United Kingdom	1,786	5.0%
6	Canada	1,751	4.9%
7	Czech Republic	1,465	4.1%
8	Taiwan	1,418	3.9%
9	India	1,394	3.9%
10	Singapore	1,256	3.5%
11	Malaysia	1,256	3.5%
12	Netherlands	1,214	3.4%
13	Italy	867	2.4%
14	Korea, Republic Of	718	2.0%
15	Thailand	665	1.9%
	All Other	6,202	17.3%
	Total Arizona Imports	***35,931***	***100.0%***

Exhibit 2d - Top 15 AZ Country Markets for 2012, Air Imports by Value

Rank	Country	Air Value (USD Millions)	% Share of Total
1	China	$930	14.5%
2	Malaysia	$762	11.9%
3	Japan	$737	11.5%
4	Germany	$417	6.5%
5	United Kingdom	$387	6.1%
6	Taiwan	$361	5.7%
7	Singapore	$312	4.9%
8	Netherlands	$254	4.0%
9	Canada	$242	3.8%
10	Thailand	$210	3.3%
11	Korea, Republic Of	$208	3.2%
12	France	$198	3.1%
13	Czech Republic	$194	3.0%
14	Costa Rica	$185	2.9%
15	Philippines	$100	1.6%
	All Other	$895	14.0%
	Total Arizona Imports	***$6,391***	***100.0%***

Exhibit 3a - Top 10 AZ Commodities from the World 2012, Air Imports by Weight

Rank	Commodity	Air Weight (Metric Tons)	% Share of Total
1	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	10,988	30.6%
2	Industrial Machinery, Including Computers	7,142	19.9%
3	Special Classification Provisions, Nesoi	3,505	9.8%
4	Optic, Photo Etc, Medic Or Surgical Instrments Etc	1,974	5.5%
5	Vehicles, Except Railway Or Tramway, And Parts Etc	1,293	3.6%
6	Edible Vegetables & Certain Roots & Tubers	915	2.5%
7	Ceramic Products	840	2.3%
8	Oil Seeds Etc.; Misc Grain, Seed, Fruit, Plant Etc	816	2.3%
9	Arms And Ammunition; Parts And Accessories Thereof	735	2.0%
10	Plastics And Articles Thereof	671	1.9%
	All Other	7,052	19.6%
	Total Arizona Imports	***35,931***	***100.0%***

Exhibit 3b - Top 10 AZ Commodities from the World 2012, Air Imports by Value

Rank	Commodity	Air Value (USD Millions)	% Share of Total
1	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	$2,881	45.1%
2	Industrial Machinery, Including Computers	$1,292	20.2%
3	Special Classification Provisions, Nesoi	$943	14.8%
4	Optic, Photo Etc, Medic Or Surgical Instrments Etc	$442	6.9%
5	Arms And Ammunition; Parts And Accessories Thereof	$185	2.9%
6	Aircraft, Spacecraft, And Parts Thereof	$130	2.0%
7	Miscellaneous Chemical Products	$88	1.4%
8	Nat Etc Pearls, Prec Etc Stones, Pr Met Etc; Coin	$77	1.2%
9	Organic Chemicals	$65	1.0%
10	Plastics And Articles Thereof	$25	0.4%
	All Other	$265	4.1%
	Total Arizona Imports	***$6,391***	***100.0%***

Exhibit 3b - Top 10 AZ Commodities from the World 2012, Air Imports by USD/KG

Rank	Commodity	USD/KG
1	Pharmaceutical Products	$667
2	Explosives; Pyrotechnics; Matches; Pyro Alloys Etc	$345
3	Nat Etc Pearls, Prec Etc Stones, Pr Met Etc; Coin	$340
4	Aircraft, Spacecraft, And Parts Thereof	$327
5	Miscellaneous Chemical Products	$294
6	Special Classification Provisions, Nesoi	$269
7	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	$262
8	Nickel And Articles Thereof	$260
9	Works Of Art, Collectors Pieces And Antiques	$255
10	Arms And Ammunition; Parts And Accessories Thereof	$251

Exhibit 3d - Top 10 AZ Commodities to the World 2012, Air Exports by Weight

Rank	Commodity	Air Weight (Metric Tons)	% Share of Total
1	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	7,642	22.0%
2	Industrial Machinery, Including Computers	7,623	21.9%
3	Aircraft, Spacecraft, And Parts Thereof	3,055	8.8%
4	Plastics And Articles Thereof	2,227	6.4%
5	Optic, Photo Etc, Medic Or Surgical Instrments Etc	1,981	5.7%
6	Articles Of Iron Or Steel	1,268	3.6%
7	Copper And Articles Thereof	942	2.7%
8	Aluminum And Articles Thereof	776	2.2%
9	Miscellaneous Articles Of Base Metal	602	1.7%
10	Miscellaneous Edible Preparations	480	1.4%
	All Other	8,144	23.4%
	Total	***34,740***	***100.0%***

Exhibit 3e - Top 10 AZ Commodities from the World 2012, Air Exports by Value

Rank	Commodity	Air Value (USD Millions)	% Share of Total
1	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	$3,392	42.3%
2	Aircraft, Spacecraft, And Parts Thereof	$1,908	23.8%
3	Industrial Machinery, Including Computers	$994	12.4%
4	Optic, Photo Etc, Medic Or Surgical Instrments Etc	$806	10.1%
5	Arms And Ammunition; Parts And Accessories Thereof	$222	2.8%
6	Pharmaceutical Products	$67	0.8%
7	Nat Etc Pearls, Prec Etc Stones, Pr Met Etc; Coin	$152	1.9%
8	Miscellaneous Chemical Products	$75	0.9%
9	Toys, Games & Sport Equipment; Parts & Accessories	$26	0.3%
10	Explosives; Pyrotechnics; Matches; Pyro Alloys Etc	$30	0.4%
	All Other	$340	4.2%
	Total	***$8,013***	***100.0%***

Exhibit 3f - Top 10 AZ Commodities from the World 2012, Air Exports by USD/KG

Rank	Commodity	USD/KG
1	Nat Etc Pearls, Prec Etc Stones, Pr Met Etc; Coin	$1,583
2	Arms And Ammunition; Parts And Accessories Thereof	$984
3	Photographic Or Cinematographic Goods	$821
4	Aircraft, Spacecraft, And Parts Thereof	$495
5	Clocks And Watches And Parts Thereof	$481
6	Ores, Slag And Ash	$463
7	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	$351
8	Optic, Photo Etc, Medic Or Surgical Instrments Etc	$335
9	Special Classification Provisions, Nesoi	$237
10	Explosives; Pyrotechnics; Matches; Pyro Alloys Etc	$207

Exhibit 4a - AZ Air Exports Ranking vs. All Other States and Washington, D.C., Weight 2008-2012

2012 Rank	State	Air Weight (Metric Tons)					CAGR (2008-2012)
		2008	2009	2010	2011	2012	
1	California	598,672	515,925	590,798	624,638	607,607	0.4%
2	Texas	344,540	287,691	334,406	377,537	391,993	3.3%
3	Florida	226,057	202,535	218,323	229,052	222,776	-0.4%
4	Illinois	174,717	134,905	178,559	187,135	179,575	0.7%
5	New York	207,109	173,984	187,498	189,188	171,302	-4.6%
6	Ohio	126,378	96,453	123,320	132,593	142,038	3.0%
7	Pennsylvania	129,258	111,653	144,502	150,724	127,604	-0.3%
8	Massachusetts	131,070	113,663	135,435	145,677	125,253	-1.1%
9	New Jersey	128,805	114,388	153,077	145,425	122,427	-1.3%
10	Indiana	70,173	63,793	81,998	104,206	95,349	8.0%
11	Georgia	82,071	75,826	87,899	94,075	85,801	1.1%
12	Washington	80,405	61,127	69,045	82,992	85,284	1.5%
13	Wisconsin	88,821	68,398	84,883	87,086	85,066	-1.1%
14	North Carolina	75,145	67,338	87,707	105,599	81,105	1.9%
15	Michigan	89,744	75,756	91,771	90,424	81,087	-2.5%
16	Minnesota	70,015	64,934	95,075	88,812	80,985	3.7%
17	Tennessee	56,435	46,069	61,796	64,857	62,221	2.5%
18	Kentucky	66,959	54,992	65,201	56,451	51,119	-6.5%
19	Connecticut	56,590	47,528	56,557	54,325	49,498	-3.3%
20	Virginia	44,554	41,551	54,021	51,417	44,619	0.0%
21	South Carolina	32,976	24,977	44,055	47,560	40,951	5.6%
22	Utah	28,440	25,823	30,299	35,280	36,951	6.8%
23	Oregon	40,506	35,510	36,596	40,079	36,688	-2.4%
24	Maryland	36,677	30,278	36,871	39,724	34,783	-1.3%
25	Arizona	34,904	27,965	32,075	33,857	34,740	-0.1%
26	Missouri	43,919	37,274	39,258	45,379	34,655	-5.8%
27	Colorado	26,734	23,361	26,831	28,127	28,424	1.5%
28	Iowa	18,538	15,333	17,913	23,565	19,552	1.3%
29	Oklahoma	13,543	11,699	14,302	17,116	18,739	8.5%
30	New Hampshire	19,039	13,792	24,399	25,244	18,394	-0.9%
31	Louisiana	14,247	14,916	18,164	17,162	17,252	4.9%
32	Alabama	18,464	19,267	19,663	18,865	14,658	-5.6%
33	Kansas	16,326	12,267	16,297	16,635	14,568	-2.8%
34	Nevada	10,104	9,103	10,923	13,185	13,814	8.1%
35	Delaware	16,747	13,888	16,701	15,286	11,546	-8.9%
36	Arkansas	5,996	5,333	7,941	11,276	11,204	16.9%
37	Nebraska	16,299	12,794	13,982	10,923	11,013	-9.3%
38	Mississippi	6,295	7,283	9,873	9,283	10,671	14.1%
39	Hawaii	7,771	7,615	9,078	10,395	10,069	6.7%
40	Rhode Island	10,795	10,142	13,557	11,507	9,262	-3.8%
41	Maine	6,934	5,493	6,891	7,327	8,614	5.6%
42	Idaho	4,855	4,925	5,743	6,126	6,604	8.0%
43	West Virginia	4,688	7,056	13,393	8,525	5,105	2.2%
44	New Mexico	5,913	6,856	4,524	6,091	4,899	-4.6%
45	Vermont	3,356	3,281	3,986	4,470	3,683	2.4%
46	Alaska	2,238	1,730	2,397	2,236	3,354	10.6%
47	South Dakota	2,807	1,453	2,051	2,442	2,537	-2.5%
48	District Of Columbia	2,946	1,942	2,125	2,108	2,053	-8.6%
49	Montana	2,007	1,340	2,301	2,748	1,907	-1.3%
50	North Dakota	1,390	1,108	3,213	2,821	1,862	7.6%
51	Wyoming	402	508	570	1,353	1,077	27.9%
	Total	***3,303,374***	***2,812,821***	***3,387,843***	***3,578,908***	***3,362,338***	***0.4%***

Exhibit 4b - AZ Air Exports Ranking vs. All Other States and Washington, D.C., Value 2008-2012

2012 Rank	State	Air Value (USD Millions)					CAGR (2008-2012)
		2008	2009	2010	2011	2012	
1	California	$69,612	$57,130	$70,249	$72,573	$72,134	0.9%
2	New York	$45,381	$32,480	$38,048	$47,541	$46,699	0.7%
3	Texas	$36,146	$30,736	$35,400	$38,496	$39,370	2.2%
4	Florida	$20,869	$21,052	$25,651	$30,559	$32,100	11.4%
5	Massachusetts	$19,662	$16,765	$18,078	$18,143	$16,524	-4.3%
6	Utah	$7,385	$7,531	$10,316	$15,193	$14,902	19.2%
7	Ohio	$10,064	$8,071	$10,634	$12,378	$12,972	6.6%
8	New Jersey	$14,534	$10,503	$13,286	$13,644	$12,207	-4.3%
9	Illinois	$11,124	$9,328	$10,741	$11,527	$11,630	1.1%
10	Indiana	$7,517	$8,211	$9,974	$9,875	$11,108	10.3%
11	Pennsylvania	$8,203	$8,199	$10,458	$11,583	$10,990	7.6%
12	Connecticut	$9,138	$8,138	$9,488	$9,876	$10,000	2.3%
13	Oregon	$9,059	$7,980	$9,024	$7,965	$8,170	-2.5%
14	Georgia	$6,499	$6,609	$7,290	$8,221	$8,134	5.8%
15	Arizona	$9,977	$6,526	$7,334	$7,819	$8,013	-5.3%
16	Tennessee	$5,762	$5,637	$6,623	$7,512	$7,987	8.5%
17	Nevada	$4,143	$4,071	$4,031	$5,736	$7,760	17.0%
18	Minnesota	$7,529	$6,623	$7,678	$7,566	$7,674	0.5%
19	Washington	$6,570	$5,699	$6,256	$6,783	$7,300	2.7%
20	Kentucky	$7,441	$7,975	$7,554	$7,160	$7,294	-0.5%
21	North Carolina	$6,151	$7,188	$6,518	$6,559	$6,987	3.2%
22	Wisconsin	$5,084	$4,663	$5,383	$5,410	$5,301	1.0%
23	Michigan	$4,222	$3,589	$4,582	$5,429	$5,000	4.3%
24	Virginia	$6,072	$4,613	$5,067	$4,709	$4,691	-6.2%
25	Maryland	$2,953	$2,992	$3,314	$3,539	$3,643	5.4%
26	Colorado	$2,975	$2,693	$3,126	$3,327	$3,296	2.6%
27	Idaho	$3,120	$2,427	$2,945	$3,196	$3,079	-0.3%
28	South Carolina	$1,934	$1,622	$2,494	$2,864	$2,924	10.9%
29	Kansas	$3,295	$2,674	$2,659	$2,928	$2,743	-4.5%
30	Delaware	$2,555	$2,181	$2,493	$2,419	$2,430	-1.2%
31	Missouri	$2,007	$2,028	$2,614	$2,386	$2,382	4.4%
32	Vermont	$1,745	$1,511	$2,005	$2,110	$1,886	2.0%
33	New Mexico	$1,854	$493	$520	$978	$1,752	-1.4%
34	Oklahoma	$1,003	$852	$1,121	$1,481	$1,634	13.0%
35	New Hampshire	$1,727	$1,254	$1,835	$1,882	$1,609	-1.8%
36	Alabama	$1,487	$1,451	$1,515	$1,524	$1,602	1.9%
37	Iowa	$1,286	$1,098	$1,158	$1,272	$1,332	0.9%
38	Mississippi	$768	$539	$1,010	$959	$1,146	10.5%
39	Louisiana	$762	$645	$750	$868	$1,019	7.5%
40	Maine	$1,153	$681	$1,289	$1,513	$1,017	-3.1%
41	Arkansas	$502	$322	$566	$445	$987	18.4%
42	District Of Columbia	$522	$464	$627	$510	$843	12.7%
43	Rhode Island	$681	$467	$635	$733	$808	4.3%
44	West Virginia	$314	$365	$516	$541	$666	20.7%
45	Nebraska	$514	$462	$491	$548	$547	1.5%
46	Hawaii	$342	$305	$346	$358	$441	6.6%
47	Montana	$219	$183	$276	$262	$233	1.6%
48	Alaska	$264	$293	$306	$349	$178	-9.3%
49	South Dakota	$514	$141	$121	$117	$134	-28.5%
50	North Dakota	$81	$96	$129	$141	$119	9.9%
51	Wyoming	$17	$19	$28	$42	$38	22.2%
	Total	***$372,738***	***$317,574***	***$374,552***	***$409,550***	***$413,437***	***2.6%***

Exhibit 4c - AZ Air Imports Ranking vs. All Other States and Washington, D.C., Weight 2008-2012

2012 Rank	State	Air Weight (Metric Tons)					CAGR (2008-2012)
		2008	2009	2010	2011	2012	
1	California	680,346	597,074	709,417	647,095	658,343	-0.8%
2	Florida	456,931	424,630	460,577	464,073	495,613	2.1%
3	Texas	304,960	231,816	295,855	295,247	286,634	-1.5%
4	New York	316,282	248,059	287,238	252,487	256,775	-5.1%
5	Illinois	259,075	184,535	244,841	228,427	213,096	-4.8%
6	New Jersey	197,495	163,656	202,088	183,951	171,222	-3.5%
7	Tennessee	110,644	112,920	138,907	127,211	138,018	5.7%
8	Pennsylvania	133,230	116,064	156,403	152,917	135,657	0.5%
9	Ohio	125,366	103,513	133,090	127,118	131,316	1.2%
10	Georgia	105,483	86,208	127,022	111,163	116,839	2.6%
11	Michigan	94,647	82,910	130,919	128,665	116,653	5.4%
12	North Carolina	113,431	82,572	123,128	117,583	101,089	-2.8%
13	Massachusetts	94,840	78,573	100,242	92,112	81,956	-3.6%
14	Kentucky	78,038	76,905	92,134	77,304	73,868	-1.4%
15	Indiana	60,655	49,708	68,735	65,815	72,070	4.4%
16	South Carolina	56,079	42,884	77,983	104,965	69,540	5.5%
17	Wisconsin	59,252	44,777	62,959	56,997	54,584	-2.0%
18	Washington	48,644	40,646	49,353	47,136	48,272	-0.2%
19	Missouri	24,980	20,451	27,291	29,644	44,062	15.2%
20	Connecticut	43,572	37,200	49,479	46,250	41,375	-1.3%
21	Minnesota	42,213	29,361	37,792	37,760	39,560	-1.6%
22	Arizona	35,467	27,736	34,104	35,408	35,931	0.3%
23	Virginia	40,679	36,390	49,924	42,042	35,408	-3.4%
24	Colorado	30,249	25,537	35,351	34,617	33,334	2.5%
25	Oregon	28,570	19,449	28,176	34,403	29,300	0.6%
26	Maryland	29,357	25,651	31,333	32,638	27,259	-1.8%
27	Alabama	23,953	18,979	31,883	33,746	25,176	1.3%
28	Iowa	24,064	12,463	20,583	17,125	19,108	-5.6%
29	Nevada	18,087	14,553	16,793	18,150	17,455	-0.9%
30	New Hampshire	15,832	11,533	15,401	14,078	15,843	0.0%
31	Oklahoma	19,438	13,911	16,612	17,109	15,641	-5.3%
32	Kansas	19,415	17,242	19,735	19,152	15,466	-5.5%
33	Mississippi	21,243	9,890	14,421	14,847	14,600	-8.9%
34	Utah	11,878	10,774	12,388	12,496	12,821	1.9%
35	Louisiana	9,161	8,431	13,815	11,394	11,639	6.2%
36	Rhode Island	14,199	12,086	14,136	11,870	11,384	-5.4%
37	Vermont	8,377	8,800	7,810	9,117	8,626	0.7%
38	New Mexico	3,579	4,408	8,119	8,394	8,153	22.9%
39	Delaware	8,283	7,238	9,103	8,470	7,675	-1.9%
40	Arkansas	7,189	6,512	10,650	7,531	7,557	1.3%
41	Hawaii	7,155	6,328	6,703	5,249	6,874	-1.0%
42	Idaho	6,087	3,984	5,174	5,557	6,053	-0.1%
43	West Virginia	4,596	6,639	7,456	7,788	5,658	5.3%
44	Nebraska	6,440	5,556	5,410	5,548	5,161	-5.4%
45	Maine	3,812	3,196	4,271	3,288	2,951	-6.2%
46	Alaska	4,009	3,420	2,764	3,423	2,354	-12.5%
47	District Of Columbia	4,810	2,865	2,671	1,920	1,902	-20.7%
48	North Dakota	1,543	690	1,676	3,848	1,417	-2.1%
49	South Dakota	2,414	723	1,710	2,040	1,080	-18.2%
50	Wyoming	646	519	1,110	1,127	913	9.0%
51	Montana	923	769	744	917	880	-1.2%
	Total	***3,817,618***	***3,180,734***	***4,005,479***	***3,817,212***	***3,734,161***	***-0.6%***

Exhibit 4d - AZ Air Imports Ranking vs. All Other States and Washington, D.C., Value 2008-2012

2012 Rank	State	Air Value (USD Millions)					CAGR (2008-2012)
		2008	2009	2010	2011	2012	
1	California	$76,349	$65,809	$83,872	$87,591	$90,378	4.3%
2	New York	$50,954	$38,990	$48,654	$57,364	$55,957	2.4%
3	Texas	$36,995	$33,352	$40,615	$48,338	$50,565	8.1%
4	Illinois	$29,847	$27,944	$34,420	$33,372	$32,228	1.9%
5	Florida	$13,863	$14,223	$17,546	$20,303	$24,133	14.9%
6	New Jersey	$23,419	$18,878	$22,645	$26,468	$23,921	0.5%
7	Pennsylvania	$13,909	$11,705	$16,353	$20,842	$21,127	11.0%
8	Tennessee	$16,950	$14,989	$15,262	$17,530	$19,534	3.6%
9	Indiana	$7,578	$9,180	$11,742	$14,489	$15,646	19.9%
10	Kentucky	$12,393	$12,527	$15,417	$13,905	$14,321	3.7%
11	Ohio	$11,752	$8,794	$10,258	$11,407	$12,118	0.8%
12	North Carolina	$13,256	$11,394	$11,335	$12,349	$12,093	-2.3%
13	Georgia	$9,637	$9,283	$12,167	$11,518	$11,920	5.5%
14	Massachusetts	$11,598	$10,029	$11,702	$12,445	$11,367	-0.5%
15	Washington	$5,470	$5,013	$6,668	$7,177	$7,758	9.1%
16	Connecticut	$6,076	$5,119	$5,876	$7,387	$7,703	6.1%
17	Michigan	$5,389	$4,010	$5,685	$6,536	$7,021	6.8%
18	Arizona	$5,827	$4,611	$5,985	$6,348	$6,391	2.3%
19	South Carolina	$2,799	$2,177	$3,417	$4,373	$4,917	15.1%
20	Utah	$2,287	$2,738	$3,869	$5,063	$4,676	19.6%
21	Oregon	$2,734	$2,227	$2,806	$5,206	$4,452	13.0%
22	Nevada	$2,886	$2,558	$2,948	$3,617	$4,251	10.2%
23	Minnesota	$4,334	$3,339	$3,799	$4,147	$4,234	-0.6%
24	Delaware	$6,263	$7,759	$6,284	$5,925	$4,141	-9.8%
25	Virginia	$4,155	$4,332	$4,734	$4,476	$4,140	-0.1%
26	Wisconsin	$3,084	$2,456	$3,459	$3,458	$3,506	3.3%
27	Idaho	$2,766	$2,143	$2,863	$3,279	$3,447	5.7%
28	Colorado	$2,732	$2,606	$3,554	$3,360	$3,175	3.8%
29	Maryland	$2,209	$2,222	$2,809	$3,251	$3,123	9.0%
30	Kansas	$2,908	$3,264	$2,441	$2,682	$2,671	-2.1%
31	Missouri	$1,785	$1,504	$1,830	$2,194	$2,174	5.1%
32	Oklahoma	$1,752	$1,354	$1,363	$1,704	$1,733	-0.3%
33	Alabama	$1,657	$1,243	$1,451	$1,544	$1,511	-2.3%
34	Mississippi	$1,061	$830	$983	$1,154	$1,418	7.5%
35	New Hampshire	$1,336	$962	$1,256	$1,227	$1,371	0.7%
36	Rhode Island	$1,155	$761	$925	$1,023	$999	-3.6%
37	Louisiana	$599	$513	$688	$729	$904	10.8%
38	New Mexico	$511	$518	$1,394	$951	$856	13.7%
39	West Virginia	$486	$481	$647	$725	$741	11.1%
40	Iowa	$711	$447	$625	$695	$708	-0.1%
41	Arkansas	$497	$420	$683	$588	$697	8.8%
42	Maine	$311	$270	$392	$367	$384	5.4%
43	Nebraska	$364	$353	$385	$405	$349	-1.1%
44	Alaska	$521	$183	$309	$565	$325	-11.1%
45	Hawaii	$343	$254	$303	$318	$289	-4.2%
46	Vermont	$338	$265	$336	$373	$244	-7.9%
47	District Of Columbia	$952	$954	$471	$241	$199	-32.4%
48	North Dakota	$69	$41	$83	$130	$106	11.4%
49	South Dakota	$183	$62	$104	$111	$96	-14.9%
50	Montana	$72	$73	$60	$71	$78	1.7%
51	Wyoming	$55	$38	$64	$76	$75	8.2%
	Total	***$405,181***	***$355,197***	***$433,534***	***$479,400***	***$486,168***	***4.7%***

Exhibit 5a - AZ Air Exports to the World by Airport of Exit

Rank	Airport Code	Airport	Air Weight (Metric Tons)	% Share of Total
1	LAX	Los Angeles Int'l Airport	15,057	43.3%
2	MEM	Memphis Int'l Airport	4,420	12.7%
3	SDF	Louisville Int'l Airport	2,485	7.2%
4	PHX	Phoenix Sky Harbor Int'l Airport	2,300	6.6%
5	SFO	San Francisco Int'l Airport	1,552	4.5%
6	MIA	Miami Int'l Airport	1,404	4.0%
7	TUS	Tucson Int'l Airport	1,056	3.0%
8	JFK	JFK Int'l Airport	985	2.8%
9	PHL	Philadelphia Intl Airport	697	2.0%
10	ANC	Anchorage Int'l Airport	555	1.6%
	Other	All Other	4,230	12.2%
		Total	***34,740***	100.0%

Note: Phoenix and Tuscon weight data includes some exports that are documented at the Nogales, AZ Customs District.

Phoenix Regional
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APPENDIX B

Arizona Air Trade with Asia

Exhibit 1a - Top 15 AZ Country Markets for AZ-Asia 2012, Air Exports by Weight

Rank	Country	Air Weight (Metric Tons)	% Share of Total
1	Japan	2,271	16.1%
2	China	1,905	13.5%
3	Singapore	1,863	13.2%
4	Australia	1,496	10.6%
5	Hong Kong	1,456	10.3%
6	Taiwan	1,065	7.6%
7	Korea, Republic Of	929	6.6%
8	Malaysia	836	5.9%
9	Afghanistan	829	5.9%
10	India	465	3.3%
11	Thailand	403	2.9%
12	Philippines	184	1.3%
13	Vietnam	122	0.9%
14	New Zealand	117	0.8%
15	Indonesia	75	0.5%
	Other	89	0.6%
	Total	***14,105***	***100.0%***

Exhibit 1b - Top 15 AZ Country Markets for AZ-Asia 2012, Air Exports by Value

Rank	Country	Air Value (USD Millions)	% Share of Total
1	China	$766	20.7%
2	Japan	$662	17.9%
3	Singapore	$456	12.3%
4	Thailand	$433	11.7%
5	Malaysia	$395	10.7%
6	Hong Kong	$251	6.8%
7	Taiwan	$234	6.3%
8	Australia	$165	4.5%
9	Korea, Republic Of	$149	4.0%
10	Philippines	$51	1.4%
11	India	$49	1.3%
12	Afghanistan	$33	0.9%
13	Indonesia	$14	0.4%
14	Vietnam	$13	0.4%
15	New Zealand	$13	0.3%
	Other	$21	0.6%
	Total	***$3,704***	***100.0%***

Exhibit 1c - Top 15 AZ Country Markets for AZ-Asia 2012, Air Imports by Weight

Rank	Country	Air Weight (Metric Tons)	% Share of Total
1	China	7,577	39.0%
2	Japan	4,008	20.6%
3	Taiwan	1,418	7.3%
4	India	1,394	7.2%
5	Singapore	1,256	6.5%
6	Malaysia	1,256	6.5%
7	Korea, Republic Of	718	3.7%
8	Thailand	665	3.4%
9	Australia	278	1.4%
10	Philippines	263	1.4%
11	Hong Kong	252	1.3%
12	Pakistan	95	0.5%
13	Indonesia	91	0.5%
14	Vietnam	70	0.4%
15	Sri Lanka	39	0.2%
	Other	61	0.3%
	Total	***19,441***	***100.0%***

Exhibit 1d - Top 15 AZ Country Markets for AZ-Asia 2012, Air Imports by Value

Rank	Country	Air Value (USD Millions)	% Share of Total
1	China	$930	24.1%
2	Malaysia	$762	19.8%
3	Japan	$737	19.1%
4	Taiwan	$361	9.4%
5	Singapore	$312	8.1%
6	Thailand	$210	5.4%
7	Korea, Republic Of	$208	5.4%
8	Philippines	$100	2.6%
9	India	$96	2.5%
10	Hong Kong	$55	1.4%
11	Australia	$44	1.2%
12	Indonesia	$27	0.7%
13	New Zealand	$4	0.1%
14	Vietnam	$3	0.1%
15	Pakistan	$2	0.0%
	Other	$4	0.1%
	Total	***$3,854***	***100.0%***

Exhibit 2a - Top 10 AZ Commodities from Asia 2012, Air Imports by Weight

Rank	Commodity	Air Weight (Metric Tons)	% Share of Total
1	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	9,079	46.7%
2	Industrial Machinery, Including Computers	3,386	17.4%
3	Special Classification Provisions, Nesoi	1,366	7.0%
4	Optic, Photo Etc, Medic Or Surgical Instrments Etc	651	3.3%
5	Plastics And Articles Thereof	443	2.3%
6	Apparel Articles And Accessories, Not Knit Etc.	380	2.0%
7	Toys, Games & Sport Equipment; Parts & Accessories	376	1.9%
8	Photographic Or Cinematographic Goods	330	1.7%
9	Miscellaneous Manufactured Articles	309	1.6%
10	Vehicles, Except Railway Or Tramway, And Parts Etc	287	1.5%
	Other	2,834	14.6%
	Total	***19,441***	***100.0%***

Exhibit 2b - Top 10 AZ Commodities from Asia 2012, Air Imports by Value

Rank	Commodity	Air Value (USD Millions)	% Share of Total
1	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	$2,275	59.0%
2	Industrial Machinery, Including Computers	$712	18.5%
3	Special Classification Provisions, Nesoi	$420	10.9%
4	Optic, Photo Etc, Medic Or Surgical Instrments Etc	$180	4.7%
5	Nat Etc Pearls, Prec Etc Stones, Pr Met Etc; Coin	$36	0.9%
6	Aircraft, Spacecraft, And Parts Thereof	$34	0.9%
7	Miscellaneous Chemical Products	$33	0.9%
8	Organic Chemicals	$22	0.6%
9	Toys, Games & Sport Equipment; Parts & Accessories	$21	0.6%
10	Photographic Or Cinematographic Goods	$15	0.4%
	Other	$106	2.7%
	Total	***$3,854***	***100.0%***

Exhibit 2c - Top 10 AZ Commodities to Asia 2012, Air Exports by Weight

Rank	Commodity	Air Weight (Metric Tons)	% Share of Total
1	Industrial Machinery, Including Computers	3,206	22.7%
2	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	3,067	21.7%
3	Optic, Photo Etc, Medic Or Surgical Instrments Etc	814	5.8%
4	Copper And Articles Thereof	739	5.2%
5	Aircraft, Spacecraft, And Parts Thereof	657	4.7%
6	Plastics And Articles Thereof	647	4.6%
7	Articles Of Iron Or Steel	520	3.7%
8	Aluminum And Articles Thereof	445	3.2%
9	Miscellaneous Edible Preparations	356	2.5%
10	Rubber And Articles Thereof	287	2.0%
	Other	3,367	23.9%
	Total	***14,105***	***100.0%***

Exhibit 2d - Top 10 AZ Commodities from Asia 2012, Air Exports by Value

Rank	Commodity	Air Value (USD Millions)	% Share of Total
1	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	$2,005	54.1%
2	Aircraft, Spacecraft, And Parts Thereof	$487	13.2%
3	Optic, Photo Etc, Medic Or Surgical Instrments Etc	$446	12.0%
4	Industrial Machinery, Including Computers	$439	11.8%
5	Arms And Ammunition; Parts And Accessories Thereof	$100	2.7%
6	Copper And Articles Thereof	$27	0.7%
7	Miscellaneous Chemical Products	$27	0.7%
8	Nat Etc Pearls, Prec Etc Stones, Pr Met Etc; Coin	$25	0.7%
9	Plastics And Articles Thereof	$23	0.6%
10	Toys, Games & Sport Equipment; Parts & Accessories	$17	0.5%
	Other	$108	2.9%
	Total	***$3,704***	***100.0%***

Exhibit 3a - Airport of Exit for AZ Exports to Asia for 2012

Rank	Airport Code	Airport	Air Weight (Metric Tons)	% Share of Total
1	LAX	Los Angeles Int'l Airport	8,638	61.2%
2	SFO	San Francisco Int'l Airport	1,416	10.0%
3	TUS	Tucson Int'l Airport	866	6.1%
4	SDF	Louisville Int'l Airport	690	4.9%
5	PHX	Phoenix Sky Harbor Int'l Airport	592	4.2%
6	ANC	Anchorage Int'l Airport	549	3.9%
7	MEM	Memphis Int'l Airport	539	3.8%
8	HNL	Honolulu Int'l Airport	236	1.7%
9	ORD	O'Hare Int'l Airport	137	1.0%
10	JFK	JFK Int'l Airport	72	0.5%
	Other	All Other	370	2.6%
		Total	***14,105***	***100.0%***

Exhibit 4a - Top 5 AZ-Asia Countries 2008-2012, Air Import Weight

2012 Rank	Country	Air Weight (Metric Tons)					CAGR (2008-2012)
		2008	2009	2010	2011	2012	
1	China	5,223	4,141	6,111	6,917	7,577	9.7%
2	Japan	3,552	2,446	3,725	4,707	4,008	3.1%
3	Taiwan	1,531	1,042	1,436	1,065	1,418	-1.9%
4	India	583	613	675	1,027	1,394	24.4%
5	Singapore	752	523	1,677	1,906	1,256	13.7%
	Other	3,621	2,703	4,376	3,728	3,788	1.1%
	Total	***15,262***	***11,468***	***18,000***	***19,350***	***19,441***	***6.2%***

Exhibit 4b - Top 5 AZ-Asia Countries 2008-2012, Air Export Weight

2012 Rank	Country	Air Weight (Metric Tons)					CAGR (2008-2012)
		2008	2009	2010	2011	2012	
1	Japan	1,967	1,503	1,639	1,919	2,271	3.7%
2	China	1,870	1,633	1,849	1,813	1,905	0.5%
3	Singapore	1,903	985	1,826	2,321	1,863	-0.5%
4	Australia	1,406	966	952	1,050	1,496	1.6%
5	Hong Kong	1,047	1,009	1,295	1,565	1,456	8.6%
	Other	3,420	3,990	5,209	4,739	5,114	10.6%
	Total	***11,613***	***10,086***	***12,770***	***13,407***	***14,105***	***5.0%***

Phoenix Regional
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APPENDIX C

Arizona Air Trade with Europe

Exhibit 1a - Top 15 AZ Country Markets for AZ-Europe 2012, Air Exports by Weight

Rank	Country	Air Weight (Metric Tons)	% Share of Total
1	United Kingdom	3,056	26.1%
2	Germany	2,321	19.8%
3	France	1,730	14.8%
4	Netherlands	812	6.9%
5	Belgium	674	5.8%
6	Italy	636	5.4%
7	Ireland	328	2.8%
8	Czech Republic	263	2.2%
9	Spain	224	1.9%
10	Hungary	221	1.9%
11	Switzerland	217	1.9%
12	Sweden	186	1.6%
13	Norway	171	1.5%
14	Turkey	137	1.2%
15	Russia	128	1.1%
	All Other	607	5.2%
	Total	***11,711***	***100.0%***

Exhibit 1b - Top 15 AZ Country Markets for AZ-Europe 2012, Air Exports by Value

Rank	Country	Air Value (USD Millions)	% Share of Total
1	United Kingdom	$659	25.0%
2	Germany	$579	22.0%
3	France	$441	16.7%
4	Switzerland	$186	7.0%
5	Netherlands	$160	6.1%
6	Italy	$126	4.8%
7	Ireland	$73	2.8%
8	Czech Republic	$63	2.4%
9	Belgium	$46	1.7%
10	Norway	$36	1.4%
11	Hungary	$35	1.3%
12	Sweden	$32	1.2%
13	Turkey	$31	1.2%
14	Spain	$30	1.2%
15	Russia	$29	1.1%
	All Other	$111	4.2%
	Total	***$2,635***	***100.0%***

Exhibit 1c - Top 15 AZ Country Markets for AZ-Europe 2012, Air Imports by Weight

Rank	Country	Air Weight (Metric Tons)	% Share of Total
1	Germany	2,451	20.1%
2	France	1,903	15.6%
3	United Kingdom	1,786	14.7%
4	Czech Republic	1,465	12.0%
5	Netherlands	1,214	10.0%
6	Italy	867	7.1%
7	Austria	498	4.1%
8	Switzerland	443	3.6%
9	Spain	371	3.0%
10	Sweden	364	3.0%
11	Belgium	109	0.9%
12	Poland	82	0.7%
13	Ireland	82	0.7%
14	Bulgaria	70	0.6%
15	Turkey	59	0.5%
	All Other	403	3.3%
	Total	***12,167***	***100.0%***

Exhibit 1d - Top 15 AZ Country Markets for AZ-Europe 2012, Air Imports by Value

Rank	Country	Air Value (USD Millions)	% Share of Total
1	Germany	$417	22.2%
2	United Kingdom	$387	20.6%
3	Netherlands	$254	13.5%
4	France	$198	10.5%
5	Czech Republic	$194	10.3%
6	Italy	$95	5.0%
7	Switzerland	$74	3.9%
8	Malta And Gozo	$50	2.7%
9	Austria	$46	2.5%
10	Spain	$30	1.6%
11	Ireland	$26	1.4%
12	Sweden	$23	1.2%
13	Belgium	$17	0.9%
14	Denmark	$14	0.7%
15	Finland	$8	0.4%
	All Other	$49	2.6%
	Total	***$1,882***	***100.0%***

Exhibit 2a - Top 10 AZ Commodities from Europe 2012, Air Imports by Weight

Rank	Commodity	Air Weight (Metric Tons)	% Share of Total
1	Industrial Machinery, Including Computers	3,139	25.8%
2	Special Classification Provisions, Nesoi	1,882	15.5%
3	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	1,328	10.9%
4	Optic, Photo Etc, Medic Or Surgical Instrments Etc	1,083	8.9%
5	Vehicles, Except Railway Or Tramway, And Parts Etc	936	7.7%
6	Arms And Ammunition; Parts And Accessories Thereof	642	5.3%
7	Articles Of Iron Or Steel	342	2.8%
8	Edible Vegetables & Certain Roots & Tubers	330	2.7%
9	Art Of Stone, Plaster, Cement, Asbestos, Mica Etc.	228	1.9%
10	Glass And Glassware	191	1.6%
	All Other	2,066	17.0%
	Total	***12,167***	***100.0%***

Exhibit 2b - Top 10 AZ Commodities from Europe 2012, Air Imports by Value

Rank	Commodity	Air Value (USD Millions)	% Share of Total
1	Industrial Machinery, Including Computers	$513	27.2%
2	Special Classification Provisions, Nesoi	$370	19.6%
3	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	$307	16.3%
4	Optic, Photo Etc, Medic Or Surgical Instrments Etc	$210	11.1%
5	Arms And Ammunition; Parts And Accessories Thereof	$173	9.2%
6	Aircraft, Spacecraft, And Parts Thereof	$63	3.4%
7	Miscellaneous Chemical Products	$54	2.9%
8	Organic Chemicals	$42	2.2%
9	Nat Etc Pearls, Prec Etc Stones, Pr Met Etc; Coin	$25	1.3%
10	Vehicles, Except Railway Or Tramway, And Parts Etc	$16	0.8%
	All Other	$110	5.8%
	Total	***$1,882***	***100.0%***

Exhibit 2c - Top 10 AZ Commodities to Europe 2012, Air Exports by Weight

Rank	Commodity	Air Weight (Metric Tons)	% Share of Total
1	Industrial Machinery, Including Computers	2,459	21.0%
2	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	2,030	17.3%
3	Aircraft, Spacecraft, And Parts Thereof	1,671	14.3%
4	Plastics And Articles Thereof	867	7.4%
5	Optic, Photo Etc, Medic Or Surgical Instrments Etc	835	7.1%
6	Articles Of Iron Or Steel		2.9%
7	Inorg Chem; Prec & Rare-Earth Met & Radioact Compd	260	2.2%
8	Miscellaneous Articles Of Base Metal	247	2.1%
9	Vehicles, Except Railway Or Tramway, And Parts Etc	224	1.9%
10	Pharmaceutical Products	196	1.7%
	All Other	2,587	22.1%
	Total	***11,711***	***100.0%***

Exhibit 2d - Top 10 AZ Commodities from Europe 2012, Air Exports by Value

Rank	Commodity	Air Value (USD Millions)	% Share of Total
1	Aircraft, Spacecraft, And Parts Thereof	$1,022	38.8%
2	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	$666	25.3%
3	Industrial Machinery, Including Computers	$338	12.8%
4	Optic, Photo Etc, Medic Or Surgical Instrments Etc	$240	9.1%
5	Arms And Ammunition; Parts And Accessories Thereof	$77	2.9%
6	Pharmaceutical Products	$57	2.2%
7	Nat Etc Pearls, Prec Etc Stones, Pr Met Etc; Coin	$57	2.2%
8	Miscellaneous Chemical Products	$35	1.3%
9	Miscellaneous Articles Of Base Metal	$33	1.3%
10	Explosives; Pyrotechnics; Matches; Pyro Alloys Etc	$16	0.6%
	All Other	$92	3.5%
	Total	***$2,635***	***100.0%***

Exhibit 3a - Airport of Exit for AZ Exports to Europe for 2012

Rank	Airport Code	Airport	Air Weight (Metric Tons)	% Share of Total
1	LAX	Los Angeles Int'l Airport	5,084	43.4%
2	MEM	Memphis Int'l Airport	1,845	15.8%
3	PHX	Phoenix Sky Harbor Int'l Airport	1,425	12.2%
4	PHL	Philadelphia Intl Airport	680	5.8%
5	SDF	Louisville Int'l Airport	580	5.0%
6	JFK	JFK Int'l Airport	443	3.8%
7	ORD	O'Hare Int'l Airport	251	2.1%
8	ATL	Atlanta Int'l Airport	217	1.8%
9	CVG	Cincinnati/Northern Kentucky Int'l Airport	179	1.5%
10	LAS	McCarran Int'l Airport	158	1.3%
	Other	All Other	850	7.3%
		Total	***11,711***	***100.0%***

Exhibit 4a - Top 5 AZ-Europe Countries 2008-2012, Air Import Weight

2012 Rank	Country	Air Weight (Metric Tons)					CAGR (2008-2012)
		2008	2009	2010	2011	2012	
1	United Kingdom	3,350	2,347	2,809	2,695	3,056	-2.3%
2	Germany	2,651	2,147	2,500	2,555	2,321	-3.3%
3	France	1,988	1,686	1,459	1,564	1,730	-3.4%
4	Netherlands	879	800	872	1,036	812	-2.0%
5	Belgium	731	398	546	850	674	-2.0%
	All Other	3,632	3,286	3,835	3,794	3,118	-3.7%
	Total	***13,231***	***10,664***	***12,021***	***12,494***	***11,711***	***-3.0%***

Exhibit 4b - Top 5 AZ-Europe Countries 2008-2012, Air Export Weight

2012 Rank	Country	Air Weight (Metric Tons)					CAGR (2008-2012)
		2008	2009	2010	2011	2012	
1	Germany	3,622	2,143	2,662	3,040	2,451	-9.3%
2	France	2,715	2,891	1,997	1,873	1,903	-8.5%
3	United Kingdom	1,822	1,771	1,567	1,481	1,786	-0.5%
4	Czech Republic	436	257	679	1,324	1,465	35.4%
5	Netherlands	4,072	2,297	2,331	1,740	1,214	-26.1%
	All Other	3,716	2,918	2,888	2,978	3,348	-2.6%
	Total	***16,383***	***12,277***	***12,124***	***12,436***	***12,167***	***-7.2%***

Phoenix Regional
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APPENDIX D

Arizona Air Trade with Latin America

Exhibit 1a - Top 15 AZ Country Markets for AZ-Latin America 2012, Air Exports by Weight

Rank	Country	Air Weight (Metric Tons)	% Share of Total
1	Brazil	932	37%
2	Mexico	391	16%
3	Chile	235	9%
4	Peru	184	7%
5	Costa Rica	173	7%
6	El Salvador	158	6%
7	Colombia	140	6%
8	Argentina	79	3%
9	Uruguay	35	1%
10	Guatemala	31	1%
11	Ecuador	22	1%
12	Honduras	17	1%
13	Trinidad And Tobago	14	1%
14	Panama	13	1%
15	Saint Maarten	13	1%
	All Other	57	2%
	Total	***2,494***	***100%***

Exhibit 1b - Top 15 AZ Country Markets for AZ-Latin America 2012, Air Exports by Value

Rank	Country	Air Value (USD Millions)	% Share of Total
1	Brazil	$305	52%
2	Mexico	$120	21%
3	El Salvador	$37	6%
4	Argentina	$35	6%
5	Chile	$22	4%
6	Colombia	$20	3%
7	Peru	$15	3%
8	Costa Rica	$12	2%
9	Panama	$4	1%
10	Venezuela	$3	0.5%
11	Guatemala	$2	0.3%
12	Dominican Republic	$2	0.3%
13	Ecuador	$1	0.2%
14	Bolivia	$1	0.2%
15	Uruguay	$1	0.2%
	All Other	$4	1%
	Total	***$582***	***100%***

Exhibit 1c - Top 15 AZ Country Markets for AZ-Latin America 2012, Air Imports by Weight

Rank	Country	Air Weight (Metric Tons)	% Share of Total
1	Peru	594	29%
2	Costa Rica	552	27%
3	Brazil	376	18%
4	Mexico	315	15%
5	Argentina	86	4%
6	Dominican Republic	31	2%
7	Chile	27	1%
8	Colombia	24	1%
9	Uruguay	8	0.4%
10	Honduras	8	0.4%
11	Panama	7	0.3%
12	Guatemala	4	0.2%
13	Nicaragua	4	0.2%
14	Paraguay	3	0.1%
15	El Salvador	3	0.1%
	All Other	7	0.3%
	Total	***2,049***	***100%***

Exhibit 1d - Top 15 AZ Country Markets for AZ-Latin America 2012, Air Imports by Value

Rank	Country	Air Value (USD Millions)	% Share of Total
1	Costa Rica	$185	68%
2	Mexico	$43	16%
3	Brazil	$24	9%
4	Chile	$5	2%
5	Argentina	$4	1%
6	Peru	$3	1%
7	Bolivia	$2	1%
8	Panama	$2	1%
9	El Salvador	$1	0.3%
10	Colombia	$1	0.3%
11	Dominican Republic	$0.5	0.2%
12	Honduras	$0.4	0.1%
13	Ecuador	$0.2	0.1%
14	Venezuela	$0.2	0.1%
15	Guatemala	$0.2	0.1%
	All Other	$1	0.2%
	Total	***$271***	***100%***

Exhibit 2a - Top 10 AZ Commodities from Latin America 2012, Air Imports by Weight

Rank	Commodity	Air Weight (Metric Tons)	% Share of Total
1	Edible Vegetables & Certain Roots & Tubers	568	28%
2	Oil Seeds Etc.; Misc Grain, Seed, Fruit, Plant Etc	528	26%
3	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	249	12%
4	Industrial Machinery, Including Computers	201	10%
5	Nat Etc Pearls, Prec Etc Stones, Pr Met Etc; Coin	105	5%
6	Special Classification Provisions, Nesoi	83	4%
7	Vehicles, Except Railway Or Tramway, And Parts Etc	46	2%
8	Musical Instruments; Parts And Accessories Thereof	34	2%
9	Plastics And Articles Thereof	25	1%
10	Apparel Articles And Accessories, Not Knit Etc.	22	1%
	All Other	188	9%
	Total	***2,049***	***100%***

Exhibit 2b - Top 10 AZ Commodities from Latin America 2012, Air Imports by Value

Rank	Commodity	Air Value (USD Millions)	% Share of Total
1	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	$193	71%
2	Special Classification Provisions, Nesoi	$38	14%
3	Industrial Machinery, Including Computers	$20	7%
4	Nat Etc Pearls, Prec Etc Stones, Pr Met Etc; Coin	$5	2%
5	Optic, Photo Etc, Medic Or Surgical Instrments Etc	$3	1%
6	Oil Seeds Etc.; Misc Grain, Seed, Fruit, Plant Etc	$2	1%
7	Works Of Art, Collectors Pieces And Antiques	$1	1%
8	Aircraft, Spacecraft, And Parts Thereof	$1	1%
9	Edible Vegetables & Certain Roots & Tubers	$1	0.5%
10	Organic Chemicals	$1	0.4%
	All Other	$5	2%
	Total	***$271***	***100%***

Exhibit 2c - Top 10 AZ Commodities to Latin America 2012, Air Exports by Weight

Rank	Commodity	Air Weight (Metric Tons)	% Share of Total
1	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	718	29%
2	Industrial Machinery, Including Computers	470	19%
3	Plastics And Articles Thereof	139	6%
4	Optic, Photo Etc, Medic Or Surgical Instruments Etc	135	5%
5	Miscellaneous Chemical Products	114	5%
6	Articles Of Iron Or Steel	113	5%
7	Aircraft, Spacecraft, And Parts Thereof	110	4%
8	Oil Seeds Etc.; Misc Grain, Seed, Fruit, Plant Etc	103	4%
9	Aluminum And Articles Thereof	91	4%
10	Miscellaneous Articles Of Base Metal	74	3%
	All Other	427	17%
	Total	***2,494***	***100%***

Exhibit 2d - Top 10 AZ Commodities from Latin America 2012, Air Exports by Value

Rank	Commodity	Air Value (USD Millions)	% Share of Total
1	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	$293	50%
2	Aircraft, Spacecraft, And Parts Thereof	$145	25%
3	Optic, Photo Etc, Medic Or Surgical Instrments Etc	$53	9%
4	Industrial Machinery, Including Computers	$50	9%
5	Arms And Ammunition; Parts And Accessories Thereof	$7	1%
6	Organic Chemicals	$6	1%
7	Miscellaneous Chemical Products	$5	1%
8	Nat Etc Pearls, Prec Etc Stones, Pr Met Etc; Coin	$3	1%
9	Plastics And Articles Thereof	$3	0.5%
10	Articles Of Iron Or Steel	$2	0.4%
	All Other	$14	2%
	Total	***$582***	***100%***

Exhibit 3a - Airport of Exit for AZ Exports to Latin America for 2012

Rank	Airport Code	Airport	Air Weight (Metric Tons)	% Share of Total
1	MIA	Miami Int'l Airport	1,377	55%
2	LAX	Los Angeles Int'l Airport	610	24%
3	SDF	Louisville Int'l Airport	182	7%
4	PHX	Phoenix Sky Harbor Int'l Airport	96	4%
		All Other	229	9%
		Total	***2,494***	***100%***

Note: Phoenix weight data includes some exports that are documented at the Nogales, AZ Customs District.

Exhibit 4a - Top 5 AZ-Latin America Countries 2008-2012, Air Import Weight

2012 Rank	Country	Air Weight (Metric Tons)					CAGR (2008-2012)
		2008	2009	2010	2011	2012	
1	Brazil	795	594	565	772	932	4.1%
2	Mexico	783	594	566	644	391	-15.9%
3	Chile	740	217	242	275	235	-24.9%
4	Peru	266	100	130	125	184	-8.8%
5	Costa Rica	109	76	150	151	173	12.2%
	All Other	482	339	369	603	579	4.7%
	Total	***3,175***	***1,920***	***2,022***	***2,570***	***2,494***	***-5.9%***

Exhibit 4b - Top 5 AZ-Latin America Countries 2008-2012, Air Export Weight

2012 Rank	Country	Air Weight (Metric Tons)					CAGR (2008-2012)
		2008	2009	2010	2011	2012	
1	Peru	196	172	159	162	594	31.9%
2	Costa Rica	118	95	80	63	552	47.1%
3	Brazil	328	527	256	331	376	3.5%
4	Mexico	471	379	510	388	315	-9.6%
5	Argentina	23	19	66	52	86	39.1%
	All Other	272	811	418	96	126	-17.5%
	Total	***1,408***	***2,003***	***1,489***	***1,092***	***2,049***	***9.8%***

Phoenix Regional
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APPENDIX E

Arizona Air Trade with Canada

Exhibit 1a - AZ-Canada 2008-2012, Air Exports by Weight

	Country	Air Weight (Metric Tons)					CAGR (2008-2012)
		2008	2009	2010	2011	2012	
1	Canada	4,784	3,428	3,118	2,929	4,105	-3.8%

Exhibit 1b - AZ-Canada 2008-2012, Air Exports by Value

	Country	Air Value (USD Millions)					CAGR (2008-2012)
		2008	2009	2010	2011	2012	
1	Canada	$828	$651	$714	$715	$761	-2.1%

Exhibit 1c - AZ-Canada 2008-2012, Air Imports by Weight

	Country	Air Weight (Metric Tons)					CAGR (2008-2012)
		2008	2009	2010	2011	2012	
1	Canada	1,227	1,130	1,836	2,060	1,751	9.3%

Exhibit 1d - AZ-Canada 2008-2012, Air Imports by Value

	Country	Air Value (USD Millions)					CAGR (2008-2012)
		2008	2009	2010	2011	2012	
1	Canada	$265	$210	$229	$238	$242	-2.2%

Exhibit 2a - Top 10 AZ Commodities from Canada 2012, Air Imports by Weight

Rank	Commodity	Air Weight (Metric Tons)	% Share of Total
1	Ceramic Products	695	40%
2	Industrial Machinery, Including Computers	276	16%
3	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	220	13%
4	Optic, Photo Etc, Medic Or Surgical Instrments Etc	189	11%
5	Special Classification Provisions, Nesoi	112	6%
6	Aircraft, Spacecraft, And Parts Thereof	63	4%
7	Art Of Stone, Plaster, Cement, Asbestos, Mica Etc.	48	3%
8	Articles Of Iron Or Steel	34	2%
9	Rubber And Articles Thereof	19	1%
10	Plastics And Articles Thereof	19	1%
	All Other	75	4%
	Total	***1,751***	***100%***

Exhibit 2b - Top 10 AZ Commodities from Canada 2012, Air Imports by Value

Rank	Commodity	Air Value (USD Millions)	% Share of Total
1	Special Classification Provisions, Nesoi	$71	29%
2	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	$62	26%
3	Industrial Machinery, Including Computers	$34	14%
4	Optic, Photo Etc, Medic Or Surgical Instrments Etc	$30	12%
5	Aircraft, Spacecraft, And Parts Thereof	$29	12%
6	Ceramic Products	$4	1%
7	Inorg Chem; Prec & Rare-Earth Met & Radioact Compd	$3	1%
8	Arms And Ammunition; Parts And Accessories Thereof	$1	1%
9	Rubber And Articles Thereof	$1	0.4%
10	Miscellaneous Articles Of Base Metal	$1	0.4%
	All Other	$6	2%
	Total	***$242***	***100%***

Exhibit 2c - Top 10 AZ Commodities to Canada 2012, Air Exports by Weight

Rank	Commodity	Air Weight (Metric Tons)	% Share of Total
1	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	1,417	35%
2	Industrial Machinery, Including Computers	958	23%
3	Aircraft, Spacecraft, And Parts Thereof	494	12%
4	Articles Of Iron Or Steel	250	6%
5	Optic, Photo Etc, Medic Or Surgical Instrments Etc	136	3%
6	Miscellaneous Articles Of Base Metal	134	3%
7	Plastics And Articles Thereof	113	3%
8	Printed Books, Newspapers Etc; Manuscripts Etc	96	2%
9	Essential Oils Etc; Perfumery, Cosmetic Etc Preps	61	1%
10	Furniture; Bedding Etc; Lamps Nesoi Etc; Prefab Bd	57	1%
	All Other	390	10%
	Total	***4,105***	***100%***

Exhibit 2d - Top 10 AZ Commodities from Canada 2012, Air Exports by Value

Rank	Commodity	Air Value (USD Millions)	% Share of Total
1	Electric Machinery Etc; Sound Equip; Tv Equip; Pts	$360	47%
2	Aircraft, Spacecraft, And Parts Thereof	$159	21%
3	Industrial Machinery, Including Computers	$107	14%
4	Nat Etc Pearls, Prec Etc Stones, Pr Met Etc; Coin	$60	8%
5	Optic, Photo Etc, Medic Or Surgical Instrments Etc	$48	6%
6	Articles Of Iron Or Steel	$4	1%
7	Plastics And Articles Thereof	$3	0.4%
8	Printed Books, Newspapers Etc; Manuscripts Etc	$2	0.3%
9	Vehicles, Except Railway Or Tramway, And Parts Etc	$2	0.3%
10	Essential Oils Etc; Perfumery, Cosmetic Etc Preps	$2	0.3%
	All Other	$14	2%
	Total	***$761***	***100%***

Exhibit 3a - Airport of Exit for AZ Exports to Canada for 2012

Rank	Airport Code	Airport	Air Weight (Metric Tons)	% Share of Total
1	MEM	Memphis Int'l Airport	1,615	39%
2	SDF	Louisville Int'l Airport	1,037	25%
3	SEA	Seattle-Tacoma Int'l Airport	358	9%
4	MSP	Minneapolis-St. Paul Int'l Airport	502	12%
5	DTW	Detroit Metro Airport	212	5%
6	SDF	Louisville Int'l Airport	69	2%
7	**PHX**	**Phoenix Sky Harbor Int'l Airport**	**54**	**1%**
		All Other	258	6%
		Total	***4,105***	***100%***

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APPENDIX F

Personal Interview Notes

The major observations from the interviews by category of company/organization are provided below.

Belly Carrier Interviews

1. Proximity to LAX was mentioned as the major factor impacting the Phoenix market as well as the primarily narrowbody equipment that operate at PHX. Lack of widebody capacity is a challenge when selling in the Phoenix market.

2. Phoenix was characterized as being a fairly small market in terms of air cargo volume by several carriers

3. Despite its relatively small local market size, most carriers cite good loads for their PHX services. Domestic carriers conduct trans-shipment activities at PHX, which helps build up loads.

4. In terms of relative performance within the networks of the respective airlines, the Phoenix/Arizona market was characterized as an "average" market by two carriers and "underperforming" by two carriers, while one carrier described it as a very good market from a domestic cargo perspective.
   - One carrier noted that some big changes have occurred in the market in recent years with large volumes of manufacturing capabilities moving away from Phoenix.

5. Types of goods identified as being shipped by air in the Phoenix/Arizona market:
   - Consumer goods – online retail sales
   - Electronics and high-tech (including semi-conductors)
   - Auto parts
   - Bio-medical (blood, biological samples, human specimens etc.)
   - Human remains (domestic)
   - Perishables – herbs, vegetables (outbound from Mexico and Southern Arizona)
   - Aerospace
   - Department of Defense (but volumes are declining)

6. Expectation is that online retail and bio-medical sectors will continue growing

7. Mexico market:
   - Impacts of near shoring are not yet evident, but expectation is that related growth in air cargo will be coming soon.
   - Mexico perishables for some carriers is large a part of business - mostly for distribution to other parts of U.S., however, yields for perishable shipments are much lower than yields for auto parts and electronics.
   - For one carrier, Mexico air freight volume tends to be 75% outbound from Mexico and 25% inbound to Mexico.

8. Two carriers mentioned potential issues at PHX related to perishables handling
   - One carrier mentioned the lack of certain U.S. Department of Agriculture ("USDA") personnel capable of clearing perishables in a timely manner that were identified as having potential problems. In cases where potential problems are spotted (e.g. bugs in a shipment), the closest USDA office for certain inspections (or clearances) is in Nogales, AZ. Due to this situation, the carrier has been materially disadvantaged as the perishable shipments are compromised with the time delays.
   - One carrier mentioned that due to the lack of proper cold-chain infrastructure at PHX (refrigerated facility, refrigerated dollies for aircraft loading) they have discontinued shipping perishables at PHX, in favor of LAX. The carrier felt that if the "cold-chain" were in place at PHX, this carrier and others may be interested in using it and transporting perishables via PHX.

9. Security issues: all carriers mentioned compliance with TSA regulations as an on-going issue and some carriers mentioned that they have screening equipment at their Phoenix stations (US Airway, Southwest, British Airways).

10. Miscellaneous comments:
    - Freighter capacity is generally priced about 1.5 times higher than belly capacity - therefore, belly is viewed as a very good option unless main deck space is required and/or the scheduled times of freighter service (i.e. night time departures) are preferred.
    - One carrier mentioned that they have analyzed the Phoenix market in detail and believe that between the local market and connecting freight, the carrier could handle more freight and consistently fill widebody aircraft belly space with cargo.

Integrated Carrier Interviews

1. Integrated carriers confirm that a modal shift has definitely occurred

   Next-Day Express has transitioned to Deferred Air (2-3 day delivery)
   Deferred Air has transitioned to Expedited Ground shipping
   Expedited Ground shipping has transition to Less-than-Truckload (LTL) shipping
   International Air Cargo shipping has transitioned to Ocean Container shipping

2. 2-3 day shipping segment is lower yield and lower cost to customers

3. System wide, sentiment is that air express will not come back to the levels once experienced. Many shippers and manufacturers have adapted their business operations to alternative modes and deferred shipping, so it is not as necessary to ship via air express.

4. Overall very flat growth is predicted for the foreseeable future in domestic air express and cargo.

5. Growth at PHX has been led by Amazon and Macy's and other online retail distribution centers in Phoenix area.

6. Amazon alone is driving much of the growth in the Phoenix area for integrators, so future growth is likely dependent on what Amazon does to build up local operations. Other than Amazon and other online retailers, the market is fairly stagnant.

7. It was inferred that many of the online retail shipments are likely very low yield (i.e. low margin) shipments, but the high volume is very attractive to the integrated carriers – as well as the passenger carriers for belly cargo.

8. Phoenix is the core service area for integrators

   East Valley – Mesa and Phoenix-Mesa Gateway Airport is seen as a growing area with a nice airport facility, but their location is currently too far out of mainstream for their primary customer base and the way the company run operations

   Quoted: "we understand that there are 1.2 million people closer to Gateway airport than PHX, but it is extremely expensive to open a separate operation"

9. Feeder flights include: Yuma, Lake Havasu, Flagstaff

10. Operations in Nogales brings lots of volume from Mexico; Tucson is well-positioned for Mexico freight, so much of that volume is handled in Tucson as well

11. One integrator's forecast team has analyzed PHX facility and market; concluded that current space is adequate for next 8-9 years; can absorb quite a bit more growth in current footprint

12. One integrator has leased additional PHX facilities expressly for the 1-2 months per year at the Holiday season when that extra capacity is critical; other 10-11 months, space is empty and idle

13. Operationally from PHX, integrators fly to:

    FedEx: OAK, IND, MEM, DFW/AFW
    UPS: SDF, ONT,

14. One carrier stated 15% of all aircraft container positions are dedicated to heavy freight, oversized shipments etc.; there is a very small volume at PHX that is NOT express

15. One carrier said that small package / express (mostly online retailers) is taking up almost all volume at the PHX station and that they cannot even sell general cargo in the market

16. This refers to aircraft space sold by integrators to freight forwarders etc.

    When space not available at PHX, integrators do not truck to other stations as forwarders would do that themselves and likely not utilize integrators

17. Many truck-to-truck transfers take place in the Phoenix area where express/freight does not even touch an airplane

Freight Forwarder Interviews

1. Service Areas

   Service areas can vary: depending domestic and international shipments
   This includes:
   - State of Arizona
   - Nogales, Mexico
   - east to El Paso
   - State of New Mexico
   - Arizona, north of Marana
   - Tucson and Marana served out of Tucson office and satellite office for maquilas
   - the state of AZ only

2. Description of Business Methods and Processes

   Majority of air freight volume handled is international
   - 80%-90% moves via LAX

- Some use of BA at PHX, but expensive and difficult to get space on that flight as it is almost always fully utilized
- Providing end to end distribution and warehousing options for shippers, including warehouse management; cross-dock facilities; Integrated supply chain solutions

Gateway policies

- Forwarders have Gateway policies whereby corporate entity dictates consolidation at major airport gateways – this encourages movements to LAX
- However, there is flexibility and when can justify use outside of gateway airports, this can be done. Common statement: "if there are more international flights at PHX, we would use them." Must be timed right and competitive with services at gateway airports.
- Use PHX for time sensitive shipments and to meet contractual delivery requirements driven by shipper RFP performance standards
- Common gateways include LAX, SFO, PDX
- Gateway service to Asia via LAX; European flows via BA at PHX, when available and CLT on US Airways
- US Airways also regularly sends trucks to the East Coast (CLT & PHL) for international (Europe) shipments that require widebody capacity
- LAX for Asia; MIA for Latin America; DFW; NYC; ORD for Europe and the Middle East
- Forwarders offices in Texas and points east utilize DFW,ORD and MIA
- Allow use of freighter or wide body at PHX, if it minimize the transit time to the customer.

Security

- Security and screening procedures are clearly on-going issues
- Most freight forwarders interviewed do not have in-house screening equipment
- Expensive and tend to locate equipment at gateway airports to reduce investment and locate where freight is consolidated. One forwarder estimated the cost of a screening machine at $150,000
- One forwarder said it is company policy to have screening equipment and certified personnel at each of their 19 office locations in U.S. – Sometimes get inquiries from other forwarder competitors to use equipment.
- Airlines have screening equipment, but charge a premium for use by forwarders
- Issue relates to time as well. If cannot screen at PHX, must wait until get to LAX. At LAX, this can lead to long waits in terms of unloading, screening, re-loading etc. Due to time and delays, can risk missing cut-offs for air carrier departures.

3. Customs

- Customs clearance times at LAX can be slow; negatively impacting transit time targets and threatening to miss airline cutoffs for tendering freight

4. Customer Base / Commodities

- Semiconductor mfrs, aerospace/aircraft, mining equipment, military shipments, electronics, auto parts, spare parts, some perishables, renewable energy mfrs, Bioscience; Mexico freight;
- Renewable energy mfrs large components by Ocean, some parts by Air
- Aerospace trending positively; semiconductors steady
- Pharma in Tucson –Ventana
- Solar – Global Solar, First Solar, Power One may be on the upswing by 2014-15

5. Customers (shippers/manufacturers) getting much more sophisticated in dealing with freight forwarders

   - Some have hired top-tier consulting firms to thoroughly evaluate companies, rates, and service quality
   - Many use software tools to track performance and ensure contracted standards are being met
   - Issuing RFPs to competitively select best service providers by shipping lane
   - Often one forwarder is selected per lane for an annual period
   - Very high service standards are required and financial penalties imposed for not meeting standards
   - These practices lead to much leverage by shippers and substantially elevate the competitive environment amongst forwarders
   - Common practice amongst large shippers and some forwarders “buying” the business to get the volume

6. Market Information

   International OUTBOUND
   - Tel Aviv, China (Dalian, Shanghai), Brussels, Frankfurt, Hong Kong, London, Japan, Malaysia, Amsterdam, India

   International INBOUND
   - Hong Kong, China (Shanghai), Singapore, UK, Frankfurt, Paris/Hamburg , (Airbus aircraft parts), Taiwan, Korea, Malaysia

7. Mexico Air Cargo

   Dominant commodities: electronics, auto parts, aircraft parts
   One forwarder uses Mexicali as main point for Mexico trade; new manufacturing occurring there
   One forwarder expecting to see upturn in near future related to nearshoring

8. Future Projections, Trends, Needs

   Slow recovery
   Stable with soft growth
   - One large forwarder was relatively optimistic at 5-7% per year
   - Majority of forwarders were hesitant, but gravitated to the 1-3% per year range

- Integrators for express did not have explicit forecasts, but mentioned “it all depends on Amazon”

Vast majority of cargo in Phoenix area can be handled by widebody pax belly (90%)
Some need for capacity for hazardous materials
Climate-controlled environment

9. Comments on Phoenix Region Airports

Challenge is the airline services available at PHX
Prefer to have Lufthansa back as the service would provide more options to Europe and competition for BA
Gateway Airport is too far east for services needed in Phoenix area
East Valley is not generating air eligible freight to warrant consideration of IWA
On-airport facilities are not designed for forwarder business model, truck staging areas problematic; access inconvenient; cost structure out of line with off-airport options

Shipper / Manufacturer Interviews

1. Main activities:

Healthcare
Cable industry equipment supplier
Semiconductor and Electronics manufacturers
Online retailer
Aerospace

2. Semiconductors and Electronics:

Some semiconductor and Electronics companies with a Phoenix-area presence have ceased manufacturing locally – some have exited the market, others have idle production lines, and some have transitioned Phoenix-area operations to focus primarily on R&D functions
For some semiconductor/electronics companies with Phoenix-area presence, manufacturing now based in Asia, Europe and some in U.S. (Texas)
- Decisions driven by cost factors (cheaper labor in Asia) and, in one case, to locate operations close to parent company headquarters in Europe

LAX is main point for shipping and distribution for several companies
Outbound air shipments consist mainly of wafers
- Inbound air shipments consist of raw materials, tools, spare parts, manufacturing equipment
- Many shipments are to/from other manufacturing facilities of same company in U.S., Europe, Asia
- New Intel Fab in 2014 will add approximately 20% to production output, most will be to domestic U.S. via FedEx
- Once new Fab is online, Chandler facility will be largest Intel manufacturing site in the world

Intel does not palletize, so most belly capacity is adequate for their needs
All shipments are managed by freight forwarder partners

3. Industries served

   Automotive, communications, computer, defense, aviation/aerospace

4. Major markets

   Southeast Asia (KUL, SIN) / Europe / Domestic US etc.

5. Common themes:

   - Majority of shippers are outsourcing the logistics functions of their inbound and outbound shipments – including air freight
   - Several large shippers have become quite sophisticated in their sourcing of transportation/logistics service providers
   - Some have hired top-tier consulting firms to thoroughly evaluate companies, rates, and service quality
   - Many use software tools to track performance and ensure contracted standards are being met
   - Issuing RFPs to competitively select best service providers by shipping lane
   - Very high service standards are required and financial penalties imposed for not meeting standards
   - Several shippers/manufacturers said they would consider use of Phoenix-area airports if services were competitive in terms of price, destinations, time

Note: In general, very few shippers or manufacturers provided information on the annual tonnage they ship by air to/from their Phoenix/Arizona facilities. This was largely seen as sensitive information and/or very difficult information to obtain as records were not kept in this manner and volumes were spread out amongst numerous forwarders. Also, inbound shipments are largely directed by external companies/suppliers, so those records are often not readily available by receiving company.

Other Interviews (associations, non-aviation transportation services, real estate etc.)
Most of the interviewees in this category are not firsthand users of air cargo. Their relevance to the Study is generally from the perspective of economic development and overall market dynamics.

- Ocean shipping company - Development of “Premier Customer Service Platform” for ocean shipments combined with RFID technology and team driving makes shipping highly competitive for time-definite shipments
  - More customers requiring premium services; trickle down of standards set by air cargo and customers shifting from air to ocean still want real-time information, stricter time commitments
- Trucking and rail view Phoenix as much more of an inbound market than outbound

  - Viewed more as a consuming market due to population growth, housing growth, favorable demographics
  - Consumer goods, cars, building supplies dominate shipments on these modes
  - Interviewees had no material dealings with air cargo and
  - Rail did not see major advantages of locating near airports; perhaps from customer perspective of having many modes (rail, air, truck) co-located so could access variety of services in one place
  - Port of Guaymas and Mexico rail – really no implications as far as air cargo seen; heavy aggregates and other industrial commodities that not relevant to air
  - Shipments from LA/Long Beach Ports to Phoenix/Arizona region shipped 70% truck / 30% rail
  - Due to distance from California ports to Phoenix area – economics really favor trucks vs. rail for most commodities… unless price of fuel spikes dramatically
- Real estate
  - Commercial real estate brokers see growth in online retail distribution centers in Phoenix region
    - Amazon, Dick's Sporting Goods, Macy's
    - Amazon has 10-year leases at its local facilities with significant investment in building upgrades
    - Cost advantages for labor, rents etc. in Arizona versus California cited as key to locating in AZ
- Mesa developer sees Gateway Airport as sub-optimal from air cargo perspective; too far from I-10; airport generally too far from shippers and manufacturers; sees Phoenix airports as better suited for cargo

Phoenix Regional
Air Cargo Planning Study

APPENDIX G

Online Survey Questionnaire for Arizona Shippers

Project Background

The City of Phoenix and Phoenix Sky Harbor International Airport (PHX) are conducting a Regional Air Cargo Planning Study for the Phoenix region.

The Study seeks to:

1. Analyze current/future regional demand for air cargo services, and
2. Identify possible air cargo facilities and infrastructure needs at Phoenix metropolitan area airports.

A key component of the Study process is the involvement of air cargo stakeholders – including shippers and manufacturers. To better understand the needs of the community for air cargo services, PHX has developed this short survey - which takes approximately 10 minutes to complete.

The information provided will remain confidential and will be summarized to maintain the anonymity of individual participants. The surveys are scheduled to close on Sunday, March XX, 2013. For the topics that will be covered, we'll be focusing on your operations here in Arizona. If you have other locations outside of Arizona, please do not consider them when answering the questions.

We thank you for your time in completing this survey.

*1. Please provide us with some information about yourself and your company.

Name	
Title	
Organization Name	
City	
State	
Email address	
Phone	

Overview of Business

2. Describe your company's main activities in the Phoenix/Arizona region.

3. What are the main products produced at your Phoenix/Arizona region facility?

4. How many employees are located at the Phoenix/Arizona region facility(ies) referenced in Question 3?

Number of employees

***5. Does your company currently ship goods by air freight?**

Please exclude use of air express for shipment of documents (e.g., FedEX or UPS for legal documents etc.)

- Yes
- No

Future Use of Air Frieght

***6. Do you foresee future use of air freight shipments for your company?**

- Yes
- No

Understanding Your Air Freight Operations

7. Who primarily directs the movement of air shipments?

- ○ Corporate Traffic/Logistics Manager
- ○ Freight forwarder
- ○ Other (please specify)

Air Freight Usage

8. What types of products do you ship by air related to your Phoenix/Arizona region facility?

Inbound products/commodities:

Outbound products/commodities:

9. Which of the following special handling needs do your products or source materials have?

Please select all that apply

- ☐ Temperature-sensitive
- ☐ High-security
- ☐ HAZMAT
- ☐ Bonded warehousing
- ☐ Other (please specify)
- ☐ Foreign Trade Zone
- ☐ Oversize
- ☐ Time Sensitive

10. What is the estimated portion of your total freight volume that moves via air transportation?

Inbound via air (%)

Outbound via air (%)

11. How frequently do you utilize air transportation for inbound and outbound shipments?

- ○ Daily
- ○ Weekly
- ○ Monthly
- ○ Other (please specify)

Air Freight Usage Domestic vs. International

12. Thinking about your air shipments from your local facility, what is the estimated portion related to domestic versus international destinations?

Answer must add to 100%

U.S. Domestic (%)

International (%)

13. What are the destination countries of OUTBOUND international air freight?

Please select all that apply

- ☐ Australia
- ☐ Brazil
- ☐ Canada
- ☐ China (excl. Hong Kong)
- ☐ France
- ☐ Germany
- ☐ Hong Kong
- ☐ Israel
- ☐ Japan
- ☐ Malaysia
- ☐ Singapore
- ☐ South Korea
- ☐ Taiwan
- ☐ United Kingdom
- ☐ Other Countries (please specify all other locations)

14. What are the origin countries of INBOUND international air freight?

Please select all that apply

- ☐ Canada
- ☐ China (excl. Hong Kong)
- ☐ Czech Republic
- ☐ France
- ☐ Germany
- ☐ India
- ☐ Italy
- ☐ Japan
- ☐ Malaysia
- ☐ Netherlands
- ☐ Singapore
- ☐ South Korea
- ☐ Taiwan
- ☐ Thailand
- ☐ United Kingdom
- ☐ Other Countries (please specify all other locations)

Annual Air Shipments

15. On an annual basis, please estimate the weight of total shipments you make by air to U.S. DOMESTIC locations?

Outbound U.S. DOMESTIC combined gross weight (lbs)

Inbound U.S. DOMESTIC combined gross weight (lbs)

16. On an annual basis, please estimate the weight of total shipments you make by air to INTERNATIONAL locations?

Outbound INTERNATIONAL combined gross weight (lbs)

Inbound INTERNATIONAL combined gross weight (lbs)

Airports used for air shipments

17. What are the main airports utilized for your outbound and inbound air shipments?

Please identify percent (%) share of your total air shipments for each airport listed. Answer must add to 100%

PHX - Phoenix Sky Harbor International Airport (%)	
LAX - Los Angeles International Airport (%)	
SFO - San Francisco International Airport (%)	
DFW - Dallas/Fort Worth International Airport (%)	
ORD - O'Hare International Airport (%)	
JFK - John F. Kennedy International Airport (%)	
ATL - Hartsfield-Jackson Atlanta International Airport (%)	
MIA - Miami International Airport (%)	
ONT – LA/Ontario International Airport (%)	
LAS – Las Vegas McCarran International Airport (%)	
Other	

18. Please share some information about the reasons for the airport choices you make.

	Not at all Important	Not Important	Neither Important or Unimportant	Important	Very Important	N/A
Low Rates	○	○	○	○	○	○
Freight forwarder preference	○	○	○	○	○	○
Direct flights	○	○	○	○	○	○
High frequency flights	○	○	○	○	○	○
Services with freighter aircraft	○	○	○	○	○	○
Choice / preference of air carriers	○	○	○	○	○	○
Airport proximity to company origin/destination facility	○	○	○	○	○	○
Specialized facilities	○	○	○	○	○	○
Foreign Trade Zone	○	○	○	○	○	○

Other (please specify)

Future Shipments by Air

19. Based on information you may have about your company's growth markets and geographies of interest, what markets will have increased importance from an air shipment perspective over the next 5 years?

- ☐ U.S. Domestic
- ☐ Australia
- ☐ Brazil
- ☐ Canada
- ☐ China (excl. Hong Kong)
- ☐ France
- ☐ Germany
- ☐ Hong Kong
- ☐ India
- ☐ Israel
- ☐ Japan
- ☐ Malaysia
- ☐ Netherlands
- ☐ Singapore
- ☐ South Korea
- ☐ Taiwan
- ☐ United Kingdom
- ☐ Other Countries (please specify all other locations)

20. Over the next 5 years, do you think air freight usage related to your company's Phoenix/Arizona region operations will increase, decrease, remain stable?

Please provide a percentage estimate for any expected change

Expected 5-year increase (%)	
Expected 5-year decrease (%)	
Remain Stable *(please enter 0)*	

Comments on Arizona Region Airports

21. What are your thoughts about the current air cargo facilities and infrastructure at the airports in the Phoenix/Arizona region?

For example, roadway access, specialized facilities, parking etc.

22. What are your thoughts about the current air services at the airports in the Phoenix/Arizona region as they relate to air cargo?

23. Do you have any additional thoughts you would like to share before we conclude?

24. Thank you for your participation in this survey. Should we have any further questions, may we contact you?

- ○ Yes
- ○ No

Thank you!

Thank you for your time.

For more information about Phoenix Sky Harbor International Airport, please visit our website.

PHOENIX SKY HARBOR
INTERNATIONAL AIRPORT

Phoenix Regional
Air Cargo Planning Study

APPENDIX H

Online Survey Questionnaire for Mexico Shippers

Phoenix

Project Background

The City of Phoenix and Phoenix Sky Harbor International Airport (PHX) are conducting an Air Cargo Planning Study for the Southwestern U.S. and Northern Mexico region.

The Study seeks to:

1. Analyze current/future regional demand for air cargo services, and
2. Identify possible air cargo services and facilities needs at Phoenix area airports.

A key component of the Study process is the involvement of air cargo stakeholders – including shippers and manufacturers. To better understand the needs of the community for air cargo services, this short survey has been developed which takes approximately 10 minutes to complete.

For the topics that will be covered, we'll be focusing on your operations here in Sonora. If you have other locations outside of Sonora, please do not consider them when answering the questions.

All information provided will remain confidential and will be summarized to maintain the anonymity of individual participants.

We thank you for your time in completing this survey.

*1. Please provide us with some information about yourself and your company.

Name	
Title	
Organization Name	
Mexico City	
Mexico State	
Email address	
Phone	

Overview of Business

2. Describe your company's main activities in Sonora.

3. What are the main products produced at your Sonora region facility(ies)?

4. How many employees are located at the Sonora region facility(ies) referenced in Question 3?

Number of employees

***5. Does your company currently ship goods by air freight?**

Please exclude use of air express for shipment of documents etc.

- Yes
- No

Future Use of Air Frieght

***6. Do you foresee future use of air freight shipments for your company?**

- Yes
- No

Understanding Your Air Freight Operations

7. Who primarily directs the movement of your air shipments?

- Corporate Traffic/Logistics Manager
- Freight forwarder
- Other (please specify)

Air Freight Usage

8. What types of products do you ship by air related to your Sonora facility?

Inbound products/commodities:

Outbound products/commodities:

9. Which of the following special handling needs do your products or source materials have?

Please select all that apply

- ☐ Temperature-sensitive
- ☐ High-security
- ☐ HAZMAT
- ☐ Bonded warehousing
- ☐ Other (please specify)
- ☐ Foreign Trade Zone
- ☐ Oversize (freighter main deck space)
- ☐ Time Sensitive

10. How frequently do you utilize air transportation for inbound and outbound shipments?

- ○ Daily
- ○ Weekly
- ○ Monthly
- ○ Other (please specify)

11. What is the estimated portion of your total freight volume that moves via air transportation at some time during shipping?

Inbound via air (%)

Outbound via air (%)

Air Freight Usage

Phoenix

12. What are the destination countries for OUTBOUND international air freight?

Please select all that apply

- ☐ United States
- ☐ Australia
- ☐ Brazil
- ☐ Canada
- ☐ China (excl. Hong Kong)
- ☐ France
- ☐ Germany
- ☐ Hong Kong
- ☐ Israel
- ☐ Japan
- ☐ Malaysia
- ☐ Singapore
- ☐ South Korea
- ☐ Taiwan
- ☐ United Kingdom
- ☐ Other Countries (please specify all other locations)

13. What are the origin countries of INBOUND international air freight?

Please select all that apply

- ☐ United States
- ☐ Canada
- ☐ China (excl. Hong Kong)
- ☐ Czech Republic
- ☐ France
- ☐ Germany
- ☐ India
- ☐ Italy
- ☐ Japan
- ☐ Malaysia
- ☐ Netherlands
- ☐ Singapore
- ☐ South Korea
- ☐ Taiwan
- ☐ Thailand
- ☐ United Kingdom
- ☐ Other Countries (please specify all other locations)

Annual Air Shipments

14. On an annual basis, please estimate the weight of total shipments you make by air to/from INTERNATIONAL locations *(excluding the United States)*?

Outbound INTERNATIONAL *(excluding U.S.)* combined gross weight (kg)

Inbound INTERNATIONAL *(excluding U.S.)* combined gross weight (kg)

15. On an annual basis, please estimate the weight of total shipments you make by air to/from locations in the UNITED STATES?

Outbound to U.S. combined gross weight (kg)

Inbound from U.S. combined gross weight (kg)

Phoenix

Airports used for air shipments

16. What portion of air shipments related to your Sonora facility utilize U.S. airports versus Mexico airports?

Answer must add to 100%

U.S. airports (%)	
Mexico airports (%)	

17. What are the main U.S. airports utilized for your outbound and inbound air shipments?

Please identify percent (%) share of your total air shipments for each airport listed.
Answer must add to 100%

PHX - Phoenix Sky Harbor International Airport (%)	
LAX - Los Angeles International Airport (%)	
TUC - Tucson International Airport (%)	
ELP - El Paso International Airport (%)	
DFW - Dallas/Fort Worth International Airport (%)	
ORD - O'Hare International Airport (%)	
JFK - John F. Kennedy International Airport (%)	
ATL - Hartsfield-Jackson Atlanta International Airport (%)	
MIA - Miami International Airport (%)	
ONT – LA/Ontario International Airport (%)	
LAS – Las Vegas McCarran International Airport (%)	
Other	

18. Please share some information about the reasons for the airport choices you make.

	Not at all Important	Not Important	Neither Important or Unimportant	Important	Very Important	N/A
Low Rates	○	○	○	○	○	○
Freight forwarder preference	○	○	○	○	○	○
Direct flights	○	○	○	○	○	○
High frequency flights	○	○	○	○	○	○
Services with freighter aircraft	○	○	○	○	○	○
Choice / preference of air carriers	○	○	○	○	○	○
Airport proximity to company origin/destination facility	○	○	○	○	○	○
Specialized facilities	○	○	○	○	○	○
Foreign Trade Zone	○	○	○	○	○	○

Other (please specify)

19. Do you regularly experience any issues related to shipping goods by air via U.S. airports?

For example, border crossing delays; U.S. airport congestion; Customs clearance; Security-related issues etc.

Future Shipments by Air

20. Based on information you may have about your company's growth markets and geographies of interest, what markets will have increased importance from an air shipment perspective over the next 5 years?

- ☐ United States
- ☐ Australia
- ☐ Brazil
- ☐ Canada
- ☐ China (excl. Hong Kong)
- ☐ France
- ☐ Germany
- ☐ Hong Kong
- ☐ India
- ☐ Israel
- ☐ Japan
- ☐ Malaysia
- ☐ Netherlands
- ☐ Singapore
- ☐ South Korea
- ☐ Taiwan
- ☐ United Kingdom
- ☐ OOther Countries (please specify all other locations)

Phoenix

21. Over the next 5 years, do you think air freight usage related to your company's Sonora operations will increase, decrease, remain stable?

Please provide a percentage estimate for any expected change

Expected 5-year increase (%)

Expected 5-year decrease (%)

Remain Stable *(please enter 0)*

Comments on Phoenix Region Airports

22. Would you consider increased use of Phoenix area airports if adequate air services and facilities were available?

For example, direct flights to Asia/Europe, specialized facilities, etc.

- Yes
- No

Please explain the reasons for your answer:

23. What are your thoughts about the current air services at the airports in the Phoenix area as they relate to air cargo?

24. Do you have any additional thoughts you would like to share before we conclude?

25. Thank you for your participation in this survey. Should we have any further questions, may we contact you?

- Yes
- No

Thank you!

Phoenix

Thank you for your time.

For more information about Phoenix Sky Harbor International Airport, please visit our website.

PHX

PHOENIX SKY HARBOR
INTERNATIONAL AIRPORT

City of Phoenix
Aviation Department

Phoenix Regional
Air Cargo Planning Study

InterVISTAS
AVIATION TRANSPORTATION TOURISM