

**Date:** February 20, 2024  
**To:** Lewis Lem, Port of Portland  
**From:** Bonnie Gee Yosick, ECONorthwest  
**Subject:** Economic Impact Considerations in Support of Connect Oregon ATC Application

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This memo describes economic impact considerations and methods employed for research and analysis in support of the Port of Portland's Connect Oregon Airtrans Center (ATC) grant application. The scope of this work focuses on the economic benefit, particularly the jobs generated or retained, in association with the Port's proposed ATC improvements. The key research questions being addressed by this work include:

***What are the top Air Exports? What are the top Air Imports?***

***What are the specific economic benefits (in terms of jobs) to this state that will result from this project?***

***Does this project benefit the Oregon economy by generating a net increase in or retention of long-term jobs (beyond short-term construction jobs) and/or increasing private investment in Oregon?***

and

***What is the workforce profile for the new and retained jobs?***

This memo describes the data sources, methodology, and analysis employed to address these questions and summarizes the key findings intended to inform and support the responses to the Connect Oregon grant application.

## Summary of Key Findings

The proposed ATC expansion adds one wide-body aircraft space at the ATC. There will be direct economic benefits (in terms of jobs) associated with the increase in cargo movement enabled, as well as an overall benefit to the Oregon economy due to a net increase of long-term jobs and increase in private investment in Oregon. Key findings include:

- Current total international air exports from the three-state region are an estimated \$29 billion annually.
- Current total international air imports to the three-state region are an estimated \$19 billion annually.
- This project will produce an estimated 59 direct jobs narrowly defined as those associated with the increase in movement of air cargo.

- Jobs retained include 506 direct freight air transportation jobs plus over another 1,000 jobs associated with air freight movement.
- These are well-paying jobs, with an estimated average wage rate of just over \$75,100 annually.
- Those hired into these jobs are expected to reflect the current workforce, which is roughly one-third women, with representation across a range of racial and ethnic groups.
- The Oregon economy will benefit from an increase of economic activity enabled by the export of an additional \$1 billion of goods produced in the region, supporting thousands more jobs.

## Analysis and Outcomes

ECONorthwest provided research, data collection, and analysis to produce the following information to support the Port's Connect Oregon grant application.

### Top 25 air imports

Using data on the top 25 international air imports by 6-digit NAICS industry code for year 2022 extracted for the three-state region and provided by Port aviation consultant Campbell-Hill, ECONorthwest averaged the dollar value and imported weight for years 2019 to 2022 to minimize year-over-year volatility and imputed an aggregated total value based on the estimated values by industry and market share. (See Appendix A: Top 25 Air Imports.) Please note that preliminary data indicate that 2023 import and export volumes declined significantly from 2022 levels (see spreadsheet documentation for additional detail). Please also note that domestic imports are not included in these international data and may overshadow these international data by a factor of three or more.

These data were compared to similar data for Oregon-specific imports and accurately reflect the industries supported by this project, including: semiconductors, industrial machinery, medical equipment and supplies, apparel, and other industries as shown in Appendix A.

### Top 25 air exports

Using data on the top 25 international air exports by 6-digit NAICS industry code for year 2022 extracted for the three-state region and provided by Port aviation consultant Campbell-Hill, ECONorthwest averaged the dollar value and exported weight for years 2019 to 2022 to minimize year-over-year volatility and imputed an aggregated total value based on the estimated values by industry and market share. (See Attachment B: Top 25 Air Exports.) Please note that preliminary data indicate that 2023 import and export volumes declined significantly from 2022 levels (see spreadsheet documentation for additional detail). Please also note that domestic exports are not included in these international data and may overshadow these international data by a factor of three or more.

These data were compared with similar data for Oregon-specific exports and the value of exports comprised heavily of semi-conductors and related industries is even more heavily skewed in the Oregon-based data, and reflect the industries supported by this project, including: semiconductors,



industrial machinery, navigational/medical instruments, computer equipment, pharmaceuticals and medicines, other leather goods, and other industries as shown in Appendix B. Exports for the three-state region include a significant volume (by weight) of cherries, which shows up in the table as "other noncitrus fruits."

## Estimate of Cargo-Related Jobs

***"What are the specific economic benefits (in terms of jobs) to this state that will result from this project?"***

Seemingly straightforward, the answer to this question depends on how one defines the jobs that result from the project. At one end of the spectrum are the jobs that result from this project defined narrowly as those directly associated with the air cargo movement through the expanded ATC? Or on the other end of the continuum, are the jobs associated with the development and production of goods moving through the expanded ATC included? For the purposes of this analysis and to provide a conservative estimate of jobs and economic benefits, ***this section defines the jobs narrowly as those associated with the increase in air-cargo movement enabled by the project.*** Appendix 5 provides a discussion of the benefits to the Oregon economy should the ATC-improvement project occur, addressing the broader definition of jobs and economic activity associated with development and production of the increased level of goods which could be exported with an expansion of capacity enabled by the ATC-improvement project.

Applying the narrow definition of jobs resulting from increased freight movement, the project is expected to produce jobs associated with the operation and maintenance of the expanded ATC. Using employment at PDX as estimated by the Steer and Martin economic impact analyses, data on cargo and passenger flight operations provided by the Port of Portland, Lightcast data on air transportation employment, and other impact data from Steer, ECONorthwest developed this analysis of direct jobs which would result from the ATC-expansion project.

According to Lightcast (which is based on Quarterly Census of Employment and Wage (QCEW) data), there are a reported 4,799 Air Transportation employees currently employed at the Port (as of 2022), with 4,053 of those jobs associated with passenger air transportation (scheduled and nonscheduled) and 506 associated with freight, as shown in Table 1 below.

**Table 1**  
**Existing Air Transportation Jobs**

NAICS	Description	Jobs
481111	Scheduled Passenger Air Transportation	3,751
481211	Nonscheduled Chartered Passenger Air Transportation	302
<b>Passenger Subtotal</b>		<b>4,053</b>
481112	Scheduled Freight Air Transportation	67
481212	Nonscheduled Chartered Freight Air Transportation	439
<b>Freight Subtotal</b>		<b>506</b>
481219	Other Nonscheduled Air Transportation	241
<b>Total</b>		<b>4,799</b>

Source: Lightcast, aggregated and summarized by ECONorthwest.

These Air Transportation jobs are limited to those in the above-included industry codes, and the total jobs associated with airport activity includes supporting industries, which—for air cargo—includes a wide array of freight forwarders, aggregators, customs brokers, and similar functions. These jobs were estimated as part of the Port’s recent analyses of economic impact by Steer (2023) and Martin Associates (2016). These analyses estimated total direct employment at the airport of 10,549 (Steer) and 10,574 (Martin). Relying on these direct job estimates and data on direct employment associated with freight air transportation, ECONorthwest developed four alternative methods for estimating the increase in cargo-related jobs. Because all four methodologies rely on the same base data, they produce similar results. This section discusses the most transparent methodology as the primary analysis, which also produced a mid-range estimate. (A brief description and the results from the other three methodologies are provided in Appendix 3 as a sensitivity analysis.)

The Port Performance and Analytics Unit reports a wide variety of statistics regarding marine and aviation cargo, including monthly air operations. ECONorthwest compiled these monthly data for year 2023, disaggregating cargo flights from passenger flights, yielding the annual total and proportions as shown in Table 2 below.

**Table 2**  
**Flight Operations, Calendar Year 2023**

	Flights	
Cargo	22,468	14.6%
Passenger	131,128	85.4%
<b>Total</b>	<b>153,596</b>	

Source: Port of Portland, Performance and Analytics, annualized by ECONorthwest.

Applying the proportion of flight operations to the estimated jobs associated with air-cargo movement from the Steer analysis yields an estimate of **1,543 current jobs** associated with movement of air cargo at PDX.

**Increase from Project:** A separate transportation capacity analysis provided a range of increased cargo volume enabled by the ATC expansion project, with a recommended increase of 3.85 percent, which is

equal to 1/26, or the proportional expected increase from adding one additional wide-body aircraft parking space to the existing 26 spaces. (As a second sensitivity analysis, two alternative scenarios of cargo volume and resulting jobs have been developed and are explored in Appendix 4.)

Applying the baseline assumption of a 3.85-percent increase in cargo volume yields an **increase of 59** direct jobs enabled by the project, with the estimated indirect, induced, and total jobs and resulting labor income, value add, and output as shown in Table 3 below.

**Table 3**  
**Estimated Narrowly-Defined Economic Impacts From the ATC Project**

	<b>Jobs</b>	<b>Labor Income</b>	<b>Value Add</b>	<b>Output</b>
Direct	59	\$4,439,000	\$5,801,000	\$11,624,000
Indirect	21	\$1,744,000	\$2,639,000	\$5,114,000
Induced	15	\$940,000	\$1,693,000	\$2,746,000
<b>Total</b>	<b>96</b>	<b>\$7,123,000</b>	<b>\$10,133,000</b>	<b>\$19,484,000</b>

Sources: Steer, Port of Portland Finance and Statistics, with computations by EConorthwest.

These jobs and this economic activity will be accompanied by a much larger number of jobs and associated economic benefits to the Oregon economy should the ATC-improvement project occur. This broader definition of jobs and economic activity is associated with development and production of the increased level of goods which could be exported from the state with an expansion of capacity enabled by the ATC-improvement project. A discussion of this broader economic impact is provided in Appendix 5.

## Workforce Profile

### *What is the workforce profile for the new and retained jobs?*

Newly generated jobs are expected to follow a similar workforce profile as existing jobs. Using Lightcast data provided by the Port for: 1) the Air Transportation and, 2) Transportation and Warehousing Industries, EConorthwest provided a summary of a few key worker attributes: average earnings per job; gender breakdown; and racial breakdown.

### **Average Earnings Per Worker**

Average earnings per job for the Air Transportation and supporting cargo-related industries are shown in Table 5 below.

**Table 4**  
**Average Earnings by Industry**

NAICS	Description	Average Earnings
481112	Scheduled Freight Air Transportation	\$123,120
481212	Nonscheduled Chartered Freight Air Transportation	\$110,992
4911	Postal Service	\$50,804
4921	Couriers and Express Delivery Services	\$55,767
4931	Warehousing and Storage	\$57,565

Source: Lightcast.

Note that the per-worker average earnings in the air transportation industry are significantly higher than per-worker average earnings in the postal service, couriers and related delivery services, and warehousing and storage industries. Also note that these averages represent the average of statewide jobs; therefore, many of the postal workers, couriers, and warehousing jobs included here do not represent workers who are associated with air freight moving through PDX. As noted above, the jobs associated with air cargo include both the higher-wage air transportation sector and the relatively lower-wage postal, courier, and warehousing/storage sector.

Weighting the estimated number of jobs resulting from the ATC expansion based on the relationship between air-freight jobs and other cargo-related jobs as described above would yield expected average wages per job of just over \$75,130 as shown in Table 5 below.

**Table 5**  
**Estimated Average Earnings by Industry, Weighted for Expected Jobs**

NAICS	Description	Proportion of Airport-Related Jobs	Avg. Earnings Per Job
48	Air Freight	506	\$112,598
49	Postal/Courier/Warehousing & Storage	1,037	\$56,853
<b>Total/Weighted Average</b>			<b>\$75,133</b>

Source: Lightcast, weightings and calculations by ECONorthwest.

### Gender and Racial Composition

The Port strives to recruit, hire, and retain a diverse workforce. To the extent they are helpful to for the grant application effort and to inform recruiting and outreach efforts, information on the workforce's gender and racial composition are provided below.

Gender breakdown by industry is shown in Table 6 below.

**Table 6**  
**Estimated Gender Breakdown – Current (2022) Workforce**

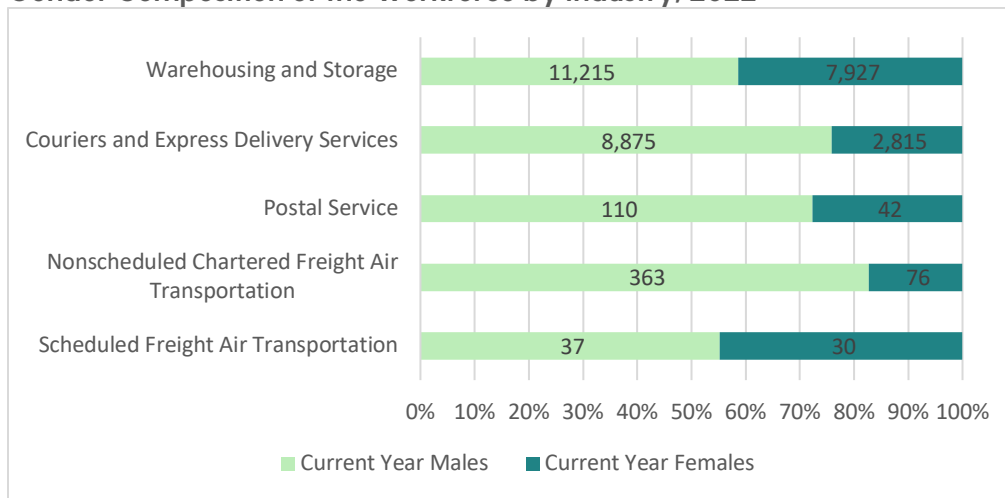
NAICS	Description	Current Year Males	Current Year Females
481112	Scheduled Freight Air Transportation	37	30
481212	Nonscheduled Chartered Freight Air Transportation	363	76
4911	Postal Service	110	42
4921	Couriers and Express Delivery Services	8,875	2,815
4931	Warehousing and Storage	11,215	7,927

Source: Lightcast.

Note that these numbers represent statewide jobs, so many of the postal, couriers, and warehousing jobs may represent workers who are not associated with air freight moving through PDX.

Although the workforce across these freight-related industries skews more heavily male (over female), the degree to which each industry is more heavily male varies, from 55 percent male (37 males out of a total of 67 workers) for Scheduled Freight Air Transportation to nearly 83 percent male (363 males out of a total of 439 workers) for the Nonscheduled Chartered Freight Air Transportation.

**Figure 1**  
**Gender Composition of the Workforce by Industry, 2022**



Source: Lightcast.

Please note that the lower proportion of male workers for Scheduled Freight Air Transportation may also be due, in part, to the relatively smaller workforce in this industry (67 total) compared to the other industries with relatively larger number of workers (11,690 statewide Couriers and Express Delivery Services workers and 19,142 statewide Warehousing and Storage workers). Overall, the workforce associated with movement of air cargo is roughly 65 percent male and 35 percent female.

Racial composition by industry is shown in Table 7 on the following page.

**Table 7**  
**Estimated Racial Breakdown – Current Workforce**

NAICS	Description	2022 Jobs	Current Year White	Current Year Black or African American	Current Year American Indian or Alaska Native	Current Year Asian	Current Year Native Hawaiian or Other Pacific Islander	Current Year Two or More Races	Current Year Hispanic or Latino
481112	Scheduled Freight Air Transportation Nonscheduled Chartered Freight Air	67	52	<10	-	<10	<10	<10	<10
481212	Transportation	439	373	<10	<10	11	-	<10	43
4911	Postal Service	152	122	<10	<10	<10	<10	<10	<10
4921	Couriers and Express Delivery Services	11,690	8,282	635	133	443	86	472	1,639
4931	Warehousing and Storage	19,142	11,477	955	175	1,397	205	637	4,297

Source: Lightcast.

Note: As their workforces are too small to adhere to confidentiality guidelines, the racial makeup of the Postal Service and Scheduled Freight Air Transportation Industries workforces have been suppressed. Also note that these numbers represent statewide jobs, so many of the postal, couriers, and warehousing jobs do not represent workers who are associated with air freight moving through PDX.

Like the population of the state, most of the workers in these industries are white, although these industries employ workers of all races as shown in the industry distributions above.



**Appendix I**  
**Top 25 Air Imports, Three-State Region**

NAICS CODE		PDX MARKET REGION: TOP 6-DIGIT NAICS IMPORT INDUSTRIES (BY 2022 SHIPMENT WEIGHT)	VALUE (\$MILLIONS) 2019-2022 AVERAGE	WEIGHT (MT) 2019-2022 AVERAGE
333242	1	SEMICONDUCTOR MACHINERY	\$2,472	7,681
334413	2	SEMICONDUCTORS & RELATED DEVICES	\$4,703	4,324
315240	3	WOMEN'S, GIRLS', AND INFANTS' CUT AND SEW APPAREL	\$177	3,907
334418	4	PRINTED CIRCUIT ASSEMBLIES (ELECTRONIC ASSEMBLIES)	\$821	1,991
315220	5	MEN'S AND BOYS' CUT AND SEW APPAREL	\$126	2,761
339930	6	DOLLS, TOYS, AND GAMES	\$190	1,870
332911	7	INDUSTRIAL VALVES	\$50	2,531
334220	8	RADIO/TV BROADCAST & WIRELESS COMMUNICATION EQUIP	\$583	3,260
326199	9	ALL OTHER PLASTICS PRODUCTS	\$54	2,334
334515	10	ELECTRICITY MEASURING/TESTING INSTRUMENTS	\$460	1,983
980000	11	GOODS RETURNED (EXPORTS FOR CANADA ONLY)	\$1,862	2,839
327212	12	OTHER PRESSED & BLOWN GLASS & GLASSWARE	\$42	1,659
112511	13	FISH, FARMED	\$23	2,241
114111	14	FINFISH FRESH/CHILLED/FROZEN; FINFISH PRODUCTS	\$18	1,718
332999	15	OTHER MISCELLANEOUS FABRICATED METAL PRODUCTS	\$59	1,837
334111	16	ELECTRONIC COMPUTERS	\$478	1,791
334516	17	ANALYTICAL LABORATORY INSTRUMENTS	\$242	1,370
111422	18	FRESH FLOWERS, SEEDS & FOLIAGE	\$8	1,472
335999	19	MISC ELECTRICAL EQUIPMENT & COMPONENTS, NESOI	\$229	1,351
316210	20	FOOTWEAR	\$34	1,208
334119	21	OTHER COMPUTER EQUIPMENT	\$262	1,597
333314	22	OPTICAL INSTRUMENTS & LENSES	\$316	1,261
334419	23	OTHER ELECTRONIC COMPONENTS	\$154	1,187
325199	24	ALL OTHER BASIC ORGANIC CHEMICALS	\$65	793
335929	25	COMMUNICATION & ENERGY WIRE, NESOI	\$66	816
		Top 25 Subtotal	\$13,493	55,782
		Imputed Total	\$19,286	105,404

Source: U.S. Census Bureau, Foreign Trade Statistics (via USA Trade Online), extracted by Campbell-Hill., averaged for 2019-2022 and imputed to total by ECONorthwest

## Top Air Imports, Oregon

COMMODITIES	AVERAGE VALUE OF 2019, 2021, 2022, AND 2023	AVERAGE WEIGHT OF 2019, 2021, 2022, AND 2023 (IN MT)
3344 Semiconductors & Other Electronic Components	\$2,727,394,932	6,045,750
3332 Industrial Machinery	\$2,034,227,400	6,693,234
9800 Goods Returned (exports For Canada Only)	\$844,537,938	1,237,719
3345 Navigational/measuring/medical/control Instrument	\$604,834,565	2,750,328
3341 Computer Equipment	\$386,501,005	1,698,471
3333 Commercial & Service Industry Machinery	\$231,445,111	952,319
3254 Pharmaceuticals & Medicines	\$216,150,802	79,075
3359 Electrical Equipment & Components, Nesoi	\$192,739,491	1,181,219
3342 Communications Equipment	\$161,998,893	661,256
3339 Other General Purpose Machinery	\$107,190,464	1,422,648
3353 Electrical Equipment	\$76,045,138	585,903
3364 Aerospace Products & Parts	\$73,801,608	105,253
3329 Other Fabricated Metal Products	\$71,501,930	2,635,858
3391 Medical Equipment & Supplies	\$62,886,055	445,218
3259 Other Chemical Products & Preparations	\$60,790,910	379,616
3251 Basic Chemicals	\$52,636,418	835,020
3314 Nonferrous (exc Alum) & Processing	\$51,695,063	321,002
3399 Miscellaneous Manufactured Commodities	\$50,979,018	878,217
3152 Apparel	\$49,460,904	961,874
3272 Glass & Glass Products	\$35,946,541	1,402,389
3334 Hvac & Commercial Refrigeration Equipment	\$33,825,045	293,335
3261 Plastics Products	\$29,227,794	1,136,805
3343 Audio & Video Equipment	\$26,370,978	228,208
9300 Used Or Second-hand Merchandise	\$24,914,219	35,323
3346 Magnetic & Optical Media	\$23,552,743	107,940
	<b>\$8,512,928,861</b>	<b>42,487,467</b>

Source: U.S. Census Bureau, Foreign Trade Statistics (via USA Trade Online), extracted by Campbell-Hill, and averaged for 2019 and 2021–2023 by ECONorthwest.

## Appendix 2 Top 25 Air Exports, Three-State Region

		PDX MARKET REGION: TOP 6-DIGIT NAICS EXPORT INDUSTRIES (BY 2022 SHIPMENT WEIGHT)	VALUE (\$MILLIONS) 2019-2022 AVERAGE	WEIGHT (MT) 2019-2022 AVERAGE
111339	1	OTHER NONCITRUS FRUITS	\$140	19,069
316998	2	ALL OTHER LEATHER GOODS & ALLIED PRODUCTS	\$358	10,262
114112	3	SHELLFISH FRESH/CHILLED/FROZEN; SHELLFISH PROD	\$134	6,852
334413	4	SEMICONDUCTORS & RELATED DEVICES	\$11,727	4,632
333242	5	SEMICONDUCTOR MACHINERY	\$2,708	5,184
33641X	6	CIVILIAN AIRCRAFT, ENGINES, EQUIPMENT, PARTS	\$2,925	4,806
331110	7	IRON & STEEL & FERROALLOY STEEL PRODUCTS	\$9	2,907
334510	8	ELECTROMEDICAL APPARATUS	\$1,162	3,029
332722	9	BOLTS/NUTS/SCRWS/RIVTS/WASHRS & OTHER TURNED PRODS	\$64	2,382
111331	10	APPLES	\$1	1,265
334119	11	OTHER COMPUTER EQUIPMENT	\$409	1,936
331315	12	ALUMINUM SHEETS, PLATES & FOILS	\$14	1,963
334111	13	ELECTRONIC COMPUTERS	\$570	2,246
111130	14	DRY PEAS & BEANS	\$5	987
332999	15	OTHER MISC FABRICATED METAL PRODUCTS	\$99	1,425
325199	16	ALL OTHER BASIC ORGANIC CHEMICALS	\$72	1,931
111421	17	NURSERY PRODUCTS & TREES	\$16	2,264
311411	18	FROZEN FRUITS, JUICES & VEGETABLES	\$3	1,123
331491	19	OTHER NONFERROUS METALS ROLL/DRAW/EXTRUD	\$307	2,561
322220	20	PAPER BAG & COATED & TREATED PAPER	\$16	1,092
311920	21	COFFEE & TEA	\$8	976
311611	22	MEAT PRODUCTS (EXC POULTRY)	\$18	1,228
334515	23	ELECTRICITY MEASURING/TESTING INSTRUMENTS	\$710	1,535
111219	24	OTHER VEGETABLES (EXC POTATOES) & MELONS	\$66	1,228
326199	25	ALL OTHER PLASTICS PRODUCTS	\$105	1,645
		<b>Top 25 Subtotal</b>	<b>\$21,647</b>	<b>84,528</b>
		<b>Imputed Total</b>	<b>\$29,308</b>	<b>154,303</b>

Source: U.S. Census Bureau, Foreign Trade Statistics (via USA Trade Online), extracted by Campbell-Hill, and averaged for 2019-2022 and imputed to total by ECONorthwest.

## Top Air Exports, Oregon

COMMODITIES	AVERAGE VALUE OF 2019, 2021, 2022, AND 2023	AVERAGE WEIGHT OF 2019, 2021, 2022, AND 2023 (IN MT)
3344 Semiconductors & Other Electronic Components	\$10,403,075,861	3,797,837
3332 Industrial Machinery	\$2,466,953,225	4,960,658
3345 Navigational/measuring/medical/control Instrument	\$625,370,549	1,282,785
3341 Computer Equipment	\$564,843,488	2,194,225
3364 Aerospace Products & Parts	\$516,932,508	1,205,684
3254 Pharmaceuticals & Medicines	\$348,601,950	711,307
3169 Other Leather Products	\$327,468,277	9,121,568
3391 Medical Equipment & Supplies	\$250,871,522	634,362
3333 Commercial & Service Industry Machinery	\$235,354,590	416,059
9900 Other Special Classification Provisions	\$196,574,764	7,861
3342 Communications Equipment	\$194,369,998	427,902
3359 Electrical Equipment & Components, Nesoi	\$189,876,387	1,329,694
3314 Nonferrous (exc Alum) & Processing	\$125,753,161	1,011,136
3336 Engines, Turbines & Power Transmsn Equip	\$91,224,842	732,763
3339 Other General Purpose Machinery	\$82,794,122	1,044,152
3353 Electrical Equipment	\$81,167,290	389,134
3324 Boilers, Tanks & Shipping Containers	\$70,235,991	620,088
3399 Miscellaneous Manufactured Commodities	\$54,115,258	453,442
3329 Other Fabricated Metal Products	\$50,073,640	645,219
3251 Basic Chemicals	\$47,885,733	2,121,823
3162 Footwear	\$46,990,241	582,534
3343 Audio & Video Equipment	\$40,337,449	293,462
3322 Cutlery & Handtools	\$39,313,336	581,579
3261 Plastics Products	\$35,550,338	1,197,443
3259 Other Chemical Products & Preparations	\$32,651,646	1,019,515
	<b>\$17,482,005,288</b>	<b>50,375,163</b>

Source: U.S. Census Bureau, Foreign Trade Statistics (via USA Trade Online), extracted by Campbell-Hill, and averaged for 2019 and 2021-2023 by ECONorthwest..

### Appendix 3

## Sensitivity Analysis #1: Alternative Methods of Calculating Jobs Directly Resulting from the Project

This Appendix provides an analysis of three alternative methods of calculating jobs resulting from the project. All rely on the 3.85-percent increase in cargo volume.

**Method 1:** Relies on Lightcast data on air transportation employment and assumes the relationship of on- and off-airport jobs is constant for air cargo and passengers.

- **Currently Existing:** Method 1 yields an estimate of **1,112 current jobs** associated with air cargo.
- **Increase from Project:** Applying the estimated 3.85 percent increase in cargo movement enabled by the project, this method results in an **increase of 43** direct jobs enabled by the project, with the estimated indirect, induced, and total jobs and resulting labor income, value add, and output as shown in Table A-1 below.

**Table A-1**

**Economic Impacts From the ATC Project as Estimated Using Alternative Method (Method #1)**

	Jobs	Labor Income	Value Add	Output
Direct	43	\$3,199,000	\$4,180,000	\$8,377,000
Indirect	15	\$1,257,000	\$1,902,000	\$3,686,000
Induced	11	\$677,000	\$1,220,000	\$1,979,000
<b>Total</b>	<b>69</b>	<b>\$5,133,000</b>	<b>\$7,302,000</b>	<b>\$14,042,000</b>

Sources: Lightcast and Steer, with computations by ECONorthwest.

**Method 2:** Assumes Lightcast data on direct air transportation employment but applies proportion of flight operations of cargo to passengers to estimate "other" employment associated with cargo.

- **Currently Existing:** Method 2 yields an estimate of **1,382 current jobs** associated with air cargo.
- **Increase from Project:** Applying the estimated 3.85 percent increase in cargo movement enabled by the project, this method results in an **increase of 53** direct jobs enabled by the project, with the estimated indirect, induced, and total jobs and resulting labor income, value add, and output as shown in Table A-2 below.

**Table A-2**

**Economic Impacts From the ATC Project as Estimated Using Alternative Method (Method #2)**

	Jobs	Labor Income	Value Add	Output
Direct	53	\$3,976,000	\$5,196,000	\$10,412,000
Indirect	19	\$1,562,000	\$2,364,000	\$4,581,000
Induced	14	\$842,000	\$1,517,000	\$2,459,000
<b>Total</b>	<b>86</b>	<b>\$6,380,000</b>	<b>\$9,077,000</b>	<b>\$17,452,000</b>

Sources: Lightcast, Port of Portland Finance and Statistics, and Steer, with computations by ECONorthwest.

**Method 3:** Assumes Lightcast data on direct air transportation employment but applies proportion of flight operations of cargo to passengers to estimate "other" employment associated with cargo. **This method was selected as the primary method for the analysis.**

- **Currently Existing:** Method 3 yields an estimate of **1,543 current jobs** associated with air cargo.
- **Increase from Project:** Applying the estimated 3.85 percent increase in cargo movement enabled by the project, this method results in an **increase of 59** direct jobs enabled by the project, with the estimated indirect, induced, and total jobs and resulting labor income, value add, and output as shown in Table A-3 below.

**Table A-3**  
**Economic Impacts From the ATC Project as Estimated Using Primary Method (Method #3)**

	<b>Jobs</b>	<b>Labor Income</b>	<b>Value Add</b>	<b>Output</b>
Direct	59	\$4,439,000	\$5,801,000	\$11,624,000
Indirect	21	\$1,744,000	\$2,639,000	\$5,114,000
Induced	15	\$940,000	\$1,693,000	\$2,746,000
<b>Total</b>	<b>96</b>	<b>\$7,123,000</b>	<b>\$10,133,000</b>	<b>\$19,484,000</b>

Sources: Port of Portland Finance and Statistics and Steer, with computations by ECONorthwest.

**Method 4:** Uses industry data on couriers and messengers from Steer's IMPLAN analysis and a cargo operations-based pro-rata share of air transportation.

- **Currently Existing:** Method 3 yields an estimate of **1,828 current jobs** associated with air cargo.
- **Increase from Project:** Applying the estimated 3.85 percent increase in cargo movement enabled by the project, this method results in an **increase of 70** direct jobs enabled by the project, with the estimated indirect, induced, and total jobs and resulting labor income, value add, and output as shown in Table A-4 below.

**Table A-4**  
**Economic Impacts From the ATC Project as Estimated Using Method #4**

	<b>Jobs</b>	<b>Labor Income</b>	<b>Value Add</b>	<b>Output</b>
Direct	70	\$5,258,000	\$6,871,000	\$13,769,000
Indirect	25	\$2,066,000	\$3,126,000	\$6,058,000
Induced	18	\$1,113,000	\$2,006,000	\$3,252,000
<b>Total</b>	<b>114</b>	<b>\$8,437,000</b>	<b>\$12,003,000</b>	<b>\$23,079,000</b>

Sources: Steer, with computations by ECONorthwest.

## Appendix 4

### Sensitivity Analysis #2: Jobs Created and Retained from Alternative Cargo Capacities

This Appendix explores two alternative scenarios of jobs resulting from the project which are theoretically possible based on the expansion of capacity enabled by the ATC project. Rather than an increase of 3.85 percent, as assumed in the primary analytic scenario, these scenarios test a 8.35-percent and 33-percent increase in cargo volume, as calculated by DKS and SGA. DKS analyzed two round-trip flights per day of an aircraft with the largest cargo capacity to develop these scenarios..

**Method A:** Assumes two round-trip flights per day with the largest cargo capacity aircraft loaded to 25-percent of capacity when enplaning and also loaded to 25-percent of capacity when deplaning. This method yields an 8.35-percent increase in cargo capacity, compared to the primary analytic scenario of a 3.85-percent increase.

Instead of the base-case 3.85-percent increase in cargo movement enabled by the project, this method applies a 8.35-percent increase, which results in an **increase of 129** direct jobs enabled by the project, with the estimated indirect, induced, and total jobs and resulting labor income, value add, and output as shown in Table A-5 below.

**Table A-5**

**Test A: Applies a 8.35-percent increase in cargo volume to the Primary Method**

	<b>Jobs</b>	<b>Labor Income</b>	<b>Value Add</b>	<b>Output</b>
Direct	129	\$9,637,000	\$12,593,000	\$25,235,000
Indirect	47	\$3,786,000	\$5,729,000	\$11,103,000
Induced	33	\$2,040,000	\$3,677,000	\$5,961,000
<b>Total</b>	<b>208</b>	<b>\$15,463,000</b>	<b>\$21,999,000</b>	<b>\$42,299,000</b>

Sources: Port of Portland Finance and Statistics and Steer, with computations by ECOnorthwest.

**Method B:** Assumes two round-trip flights per day with the largest cargo capacity aircraft fully loaded when enplaning and also fully loaded when deplaning. This method yields a 33-percent increase in cargo capacity, compared to the primary analytic scenario of a 3.85-percent increase.

Instead of the 3.85-percent increase in cargo movement enabled by the project, this method applies a 33-percent increase, which results in an **increase of 509** direct jobs enabled by the project, with the estimated indirect, induced, and total jobs and resulting labor income, value add, and output as shown in Table A-6 below.

**Table A-6**

**Test B: Applies a 33-percent increase in cargo volume to the Primary Method**

	<b>Jobs</b>	<b>Labor Income</b>	<b>Value Add</b>	<b>Output</b>
Direct	509	\$38,087,000	\$49,769,000	\$99,731,000
Indirect	184	\$14,964,000	\$22,640,000	\$43,880,000
Induced	129	\$8,061,000	\$14,530,000	\$23,557,000
<b>Total</b>	<b>823</b>	<b>\$61,112,000</b>	<b>\$86,939,000</b>	<b>\$167,168,000</b>

Sources: Port of Portland Finance and Statistics and Steer, with computations by ECOnorthwest.



Again, these scenarios are presented in this appendix as a sensitivity analysis since they are possible based on the expansion of capacity enabled by the ATC project, but are considered unlikely. These scenarios test extend DKS' analysis of two round-trip flights per day of the largest cargo capacity aircraft, at 25-percent and 100-percent capacity.



## Appendix 5

### Potential Jobs Enabled in Regional Economy due to Increased Cargo Movement

#### ***Does this project benefit the Oregon economy by generating a net increase in or retention of long-term jobs (beyond short-term construction jobs) and/or increasing private investment in Oregon?***

The relatively modest increase in jobs associated with the movement of air cargo will be supplemented by a much larger number of jobs associated with the increase in economic activity generated elsewhere in the state. These jobs are associated with the increase in the production of goods and services whose export movement will be made possible with this expansion to the ATC. Using the information on the Top 25 Air Exports (2019 through 2022) by industry and the estimated market share of those industries, ECONorthwest imputed an estimated total annual value of goods exported by air of approximately \$29 billion of goods being exported by air annually (as shown in Attachment B: Top 25 Air Exports)

**Increase from Project:** Applying the estimated 3.85 percent increase in cargo movement enabled by the project, this estimate results in **an increase of over \$1.1 billion** in additional air exports enabled by the Project. Although we cannot predict the types of commodities that will be exported, it is reasonable to assume that the increase in exports enabled by the Project might include a large proportion of semiconductors & related devices, semiconductor machinery, electromedical apparatus, electronic computers, electricity measuring/testing instruments, and other computer equipment (which together comprised an estimated 80 percent of the estimated total value of the top 25 air exports for year 2019 to 2022). This increase in air cargo exports is likely to result in a reduction of leakage of goods produced in Oregon being exported via Air through Seattle or Ports in California, which may result in cost savings and environmental impacts from trucking.

The IMPLAN model estimates the economic impacts associated with a \$1 billion increase in output of the semiconductor and related device manufacturing industry to include an estimated 1,050 direct jobs, with the estimated indirect, induced, and total jobs and resulting labor income, value add, and output as shown in Table A-7 below.

**Table A-7**

#### **Estimated Economic Impact from \$1 Billion of New Output in the Semiconductor Industry**

<b>Impact Type</b>	<b>Employment</b>	<b>Labor Income</b>	<b>Value Added</b>	<b>Output</b>
Direct	1,050	\$216,142,000	\$412,931,000	\$1,000,000,000
Indirect	1,850	\$184,251,000	\$261,715,000	\$468,031,000
Induced	1,740	\$106,743,000	\$190,811,000	\$318,733,000
<b>Total</b>	<b>4,640</b>	<b>\$507,136,000</b>	<b>\$865,457,000</b>	<b>\$1,786,764,000</b>

Source: IMPLAN, 2022, modeled by ECONorthwest.