
JOINT TRANSPORTATION COMMITTEE

**WASHINGTON STATE AIR CARGO
MOVEMENT STUDY
FINAL REPORT**

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Submitted by



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GLOSSARY

Air Cargo	Air cargo is made up of freight and mail that moves by air. It can be carried on freighter aircraft or in the lower (belly) holds of passenger aircraft.
Air Charter	The business of renting an entire aircraft as opposed to buying space for an individual shipment, usually from an airline offering a non-scheduled service.
Air Freight	All air cargo other than mail.
Air Freight Forwarder	Serving a dual role, the air freight forwarder is, to the shipper, an indirect carrier, so classified because he receives freight from the shippers under his own tariff, usually consolidating it into larger units that he tenders to the airlines. To the airlines, the air freight forwarder is a shipper.
All-Cargo Carrier	Refers to a Federal Aviation Regulations Part 121 air carrier that only operates freighter aircraft and does not carry passengers.
Belly Cargo	Air cargo carried in the lower holds of passenger aircraft.
Bill of Lading	The document that is provided to the shipper by the shipping line (or his agent) designating the cargo being carried and the terms and conditions. It is a negotiable document, in that the holder of the Bill of Lading may transfer his rights in the cargo to someone else; that is, the cargo can be sold and change hands while it is at sea.
Business-to-Business (B2B)	Many companies are now focusing on this strategy, and their sites concentrate on businesses (think wholesale), and only other businesses can access or buy products on the site. Internet analysts predict this will be the biggest sector on the web.
Business-to-Consumer (B2C)	Terms used to indicate the hundreds of e-commerce websites that sell goods directly to consumers. This distinction is important when comparing to Business-to-Business websites since the business model, strategy, execution, and fulfillment differ.
Capacity Planning	Ensuring that needed resources (e.g., distribution center capacity, transportation vehicles) will be available at the right time and place to meet logistics and supply chain needs.
Cargo Community System	A neutral and open electronic platform, enabling intelligent and secure information exchange between public and private stakeholders in order to improve the competitive position of airport communities.
Carrier	A term that refers to who is transporting the goods. Thus, ocean carrier is the shipping line, and air carrier is the airline.
Commercial Air Carrier	An air carrier certificated in accordance with Federal Aviation Regulations Part 121 to conduct scheduled service on specified routes. Air carriers may also provide nonscheduled and charter service.
Consignee	The person or party named in the Bill of Lading as the person or party to whom the goods are consigned.

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Containerization	The practice or technique of using a box-like or other device in which packages are stored, protected, and handled as a unit in transit. Containers used by ocean, rail, and truck are of standardized construction, while containers used by air carriers differ in size, weight, shape, and construction.
Customs Brokers	A broker who, upon examination, is certified by the U.S. Customs and Border Protection to act for importers and others in handling for them the sequence of Customs formalities and other details attendant to the legal and expeditious importing of goods.
Distribution Center (DC)	The customer's facility from which vendor orders are received and then distributed to the appropriate stores.
Foreign Flag Carrier	An air carrier other than a U.S. flag carrier in international transportation.
Foreign Trade Zone	An area or zone set aside at or near a port or airport, under the control of the U.S. Customs and Border Protection, for holding goods duty-free, pending customs clearance.
Freedom of the Air	A set of commercial aviation rights granting a country's airlines to overfly another country's airspace and to land for a technical stop as well as the privilege pick up and discharge traffic in another country's territory.
Gateway	A point which freight moving from one territory to another is interchanged between transportation lines.
Integrated Carrier	An all-cargo carrier that provides door-to-door service.
Integrator/Express All-Cargo Airlines	An all-cargo carrier that provides door-to-door, small package, time-definite service, typically using their own aircraft, truck and package sorting facilities; (e.g., FedEx, UPS, and DHL)
Intermodal	The movement of goods and/or persons by two or more modes of transportation between specific origins and destinations. (The term intermodal is often used in the industry to refer to utilizing, rail and/or truck containerized transport services with or without an oceangoing link.)
Logistics	The process of planning, implementing, and controlling the efficient, effective flow and storage of goods, services, and related information from point of origin to point of consumption in order to conform to customer requirements.
Logistics Park	A defined area for the activities related to transports, logistics and distribution of goods.
Manifest	Document containing full list of a ship's cargo extracted from the Bills-of-Lading.
Marketshed (or Market Area)	A geographic zone containing the people or businesses who are likely to purchase a firm's goods or services.
Metric Ton	A metric unit equivalent to 2,204.6 pounds.

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Multimodal	Refers to a seamless mode of transportation utilizing all appropriate modes of transportation (ocean, rail, trucking, and/or air services) to transport shipments on a single ocean Bill of Lading.
Narrow-Body Aircraft	Also known as a single-aisle aircraft, has limited capability to carry air cargo due to the small size of the aircraft frame. A narrow-body freighter can carry air cargo on the main deck of the aircraft as well as the lower hold area. A Boeing 737 freighter can carry approximately 22 tons of cargo while a Boeing 737 passenger aircraft can carry approximately 5 tons of luggage and belly cargo.
Passenger Belly-Cargo Airlines	Provide airport-to-airport air cargo service for freight forwarders utilizing the lower deck of their passenger aircraft.
Road Feeder Service	A service offered by an airline to move its carried goods to and from the aircraft and/or terminal by road service. This service allows an airline to offer services to a city to which it does not fly. Some such services are allocated an airline flight number.
Supply Chain	The material and informational interchanges in the logistical process stretching from acquisition of raw materials to delivery of finished products to the end user.
Supply Chain Management	The practice of controlling all the interchanges in the logistics process from acquisition of raw materials to delivery to end user.
Third-Party Logistics Companies	An outsourced company that can offer value-added services such as custom packaging or product enhancement, thus freeing the client to focus on running core operations.
Traditional Air Cargo Airline	An all-cargo airline or a passenger belly cargo airline that provides airport-to-airport service in support of the freight forwarder, utilizing a network of air cargo terminal operators and freight forwarders. There are few limits on the size and or type of cargo carried by the traditional all-cargo airlines.
Transit Air Cargo Manifest Procedures	Procedures under which air cargo imports move through the gateway city to the city of final U.S. Customs and Border Protection designation for the collection of duty and other import processing, thereby expediting shipment movements, reducing gateway congestion, and saving expense for importers, the U.S. Customs and Border Protection, and the airlines.
Transload	The transfer of a product from one mode to another and the physical transfer from one type of containing device to another.
U.S. Flag Carrier	An air carrier holding a certificate issued by the Department of Transportation, and approved by the President, authorizing the carrier to provide scheduled operations over a specified route between the United States and one or more foreign countries.
Value Added	The additional amount a customer is willing to pay for an item as it is transformed from a raw material into a finished product.

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Wide-Body Aircraft	<p>Also known as a twin-aisle aircraft, is an airplane with a fuselage wide enough to accommodate two passenger aisles with seven or more seats abreast. A passenger wide-body aircraft can carry containerized cargo in the lower hold (belly) of the aircraft, while a wide-body freighter can carry air cargo on the main deck of the aircraft as well as the lower hold area. A Boeing 777 freighter can carry approximately 70-80 tons of air cargo, while a passenger 777 can carry approximately 30 tons of belly cargo and luggage.</p>
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ACRONYMS

ACRP	Airport Cooperative Research Program
CPM.....	Cargo Program Management
GDP	Gross Domestic Product
ICAO.....	International Civil Aviation Organization
JTC	Joint Transportation Committee of the Washington State Legislature
KPI.....	Key performance indicators
SEA	Seattle-Tacoma International Airport
TIACA	The International Air Cargo Association
WASP.....	Washington Aviation System Plan
WSDOT	Washington State Department of Transportation

Executive Summary

STUDY PURPOSE

The Joint Transportation Committee of the Washington State Legislature initiated this study to evaluate the current and future capacity of the statewide air cargo system.

The study objectives are the following:

- Educate policy makers about air cargo movement at Washington airports.
- Explore possibilities for accommodating the growing air cargo market at more airports around the state.
- Identify the State of Washington's interest and role in addressing issues arising from air cargo congestion.

Seattle-Tacoma International Airport (Sea-Tac or SEA) dominates the Washington state air cargo market. The Washington State Department of Transportation's Washington Aviation System Plan (2017) states:

"the ability of SEA to accommodate and expand air cargo activity, particularly international freighter service, should be closely monitored due to recent, dramatic, increases in demand and discussions of expansion of air passenger and maintenance, repair and overhaul activities."

This study identifies opportunities and constraints for utilizing capacity at a variety of existing airports around the state to meet the increasing demand for cargo operations.

STUDY PROCESS

The Washington State Air Cargo Movement Study included four technical white papers as well as review and input by advisory committees and periodic check-ins with the Joint Transportation Committee in November 2017, July 2018, and November 2018. All technical papers are available as the appendices to the final report for the study.

The study process relied on input from a staff work group and a stakeholder panel, each of whom met four times throughout the course of the study.

The *staff workgroup* included legislative and agency staff members as well as representatives from industry associations and all of the largest Washington airports. They provided guidance and input to the technical methods and results as well as insight into the interests of their respective organizations and committees. The staff work group also collaborated on recommendations to the stakeholder panel.



Washington state airports handled \$47.6 billion in freight in 2015, compared to state GDP of \$452 billion. Looking into the future, the value of Washington state air cargo is expected to grow at 4.4 percent per year in real value terms out to 2045. This is faster growth than the general economy, implying that air cargo will play an ever more important function in the state's logistics.

The *stakeholder panel* included legislators, top agency officials, airport representatives, and industry representatives. They reviewed the results and recommendations at a higher level with a focus on the implications for their constituents. The stakeholder panel provided input on recommendations to the Joint Transportation Commission, the legislature and the governor, who will make final decisions.

WASHINGTON AIR CARGO PROFILE

Air cargo in Washington state is primarily generated by activity at Sea-Tac, King County International Airport (Boeing Field), and Spokane International Airport. Sea-Tac and Boeing Field combined have an 85 percent share of the total Washington state air cargo market. Spokane, the third largest cargo



airport in the state, represents an 11 percent share of the Washington state market. Other non-hub and small commercial passenger airports within the state account for only 4 percent of the total air cargo volumes moved in 2016.

Sea-Tac is the dominant commercial airport in the state. It has more than 35 scheduled airlines that offer nonstop narrow-body and wide-body service to over 90 domestic and 30 international destinations. In 2017 the airport accommodated 46.9 million air passengers (up 2.6 percent from 2016), and processed 425,856 metric tons of air cargo (up 16.2 percent) from the previous year.

Boeing Field in King County serves as an important regional gateway airport for the integrator/express airline UPS, as well as a center for business aviation and an industrial aerospace facility for the Boeing Company.

Spokane International Airport is the dominant eastern Washington commercial service airport. It also serves as a key air cargo transshipment and distribution center for FedEx and UPS. The Spokane International Airport Business Park is home to a new 2.4 million square foot e-commerce fulfillment center.

A 10-year forecast of air cargo demand conducted as part of this study anticipates air cargo tonnage in Washington state to grow at a compounded annual average growth rate of 4.4 percent. This will result in 870,000 annual metric tons of enplaned and deplaned air cargo in 2026, up from 566,000 metric tons in 2016. Sea-Tac is anticipated to reach 580,000 metric tons during the forecast period.

KEY FINDINGS

The term “air cargo congestion” commonly describes situations when demand increases beyond what airports and cargo carriers can efficiently handle. This definition, however, does not adequately convey the complexity and interdependence between different elements of the air cargo system. The air cargo system comprises both on-airport facilities and services (e.g., airlines, ground handlers, cargo terminals, aircraft parking, on-airport parking, federal inspection services) and off-airport facilities and services (e.g., freight forwarders, trucking terminals, warehouses, sort facilities, customs brokers, shippers and receivers). Capacity constraints at any one of these components can cause congestion.

Effects of congestion become evident long before capacity is reached. In congested conditions, each additional unit of cargo increases costs for everyone and creates higher rates, longer queues, and more unreliability. Shippers/carriers must consider alternatives or become less competitive. Additionally, due to the character of the market and cargo operations, there are only limited immediate alternatives for a given air cargo shipment. If competitor airports are as congested, or worse, than a given primary gateway, shippers may have no choice but to incur the increased costs.

As part of our analysis, we considered congestion at competitive airports to Sea-Tac throughout the West Coast. In general, Sea-Tac performs as well or better than its major West Coast competitors in terms of delays. Nonetheless, it is important for regional competitiveness to attempt to manage congestion and provide the most efficient air cargo system possible.

In regards to on-airport capacity, the planning analysis found that, absent any infrastructure investment, Sea-Tac will face a deficit of on-airport cargo buildings starting in 2021 that will reach 75,000 square feet by 2026. According to the Seattle-Tacoma International Airport's Sustainable Airport Master Plan, there will be 330,000 square feet of cargo buildings developed as part of its "near-term projects," to be in development by 2027. Another 400,000 square feet of on-airport cargo buildings are envisioned as well; however, these are not included in the near-term projects and would require further study after 2027. A major issue facing Sea-Tac is that future air cargo facilities at the airport will be expensive to develop and must compete for scarce Port of Seattle resources being used for overall airport expansion.

Adding to the complexity of accommodating future air cargo growth at Sea-Tac is that solutions for accommodating required air cargo facilities and services off-airport are limited because of increasing traffic congestion. The Washington State Department of Transportation (WSDOT) reported in 2016 that Puget Sound traffic delays had increased 91.2 percent in five years. By the year 2040, the Puget Sound region is expected to grow by about 800,000 people. Land prices are rising rapidly throughout the region, including around the airport and in the warehousing district nearby in Kent Valley. According to the *2015 WSDOT Corridor Capacity Report*, increasing congestion threatens the economic health of the Puget Sound region, home to 70 percent of Washington state's economic activity. The report adds that businesses will be reluctant to continue to invest and expand in the region without a modern transportation network that moves people and products reliably.

It is important to recognize that inhibitors to the growth of the Washington state air cargo industry are not only a transportation-related issue, but an economic development one as well. Washington state airports handled \$47.6 billion in freight in 2015, compared to state GDP of \$452 billion. The value of Washington state air cargo is expected to grow at 4.4 percent per year in real terms out to 2045. Air cargo handled by airports in the state is projected to reach \$173.6 billion by 2045. Air cargo value grows faster than the general economy in this forecast, implying that air cargo will play an ever more important function in the state's logistics.

Beyond the value of the commodities that make up the air cargo market is the fact that high-value supply chains rely on the worldwide connectivity and security provided by air cargo to grow their businesses and compete in a global marketplace. Shippers value travel time by air 18 times more than travel time by truck, and they value reliability 142 times more by air than by truck. Risks to reliability

from air cargo congestion can impose a substantial economic penalty. To remain competitive to global businesses, Washington state needs to ensure an effective and efficient air cargo network.

STRATEGIC RECOMMENDATIONS

Traditional and non-traditional options exist for expanding and developing new air cargo and logistics services for Washington state airports. The three most immediate air cargo development opportunities for Washington state airports are the following:

- Maintain and expand the existing integrator (i.e., Amazon, DHL, FedEx, UPS) operations around the state in conjunction with the private sector.
- Attract air charter operations for exports of agricultural products, particularly perishable freight and vegetables, from central Washington airports.
- Develop non-hub airports into centers for regional ground-based logistical operations.

To attract the logistics/distribution market, the state should promote to individual airports the “inland port” or airport logistics park model used by Rickenbacker International Airport and Huntsville International, leveraging their designations as US Ports of Entry, Foreign Trade Zones and branding themselves “Global Logistics Centres” and actively recruiting intermodal business in the ocean cargo, railroad and motor carrier markets.

In the longer term, scheduled freighter service becomes a more realistic goal for some airports such as Spokane International, Snohomish County and, possibly, Grant County International as they have the market access, runway characteristics, ground-handling capabilities, landside facilities, and highway access necessary to accommodate international aircraft. Also, with the emergence of e-commerce as a force in the new economy, the State of Washington should be proactive in courting e-commerce fulfillment centers by highlighting the state’s airports, Pacific Rim location, developable land, and gateway hubs for the major integrator airlines.

The most effective approach Washington state airports can take with the integrator carriers is to be knowledgeable of each individual integrator carrier’s business model—since each carrier is different—and to be attuned to both the national and local market dynamics for each individual integrator carrier. The State of Washington and individual airports should build an in-house knowledge base for Amazon, DHL, FedEx, SF Express, UPS, and the US Postal Service.

Development of the air cargo charter market will hinge on an airport’s ability to provide ground-handling and cargo-handling services for both narrow-body and wide-body freighter aircraft at a competitive price. Proactive marketing to introduce and promote Washington state airports to the airline, freight forwarder and shipping community is also critical to expanding both the cargo charter market and scheduled service market.

As further described in Section 5.4 of the *Evaluate How to Use Existing Capacity Across Washington State* white paper (Appendix C), the rationale behind marketing to the logistics/distribution industry, with the initial focus on surface distribution, is to build up the business and forwarder infrastructure in the airport region. Attracting surface-based logistics/distribution services to an airport would provide the

basic freight forwarder and trucking network needed to attract air cargo and give the airport more exposure in the freight distribution industry. Certain airports can position themselves as a cost-effective supply/distribution chain distribution points. Beginning with truck-based distribution, an airport-related “inland port and logistics service center” could also accommodate air cargo charters with the long-term strategy of attracting scheduled air cargo service.

Development of airport-related logistics/distribution centers, airport logistics parks or inland ports helps small and non-hub commercial service airports to generate non-aviation revenue while building up the facilities and services necessary to attract air cargo. Logistics facilities and services located strategically within the state could take some of the pressure off the Port of Seattle and Sea-Tac, by accommodating activities that traditionally take place at, or near these facilities. This also begins to develop the logistics infrastructure needed to attract more business to smaller metropolitan regions.

The next section describes specific recommendations to implement these strategic recommendations. While they are directed to the State of Washington for action, success will depend on involvement and support of the private-sector companies involved in the air cargo industry.

Air Charter Example: Cherry Pilot from Grant County International Airport, Summer 2018

Grant County International Airport had been actively soliciting charters for cherries for years. In 2017, the backups at Sea-Tac during peak cherry season were such that the berries sat too long and got too warm and the quality of this luxury item was compromised. In June 2018, a major shipper of fresh fruit initiated a pilot project to prove the concept for shipping cherries from Moses Lake to China.

- **Result:** Eleven charter planes carried 200 to 250 thousand pounds of cherries each, for a typical time of three days from tree to international customer while maintaining consistent cold temperatures. The cold chain was proven successful.
- **Grant County’s advantage:** Improved fruit condition resulting from significantly less truck travel due to proximity to orchards and significantly reduced dwell time in summer heat due to efficiency of handling. In addition, the airport boasts significantly cheaper airport landing fees than Sea-Tac.
- **Grant County’s investment:** Provision of an existing air cargo freight loader, conversion of a maintenance hangar to cold storage using temporary cooling units, paving and electrical upgrades.

RECOMMENDATIONS FOR IMPLEMENTATION

The Air Cargo and Logistics Business Development Strategic Plan provides a road map for the State of Washington to follow in building an air cargo development agenda and seeing ideas put into action. This starts with developing clear lines of responsibility and authority for the development of the air cargo system.

The plan recommends creation of an Air Cargo Development Program to be led by a new position—the Air Cargo Program Manager—that could be housed in either the Department of Commerce or WSDOT. The Air Cargo Program Manager would be responsible for convening an Air Cargo Development Group from existing agency staff and working with them to implement the following activities:

- Cargo Community System
- General/Indirect Marketing
- Air Cargo Statistics and Data Collection
- Facility and Service Development
- Airport Logistics/Distribution Centers

To achieve the State of Washington’s vision of a statewide system of on-airport and off-airport air cargo facilities working in concert to accommodate air cargo demand, it is recommended that the legislature institute the Air Cargo Management Program and give it three principal elements:

- **Air Cargo Resource Assistance Program** – A coordinated program to ensure the timely creation of services and facilities for which there is a perceived market need (e.g., revitalizing existing infrastructure, and creating new facilities, a community cargo system, and air cargo logistics parks)
- **Air Cargo Marketing Program** – A program with a focus on brand creation and dissemination, implementation of marketing strategies, creation of a Washington State value proposition, customer research and market intelligence, advertising campaign, and conference participation.
- **Air Cargo Program Management** - Each of the above program elements are interrelated and depend on a strong program manager to coordinate efforts and advocate for moving the State of Washington forward in achieving the objectives outlined previously.

Table 3 summarizes the proposed recommendations. It includes an assessment of the relative priority (high, medium or low) as well as a general indication of timing (short, medium or long term). The recommendations are focused on the higher priority actions that could be completed in the near- and medium terms.

NEXT STEPS

Implementation of specific recommendations should begin immediately. Many recommendations can be implemented in the short term. A more detailed implementation plan will need to be developed by the Air Cargo Development Working Group and Air Cargo Program Manager. They should address specific actions and responsibilities regarding the individual recommendations in order for them to reach fruition.

Table ES-1. Summary of Recommendations

Recommendation	Potential Lead Entity	Priority	Timing
Recommendation 1: Establish Air Cargo Development Program	Legislature	H	S
Recommendation 1A: Hire Air Cargo Program Management staff (CPM)	WSDOT or Commerce	H	S
Recommendation 1B: Convene Air Cargo Development Working Group	CPM	H	S
Recommendation 2: Create Air Cargo Resources Program	CPM	H	S
Recommendation 2A: Provide Air Cargo Resource Assistance	CPM	H	S
Recommendation 2B: Propose New Policies and Programs as Needed	CPM/Air Cargo Working Group	H	M
Recommendation 3: Establish Air Cargo Marketing Program	CPM	H	S
Recommendation 3A: Brand and Promote WA Airport System	CPM	H	S
Recommendation 3B: Continued Market Analysis	CPM	H	M
Recommendation 4: Develop Cargo Community System	CPM	H	M
Recommendation 4A: Create a Web Portal with Information on WA Airports	CPM	H	S
Recommendation 4B: Establish WA Air Cargo Industry Association	Working Group	H	M
Recommendation 4C: Initiate a Feasibility Study	CPM	H	S
Recommendation 5: Collect Air Cargo Statistics and Data	WSDOT Aviation	M	S
Recommendation 5A: Report Air Cargo Data	WSDOT Aviation	M	M
Recommendation 6: Support Development of Airport Logistics Centers	CPM	H	M
Recommendation 6A: Develop Guide for Establishment of Airport Logistics Parks and Free Trade Zones	CPM	H	M
Recommendation 6B: Develop or Adapt Grant Program for Air Cargo Feasibility Studies	CPM	H	M
Recommendation 7: Measure Performance	CPM	H	M

1 Introduction

1.1 STUDY PURPOSE

The Joint Transportation Committee of the Washington State Legislature initiated this study to evaluate the current and future capacity of the statewide air cargo system.

The study objectives are the following:

- Educate policy makers about air cargo movement at Washington airports.
- Explore possibilities for accommodating the growing air cargo market at more airports around the state.
- Identify the State of Washington's interest and role in addressing issues arising from air cargo congestion.

Seattle-Tacoma International Airport (Sea-Tac or SEA) dominates the Washington state air cargo market. The Washington State Department of Transportation's Washington Aviation System Plan (2017) states:

“the ability of SEA to accommodate and expand air cargo activity, particularly international freighter service, should be closely monitored due to recent, dramatic, increases in demand and discussions of expansion of air passenger and maintenance, repair and overhaul activities.”

This study identifies opportunities and constraints for using existing capacity at airports around the state to meet the increasing demand for cargo operations.

1.2 STUDY BACKGROUND AND PROCESS

The study started in fall of 2017. It included four technical white papers as well as review and input by advisory committees and periodic check ins with the Joint Transportation Committee in November 2017, July 2018, and November 2018.

1.2.1 Technical Papers

The *Market, Facilities and Forecast Technical Report* (Appendix A) provided the foundational data and analysis for the study and included the following:

- An air cargo profile that includes industry background, historic trends, and a description of the airports in the state



Washington state airports handled \$47.6 billion in freight in 2015, compared to state GDP of \$452 billion. Looking into the future, the value of Washington state air cargo is expected to grow at 4.4 percent per year in real value terms out to 2045. This is faster growth than the general economy, implying that air cargo will play an ever more important function in the state's economy.

- An assessment of the market capture of state airports
- An inventory of the air cargo facilities and services at airports in the state
- A forecast of future air cargo demand within the state
- Future facility requirements needed to meet the projected air cargo demand within the state

The *Air Cargo Congestion* white paper (Appendix B) defined air cargo congestion, assessed the extent of air cargo congestion in the state, and described its impacts to the local economy.

The third white paper, *Evaluate How to Use Existing Capacity across the State* (Appendix C), included the following:

- Comparison of competitive airports to Washington state airports
- Basic components needed to attract and maintain air cargo air service
- Comparison of select airports to meet basic air cargo facility and market requirements for air cargo service
- Identification of key air cargo airports
- Evaluation of potential to attract air cargo service
- Conclusions and recommendations
- Summary of strengths, weaknesses, opportunities and threats for select airports.

The final white paper, *Recommendations and Implementation Strategies* (Appendix D) presented a Washington State Air Cargo and Logistics Business Development Strategic Plan. All technical papers are available on the study website and as Appendices A through D of this report:

<http://leg.wa.gov/JTC/Pages/aircargo.aspx>

1.2.2 Advisory Committees

The study process relied on input from a staff workgroup and a stakeholder panel, each of whom met four times throughout the course of the study.

The *staff workgroup* included legislative and relevant state agency staff members as well as representatives from several airports and industry associations. They provided guidance and input to the technical methods and results as well as insight into the interests of their respective agencies and committees. The staff workgroup also collaborated on recommendations to the stakeholder panel.

The *stakeholder panel* included legislators, top agency officials and industry representatives. They reviewed the results and recommendations at a higher level with a focus on the implications for their constituents. The stakeholder panel provided input included in this report.

1.3 ORGANIZATION OF THIS REPORT

This report summarizes study findings and recommendations and references the white papers (Appendices A through D). It is organized as follows:

- Chapter 2 reviews the air cargo market trends and profile for Washington state.
- Chapter 3 presents an air cargo forecast for Washington state.
- Chapter 4 summarizes air cargo facility needs in the state.
- Chapter 5 defines air cargo congestion and discusses the forecast in light of the facility needs.
- Chapter 6 evaluates of airports across the state, identifies potential opportunities and constraints and suggests potential approaches to address them.
- Chapter 7 presents the study recommendations.
- Chapter 8 provides conclusions

The early chapters are shorter since they summarize technical background and analysis at a high level and rely on the appendices for details. Chapters 6 and 7 are longer since they present the results of the evaluation that provides the backdrop for the recommendations and explain the recommendations themselves.

2 Air Cargo Market Trends and Washington State Profile

Some of the key findings detailed in the *Market, Facilities and Forecast Technical Report* (Appendix A) include the following:

- Air cargo in the state is primarily generated at three airports: Seattle-Tacoma International Airport (Sea-Tac), the nearby King County International (locally known as Boeing Field), and Spokane International.
- Non-hub and small commercial passenger airports account for less than 5 percent of state volume, although Moses Lake has unusual capabilities for very large freighters.
- Most of the expansion of air cargo within the state has been driven by the increase in international wide-body aircraft passenger service at Sea-Tac (these passenger planes also carry air cargo in the lower hold of the aircraft), and there is recent growth in express cargo driven by e-commerce.
- The growth in e-commerce presents opportunities statewide since the integrated carriers that handle the lion's share of e-commerce are the principal operators at most airports (apart from Sea-Tac). Additionally, since rapid delivery service is a crucial component of e-commerce, this requires local staging of goods near the delivery point, which favors regional airports for part of the business.
- Sea-Tac is a significant gateway for export and import trade with East Asian countries. This is the chief corridor for the state's international trade by air. For most product categories, Sea-Tac is accommodating Washington state demand and reaching into Oregon, Idaho, and British Columbia, although a few exceptions are discussed in Chapter 3.
- The forecast air cargo tonnage growth rate for Washington state is 3.5 percent compounded annually, which puts total annual growth through the next 10 years over 4 percent. This is driven by the projections for Sea-Tac, but there is growth forecast everywhere in the state.
- Statewide, airport facilities should be able to absorb the volume. The exception may be Sea-Tac, where there is competition between the development of cargo facilities and the need for expanding passenger terminals. Questions regarding cargo building space are explored in Chapter 6. The pending update of the Port of Seattle's Sustainable Airport Master Plan should clarify some of these questions.
- These findings and other information in the technical report served as input to future tasks, including analysis of congestion and opportunities, and constraints at airports around the state.

2.1 AIR CARGO INDUSTRY BACKGROUND

Air cargo is a \$67 billion business worldwide—representing 15 percent of total traffic revenue of the worldwide airline business—and supports approximately 68 million jobs. According to the International Air Transport Association, the value of goods shipped by air in 2016 was USD \$6 trillion dollars.

Air cargo is an increasingly important component of the U.S. economy. In 2015, air freight accounted for 25 percent of the total U.S. import and export trade of \$ 4.2 trillion¹.

2.2 NORTH AMERICA, WEST COAST, AND REGIONAL AIR CARGO ACTIVITY

2.2.1 U.S. Air Cargo Market

According to Boeing, air cargo moving to, from, and within the United States and Canada accounts for 13.8 percent of the world's air cargo traffic in terms of weight.

Figure 1 shows the top 25 U.S. air cargo airports. As this figure depicts, integrator/express carrier hub airports of Memphis and Louisville and international passenger gateway airports of Miami, Los Angeles, Chicago, and New York City's John F. Kennedy dominate the U.S. air cargo market. Anchorage International Airport has minimal enplaned and deplaned air cargo, but acts as a trans-shipment hub (a transloading point where air cargo is switched between airplanes to various destinations) for air cargo freighters serving the Asia-North America market. Cincinnati is a gateway hub for DHL, and Indianapolis, Ontario, and Oakland are regional gateways for FedEx and UPS.

Most of the growth in air cargo at U.S. airports is in the international market. Domestic air cargo in the United States has significantly declined since 2000 as passenger airlines downsized the dimensions of their aircrafts and scheduled, traditional domestic air freight airlines exited the U.S. market.

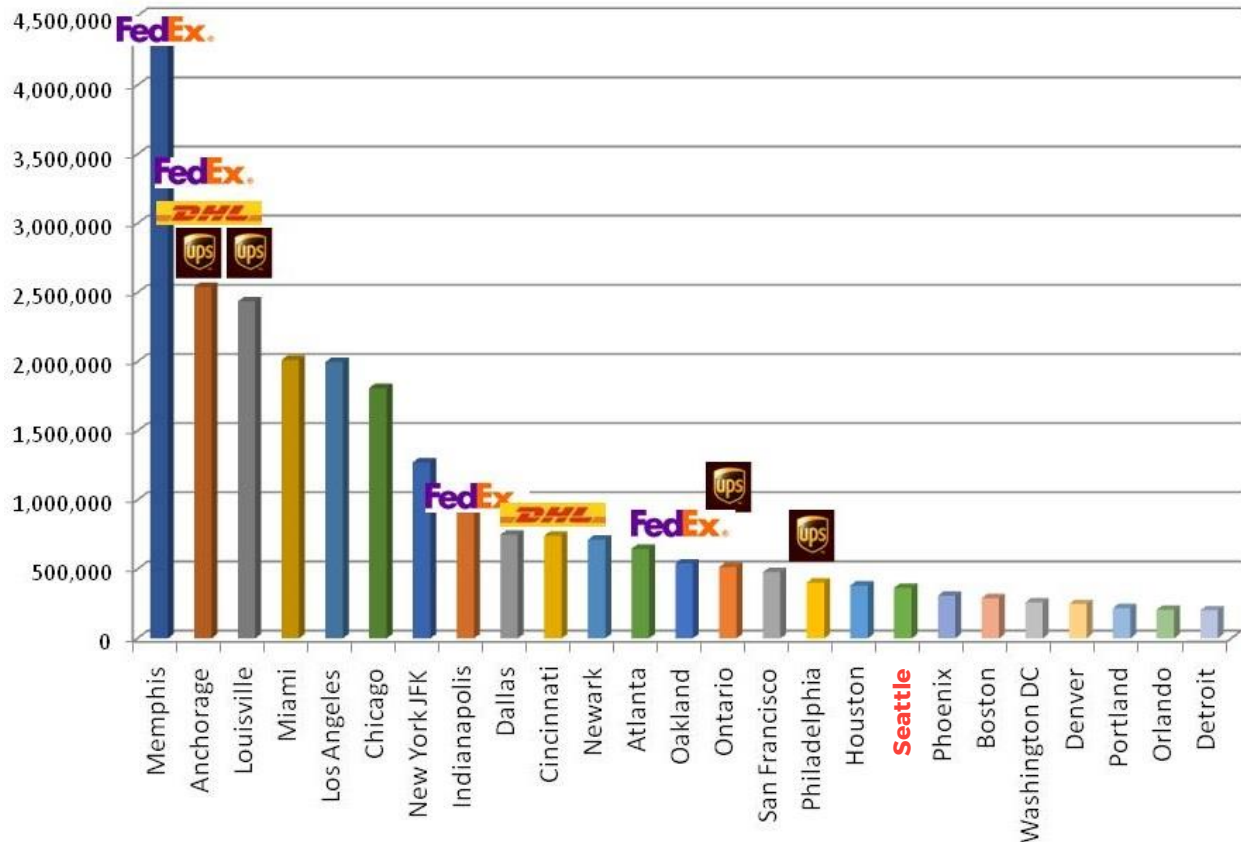
The top airports are dominated by the following:

- Metro areas with largest markets
- Hubs for express carriers

Most of the growth in air cargo at U.S. airports is in the international market.

¹ *Freight Facts and Figures 2017*, published by U.S. DOT. <https://www.bts.gov/newsroom/freight-facts-and-figures-2017>

Figure 1. Top 25 U.S. Air Cargo Airports (by weight)



2.2.2 West Coast Air Cargo Market

The dominant air cargo airport on the West Coast is Los Angeles International Airport with a 44 percent market share in 2016. LA/Ontario International is a distant second followed closely by Oakland, San Francisco and Seattle (Sea-Tac).

The air cargo markets at LA/Ontario, Oakland, King County, and Spokane International Airports are dominated by the integrator/express airlines. LA/Ontario International is the West Coast hub for UPS and Oakland International is the West Coast hub for FedEx. King County International is the UPS gateway airport for Western Washington, and Spokane is a transload hub for the Pacific Northwest for both UPS and FedEx. Sea-Tac is the western Washington state gateway for FedEx and DHL.

Ted Stevens Anchorage International Airport ranks second in air cargo in the United States according to Airports Council International. It is a unique airport in that it has a small local market but serves as a technical stop (for refueling, maintenance, and crew changes) and transshipment hub for air cargo carriers serving the trans-Pacific market.

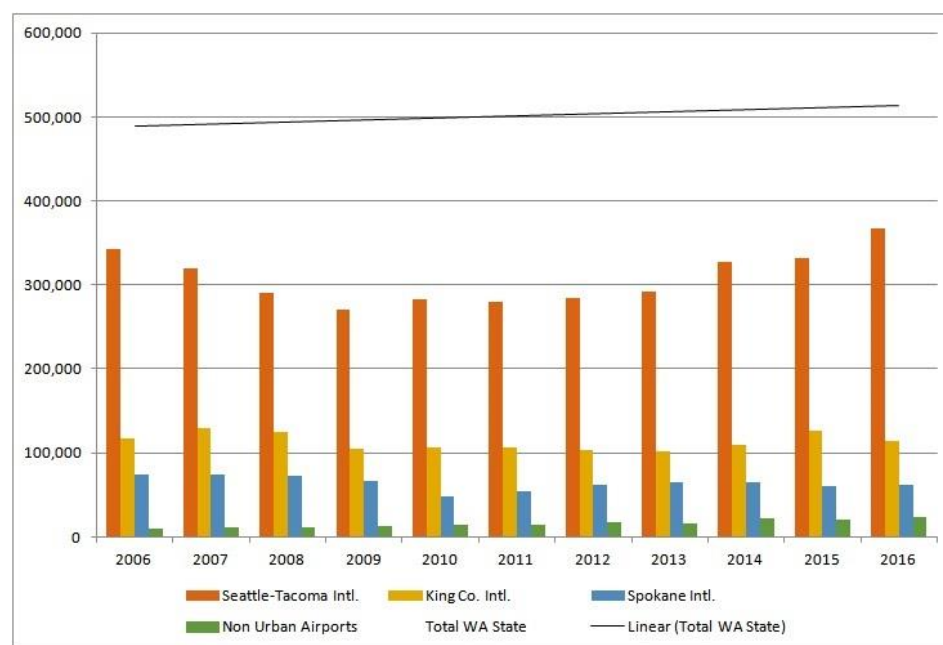
Other secondary West Coast airports competing within the Seattle air cargo tertiary marketshed include Calgary International, Edmonton International, Boise Air Terminal, Salt Lake City International, Reno-Tahoe International, and San Jose International.

2.2.3 Washington State Air Cargo

Air cargo in Washington state is primarily generated by activity at Sea-Tac, King County, and Spokane International Airports. Non-hub and small commercial passenger airports within the state account for only 4 percent of the total air cargo volumes moved in Washington state in 2016.

Figure 2 shows the trend of air cargo activity for Washington state. Reflecting trends in the general economy as well as systemic changes in the air cargo industry, air cargo volumes in Washington state have fluctuated over the past 10 years, with 543,921 metric tons in 2006 dropping to a low of 454,419 metric tons during the economic crisis of 2008/2009, then reaching a high of 565,728 tons in 2016.

Figure 2. Washington State Air Cargo Volume, 2006–2016 (metric tons)



Over the past five years after the recession, air cargo in the state has increased at approximately 5 percent per year. Most of the growth in air cargo within the state is driven by the increase in international wide-body aircraft service at Sea-Tac, and recently by e-commerce.

Sea-Tac dominates the local Seattle air cargo market with a mix of domestic and international belly cargo, domestic and international freighter cargo, as well as integrator/express cargo generated by FedEx.

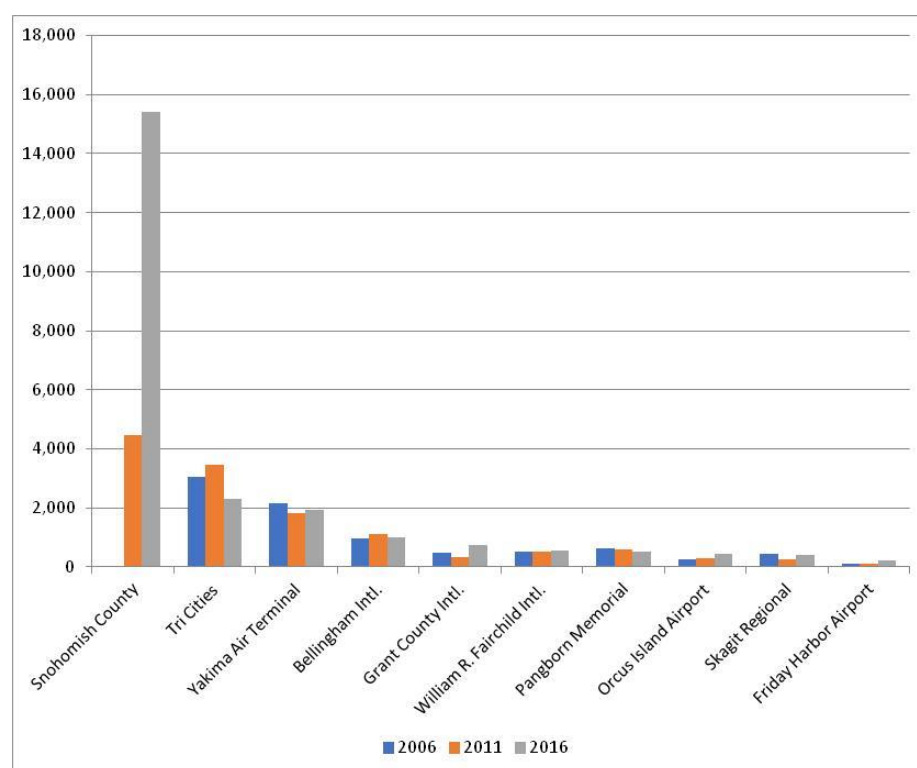
Air cargo at **King County International** is generated exclusively by the integrator all-cargo carrier, UPS.

Spokane International Airport is utilized as an integrator/express cargo hub for the Pacific Northwest. It is dominated by FedEx and UPS with a combined market share of 97 percent. The remaining 3 percent is carried by passenger airlines.

The air cargo at **Snohomish County Paine Field** in 2016 was generated by special modified wide-body freighters as a part of the Boeing Company’s 787 airplane manufacturing and assembly program. Origin and destination cities for cargo generated at Paine Field included Anchorage (a trans-Pacific transload point), Charleston, Nagoya and Wichita. The general cargo demand in Snohomish County is served through Sea-Tac and King County International Airports.

Air cargo activity at **other airports in Washington state** (Figure 3) is generated almost exclusively by FedEx and UPS with small quantities of enplaned and deplaned cargo by Alaska/Horizon Airlines. Lower-deck (belly) cargo capacity at smaller airports in the state is limited due to the smaller regional aircraft utilized to serve these markets.

Figure 3. Secondary Washington State Air Cargo Markets (metric tons)



2.3 WASHINGTON STATE AIR CARGO MARKET CAPTURE

Sea-Tac is one of the United States’ principal gateways for international air cargo, especially for trade with East Asia. In terms of U.S domestic regions, the airport serves the Washington state and, in some cases, broader U.S. regional markets. The extent of an airport’s geographic market reach varies widely by product, origin, and destination. An analysis performed for this study evaluated the ability of Washington state airports to capture the market in product categories.

The basic question for exports is whether Washington state airports ship all of the goods produced in Washington state, or are some of those goods shipped out of airports in other states or provinces? For imports, the question is whether Washington state airports serve demand for goods generated only in the state or demand in other states? In other words, how well does an airport's market serve Washington state and states beyond Washington, including Oregon and California to the south and Idaho and other states to the east? To understand the market reach and opportunities for state airports, the study analyzed the top commodities for exports and imports, focusing on the largest international markets: East Asia and Europe.

2.3.1 Exports

Washington state and Sea-Tac exports are concentrated in perishable foods. Fresh cherries and seafood together represented over a quarter of the airport's air cargo exports in 2016. These commodities were destined almost entirely to East Asian countries.

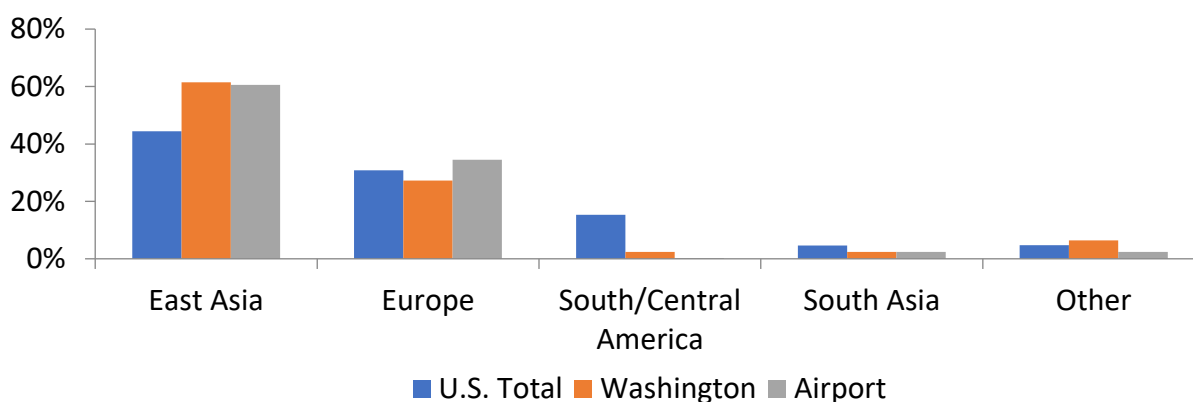
While Sea-Tac's export volumes of seafood seem to be relatively balanced with Washington state exports, it appears that a large share of cherry exports may be handled by out-of-state airports, including Vancouver, BC. While this may be due to a variety of seasonal capacity, flight service, or other logistics and market issues, addressing the cherry imbalance may represent an opportunity for Washington state airports to increase air cargo volumes while reducing transportation costs to exporters.¹

For most other export product categories going to Asia, Washington state airports already capture most of the goods produced in the state, as well as those shipped from nearby states. For the European market, there may be more limited opportunities to export Washington state goods from the state's airports.

2.3.2 Imports

Total Washington state air imports are heavily skewed to volumes from East Asia and, to a lesser extent, Europe, as shown in Figure 4.

Figure 4. United States, Washington State, and Washington State Airport Shares of Air Imports by World Region



Source: U.S. Census Bureau Foreign Trade Statistics

Washington state airports imported 68.0 thousand metric tons in 2016 (1.6 percent of the U.S. total). Sea-Tac handled 64.4 thousand metric tons, or 95 percent of the state's total. In aggregate, this would indicate that Sea-Tac's geographic market reach generally corresponds to Washington state, with some shippers also using airports outside the state. However, this measure of Sea-Tac's market area varies widely by commodity and origin of imports. For example, Washington state airports handle a much higher volume of aircraft parts than is used by Washington state. Conversely, Washington state imports a large volume of electronic goods, most of which come in through California airports.

The conclusion from this analysis is that Sea-Tac serves the Pacific Northwest import market for international air cargo for the most part very well, but with exceptions in specific commodities and overseas regions.

Additional detail on commodities and markets is included in Chapter 3 of the *Market, Facilities and Forecast Technical Report* (Appendix A).

3 Washington State Air Cargo Forecast

3.1 OVERVIEW

Chapter 5 of the *Market, Facilities and Forecast Technical Report* (Appendix A) provided an estimate of a 10-year forecast of air cargo demand for Washington state. The forecast was then compared to existing and proposed state air cargo facilities to identify possible areas of congestion with the state airport system in Chapter 6. It was also used to identify opportunities and constraints and develop a statewide air cargo strategy in subsequent tasks.

Table 1 provides a summary of the Washington state 10-year preferred air cargo tonnage forecast. The projected 10-year average annual growth rate for air cargo demand in the state is 4.4 percent, driven primarily by the express/integrator and international cargo markets.

Table 1. Air Cargo Forecast for Washington State* (metric tons)

	Sea-Tac	King County Intl	Spokane Intl	Non-hub Airports	Total State
Historical					
2016	366,430	114,364	61,396	23,538	565,728
Forecast*					
2021	504,100	151,600	71,200	26,000	752,800
2026	579,800	176,700	85,500	28,700	866,700

*Many of the factors influencing future aviation demand cannot necessarily nor readily be quantified. As a result, the forecast process should not be viewed as precise, particularly given the major structural changes that have occurred in the air cargo industry, the uncertain global economy and trade outlook, and the security regulations imposed by ongoing terrorist threats. Actual future traffic levels addressed here may differ materially from the projections presented herein because of unforeseen or unrealized events.

3.2 RECENT MARKET TRENDS AFFECTING AIR CARGO

3.2.1 Global Economic Trends

Globalization of world markets has expanded trade activity. Global economies are interdependent, and global integration is at a stage that is unprecedented since the late 19th and early 20th centuries. In 2015, over \$16 billion of goods traveled by air each day—1/3 of all world trade by value.

Free-trade agreements have played an important role in opening foreign markets to U.S. exporters. In 2017, the United States held free-trade agreements with 20 countries. In 2015, 47 percent of U.S. goods exports went to free-trade agreement partner countries. U.S. merchandise exports to the 20 free-trade agreement partners with agreements in force totaled \$710 billion. The United States also enjoyed a trade surplus in manufactured goods with U.S. free-trade agreement partners totaling \$12 billion in 2015. Recent changes in trade policy have created uncertainty in a number of air cargo markets, including cherry shipments to China.

Over the medium and long terms, demand for aviation is driven by economic activity. A growing U.S. and world economy provides the basis for aviation to grow over the long run. The 2017 Federal Aviation Administration forecast calls for international air cargo growth over the next 20 years to average 3.8 percent per year. In the near term, IHS Global Insight projects that world economic growth will pick up from its 2016 low of 2.4 percent to 2.8 percent in 2017 and 3.1 percent in 2018. IHS Global Insight predicts world real GDP to grow at 2.9 percent a year between 2017 and 2037.

Historically, air cargo activity has moved in synch with GDP, influenced by fuel price volatility, movement of real yields, and globalization. Over the past five years, however, profound structural changes have occurred in the air cargo industry, including the following:

- Tighter air cargo security regulations issued by the U.S. and EU regulators
- Market maturation of the domestic express market (e.g., UPS, FedEx)
- Domestic U.S. modal shift from air to other modes (especially truck)
- Significant shifts in the cost of oil
- Growth in international trade from open skies² agreements
- Increased use of mail substitutes such as email
- Emergence of the cross-border e-commerce market
- Change in U.S. trade policy

3.2.2 Washington State Economic Trends

According to the September 2017 Washington State Economic and Revenue Forecast, the Washington state economy is expanding at a solid pace and growing faster than the national economy. Washington state's per capita GDP increased from \$55,780 to \$56,831 in 2016 while the state's #10 rank remained unchanged. Reported in the 2017 Washington State Economic Climate Study, Washington state ranked 2nd in exports as a percentage of personal income in 2016 for the fourth consecutive year.

As shown in Figure 5, air exports from Washington state accounted for \$8 billion in 2016 and air imports to Washington were \$6.8 billion.

² Open Skies agreements set liberal ground rules for international aviation markets and minimize government intervention. Provisions apply to passenger, all-cargo and combination air transportation and encompass both scheduled and charter services.

Figure 5. Washington State Air Imports and Exports

3.2.3 World Air Cargo Trends

World air cargo traffic has averaged 5 percent growth per year between 1985 and 2015. Growth slowed as fuel prices began to rise in 2005, and many shippers began to divert freight to truck or ocean modes of transport. The global economic downturn of 2008–2009 dragged down all modes of freight transport resulting in a 13 percent drop in world air cargo traffic over the two years ending in 2009. Air cargo has grown only modestly for the past seven years. Recent strong increases in consumer confidence, along with the impact that growing sectors such as e-commerce and pharmaceuticals resulted in a surge in air freight growth. International air cargo grew by 9.9 percent year-on-year in 2017.

3.2.4 Industry Forecasts of Air Cargo Activity

According to most industry analysts, worldwide air cargo is expected to rise between 3 percent and 5.5 percent per year over the next 20 years. This growth relates to an improving world economy and accelerating rates of international trade.

Worldwide, air cargo grew by 9.0 percent year-on-year in 2017, the strongest calendar-year of growth since 2010. Air cargo grew more than twice as fast as global trade volumes during the year as a whole—the widest margin of out-performance since 2010. A number of factors are likely to be contributing to the out-performance, including increases in consumer confidence, along with the impact of the growing sectors of e-commerce, pharmaceuticals, and perishables.

More detail on outlooks from leading industry forecasters (e.g., Boeing, Airbus, Federal Aviation Administration and International Air Transport Association) are presented in Chapter 5 of the *Market, Facilities and Forecast Technical Report* (Appendix A). That report also details the key factors influencing the forecasts, including monetary policy, economic trends and changes in distribution and consumption, among them fuel prices and e-commerce.

3.3 FORECAST OF AIR CARGO FOR WASHINGTON STATE

3.3.1 Introduction

The development of an air cargo demand forecast involves both quantitative analysis and subjective judgment. In general, past air cargo activity data are examined in anticipation of identifying past trends that will give an indication of future activity levels.

Typically, the most reliable approach to estimating aviation demand is through the use of more than one analytical technique. Methodologies considered for forecasting generally include both a bottom-up and top down approach using regression analysis, time-series extrapolation, and market share analysis. Forecasts of air cargo activity prepared as part of existing or ongoing master plans at Sea-Tac, King County, and Spokane International Airports were also reviewed and considered.

Many of the factors influencing future aviation demand cannot necessarily nor readily be quantified. As a result, the forecast process should not be viewed as precise, particularly given the major structural changes that have occurred in the air cargo industry such as airline deregulation, trucking deregulation, the advent of Open Skies, the war on terrorism, and recent changes in trade policy. Actual future traffic levels addressed here may differ materially from the projections presented because of unforeseen or unrealized events.

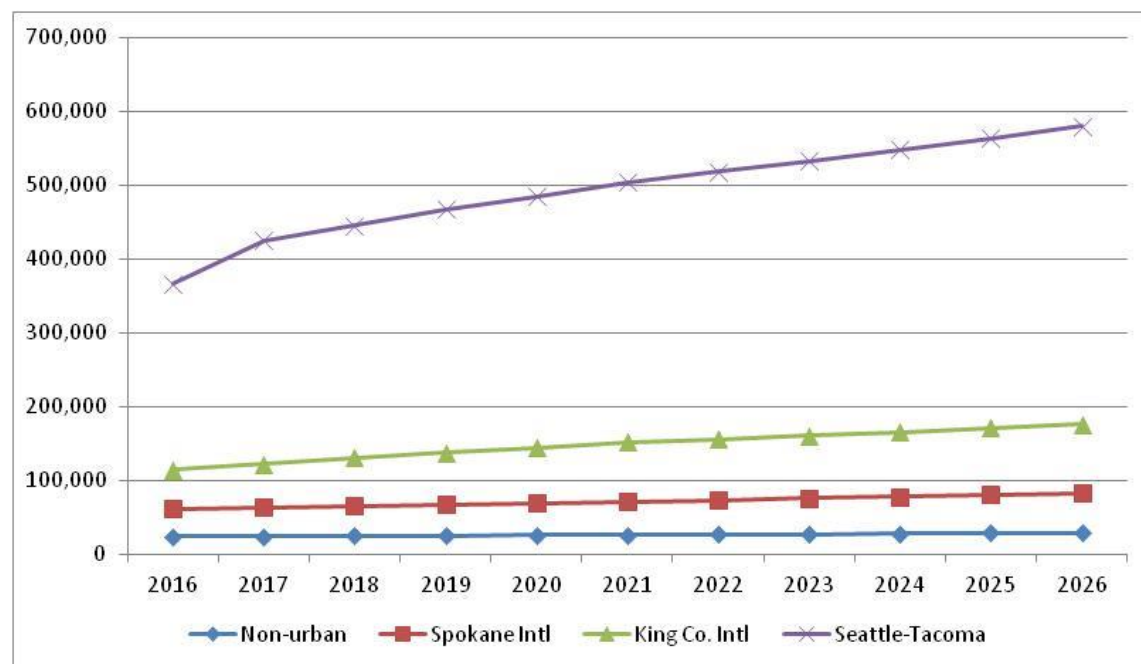
3.3.2 Forecast Summary

The preferred air cargo forecast for Washington state is presented in Table 2 and illustrated in Figure 6. Washington state's compound annual growth rate for the forecast years 2017 through 2026 is 3.52 percent; over the 10-year period from 2016, the growth rate is 4.36 percent. It is expected that the Seattle market will continue to dominate the Washington state air cargo market for the duration of the forecast, with Sea-Tac maintaining the largest share.

Table 2. Washington State (Preferred) - Air Cargo Forecast

	Year	NonUrban	Spokane Intl/	King County Intl	Sea-Tac	Total WA State
Historical	2016	23,538	61,396	114,364	366,430	565,728
	2017	24,009	63,238	122,369	425,000	634,616
	2018	24,489	65,135	130,935	445,485	666,044
	2019	24,979	67,089	137,482	467,164	696,714
	2020	25,478	69,102	144,356	485,249	724,185
Forecast	2021	25,988	71,175	151,574	504,104	752,841
	2022	26,508	73,310	156,121	518,399	774,338
	2023	27,038	75,509	160,805	533,106	796,458
	2024	27,579	77,775	165,629	548,238	819,220
	2025	28,130	80,108	170,598	563,806	842,642
	2026	28,693	82,511	175,716	579,824	866,744
	2017-2026 AAGR		2%	3%	4.1	3.5%
2017-2026 % change		19.5%	30.5%	43.6%	36.4	36.6%

Figure 6. Washington State (Preferred) - Air Cargo Forecast

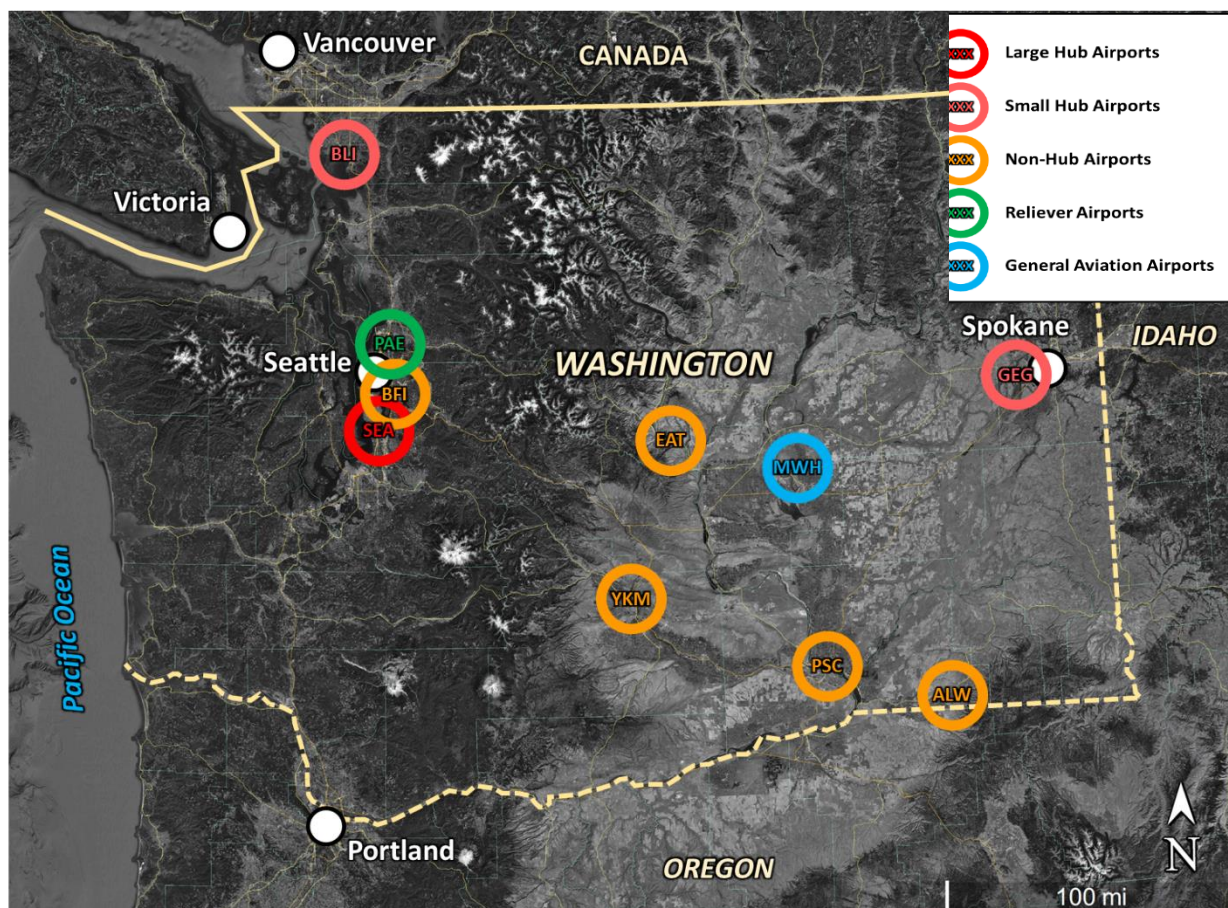


For context, and because there are many uncertainties associated with any forecast, low, preferred and high air cargo forecasts for Washington state were developed and presented in Appendix D of the *Market, Facilities and Forecast Technical Report* (Appendix A).

4 Facility Requirements

This chapter summarizes the assessment of the capabilities of the Washington state airport system to accommodate the forecasted air cargo demand that was completed in the *Market, Facilities and Forecast Technical Report* (Appendix A). Chapter 4 of that report included a detailed inventory of existing air cargo facilities at airports shown in Figure 7. Chapter 6 of that technical report then evaluated the ability of Sea-Tac, King County, Spokane and other airports to accommodate future demand, and to identify additional underutilized capacity within the state. That analysis covered airside, cargo buildings, as well as landside and road access. It did not address operational factors as those are difficult to quantify and subject to frequent change.

Figure 7. Airports Inventoried by the Study



*Airport categories are based on the National Plan of Integrated Airport Systems 2017-2021.

ALW = Walla Walla Regional Airport; **BFI** = Boeing Field (aka King County International); **BLI** = Bellingham International Airport; **EAT** = Pangborn Memorial Airport; **GEG** = Spokane International Airport; **MWH** = Grant County International Airport; **PAE** = Snohomish County Airport/Paine Field; **PSC** = Tri-Cities Airport; **SEA** = Seattle-Tacoma International Airport; **YKM** = Yakima Air Terminal/McAllister Field

This assessment of facility requirements developed a baseline of facility needs to meet projected air cargo demands. It served as a basis for an analysis of congestion, opportunities and constraints and, ultimately, fed into recommendations for how best to utilize the existing system.

4.1.1 Methodology

The main sources for this analysis were the preferred air cargo forecast presented in the previous chapter, the Washington Aviation System Plan (2017), the U.S. Transportation Research Board's Airport Cooperative Research Program (ACRP) Report 143 on air cargo facility planning and development, and information gathered in the master plans for select airports.

Due to the ACRP's credibility with their research, the study utilized their Guidebook for Air Cargo Development and Planning to help establish the requirements for air cargo facilities. The needed facilities to support the air cargo activities are developed using a model that determines the space needs of each facility based on the total tonnage required to be served.

Three key types of facilities are necessary infrastructure for handling air cargo. These areas were evaluated using the ACRP model to determine the specific facility needs for airports forecasted to receive a significant volume of air cargo activities:

- **Air Cargo Apron Requirements:** combining requirements for aircraft ramps used by aircraft to maneuver and park, and ground support equipment storage used for parking vehicles and equipment assisting aircraft and cargo operations on the ground (e.g., tow-tractors, baggage carts, containers, etc.).
- **Air Cargo Buildings Requirements:** encompassing warehouses and other cargo buildings (offices, logistics centers, etc.).
- **Truck and Auto Parking Requirements (landside):** including pavements for the maneuvering and parking of trucks for the purpose of loading and unloading freight, as well as parking space for cars (customers and employees). These needs are aggregated in the ACRP model for planning purposes.

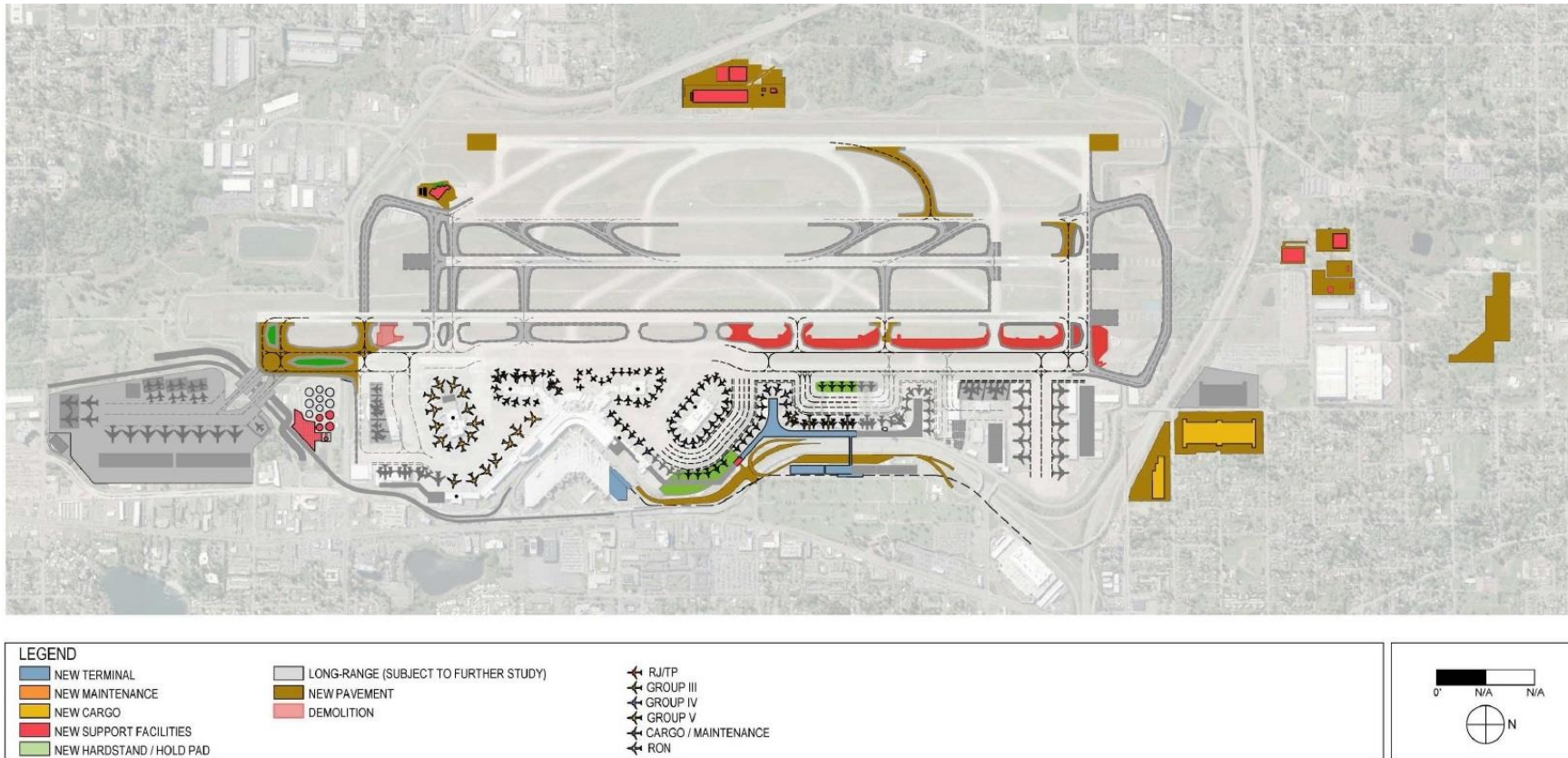
4.1.2 Findings

Key findings (further detailed in Chapter 6 of the *Market, Facilities and Forecast Technical Report* [Appendix A]) include:

- Sea-Tac, Spokane, and Paine Field Airports all have enough existing cargo ramp space to support the projected cargo forecasts for 2021 and 2026.
- King County International's existing ramp space is slightly below the forecasted needs based on the model estimates. With the primary cargo provider being UPS, the ramp space will be sufficient to meet the needs of the current cargo carriers at the forecast levels due to the nature of how UPS operates and the general estimating nature of the model. King County International is preparing its updated airport master plan, which will include developing additional ramp space to the north of the UPS ramp, and adding a new facility area on the west side of the airport.

- Sea-Tac will need additional warehouse areas to accommodate future air freight needs, which could be located either on or off the airport. New cargo facilities are being built and/or permitted within a 5-mile radius of the airport. Figure 8 depicts proposed facilities from Sea-Tac's draft master plan.
- At King County International, the model indicates that additional cargo building space will be required. Since UPS is the primary cargo carrier at this airport and its business model has the cargo transferring and sorting activities on the ramp without an on-site building, additional air cargo building space is not required. The airport is planning for a new cargo area on the west side of the airport just north of the Museum of Flight. This facility would allow for a cargo building, ramp space, and access to East Marginal Way.
- Spokane International has slightly less existing cargo building space than estimated to be needed to support the future cargo forecast. Additional cargo building space may be required at the airport to accommodate the additional forecast cargo tonnage, but there is available space at the airport to support the growth.

Figure 8. Sea-Tac - Proposed Air Cargo Redevelopment and South Aviation Support Area (Draft Master Plan)



Source: Port of Seattle and LeighFisher, 2016

5 Air Cargo Congestion

Air cargo congestion is defined as the increase in costs to shippers/operators as cargo volumes approach capacity, stressing one or more system components. Many industries stand to be affected by air cargo congestion. Airports in Washington state handled \$47.6 billion in freight in 2015, and looking to the future, air cargo value is anticipated to surge to \$174 billion by 2045.

Air cargo is used by high-value supply chains that are critical to the region's economy, and are expected to become even more important in the future. These supply chains typically use just-in-time strategies that place a very high premium on travel times and reliability. Congestion that diminishes the performance of airports and causes delays and unreliability can be particularly costly for these supply chains. It has been estimated that shippers value travel time by air 18 times higher than travel time by truck, and reliability 142 times higher by air than by truck.³ Reliability is the most important reason for shippers deciding to use air freight services, and that risks to reliability from air cargo congestion impose a substantial economic penalty to these industries.

The *Air Cargo Congestion* white paper (Appendix B) utilized a set of performance indicators to assess whether airside, landside, and access system components are congested. These indicators are interrelated, and their importance depends on market needs, leading to a complex picture where no single indicator fully captures all the symptoms of congestion.

This congestion analysis concluded that congestion is a more pressing concern at Sea-Tac than at other airports in the state. While others do face some concerns, it appears they can be easily managed. More specifically, we found the following:

- **Airside capacity** is adequate throughout the state to accommodate expected cargo volumes. Performance data shows that Sea-Tac operates better than regionally competing airports such as San Francisco and Los Angeles International Airports, and on par with other regionally important airports such as Portland, Oakland, and Salt Lake International Airports. Other air cargo airports in the state likely have adequate airside capacity given this measure. Congestion costs from airside delay and unreliability are low relative to other nearby states. Planned infrastructure investments and improvements at airports throughout the state are expected to maintain adequate airside capacity.
- **Landside capacity** is inadequate to meet the cargo needs of the main air cargo airports in the state, particularly at Sea-Tac. Planning analysis shows that Sea-Tac will begin having a deficit in cargo buildings in 2021, which will reduce the efficiency of handling cargo at this airport and could lead to system congestion. This deficit could be worsened by the rapid growth of passenger demand at this airport and increasing competition for on-airport space. As there are limited on-airport opportunities for expanding cargo building capacity, alternative strategies such as off-site facilities may be required. Several properties in the immediate vicinity of the airport, north of SR-18, have been investigated and are being considered as part of the Sea-Tac master plan. In addition, air-

³ De Jong, G., et al., *New SP-values of time and reliability for freight transport in the Netherlands*. Transportation Research Part E: Logistics and Transportation Review, 2014. **64**: p. 71-87

cargo-related businesses have begun to locate in Kent. While distribution center availability in Kent has tightened considerably in the recent past, air-cargo volumes are relatively small compared to regional trucking and distribution, so that the real consequence of warehouse market conditions needs to be further explored. A similar situation is occurring at Spokane International Airport, although in this case there is ample on-airport land available for capacity enhancements. The planning analysis also showed that there is currently a truck and passenger parking deficit at Sea-Tac, King County, and Spokane International. Reducing this deficit for Sea-Tac and King County will be a challenge because of land availability.

- **Access capacity** is restricted in Seattle airports (Sea-Tac and King County International) because the main access interstate, I-5, is rapidly becoming congested. This increases costs to shippers and trucking companies, and affects the way shipments are dispatched and managed. Even so, roadway conditions may not be a material competitive disadvantage compared to the congestion surrounding the rival San Francisco and Los Angeles International Airports. Washington Department of Transportation's Puget Sound Gateway Program includes several highway projects that will improve accessibility to Sea-Tac. Access capacity is adequate at other airports in the state.

While the organization of operations can affect how much air cargo can be handled, operational factors were not addressed in this analysis because their effects are hard to quantify and are subject to frequent change by the airport or federal regulations. However, airports should pay attention to operations since organization and services can maximize facility capacity.

Air cargo congestion at Sea-Tac would not only reduce the performance of the airport and increase costs to shippers, but it could possibly force shippers to consider other regionally (West Coast) competitive airports. An analysis was conducted to assess the impacts of a hypothetical shift of 10 percent of cargo demand at Sea-Tac to other airports. It was found that truck vehicle miles traveled in Washington state would increase by 320,000 to 740,000 per year. This increase would generate significant emissions of pollutants and increase the accident risk on highways. Moreover, having to truck freight to regionally competitive airports would cost shippers from \$760,000 to \$5 million per year, depending on which airports the demand would shift to.

More details on the analysis can be found in the *Air Cargo Congestion* white paper (Appendix B).

6 Evaluation of How to Use Existing Capacity Across the State

6.1 INTRODUCTION

The *Evaluate How to Use Existing Capacity Across Washington State* white paper (Appendix C) assessed the strengths, weaknesses, opportunities and threats at selected airports related to their ability to attract air cargo. It evaluated the potential for Washington airports to attract the following:

- Traditional all-cargo airlines
- Passenger belly-cargo airlines
- Integrator/express all-cargo airlines
- Third-party logistics companies/distribution centers

6.2 BASIC COMPONENTS NEEDED TO ATTRACT & MAINTAIN AIR-CARGO AIR SERVICE

There are certain basic factors, or components, that airports need to satisfy to attract and maintain air cargo service. These components can be divided into five distinct areas:

- Airport Market Area Requirements
- Airport Location Requirements for Integrators
- Airport Infrastructure Requirements
- Financial Environment
- Operational Freedom

All five criteria are interrelated and are important to cargo carriers and forwarders, although priorities vary among different airline types. They were used to evaluate the airports.

Traditional all-cargo airlines provide airport-to-airport freighter service utilizing a network of air cargo terminal operators and freight forwarders. There are few limits on the size and or type of cargo carried by the traditional all-cargo airlines.

Passenger belly-cargo airlines also provide airport-to airport air cargo service for freight forwarders utilizing the lower deck of their passenger aircraft.

Integrator/express all-cargo airlines provide door-to-door small package time definite service typically using their own aircraft, truck and package sorting facilities; (e.g., FedEx, UPS, and DHL)

Third-party logistics companies provide outsourced logistics services and can offer value-added services such as custom packaging or product enhancement, thus freeing the client to focus on running core operations.

6.2.1 Airport Market Area Requirements

While the size of a local market area is important to all carriers, the threshold at which a carrier can initiate service in a particular market differs significantly among types of air carriers.

Airport market area thresholds tend to be more of a concern to the belly carriers operating freighter aircraft, and traditional all-cargo carriers providing airport-to-airport service, than to the integrator/express airlines. Integrator/express airlines carriers, by the nature of their hub-and-spoke networks, have more flexibility in assigning the appropriate level of resources to serve a particular market.

The traditional airport-to-airport all-cargo carriers rely primarily on freight forwarders to generate much of their business, and freight forwarders rely on the traditional all-cargo carriers and passenger belly-cargo airlines to provide lift. Freight forwarders consider integrator carriers to be their direct competitors. Only when integrator carriers have the only service to a point will freight forwarders use their service.

MARKET CRITERIA FOR TRADITIONAL ALL-CARGO AIRLINES

Some of the market-oriented criteria considered important to air carriers operating wide-body passenger aircraft and the all-cargo airlines providing airport-to-airport service are as follows:

- Strong local production and consumption (up to 100 miles) of air-eligible commodities
- An additional secondary market within 400 miles
- Interlining⁴ capabilities with connecting passenger carriers, charters, and motor carriers
- A strong presence of freight forwarders in the local market place
- Warehouse distribution services for both local and long-distance distribution

These criteria are basic market guidelines as to the reasonableness of attracting air cargo service to an airport.

6.2.2 Airport Location Requirements for Integrators

For integrator carriers, the most important considerations are the actual physical location of an airport in relation to the carrier's distribution network as well as proximity to shipping and receiving customers. This contrasts with scheduled all-cargo and passenger belly-cargo airlines, which depend primarily on a sizable regional market.

The **integrator/express all-cargo airlines** (such as FedEx, UPS, and DHL) provide single-vendor door-to-door time-definite service. Operations by the integrators can be segmented into two categories: ground operations and airport operations.

⁴ Interlining is the movement of cargo between different transportation companies on its journey from origin to consignee.

The airside efficiency of the integrator/express all-cargo airlines is possible through the utilization of an extensive hub-and-spoke network system. Flights are fed from the originating city to hubs throughout the United States. At the hubs, the freight is sorted and redistributed to other flights for carriage to dozens of destination cities.

On a ground operation level, fast and affordable delivery is predicated on the integrator/express all-cargo airlines' locations relative to its customers. Local ground operations (1) pick up freight from stationary drop boxes and variable customer pick-up locations and then transport it to the airport on or ahead of schedule; and (2) pick up freight from the airport and deliver it to customers at variable locations before delivery deadline. The variability of either the pickups or dropoffs makes efficient routing and scheduling difficult. For these reasons, the integrator must be located at an airport that is physically close to its local market.

Measures of accessibility for the integrator airlines include the following:

- Percentage of businesses within X miles or Y minutes of a particular airport
- Percentage of population (as “markets”) within X miles or Y minutes of an airport
- Percentage of population residing within a 10-minute or a 2-mile radius of pick-up and drop-off facility
- Percentage of businesses, by industry/commodity, that have satisfactory access to preferred/relevant mode or to preferred suppliers/market
- Percentage of package goods shippers within X miles of an airport
- Percentage of shipments (ton or package miles) to just-in-time industries

SUMMARY

In summary, airlines consider the following key airport location factors:

- Fit of the existing transportation network to the specific carrier
- Proximity to customers
- Quality of the local roadway network
- Connectivity to interstates/highways

6.2.3 Airport Infrastructure Requirements

Regardless of the suitability of the local and regional market and geographical location requirements, basic airport infrastructure requirements must be met for an air carrier to select a particular airport. Some of the most important of these requirements include adequate runway length and pavement strength to accommodate wide-body aircraft, 24-hour air traffic control operations, de-icing capabilities, aircraft rescue and fire-fighting facilities, adequate fuel availability, a precision instrument approach landing system, and an acceptable number of days that the airport could be closed because of poor weather conditions.

In summary, the following key airport infrastructure factors influence carrier decisions:

- Runway characteristics
- Aircraft parking and ground-handling capabilities
- Landside facilities and services
- Interstate highway access

6.2.4 Financial Environment

The financial requirements for carriers analyzing potential airport locations vary considerably depending on carrier, regional location, market and anticipated hub size. In its simplest form, the financial requirements of carriers relate primarily to the reasonableness of the following:

- Typical operating costs are landing fees, aircraft parking fees, fuel and fuel flowage fees, and building and ground rentals.
- Transparency of accounts refers to the carrier's ability to know the basis of costs for which they are charged by the airport. This is important to any business with thin operating margins such as the air cargo business.
- Non-discriminatory treatment refers to the airline not being charged fees over and above the cost of actual services used.

Less definable financial requirements include various economic incentive packages that may be the ultimate deciding factor between two potential airport locations with similar qualities. In the United States, economic incentive packages have become the norm for airlines in locating new station operations. Incentive packages can range from temporary exemption of landing fees and deferred property taxes to multimillion dollar tax breaks.

When UPS was deciding whether to relocate or expand its Louisville, Kentucky, primary hub operation, it was offered an incentive package that included a \$35 million income-tax break and a \$3 million annual benefit from a new \$1 million cap on the state sales tax on jet fuel. Another key component of the package for UPS was a program called the Metropolitan College Plan. This plan was designed to provide workers for UPS in the tight local labor market. It promises workers at the air hub free college tuition for as long as they work at UPS. Workers can get free tuition at the University of Louisville, Jefferson Community College or Jefferson Technical College, and they can pursue a two- or four-year degree.

In summary, the key financial factors that affect air cargo carriers at airports relate to the following:

- Operating costs
- Transparency of accounts
- Economic incentive packages

6.2.5 *Operational Freedom*

Operational freedom is a broad term for a variety of important factors related primarily to national policy issues. The freedoms of the air are a set of commercial aviation rights granting a country's airlines the privilege to enter and land in another country's airspace. Included in this category are the necessary permissions related to routes, frequencies, pricing, operational flexibility, intermodal services, and self-handling. Perhaps the most important of these freedoms is the schedule of agreements related to available routes that an air carrier can fly.

The route schedule of a bilateral airline agreement determines the points that may be served in carrying traffic between bilateral partners' countries and between these countries and third countries. The most desirable for any airline—called an open route—permits airlines to operate from points “behind” their homelands via their homelands and intermediate points to points in the bilateral partner's country and beyond. Restrictive agreements contain “narrow” route schedules that specify limited, named points that may be served and frequently limit the destinations that may be served intermediate to and beyond the bilateral partner's country.

In terms of operating freedom at an airport, airlines must consider the following key factors:

- Permissions
- Operating flexibility
- Ability to use intermodal services

6.2.6 *Highlights of Basic Components Needed to Attract Air Cargo Service*

Depending upon the type of air carrier, the relative importance of the five decision choice factors (Market Requirements, Location, Infrastructure, Financial Environment, and Operational Freedoms) for determining the feasibility of introducing air cargo service to an airport will vary significantly.

For the traditional all-cargo airlines, having a large local and secondary market is important in choosing which airport to serve. The integrators must first consider an airport's geographic location relative to their existing hub-and-spoke network and distance from the airport to their customer base. Both types of carriers must also consider runway length, taxi distances, availability of aircraft parking, storage for ground service equipment, truck marshalling areas and other basic infrastructure needs.

There are, of course, a few exceptions to the decision factors outlined above. For example, Panalpina (a large international freight forwarder) has established all-cargo airline operations at Huntsville, Alabama (a non-hub airport) with little or no local market. The all-cargo operations primarily support a major customer but also serve Panalpina's existing U.S. Southeast and Mexico distribution network.

In another example, an all-cargo airline with an established customer base distributed throughout a multi-state region may choose to locate at an uncongested airport on the outskirts of a large metropolitan area. Since the average time for an international air freight shipment is six days, locating at an airport with good interstate highway access and away from congested airspace and crowded local highways, and offering low operating costs would give the carrier adequate access to both the local and

regional markets. An example of this type of situation is Columbus Rickenbacker International Airport, which—by positioning itself as a cargo friendly, uncongested airport with an adjacent logistics park, located on the outskirts of both the Chicago and New York hinterland markets—has attracted Cargolux, Cathay Pacific and Emirates Skycargo freighter operations.

6.3 BEYOND THE BASICS

Beyond the basic factors discussed in the previous sections, certain additional qualities make a competitive air cargo airport. The following qualities characterize a more mature air cargo airport and reflect the need for a long-term strategy in building capacity:

- A successful local cargo industry:
 - Thriving home based-carrier and their alliances with other airlines
 - An independent and adequate choice of ground-handling agents
 - A business-oriented Customs, smooth operations and adequate IT infrastructure to support e-freight operations and Cargo Community Systems
 - Presence of an Express/Integrator hub with an extensive spoke system
- A balanced global and continental network with:
 - Connections to key economic centers in the world
 - Extensive freighter networks to most global hubs
 - Excellent connections to secondary markets
 - Connections between Sea-Air transport
- Ample long-term capacity
- A strong market position and strategy

Chapter 4 of the *Evaluate How to Use Existing Capacity Across Washington State* white paper (Appendix C), evaluates select airports within Washington state that could physically accommodate air transport aircraft to perform air cargo operations with the five criteria outlined in Section 6.2.

6.4 ASSESSMENT OF OPPORTUNITIES

Chapter 5 of the *Evaluate How to Use Existing Capacity Across Washington State* white paper (Appendix C) evaluates the opportunities of Washington state airports to support varying types of air cargo based businesses based on the synthesis of information summarized in the previous sections. Each airport was evaluated as to its the potential to attract the following key markets:

- Chartered traditional all-cargo airlines
- Scheduled traditional all-cargo and passenger belly-cargo airlines
- Integrator/express all-cargo airlines
- Third-party logistics companies/distribution centers

As described previously, Sea-Tac is a successful and growing air cargo airport owned and operated by the Port of Seattle. Current peak-period congestion issues aside, the airport has a well-developed infrastructure, a mature airline and forwarder base, and the

Inland Washington state airports can have some influence on service consistency by promoting themselves to top-tier air cargo airlines.

management expertise to successfully chart its future course in the air cargo market. Therefore, this section provides some insights as to opportunities that other Washington state airports could pursue growing their own air cargo and logistics services markets. Various air cargo market segments that will be discussed include air cargo charters; non-integrator (or traditional) airlines, which includes scheduled passenger belly carriers and freighters; the integrator airlines; and airport logistics parks.

6.4.1 Chartered Traditional All-Cargo Airlines

The international and domestic charter business is growing, and a number of air carriers and airports are capitalizing on charters for increasing their share of the air cargo market. All-cargo charters do not rely on passenger service or integrator service. Therefore, they present an opportunity for smaller, non-hub airports that have the appropriate facilities and are proximate to a significant source of air cargo demand.

Air charters are used by importers and exporters to supplement scheduled freighter capacity during peak times of the year—for providing needed capacity for certain seasonal exports such as perishable commodities and for missed production schedules—and by importers for holidays such as Christmas. International charters are also important because they allow service by a foreign flag carrier that does not enjoy an Open Skies agreement⁵ with the United States, or is limited in the cities it may serve under a bilateral agreement.⁶ Charters are a way of branching out to alternative cities and offer a way for a carrier to test a cargo market without committing its own resources. As described previously, a good example of an airport that is currently accommodating specialized international air charters (for the Boeing Company) is Snohomish County Paine Field.

COMPETITIVE FACTORS

The primary drivers of the air charter market are the freight forwarders and third-party logistics (3PL) service providers. Freight forwarders and 3PL providers consider the following three factors when choosing an airport for both domestic and international charters, as well as international scheduled service:

- Convenience
- Pricing
- Consistency

⁵ The EU-US Open Skies Agreement is an open skies air transport agreement between the European Union (EU) and the United States. The agreement allows any airline of the European Union and any airline of the United States to fly between any point in the European Union and any point in the United States.

⁶ Bilateral air transport agreements cover the basic framework under which airlines may engage in international commercial air transport services between two countries.

First, to be competitive, it must be convenient for freight forwarders to utilize a secondary or non-metropolitan or rural airport rather than a large metropolitan gateway airport. Second, and most important, is pricing. The freight forwarder community will not move from their traditional lanes unless there is a price incentive in the form of lower distribution costs, lower liability costs, labor or lower airport fees. Thirdly, the service must be consistent and adhere to promised schedules.

Regarding pricing, one of the main advantages of most Washington state airports is the lack of congestion. The congestion factor at Sea-Tac may have an impact on fuel requirements and add to the flight operating cost. Delays at inland Washington state airports are almost non-existent. Other relevant costs that can be competitive with Seattle, Portland, and Vancouver, BC, include ground-handling fees, on-site storage, and hotel accommodations for the flight crews.

Consistency of service is something over which the airport will have little control, other than to ensure that the airport operates 24 hours a day, seven days a week. From the forwarder's perspective, consistency relates more to the ability of the airline servicing the airport to adhere to published schedules. Plaguing the all-cargo airline industry are some air carriers who operate less modern freighters or who have a limited number of aircraft and do not have replacement aircraft in the case of a mechanical problem. Inland Washington state airports can have some influence in this area by promoting themselves to top tier air cargo airlines.

ASSESSMENT

Several Washington state airports may compete well for the all-cargo air charter business based on convenience and geographic proximity to important Washington state products as well as access to growing markets. These include Spokane International, Grant County International, Paine Field in Snohomish County, and King County.

Spokane International Airport and Grant County International Airport are the two closest airports to cherry exporters in central Washington state (Figure 9) and have the runway length and pavement strength capable of handling wide-body freighters. As discussed in Section 3.2.1 of Working Paper 1, Washington state exported by air approximately 20,000 metric tons of cherries in 2016. This volume resulted in approximately 100 international air charter flights at Sea-Tac. As can be seen, air charters already provide some additional capacity needed for seasonal peaks of shipping perishable commodities.

Figure 9. Cherry Exporter Locations in Washington State



However, a good location must be weighed against the availability or lack of cargo handling service available at these two airports. Spokane International Airport has the ability to ground handle a large B747 or MD 11 freighter, and Grant County International Airport recently acquired ground-handling equipment to accommodate wide-body aircraft. Beyond ground handling, each airport must also consider the need to develop warehouse services including cold storage and 3PL providers that will allow forwarders to break down containers that are off-loaded from charter aircraft, or to consolidate shipments for outbound service.

King County International Airport has a convenient downtown Seattle location close to I-5 and could be attractive to air charter operators, particularly small freighters delivering “hot shot” deliveries of critical medical supplies or assembly line replacement parts. The airport’s lack of large aircraft parking positions and cargo warehouse facilities limits its regular use by itinerant wide-body freighters.

Snohomish County Paine Field accommodates specialized large aircraft charter operations related to Boeing Company’s 787 airplane manufacturing and assembly program. Due to the airport’s I-5 location and access to the Puget Sound market, there is potential to expand its charter business into other markets.

Bellingham International Airport is similarly located on the I-5 corridor and is only minutes away from the United States–Canadian border, and could take advantage of this opportunity in a couple of ways. Firstly, in the past, niche players in the cross-border small-package business utilized air taxi charters to deliver time-sensitive shipments between Bellingham and Victoria, British Columbia, to avoid the high cost of international commercial air shipments. Secondly, as the cross-border e-commerce business grows, there may be potential to further develop this market.

Air Charter Example: Cherry Pilot from Grant County International Airport, Summer 2018

Grant County International Airport had been actively soliciting charters for cherries for years. In 2017, the backups at Sea-Tac during peak cherry season were such that the berries sat too long and got too warm and the quality of this luxury item was compromised. In June 2018, a major shipper of fresh fruit initiated a pilot project to prove the concept for shipping cherries from Moses Lake to China.

- **Result:** Eleven charter planes carried 200 to 250 thousand pounds of cherries each, for a typical time of three days from tree to international customer while maintaining consistent cold temperatures. The cold chain was proven successful.
- **Grant County’s advantage:** Improved fruit condition resulting from significantly less truck travel due to proximity to orchards and significantly reduced dwell time in summer heat due to efficiency of handling. In addition, the airport boasts significantly cheaper airport landing fees than Sea-Tac.
- **Grant County’s investment:** Provision of an existing air cargo freight loader, conversion of a maintenance hangar to cold storage using temporary cooling units, paving and electrical upgrades.

6.4.2 Scheduled Traditional All-Cargo and Passenger Belly-Cargo Airlines

The scheduled traditional air carriers comprise both the non-integrator (or line-haul) category of all-cargo airline that provide airport-to-airport service as well as the scheduled passenger airlines that

carry air cargo in the lower hold of the aircraft (belly-cargo carriers). In this section, we discuss the non-integrated, traditional carriers that are supported by an established structure of freight forwarders, consolidators, and trucking services located on or near the airport.

No non-integrator all-cargo airlines or wide-body passenger airlines provide regularly scheduled service to Washington state airports other than Sea-Tac. Small feeder airlines (e.g., ABX Air, Airpac, Ameristar, Swift Air) support FedEx, UPS, DHL and Amazon Air operations at smaller airports within the state. Alaska Airlines provides narrow-body belly cargo service to Bellingham, Pasco/Tri-Cities, Pullman, Spokane, Walla Walla, Wenatchee, and Yakima. To airports other than Spokane and Bellingham, air cargo shipments are limited to 150 pounds per piece. No outbound belly cargo is accepted by Alaska Airlines at Walla Walla or Pullman due to aircraft capacity and limited runway length at these airports.

Domestically, there are a very limited number of non-integrator U.S. all-cargo carriers, if any, outside of Alaska that provide scheduled line-haul freighter service between points in the United States using transport-size (Boeing 737 or larger) aircraft. Most of this market shifted to trucks starting in 2005.

COMPETITIVE FACTORS

A primary consideration for non-integrated all-cargo carriers and combination carriers flying freighters and/or belly cargo is to locate at an airport with strong local production and consumption of air-eligible commodities within 75 to 150 miles, with an additional market within 400 to 800 miles.

ASSESSMENT

Washington state has a growing manufacturing base, but when outside the Puget Sound region, it is mostly small specialized markets. Nevertheless, the inland locations of Spokane International and Grant County International Airports have positive attributes that can provide opportunities for niche markets or potential freight gateways for the traditional international air cargo airlines.

Spokane International Airport is located 25 miles west of the Washington-Idaho border and 110 miles south of the United States–Canadian border. It

is the primary air carrier airport serving a 36-county region encompassing eastern Washington, northern Idaho, western Montana, northeastern Oregon and the southern portions of British Columbia and Alberta. As the economic and cultural center

of eastern Washington state, Spokane is an important point for serving the regional inland Northwest market with excellent access to the Seattle metro region, the Intermountain region (defined as the Rocky Mountains and eastern slopes of the Cascade Mountains, including Denver and Salt Lake City) and Northern California.

The inland locations of Spokane International and Grant County International Airports have positive attributes that can provide opportunities for niche markets or potential freight gateways for the traditional international air cargo airlines.

Depicted on Figure 10, Grant County International's competitive advantage is its significant airfield infrastructure that can accommodate large wide-body freighters and its driving times to most major cities on the West Coast. Located in the center of eastern Washington, Moses Lake is positioned at the

crossroads of the emerging “Cascadia” transshipment region that encompasses Washington, Oregon, Montana, Idaho, and British Columbia.

Figure 10. Grant County International Airport Situation Map



As potential freight gateways, Spokane International and Grant County International can offer the benefit of uncongested surface access, uncrowded interstate highway systems, available and easily developable land for warehouses and distribution centers, and more consistent weather for aircraft operations than Puget Sound airports.

6.4.3 Integrator/Express All-Cargo Airlines

Integrator/express companies are the dominant U.S.-based all-cargo airlines. The two top U.S. freight carriers in the nation in 2017 were all-cargo integrated airlines FedEx and UPS. Also included within this category are DHL Aviation and Amazon Air.

In general, there are only two opportunities available to airports relative to the integrator market. The first is to research and reach out to the integrators to establish basic operations at the airport. Most commercial service airports within Washington state—including Bellingham, Burlington, Pasco, Yakima, Moses Lake, Friday Harbor, Spokane, Wenatchee, Pullman, Sequim, Port Angeles, etc.—are already serviced by FedEx and/or UPS.

The second opportunity is to develop the integrators presence to the next level by establishing the airport as a part of the integrator carrier's regional hub network. This strategy may take the form of the airport marketing itself to the integrator carriers as a sort center for both ground and air operations by providing sufficient and affordable co-located facilities to accommodate both air and ground operations, or in the case of Spokane International, to develop the airport into a regional transshipment hub.

Airports should not think of themselves as only airfields, but as potential economic centers that extend beyond the airport fence and embrace partnership opportunities to help enhance and create new logistical services. The overall goal is to enhance both aeronautical and non-aeronautical activities at the airport and increase air cargo capacity and efficiencies in Washington state.

Due to the nature of their business model, the integrators are adept at being able to allocate the appropriate resources to fit a specific market. The integrators may choose to serve a particular market exclusively by truck; or by truck, small feeder aircraft, and large jet freighters; or by whatever combination of equipment most effectively fits their needs. The level of service an integrator carrier provides at an airport will also shrink or expand with varying market conditions.

COMPETITIVE FACTORS

The key to integrator growth at a particular airport is the size of the local market and the airport's physical location in relationship to that market, or to other growing markets that can be served from that particular airport.

Essential to the integrator carriers is the ability to provide to their customers the earliest possible delivery time and the latest possible pick-up time. The limiting constraint to these times is the need to meet sorting schedules at their primary Midwest or local regional hubs.

ASSESSMENT

Retention and expansion of existing service is the best option open to most Washington state airports related to the integrator market. For Spokane International, the strong integrator airline presence at the airport also presents an opportunity for the airport to attract high-level logistics and distribution service companies to the airport and vicinity. The high levels of air freight service associated with the integrator carriers are attractive to companies that depend on having access to reliable, secure, time-definite and extensive global air coverage as a part of their business models. Examples of these types of businesses include companies such as bio-tech and life-science companies, high-tech repair facilities, and other companies engaged in reverse logistics, spare-parts distributors, and e-commerce fulfillment centers.

6.4.4 *Third-Party Logistics Companies /Distribution Centers*

Logistics/distribution centers (or airport logistics parks) can provide the basis for an indirect strategy of attracting air cargo service as part of this larger multimodal distribution concept. This is an opportunity requiring a long-term outlook.

Contract logistics/distribution services are typically 3PL providers that manage all, or particular segments, of the following various functions that comprise a company's logistics system: transportation, inventory, materials handling, warehousing, customer service, order processing, or any other activity that creates value. Contract logistics services are usually spinoffs of transportation companies that have added global electronic data interchange networks, imaging and bar-coding systems, and computerized inventory management systems to their own information systems capabilities. Distribution management, including warehousing, is the most profitable logistics-service business. Target markets include the automotive, aerospace, alternative energy, advance materials, and biotechnology/pharmaceuticals.

The rationale behind marketing to the logistics/distribution industry, with the initial focus on surface distribution, is to build up the business and forwarder infrastructure in the airport region. Attracting surface-based logistics/distribution services to an airport would provide the basic freight forwarder and trucking network needed to attract air cargo and give the airport more exposure in the freight distribution industry. Certain airports within the state can position themselves as a cost-effective supply/distribution chain distribution point. Beginning with truck-based distribution, an airport-related "Inland Port and Logistics Service Center" could also accommodate air cargo charters with the long-term strategy of attracting scheduled air cargo service.

E-COMMERCE FULFILLMENT CENTERS

A variation on logistics/distribution centers, e-commerce fulfillment centers may also offer an opportunity for certain Washington state airports to attract regional and cross-border e-commerce. The growing phenomenon of internet shopping and the resultant Business to Consumer (B2C) interactions should be of particular interest to airports in Washington state. While most business transactions and logistics services taking place in the world economy are between and among businesses, B2C e-commerce is distinct because of its model of interaction. That is, a consumer shops online directly with an e-tailer (rather than a brick and mortar retailer) who then ships the purchase from his warehouse to the consumer's residence, or facilitates shipment under the e-tailer's brand from a vendor warehouse to the residence.

E-commerce sellers need a way to deliver online purchases to customers, often known as fulfillment. At a store like Walmart, fulfillment is automatic. The customer picks up the item of desire, pays for it, and walks out the door. The e-commerce B2C model cuts out the traditional visit to a store. Rather, the seller of the merchandise delivers directly to the consumer. This "last mile" or "to the door" delivery model is changing the face of the logistics-service industry.

A typical e-commerce facility needs three times as many employees as a traditional regional distribution center. The density of people is needed to package individual orders versus shipping cases or pallets to a store. To accommodate more employees, companies establishing dedicated e-commerce centers look for properties with plenty of parking. E-commerce facilities also need more electrical, heating, and cooling infrastructure than traditional distribution centers to power automated systems and keep large workforces comfortable and safe.

A company opening an e-commerce fulfillment center must also choose the right location. Like a regular distribution center, a fulfillment center needs to be close to as many customers as possible. The

same-day and next-day delivery options offered in e-commerce for a growing number of markets heighten the importance of proximity. Because direct-to-customer fulfillment generally relies on package carriers, it's best to locate in an area that offers good service from UPS, FedEx, DHL and the U.S. Postal Service.

With the right conditions in place (Foreign Trade Zone status, port of entry status, available developable land, etc.), for certain Washington state airports, an opportunity exists for attracting regional and cross-border e-commerce fulfillment centers.

ASSESSMENT

The option of developing airport-related logistics/distribution centers, airport logistics parks or inland ports, is an ideal way for small and non-hub commercial service airports to generate non-aviation revenue while building up the facilities and services necessary to attract additional air cargo to the airport, or attract it in the future. A principal benefit to the Washington state freight transportation system is that having logistics facilities and services located strategically within the state may be able to take some of the pressure off the Port of Seattle and Sea-Tac, by accommodating activities that traditionally take place at, or near, the Port of Seattle, Sea-Tac, or in the Kent Valley. It also helps develop the basic logistics infrastructure needed to attract more business to smaller metropolitan regions of the state.

This concept is not new in Washington state. As early as 2003, Spokane International Airport developed the concept of creating a logistics park as a part of an East Side Cargo Complex (Figure 11).

Figure 11. Spokane International Airport Business Park



The core of the development scheme was the utilization of the airport business park, located eight minutes from downtown Spokane via Exit 276 from I-90. The business park has a variety of buildings supporting different uses, ranging from the Geiger Correctional Facility to business incubator

operations. The business park is served by full utilities sized to accommodate industrial needs, as well as high-speed fiber optic line access. The proposed “Logistics Park” (as well as the airport as a whole) enjoys Foreign Trade Zone status (FTZ No. 224) with the authority to establish subzones elsewhere throughout the Spokane area.

To show the potential of the Spokane International Airport business park to the airport, an application has just been submitted to the Spokane County Building and Planning Department for a four-story 2.5-million-square-foot warehouse space to be constructed within the park to serve as a fulfillment center for Amazon.

6.5 CONCLUSIONS

A number of traditional and non-traditional options exist for expanding and developing new air cargo and logistics services for Washington state airports. The three most immediate air cargo development opportunities for Washington state airports are the following:

- Maintaining and expanding the existing integrator (Amazon, DHL, FedEx, UPS) operations around the state in conjunction with the private sector
- Attracting air charter operations for exports of agricultural products, particularly perishable freight and vegetables, from Central Washington airports
- Developing non-hub airports into centers for regional ground-based logistical operations

In the longer term, scheduled freighter service becomes a more realistic goal for some airports such as Spokane International, Snohomish County and, possibly, Grant County International. Also, with the emergence of e-commerce as a force in the new economy, the State of Washington should be proactive in courting e-commerce fulfillment centers, highlighting the state’s airports, Pacific Rim location, developable land and gateway hubs for the major integrator airlines.

The most effective approach Washington state airports can take with the integrator carriers is to be knowledgeable of each individual integrator carrier’s business model, since each carrier is different, and to be attuned to both the national and local market dynamics for each individual integrator carrier. As described in the next chapter, the State of Washington and individual airports should build an in-house knowledge base for Amazon, DHL, FedEx, SF Express, UPS, and the US Postal Service.

To attract the logistics/distribution market, the state should promote to individual airports the “inland port” or airport logistics park model used by Rickenbacker International Airport and Huntsville International, leveraging their designations as US Ports of Entry, Foreign Trade Zones and branding themselves “Global Logistics Centres” and actively recruiting intermodal business in the ocean cargo, railroad and motor carrier markets.

Development of the air cargo charter market will hinge on an airport’s ability to provide ground handling and cargo handling services for both narrow-body and wide-body freighter aircraft at a competitive price. Proactive marketing to introduce and promote Washington State airports to the

airline, freight forwarder and shipping community is also critical to expanding both the cargo charter market and scheduled service market.

As further described in Section 5.4 of the *Evaluate How to Use Existing Capacity Across Washington State* white paper (Appendix C), the rationale behind marketing to the logistics/distribution industry, with the initial focus on surface distribution, is to build up the business and forwarder infrastructure in the airport region. Attracting surface-based logistics/distribution services to an airport would provide the basic freight forwarder and trucking network needed to attract air cargo and give the airport more exposure in the freight distribution industry. Certain airports can position themselves as a cost-effective supply/distribution chain distribution point. Beginning with truck-based distribution, an airport-related “Inland Port and Logistics Service Center” could also accommodate air cargo charters with the long-term strategy of attracting scheduled air cargo service.

Development of airport-related logistics/distribution centers, airport logistics parks or inland ports helps small and non-hub commercial service airports to generate non-aviation revenue while building up the facilities and services necessary to attract air cargo. Logistics facilities and services located strategically within the state may be able to take some of the pressure off the Port of Seattle and Sea-Tac, by accommodating activities that traditionally take place at, or near these facilities. This also begins to develop the logistics infrastructure needed to attract more business to smaller metropolitan regions.

The next chapter describes specific recommendations and implementation strategies to follow through on these opportunities and findings. While they are directed to the State of Washington for action, success will depend on involvement and support of the private sector companies involved in the air cargo industry.

7 Recommendations and Implementation Strategies

7.1 PURPOSE, VISION, GOALS AND OBJECTIVES

7.1.1 Purpose

The recommended purpose, goals and objectives were developed in consultation with the JTC staff, the Staff Work Group and the Stakeholder Panel. They are based on the understanding of the opportunities and challenges confronting the air cargo system in the state which was developed over the course of this study.

The purpose of preparing an Air Cargo and Logistics Business Development Strategy for Washington state is to:

- Clearly define the purpose of an air cargo and logistics business development program for Washington state.
- Effectively utilize the air cargo capacity at more airports around the state.
- Establish realistic goals and objectives consistent with that purpose in a defined time frame within the State's capacity for implementation.
- Communicate those goals and objectives to air cargo stakeholders and the community.
- Ensure the most effective use is made of the State's resources by focusing on key priorities.
- Provide a base from which progress can be measured and establish a mechanism for informed change when needed.
- Build a consensus about the strategic direction Washington state airports are taking in terms of air cargo and logistics services.
- Define the State of Washington's interest and role in addressing issues arising from air cargo congestion.
- Provide policy guidance and recommendations on air cargo to supplement the Washington State Department of Transportation (WSDOT) Freight and Goods Transportation System Plan.
- Help fulfill the vision and focus areas of the Washington Transportation Plan Phase 2, which were to:
 - Maintain and Preserve Assets
 - Manage Growth and Traffic Congestion
 - Enhance Multimodal Connections and Choices
 - Align the Funding Structure with the Multimodal Vision

The Air Cargo and Logistics Business Development Strategic Plan is also designed to provide for clearer policy and market guidance for the State of Washington and provide a direct link between the State of Washington and the state's airport and air cargo community.

7.1.2 Vision

The following vision statement describes the desired outcome for the future of air cargo facilities and services in the state of Washington:



VISION

A statewide system of on-airport and off-airport air cargo facilities, working in concert to accommodate Washington's future air cargo needs with efficient facilities and services, global access, and seamless surface distribution capabilities

This statement is used to guide the development of specific goals, objectives, and strategies to attain them, to be employed by the State of Washington to realize this vision.

7.1.3 Strategic Goals

Goals are the result or achievement toward which effort is directed. The primary strategic goals for air cargo identified as part of the study process for Washington state are:

- To seek to ensure that Washington state maintains adequate in-state air cargo capacity to accommodate future levels of demand.
- To assist airports throughout the state with optimizing their existing resources in expanding the state's air cargo capacity.
- To be prepared to adapt in a timely manner to structural changes in supply chain management and distribution as it relates to air cargo.
- To integrate air cargo into other statewide freight planning and economic development initiatives.
- To make air cargo logistics a core component of State of Washington's economic platform.

7.1.4 Air Cargo Strategic Objectives

The strategic objectives to successfully fulfill the goals of the State of Washington related to air cargo are as follows:

- Retain the existing air cargo service levels within Washington state.
- Expand the level of air cargo services offered by existing airlines and forwarders.
- Attract new airlines, air freight forwarders and logistics-service providers to Washington state.
- Increase the state's air cargo lift capacity during peak cherry season.
- Attract third-party logistics providers, value added manufacturers, warehouse operators, road feeder services, etc. to Washington state by supporting ready-to-build off-airport industrial real estate sites at airports outside the Seattle metropolitan area.
- Implement a statewide air cargo community system to enable information exchange between public and private stakeholders in order to improve the competitive position of the state's air cargo airports and air cargo logistics-service providers.
- Integrate air cargo into the WSDOT Freight and Goods Transportation System Plan.
- Assist non-hub airports in Washington state in developing and attracting air cargo and other logistics services opportunities.

7.2 RECOMMENDATIONS

While the recommendations below are directed to the State of Washington for implementation, they will rely on the private sector for their success as described. The primary recommendation as set forth in the following sections is to:

- Establish an Air Cargo Development Program, including management, resource assistance, and marketing programs

Additional recommendations include the following:

- Develop an air cargo community system
- Conduct data analysis and reporting
- Support development of Airport Logistics and Distribution Centers
- Measure performance

7.2.1 Recommendation 1: Establish a Washington State Air Cargo Development Program

Some of the airports within the state have the in-house resources necessary to engage in long-range strategic air cargo business development planning (e.g., Spokane, King County, and Sea-Tac International), and have identified opportunities related to air cargo development, while other smaller

airports intuitively recognize their unrealized potential for air cargo, but are in need of additional guidance on how to move forward to enter the market.

To be responsive to the air cargo goals and objectives stated previously, the State of Washington should administer a strategy comprising the following functions:

- Air cargo development program management
- Air cargo resource development assistance program
- Air cargo marketing program

Each function is closely interrelated and dependent on each other. As documented in earlier sections of this report and the appendices, air cargo is by nature multimodal and the air cargo chain extends far beyond the airport fence line, incorporating highways, off-airport warehousing, trucking services, customs brokers, production, growing and packing facilities, etc. Air cargo airports, air cargo users, and air cargo service providers range widely in terms of organization, resources, functions, and priorities.

Sea-Tac is operated by the Port of Seattle, a special-purpose municipal corporation serving the citizens of King County. King County International Airport is owned by King County and managed by the county's Department of Transportation. Spokane International Airport is jointly owned by Spokane County and the City of Spokane. Other airports within the state are similarly owned and operated by local government entities. At present, air cargo airports in Washington state do not operate as a system.

The recommendations below are intended to provide additional support, but participation in the various programs and activities by individual airports would be voluntary. The recommendations do not establish a state management or regulatory structure over independent airports in the state. Rather they are intended to assist airports in the state to accommodate future air cargo needs. The planning, organization and implementation of airport development strategies related to air cargo would take place within an organizational structure as described below.

Recommendation 1A: Hire Air Cargo Development Program management staff

- Manage the Air Cargo Development program
- Direct reporting relationship with WSDOT and/or Department of Commerce ("Commerce")
- Manage, monitor and track performance of the Resource Development Program and Cargo Marketing Program
- Facilitate stakeholder relationships (airports, airlines, state regional development councils, freight forwarders, shippers, etc.)
- Ensure air cargo operations continuity with a management plan in case of an emergency
- Identify and research existing and emerging trends

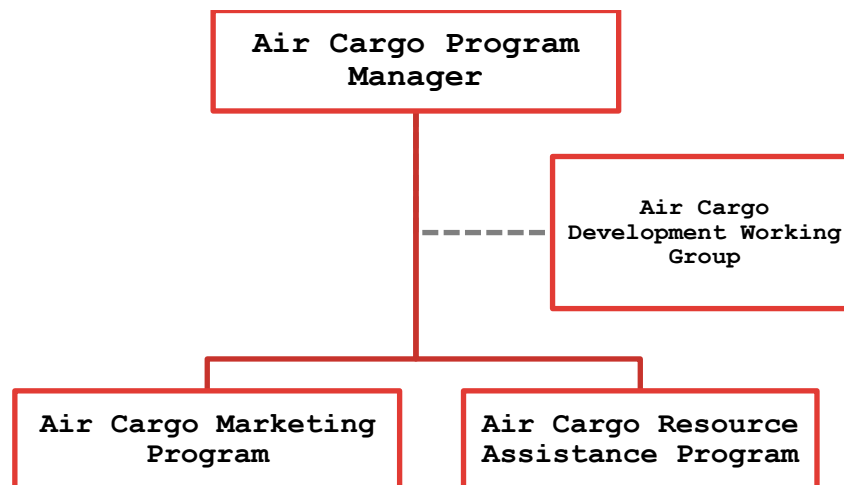
- Represent and advocate at industry and government meetings and events that impact Washington state (TIACA, ACI, AFA, ICAO, WCO, WAMA, etc.⁷)
- Build and manage partnerships (Memorandums of Agreement, joint marketing efforts, etc.)

Recommendation 1B: Convene Air Cargo Development Working Group comprising other departments within the state (e.g., Governor's office, State Department of Transportation, Department of Commerce) and select stakeholders (e.g., airports, ports, local community planning organizations, shippers, freight forwarders)

- Coordinate State of Washington grant programs, economic development initiatives and marketing programs
- Obtain feedback from stakeholder relationships
- Identify and research existing and emerging trends and issues
- Generate new programs and ideas

Figure 12 presents a simple depiction of the organizational structure. As previously discussed, air cargo is a complex system. It is operationally multimodal (air cargo depends on both air and truck operations) and its demand is directly related to the needs of the manufacturing, retail and agricultural industries. Beyond the value of the commodities that make up the air cargo market is the fact that high-value supply chains rely on the worldwide connectivity and security provided by air cargo to grow their businesses and compete in a global marketplace. Therefore, the two likely candidates to be engaged in air cargo issues within the state government are the WSDOT and the Washington State Department of Commerce (Department of Commerce).

Figure 12. Air Cargo Development Program Organization



Among the various Washington state transportation agencies that may have an interest in air cargo and freight operations are WSDOT's Aviation and Freight Transportation Divisions and

⁷ The International Air Cargo Association, Airport Council International, Airfreight Forwarders Association, International Civil Aviation Organization, World Customs Organization, Washington Airport Managers Association.

the Washington State Freight Mobility Strategic Investment Board. WSDOT Aviation, among other things, manages the Washington Aviation System Plan (WASP). Most of the programs and responsibilities related to WSDOT Aviation are geared toward small commercial and general aviation airports, but alongside of safety and airport infrastructure improvements, economic development and vitality are also a stated goal of the current WASP. Both WSDOT's Freight Division and Freight Mobility Strategic Investment Board are responsible for facilitating freight movement between and among local, national and international markets which enhances trade opportunities. Both freight programs are focused primarily on surface-transportation modes, including roads, rail, trucks and seaports.

The Department of Commerce describes itself on its website as “the one agency in state government that touches every aspect of community and economic development: planning, infrastructure, energy, public facilities, housing, public safety and crime victims, international trade, business services and more.” Three offices within the Department of Commerce that may have direct interest in air cargo issues are the Office of Economic Development and Competitiveness, the Public Works Board, and the Community and Economic Revitalization Board.

Clearly, participation by state aviation, freight transportation, and Department of Commerce programs are all necessary to deal with policy, infrastructure, operational and market development needs of the air cargo logistics industry within the state. The key, however, is how to coordinate not just future airfield, highway and warehouse capacity needs and funding, but how to lay the groundwork for an evolving air cargo logistics system in Washington state that attracts and cultivates new industries that rely on highly efficient supply chains and worldwide connectivity.

7.2.2 Recommendation 2: Create an Air Cargo Assistance Program

Often the greatest hurdle for smaller airports is overcoming the lack of air cargo facilities and services. Air cargo terminals are expensive to build and aircraft ground-handling equipment is expensive to purchase and maintain. The State of Washington can create an outreach initiative to assist Washington state's airports. The purpose of an air cargo resource assistance program is to help Washington state's airports in the timely creation of services, facilities and support for which they have determined there is a perceived market need. Some examples from around the county include the following:

- Assisting airports in identifying and securing existing grants for acquisition of machinery and equipment, new building construction, building acquisition, on- or off-site infrastructure improvements, and other fixed asset investments
- Securing tax credits as an incentive to attract companies to locate at a particular airport
- Sales tax abatements on construction materials used in air cargo facility construction
- Loans for land and building acquisition, construction, expansion, or renovation, and equipment purchases
- Matching grants to assist airports in developing air cargo market assessment studies

- Providing expertise and advice on the creation and operation of an airport Foreign Trade Zone

The rationale of this program is threefold:

- Act as a clearing house and resource center, assisting airports that have an interest in developing their air cargo market to navigate the various existing state and federal grants that can be utilized by the airport to improve existing, or create new, air cargo facilities and services.
- Identify the need for new sources of funding and support that Washington state airports can utilize to meet air cargo market requirements.
- Help develop new legislative policy initiatives to promote and encourage air cargo development throughout Washington state.

It is envisioned that the air cargo resource assistance program would work closely with Office of Economic Development and Competitiveness and the Public Works Board and Community and Economic Revitalization Board within the Department of Commerce, and the Freight Systems Office and the Office of Aviation within WSDOT. These are established entities within the Washington state government that have already established programs directly applicable to furthering the development of air cargo facilities and services within the Washington state, yet have no specific mandate related directly to air cargo and the importance of air cargo capacity to the state's future economic development.

Recommendation 2A: Provide Air Cargo Resource Assistance

- Inform airports throughout Washington state of existing opportunities in the state for technical assistance in securing grants or matching funding for acquisition of machinery and equipment, new building construction, building acquisition, on- or off-site infrastructure improvements, and other fixed asset investments.

Recommendation 2B: Identify resource gaps and develop policies and programs to address them

- If new programs or policy needs are identified, the Air Cargo Program Manager (CPM) and Working Group should work together to develop new legislative policy initiative that support air cargo development throughout the state.

7.2.3 Recommendation 3: Air Cargo Marketing Program

The term “marketing” covers many different activities—all associated with selling an organization's products and services. Advertising is the most obvious marketing activity, but so is customer research that better matches a product or service to customer or tenant wants and needs. The Air Cargo Development Working Group would provide a forum for consulting key private partners about the most effective marketing strategies.

Strategic air cargo marketing encompasses the following:

- Determining the need for a facility or service through customer research and by observing and quantifying sales patterns of similar facilities or services in the marketplace

- Identifying needs to modify existing facilities or services or create new facilities or services to match customer wants and needs
- Determining how best to reach potential customers to make them aware of an airport's facilities or services and to persuade them to utilize them
- Creating marketing campaigns based on determinations of the most effective way of reaching customers, confirming customer relationships via follow-up sales campaigns

For Washington state's smaller airports to build their air cargo market, they will need to engage in some type of marketing effort to gain exposure to potential customers, be they airlines, forwarders, shippers, or logistics-service providers. Airports will also need good market intelligence in order to know the needs and price points of their potential customers/tenants. Today, most of Washington state's airports lack the funding and industry expertise to market to the global air cargo industry on an individual basis.

An important role that State of Washington can fulfill is to assist airports in gaining exposure to the marketplace by helping coordinate individual airport direct sales efforts with general indirect marketing aimed at a broad range of promotional efforts for Washington state airports. The concept is for the State of Washington not to direct market or "sell" for individual airports, but rather to work with airports in Washington state and other State of Washington government departments, such as the Office of Economic Development and Competitiveness and the Governor's Office, to promote Washington state's airports on international trade missions, participate in trade shows as group exhibitors, and offer grants to help support airport attendance at domestic and international air cargo events.

Recommendation 3A: Brand and Promote Washington State Air Cargo Airports through General/Indirect Marketing

The targets for the direct sales efforts by individual airports will be more receptive if the market previously became broadly aware of Washington state attributes as an air cargo logistics center. To create that awareness, to reinforce direct sales calls by airports, and to generate direct sales leads, the general marketing program should include a range of general promotion efforts. Those efforts may include both passive elements (press releases, brochure mailings, etc.) and active elements (attendance at industry meetings, presentations at user conferences, etc.). A key component is to create global brand awareness of Washington state's economic opportunities with a consistent worldwide message and theme in the following ways:

- Create a marketing campaign to promote the use of Washington state airports. Overall, the theme could focus on Washington state exports. One key theme should center on central Washington state airports that can accommodate international exports of Washington state-grown agricultural products. Air cherry charters, in particular, are an immediate opportunity that could handle more of the cherries through Washington state airports and take pressure off of Sea-Tac at peak.
- Attend international air cargo events to promote Washington state air cargo airports.
- Organize and design a joint-use exhibition display booth to promote Washington state airports at air cargo forums and exhibitions.

- Organize attendance of interested Washington state airports at the International Air Cargo Association (TIACA) Air Cargo Forum 2020.

Recommendation 3B: Market Analysis and Refinement

- An important function of the Marketing Program will be continued tracking of trends and refinement of the Washington state market opportunities. This research should then inform the marketing campaign and promotion activities.

7.2.4 Recommendation 4: Develop a Cargo Community System

In order for the State of Washington to facilitate coordination among on-airport and off-airport air cargo facilities and create a competitive advantage at Washington state airports in comparison to other states, the various stakeholders in the cargo community—such as airports, forwarders, ground handlers, airlines and customs—all need to communicate and cooperate.

An Airport Community System (often called a Cargo Community System) can be defined as a neutral and open electronic platform, enabling intelligent and secure information exchange between public and private stakeholders in order to improve the competitive position of airport communities.

The Cargo Community System concept is broad and can range from the simple to the complex. A simple system may be a dedicated web portal and/or social media site that provides a forum for identifying and discussing local air cargo issues, and provides updated airline schedules, cargo aircraft arrival information, air cargo terminal delays, airport roadway congestion, warehouse vacancies, and employment information. A more sophisticated system in place at airports such as Brussels, Amsterdam, Frankfurt, Incheon, Hong Kong, Dubai, Mumbai, and Malpensa, provides real-time exchange of operational and other information between the various players (industrial shippers, operators, truckers, handling agents, airlines, and customs) through single-window IT platforms.

As envisioned for Washington state, the Air Cargo Community System would become a registered industry association to represent and foster the common interests of all the players involved in the Washington state cargo industry. Airport and air cargo industry associations are relatively common in the United States, although they don't tend to achieve the level of information exchange common in other countries. The International Air Cargo Association of Chicago⁸ is an example of the type of airport air cargo association in the United States, which typically provide industry information, forums, opportunities for networking and promotion for members.

Initially, the Washington state Air Cargo Community System can begin with a dynamic stand-alone website identifying and discussing local and statewide air cargo issues; providing real-time airline schedules and cargo aircraft arrival information, air cargo terminal delays, weather information, and airport and regional roadway congestion. The Washington state Air Cargo Community System will also be used as an outreach and information dissemination platform for the Air Cargo Resource Management Program and state air cargo marketing initiatives.

⁸ <https://www.iacac.com/>

Over time, a more active association that provides more services to members could be developed.

A more long-term goal is to consider development of a neutral and open electronic platform to secure information exchange between the various proprietary electronic systems currently used by existing cargo terminal operators and local freight forwarders and truckers. Commercial platforms to accomplish this are available and should be explored.

Recommendation 4A: Create a web portal to provide information on Washington State air cargo airports

- The portal would detail the air cargo facilities and services available at each airport, including contact information.

Recommendation 4B: Establish Washington Air Cargo Association

- The association could provide industry information, forums, networking and other services to members.

Recommendation 4C: Initiate a study on the feasibility of an open electronic platform

- The purpose of the platform would be to enable intelligent and secure information exchange that will allow the tracking and tracing of air cargo between cargo warehouses, airlines and forwarders.

7.2.5 Recommendation 5: Air Cargo Statistics and Data Collection

Air cargo data collection is problematic, both at the industry and airport levels. Historical air cargo data is limited and activity by carrier and cargo type at many airports in Washington state is unavailable. It is only by accurate data reporting that trends can be observed and performance can be measured.

Recommendation 5A: Airport Air Cargo Data Reporting

- Introduce a standardized statewide air cargo data reporting form. At a minimum, the report form should include units of enplaned and deplaned air cargo, categorized as international or domestic by air carrier. The report form should also include landings by all-cargo aircraft, by aircraft type, and air carrier.
- Other desirable air cargo metrics include enplaned and deplaned air cargo by combination carriers (belly carriers) and freighter operators, and number of truck trips to and from air cargo terminals.

7.2.6 Recommendation 6: Support Development of Airport Logistics/Distribution Centers

An airport can be thought of as a key intersection between air logistics and real estate. Airlines and airports are only one part of a larger ecosystem of support services and facilities that comprise the air cargo supply-distribution chain. An area of non-traditional infrastructure development related to air cargo that was introduced earlier in this report is the concept of airport logistics/distribution centers. Logistics/distribution centers can provide the base for an indirect strategy of attracting air cargo

service as part of a larger multimodal distribution concept. Contract logistics/distribution services are typically third-party providers that manage all, or particular segments, of the various functions that comprise a company's logistics system: transportation, inventory, materials handling, warehousing, customer service, order processing, or any other activity that creates value. Air cargo is a component but often is not the principal driver of services; nevertheless, growth in broader services can breed growth in air cargo.

Ultimately the vision statement calls for a system of on-airport and off-airport air cargo facilities working in concert to accommodate Washington's future air cargo needs with efficient facilities and services, global access and seamless surface distribution capabilities.

The planning of an airport logistics park is unique and is more than just a collection of air cargo terminals and warehouses. Air cargo has specific operating and security needs that are very different than those associated with typical logistics functions. The design, nature, and location of facilities must be compatible with airport operations, tenants' operating and safety requirements and special customs security requirements. Connections between the aeronautical areas and the air cargo logistics park should be secure and operationally efficient. Also important is that the plan must reflect the realities of the local and global marketplace.

When planning for airport-centric development, the following factors should be considered:

- Market demand
- Sufficient airport infrastructure
- Air and surface connectivity
- Funding sources for development
- Other regional economic development initiatives
- Collaboration among stakeholders

Sufficient airport infrastructure typically refers to facilities already in place to accommodate commercial air activities. Air and surface connectivity refers to routes taken by passengers or cargo to and from the airport to and from other destinations that may be enhanced by highway, rail, and port construction. Obviously, funding is a key consideration, whether self-financed, use of Public Private Partnerships, or utilizing a private developer. The airport logistics park should also be considered as a way to enhance, or leverage, other regional development initiatives; and "Collaboration among stakeholders" refers to the various actions that stakeholders can take to reach the goals and objectives that may further airport-centric development.

Recommendation 6A: Create a Guidebook for the development of airport logistic parks and Free Trade Zone creation and operation.

Recommendation 6B: Develop or adapt a grant program to assist airports to perform air cargo market analysis, feasibility studies and determination of air cargo facility requirements.

7.2.7 Recommendation 7: Measure Performance

Measuring performance is important to determining the success of the Washington State Air Cargo Development Strategic Plan. The following key performance indicators (KPI) quantify the progress of the air cargo business development program:

- Number of wide-body freighter landings (domestic and international)
- Number of narrow-body freighter landings
- All-cargo aircraft landed weight⁹
- Tons of air cargo
- Tons of international air cargo (traditional and express)
- Tons of domestic air cargo (traditional and express)
- Tons of cargo by aircraft type (passenger vs. freighter)
- Square footage of air cargo terminal space (both used and available)

The KPIs are designed to measure long-term trends in Washington state rather than to track the progress of specific marketing initiatives. The KPIs also provide a baseline for airport-to-airport comparative analysis. The KPIs are basic to monitoring long-term trends at each individual airport and collectively for the whole state.

The CPM may want to modify this list based on input from the Air Cargo Working Group. For example, the performance measures do not assess cargo capacity in relation to demand to track congestion or operational performance. This is because there are no standard reporting mechanisms in place to record how well various terminals perform as compared to basic industry standard. Unlike passenger aircraft performance and delays that are monitored and published by the Federal Aviation Administration, the performance of air cargo terminal operations is not tracked by any governmental entities. The detailed inventory and evaluation of capacity versus demand and congestion assessment that was conducted for this study, cannot be easily replicated as an ongoing performance measure. It would be possible, however, to monitor and track the performance of various air cargo terminals at airports in Washington state by implementing a series of on-site observations over various times of the year at each of the key air cargo airports in the state. Specific proposed measures to this effect have been provided as a supplement to this report for future consideration by the State of Washington.

7.3 IMPLEMENTATION STRATEGY

The purpose of the Air Cargo and Logistics Business Development Strategic Plan is to provide a road map for the State of Washington to follow in setting a course for building an air cargo development agenda and seeing ideas put into action.

The implementation portion of the plan generally defines how the various strategies could be realized. At minimum, to start, a strong program manager will be necessary to coordinate efforts and advocate

⁹ All-cargo aircraft landed weight is a metric used by the Federal Aviation Administration and is the certificated maximum gross landed weight of the aircraft type as specified by the aircraft manufacturer, whether empty or full.

for moving Washington state forward in achieving the objectives outlined previously. A key task for the cargo program manager (CPM) will be the development and maintenance of a more detailed implementation plan with specific actions, timing, priorities and responsibilities required for execution of the recommendations outlined in this report. Additional staffing and/or other resources would likely be required to fully implement the other recommendations, including the air cargo resources and marketing programs. To be successful in their role, it is recommended that the CPM have a direct internal reporting line to WSDOT and/or Department of Commerce.

The primary skill for the CPM is to be knowledgeable of the air cargo industry and of air cargo activity in Washington state, as well as the resources within the various programs operated by the government.

Important tasks associated with this effort include initiating and maintaining regular personal contact with air cargo stakeholders and being proactive in identifying competitive opportunities. This effort requires the CPM to maintain a scheduled pattern of personal contacts with state airports, key air cargo forwarders and carriers. The CPM should strive to maintain familiarity with the plans, goals and services of existing airport and potential air cargo stakeholders.

A major responsibility of the CPM is to establish and coordinate the efforts of an Air Cargo Working Group. The makeup of the group can be flexible, and may consist of the CPM, representatives from various state administrative divisions such as Governor's office, WSDOT Aviation, WSDOT Freight Division, Department of Commerce, and select stakeholders (e.g., airports, Port Authorities, local community planning organizations, shippers, freight forwarders, and others as appropriate).

The Air Cargo Working Group should meet quarterly to review the progress of the strategy and implementation of the Resource Development Program and the Marketing Program, making any adjustments and adding new ideas and suggestions as necessary. Guidelines to managing the Air Cargo Working Group meetings are presented in Chapter 5 of the *Recommendations and Implementation Strategies* white paper (Appendix D). The guidelines suggest various umbrella strategies and related evaluation criteria to measure progress and stimulate discussion.

8 Summary of Findings and Recommendations

8.1 KEY FINDINGS

Air cargo in Washington state is primarily generated by activity at Sea-Tac, King County, and Spokane International Airports. Sea-Tac and King County International Airports combined have an 85 percent share of the total Washington state air cargo market. Spokane, the third-largest cargo airport in the state, represents an 11 percent share of the Washington state market. Other non-hub and small commercial passenger airports within the state account for only 4 percent of the total air cargo volumes moved in 2016.

A 10-year tonnage forecast for Washington state air cargo demand done as a part of this study anticipates air cargo to grow at a compounded annual average growth rate of 4.4 percent, resulting in 870,000 annual metric tons of enplaned and deplaned air cargo in 2026 (up from 566,000 metric tons in 2016). Sea-Tac is anticipated to reach 580,000 metric tons during the forecast period.

The term air cargo congestion is commonly used to describe situations when demand increases beyond what airports and cargo carriers can efficiently handle. However, we need to account for the fact that the air cargo system is complex. It comprises both on-airport facilities and services (e.g., airlines, ground handlers, cargo terminals, aircraft parking, on-airport parking, Federal Inspection Services) and off-airport facilities and services (e.g., freight forwarders, trucking terminals, warehouses, sort facilities, customs brokers, shippers and receivers). Capacity constraints at any one of its components can cause congestion.

Effects of congestion appear long before capacity is reached. In congested conditions, each additional unit of cargo increases costs for everyone: higher rates, longer queues, and more unreliability. Shippers/carriers must consider alternatives or become less competitive. Additionally, due to the complex market, there are only limited immediate alternatives for a given air cargo shipment. If competitor airports are as congested or worse than a given primary gateway, the shippers may have no choice but to incur the increased costs.

As part of the analysis, congestion at competitive airports to Sea-Tac was considered. In general, Sea-Tac performs as well or better than its major competitors in terms of delays. Nonetheless, for regional competitiveness it is important to attempt to manage congestion and provide the most efficient air cargo system possible.

In regard to on-airport capacity, the planning analysis found that, absent any infrastructure investment, Sea-Tac will face a deficit of on-airport cargo buildings. The Sea-Tac Sustainable Airport Master Plan includes development of some cargo buildings as part of the “near-term projects,” to be in development by 2027 and more in the longer term. However, areas proposed for future air cargo facilities at Sea-Tac will be expensive to develop and must compete for scarce Port of Seattle resources being used for overall airport expansion.

Adding to the complexity of accommodating future air cargo growth at Sea-Tac is that there are only limited solutions for accommodating required off-airport air cargo facilities and services. Land prices are rising rapidly throughout the region, including around the airport and in nearby Kent Valley, where many distribution warehouses are located.

It is important to recognize that inhibitors to the growth of the Washington state air cargo industry are not only a transportation-related issue but an economic development one as well. Washington state airports handled \$47.6 billion in freight in 2015, compared to state GDP of \$452 billion. The value of Washington state air cargo is expected to grow at 4.4 percent per year in real terms out to 2045. Air cargo handled by airports in the state is expected to grow to \$173.6 billion by 2045. Air cargo value is forecast to grow faster than the general economy, implying that air cargo will play an ever more important function in the state's logistics.

Beyond the value of the commodities that make up the air cargo market is the fact that high-value supply chains rely on worldwide connectivity and security provided by air cargo to grow their businesses and compete in a global marketplace. Shippers value travel time by air 18 times more than travel time by truck and value reliability and 142 times more by air than by truck. Risks to reliability from air cargo congestion can impose a substantial economic penalty. To remain competitive to global businesses, Washington state needs to ensure an effective and efficient air cargo network into the future.

8.2 SUMMARY OF RECOMMENDATIONS

8.2.1 Strategic Recommendations

A detailed review and evaluation of constraints and opportunities at airports around the state, found that traditional and non-traditional options exist for expanding and developing new air cargo and logistics services for Washington state airports. The three most immediate air cargo development opportunities for Washington state airports are the following:

- Maintain and expand the existing integrator (i.e., Amazon, DHL, FedEx, UPS) operations around the state in conjunction with the private sector.
- Attract air charter operations for exports of agricultural products, particularly perishable freight and vegetables, from central Washington airports.
- Develop non-hub airports into centers for regional ground-based logistical operations.

In the longer term, scheduled freighter service becomes a more realistic goal for some airports such as Spokane International, Snohomish County and, possibly, Grant County International since they have the market access, runway characteristics, ground-handling capabilities, landside facilities, and highway access necessary to accommodate international aircraft. Also, with the emergence of e-commerce as a force in the new economy, the State of Washington should be proactive in courting e-commerce fulfillment centers by highlighting the state's airports, Pacific Rim location, developable land, and gateway hubs for the major integrator airlines.

8.2.2 Recommendations for Implementation

Implementation of specific recommendations should begin immediately. Many recommendations can be implemented in the short term; however, success will depend on involvement of private-sector companies in the air cargo industry

Table 3 summarizes the proposed recommendations. It includes an assessment of the relative priority (high, medium or low) as well as a general indication of timing (short, medium or long term). The recommendations are focused on the higher priority actions that could be completed in the near- and medium terms. A key first step will be creating a new position, the Air Cargo Program Manager (CPM), to coordinate the efforts. This would be the minimum requirement to implement this program. After the Air Cargo Development Program gets underway, the CPM and the Air Cargo Working Group are expected to identify a more specific action plan and longer-term recommendations. Additional resources would likely be needed over time to fully implement all of the recommendations.

Table 3. Summary of Recommendations

Recommendation	Potential Lead Entity	Priority	Timing
Recommendation 1: Establish Air Cargo Development Program	Legislature	H	S
Recommendation 1A: Hire Air Cargo Program Management staff (CPM)	WSDOT or Commerce	H	S
Recommendation 1B: Convene Air Cargo Development Working Group	CPM	H	S
Recommendation 2: Create Air Cargo Resources Program	CPM	H	S
Recommendation 2A: Provide Air Cargo Resource Assistance	CPM	H	S
Recommendation 2B: Propose New Policies and Programs as Needed	CPM/Air Cargo Working Group	H	M
Recommendation 3: Establish Air Cargo Marketing Program	CPM	H	S
Recommendation 3A: Brand and Promote WA Airport System	CPM	H	S
Recommendation 3B: Continued Market Analysis	CPM	H	M
Recommendation 4: Develop Cargo Community System	CPM	H	M
Recommendation 4A: Create a Web Portal with Information on WA Airports	CPM	H	S
Recommendation 4B: Establish WA Air Cargo Industry Association	Working Group	H	M
Recommendation 4C: Initiate a Feasibility Study	CPM	H	S
Recommendation 5: Collect Air Cargo Statistics and Data	WSDOT Aviation	M	S
Recommendation 5A: Report Air Cargo Data	WSDOT Aviation	M	M
Recommendation 6: Support Development of Airport Logistics Centers	CPM	H	M
Recommendation 6A: Develop Guide for Establishment of Airport Logistics Parks and Free Trade Zones	CPM	H	M
Recommendation 6B: Develop or Adapt Grant Program for Air Cargo Feasibility Studies	CPM	H	M
Recommendation 7: Measure Performance	CPM	H	M