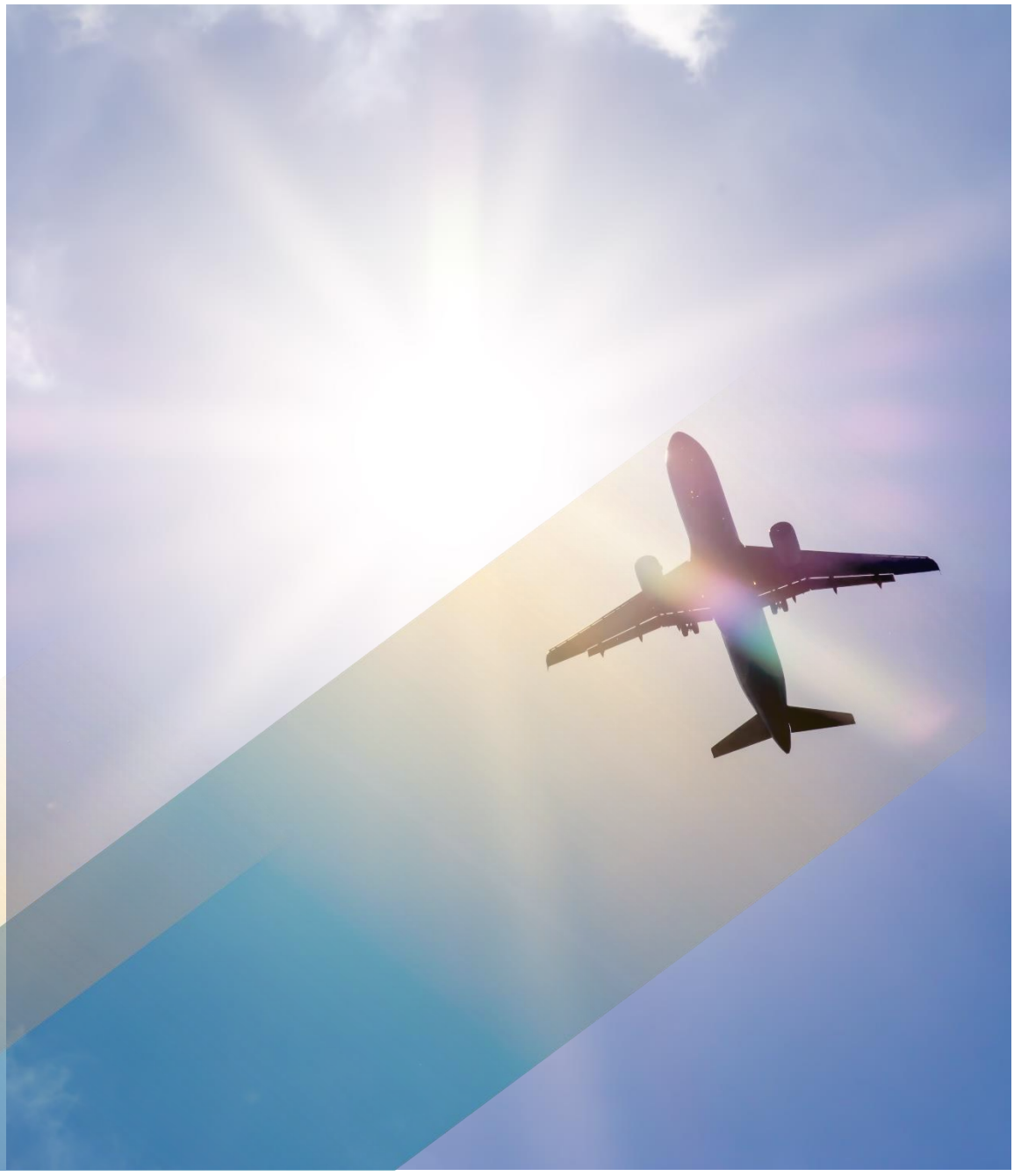
RS&H

August 22, 2023

FORECAST OF AVIATION DEMAND



FORECAST OF AVIATION DEMAND

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Prepared by RS&H, Inc. at the direction of
Ted Stevens Anchorage International Airport

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CHAPTER 3

Forecast of Aviation Demand

3.1 Introduction

This chapter presents projections of aviation activity at the Ted Stevens Anchorage International Airport (ANC or the Airport). These projections are used for evaluating the capability of the existing Airport facilities to meet current and future demand and to estimate the extent to which facilities should be further expanded and or provided in the future. Aviation activity forecasting is an analytical and subjective process that provides the best estimates of the order of magnitude traffic levels expected in the future. Actual activity levels in future years may differ from the forecasts developed in this chapter due to unexpected future changes in local economic conditions, the dynamics of the commercial and general aviation industry, as well as economic and political changes within both the service area and United States. Future facility improvements should be implemented as demand warrants rather than at set future values associated with time frames. This will allow the Airport to respond to changes in demand, either higher or lower than the forecast, regardless of the year in which those changes take place.

A key consideration in the development of aviation forecasts is how they compare with the FAA Terminal Area Forecasts (TAF).[1] The TAF is an important planning tool used by the FAA to review and compare forecasts prepared by Airport Sponsors. In accordance with FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions, paragraph 706.b(3), "The sponsor's forecast must be consistent with the TAF. To be consistent with the TAF, the sponsor's 5-year forecast should be within 10.0 percent of the TAF and a 10-year forecast should be within 15.0 percent of the TAF."[2] The FAA must approve sponsor forecasts before they can be used to prepare facility requirements in a master plan or before going forward with an environmental document that requires a forecast. If these stated thresholds are exceeded, the FAA Region office in which the airport is located, will forward the forecasts to FAA headquarters for review.

3.1.1 Background and Role

As of 2021 reports, the U.S. Census Bureau estimates that the Anchorage, AK, Metropolitan Statistical Area (MSA) had a population of 398,807, ranking it the 137th largest MSA in the United States (U.S.). ANC is located on the westernmost mainland point of the Municipality of Anchorage (MOA), the populated urban area known commonly as Anchorage, Alaska. The Airport is approximately six miles southwest of downtown and is owned and operated by the State of Alaska Department of Transportation and Public Facilities (DOT&PF). Under the control of DOT&PF, the state operates the Alaska International Airport System (AIAS), acting as financial, administrative, and oversight body for both ANC, and Fairbanks International Airport (FAI).

[1] The Terminal Area Forecast is the official FAA forecast of aviation activity for U.S. airports.

[2] December 23, 2004, memorandum from the FAA Director, Airport Planning and Programming, entitled Revision to Guidance on Review and Approval of Aviation Forecasts.

3.1.1.1 ANC at a Global Level

ANC plays a significant role in air cargo at the global level. Its geographic location is a key reason for this as it lies approximately 9.5 flight hours from 90 percent of the industrial world. The Airport's location enables cargo aircraft moving between East Asia and North America to make a convenient fuel and crew stop thereby increasing revenue producing payload between these markets. A major aspect of the Airport's use is to serve transiting intercontinental cargo aircraft. With the advent of the "just-in-time" business concept, cargo and freight is loaded onto aircraft and shipped "just-in-time" to reach the customer. This requires a reliable air transportation system that works efficiently and effectively. While modern jet aircraft have the range to make non-stop intercontinental routes with a full fuel load, payload capacity must often be reduced to accommodate the full fuel load. Consequently, airlines that prioritize maximum revenue producing payload will accept a reduced range and a stop to refuel. Cargo airlines prefer to stop at ANC because of its optimum location for refueling, modern infrastructure and facilities, and because ANC ground crews are efficient at preparing the aircraft to continue their flights. Ground crews typically refuel and service transiting aircraft within 60 minutes, allowing aircraft to quickly continue their routes.

The Airport not only serves as a refueling/repair stop, but as a major point for airlines to transfer and sort cargo. The two largest sorting facilities at ANC belong to UPS and FedEx. Both airlines use the Airport as regional sorting hubs. Further deregulation of cargo transfer rules and the expansion of markets will likely encourage additional growth of cargo transfer operations at ANC. This potential for growth is supported by the Airport's ability to accommodate the largest cargo aircraft (Airplane Design Group VI) flying today.

At the time of this writing, ANC is currently the third busiest airport in the world as measured by cargo volume. ANC surpassed Shanghai Pudong Airport (PVG) to claim the slot in Calendar Year (CY) 2022[3].

3.1.1.2 ANC at a National Level

At a national level, the National Plan of Integrated Airport Systems (NPIAS) classifies ANC as a medium hub, commercial service airport. Medium hub airports usually have sufficient capacity to accommodate air carrier operations and a substantial amount of general aviation activity. In addition to its role at the global level, the Airport plays a key role in transporting passengers and cargo between Alaska and the Lower 48 States (interstate travel) as a function of Alaska's remote location and limited road and marine transportation connections with the Lower 48 United States. As a result, almost all interstate passenger transport to/from Alaska is handled through ANC. Freight and heavy cargo that is not time sensitive may be transported to/from Alaska by

[3] Airports Council International (ACI), April 2023

highway or ship but, generally, Alaskans have a greater reliance on air freight for goods shipments than other comparable regions.

3.1.1.3 ANC at a State and Local Level

As the busiest airport in Alaska, ANC plays an important role in the transport of goods and people within the State. Aviation is an essential mode of transportation in Alaska as 82 percent of Alaska's communities do not have access to a roadway or rail network[4]. The intra-Alaska transport of people, cargo, and mail is primarily achieved through air travel via regional air carriers and freight forwarders.

Two federal programs that subsidize the movement of aircraft within the State are the Alaska Bypass Mail Program and the Essential Air Service (EAS) federal program. These two programs have specific criteria for subsidies that help connect 139 communities to Anchorage. Bypass mail is defined as bulk mail that is not handled in a U.S. Post Office. Since Anchorage is one of two locations where bypass mail originates, the Airport plays a vital role in the transportation of the mail from originating points to final destinations in Alaska.

3.1.2 Forecast Framework

The baseline year for this forecast is the State of Alaska Fiscal Year (FY) 2022. This forecast document defines a FY as the period between July 1st of a year and June 30th of the following year. For example, the FY 2022 is July 1st, 2021, through June 30th, 2022. This FY definition is in line with that of the DOT&PF. Data results from these forecasts are compared to the FAA TAF, the latest which was published in March 2023. The FAA TAF provides data based upon the Federal Fiscal Year (FFY), which is defined as the period from October 1st of a year and September 30th of the following year. The most current TAF provides projections from FFY 2022 through FFY 2049. The forecasts in this report provide data in FY format, except where otherwise identified.

[4] FAA, September 2021

3.2 Socioeconomic and Historical Aviation Demand Factors

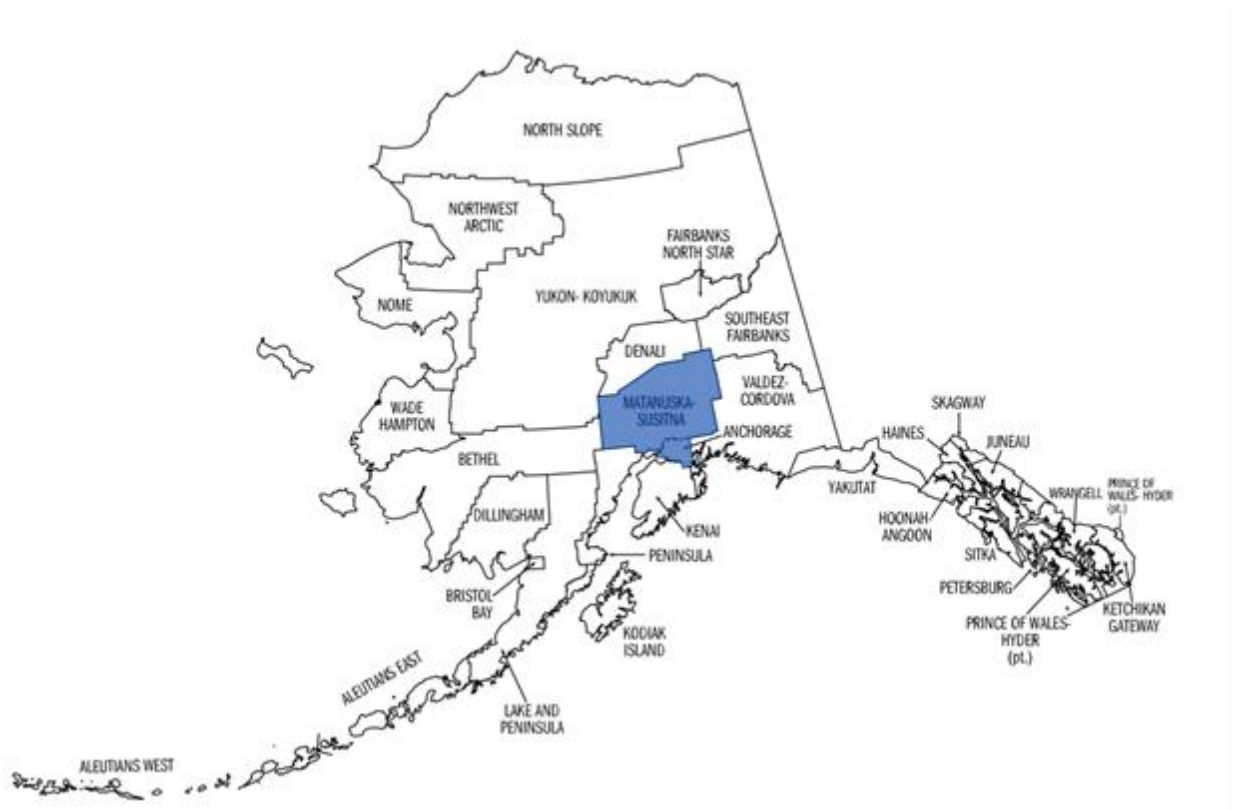
3.2.1 Socioeconomic Data

3.2.1.1 Population

The Municipality of Anchorage (MOA) is the State's largest city with approximately 41 percent of the State's total population. The MOA is currently experiencing a decline in population due to out-migration. However, a sizeable portion of out-migrating residents are moving to the nearby Matanuska-Susitna (Mat-Su) Borough, which has a lower cost of living and more available housing. The Mat-Su Borough covers approximately 25,000 square miles, about the size of West Virginia, with a diverse collection of communities and is the fastest growing area in Alaska. Despite the MOA experiencing a slow population decline, the Mat-Su Borough's population is growing. Anchorage and the Mat-Su Borough together constitute the Anchorage, Alaska Metropolitan Statistical Area (MSA). Overall, the Anchorage MSA is experiencing population growth.

Figure 3-1 illustrates the Anchorage MSA location within Alaska. The MOA and the Mat-Su Borough collectively will be referred to as the Anchorage MSA in this chapter.

Figure 3-1 Map of Alaska – Anchorage and Mat-Su Area



Sources: RS&H, 2023

According to Woods and Poole Economics, Inc., the 2022 to 2043 forecasted compound annual growth rate (CAGR) for the Anchorage MSA is 0.9 percent. The forecasted CAGR for the rest of Alaska for the same period is 0.3 percent. The Anchorage MSA population is expected to grow at a faster rate than the rest of U.S. over the 20-year planning period as the forecasted CAGR for the U.S. is 0.6 percent. **Table 3-1** depicts the forecasted populations for the Anchorage MSA, remainder of the State, Alaska as a whole, and for the entire U.S.

Table 3-1 Forecast – Population

Population Forecast				
Calendar Year	**Anchorage MSA (a)**	**Rest of Alaska**	**Alaska Total**	**U.S.**
2022	402,919	335,313	738,232	334,193,837
2023	406,981	336,711	743,692	336,451,657
2028	427,387	343,334	770,721	347,672,031
2033	447,617	349,171	796,788	358,560,569
2038	467,341	354,047	821,388	368,913,772
2043	486,825	358,105	844,930	378,928,870
CAGR 2023 - 2043	**0.9%**	**0.3%**	**0.6%**	**0.6%**

(a) Includes Municipality of Anchorage and Mat-Su Borough.
Sources: Woods & Poole Economics, Inc.; RS&H Analysis, 2023

3.2.1.2 Employment

Historically, the largest employers in the Anchorage MSA have been in the oil industry. Other important industries in the Anchorage MSA include healthcare, leisure and hospitality – tourism, and transportation. The area economy is also impacted by the Joint Base Elmendorf-Richardson (JBER) military facility, which is a combination of the Elmendorf Air Force Base and the Army's Fort Richardson. While Juneau is the state capital, the Anchorage MSA has more government employees, with nearly 4,500 state government employees and almost 11,000 federal government employees, largely attributable to the Joint Base.

The employment forecast for the Anchorage MSA between 2022 and 2043 matches the rate of forecasted population growth with an annual rate of 0.9 percent. The Anchorage MSA employment growth rate is notably higher than that of the rest of Alaska, which has a forecasted growth rate of 0.6 percent. However, the growth rate for the Anchorage MSA is lower than that of the U.S., which has a forecasted growth rate of 1.1 percent. This indicates that although the Anchorage MSA is expected to experience growth in the job market, it may not grow as fast as other areas in the U.S.

The projected job market growth rate in the Anchorage MSA likely results from a combination of factors including the diversification of the local economy, an increase in infrastructure development, and the rise of new industries such as e-commerce. It is important to note that these growth rates are only projections and may be subject to changes in economic conditions in Anchorage and the rest of Alaska. **Table 3-2** depicts the forecasted employment totals for the Anchorage MSA, remainder of the State, Alaska as a whole, and for the entire U.S.

Table 3-2 Forecast – Employment

Employment Forecast				
Calendar Year	**Anchorage MSA (a)**	**Rest of Alaska**	**Alaska Total**	**U.S.**
2022	246,382	213,635	460,017	207,048,429
2023	252,382	218,996	471,378	212,472,374
2028	265,289	226,329	491,618	226,480,417
2033	277,479	233,095	510,574	240,120,076
2038	289,095	239,424	528,519	253,525,606
2043	300,225	245,322	545,547	266,780,547
CAGR 2023 - 2043	**0.9%**	**0.6%**	**0.7%**	**1.1%**

(a) Includes Municipality of Anchorage and Mat-Su Borough.
Sources: Woods & Poole Economics, Inc.; RS&H Analysis, 2023

3.2.1.3 Personal Income

During the planning period, the personal income CAGR for the Anchorage MSA is projected to be 2.1 percent. This is a positive indicator, as it suggests that individuals in the Anchorage MSA are likely to experience an increase in their personal income over the next two-decade period. However, this growth rate is slightly lower than the national average of 2.2 percent.

Meanwhile, the rest of Alaska is forecast to have a CAGR of 1.8 percent, which is lower than both the Anchorage MSA and the national average. This could be due to the fact that the economy in Alaska is heavily reliant on natural resources such as oil, which can be subject to fluctuations in price and demand. **Table 3-3** depicts the forecast of total personal income rates for the Anchorage MSA, remainder of the State, Alaska as a whole, and for the entire U.S.

Table 3-3 Forecast – Personal Income

Personal Income (000's of 2012 Dollars)				
Calendar Year	**Anchorage MSA (a)**	**Rest of Alaska**	**Alaska Total**	**U.S.**
2022	$24,497,401	$19,291,977	$43,789,378	$17,932,090,197
2023	$25,123,645	$19,728,073	$44,851,718	$18,353,421,034
2028	$28,136,597	$21,679,477	$49,816,074	$20,589,751,617
2033	$31,347,935	$23,713,598	$55,061,533	$22,972,558,050
2038	$34,750,274	$25,813,829	$60,564,103	$25,501,747,573
2043	$38,334,411	$27,962,257	$66,296,668	$28,177,213,675
CAGR 2023 - 2043	**2.1%**	**1.8%**	**2.0%**	**2.2%**

(a) Includes Municipality of Anchorage and Mat-Su Borough.
Sources: Woods & Poole Economics, Inc.; RS&H Analysis, 2023

3.2.1.4 Per Capita Personal Income

Per Capita Personal Income (PCPI) is calculated by dividing a region's total personal income by its population. Between 2022 and 2043, the forecasted PCPI growth rate for the Anchorage MSA is at 1.2 percent annually. The forecasted PCPI growth rate for the rest of Alaska is 1.4 percent. The forecasted PCPI growth rate for the State of Alaska, which combines the Anchorage MSA and the rest of Alaska, is 1.3 percent.

Overall, forecasted PCPI growth for Alaska is lower than the U.S. average. This could potentially be due to Alaska's reliance on natural resources such as oil, which is subject to price and demand fluctuations. Nevertheless, the projected growth rates for PCPI in the Anchorage MSA, the rest of Alaska, and the State as a whole, indicate a positive trend that could translate to higher standards of living for residents in the State over the next two decades.

Changes in economic conditions, government policies, and other factors can impact the growth rates for PCPI. Nonetheless, the projected growth rates provide important insights into the potential trajectory of income growth in these regions. **Table 3-4** depicts the forecasted PCPI for the Anchorage MSA, rest of the State, Alaska as a whole, and for the entire U.S.

Table 3-4 Forecast – Per Capita Personal Income

Per Capita Personal Income (000's of 2012 Dollars)				
Calendar Year	**Anchorage MSA (a)**	**Rest of Alaska**	**Alaska Total**	**U.S.**
2022	$60,800	$57,534	$59,317	$53,658
2023	$61,732	$58,591	$60,310	$54,550
2028	$65,834	$63,144	$64,636	$59,222
2033	$70,033	$67,914	$69,104	$64,069
2038	$74,357	$72,911	$73,734	$69,127
2043	$78,744	$78,084	$78,464	$74,360
CAGR 2023 - 2043	**1.2%**	**1.4%**	**1.3%**	**1.6%**

(a) Includes Municipality of Anchorage and Mat-Su Borough.
Sources: Woods & Poole Economics, Inc.; RS&H Analysis, 2023

3.2.1.5 Global Economic Forecasts

The U.S. is projected to have an annual Gross Domestic Product (GDP) CAGR of 2.3 percent from 2022 to 2042. This growth rate is lower than that of Asia, but higher than that of Eurozone[5] and Japan. The growth rate is driven by factors such as demographic changes, technological

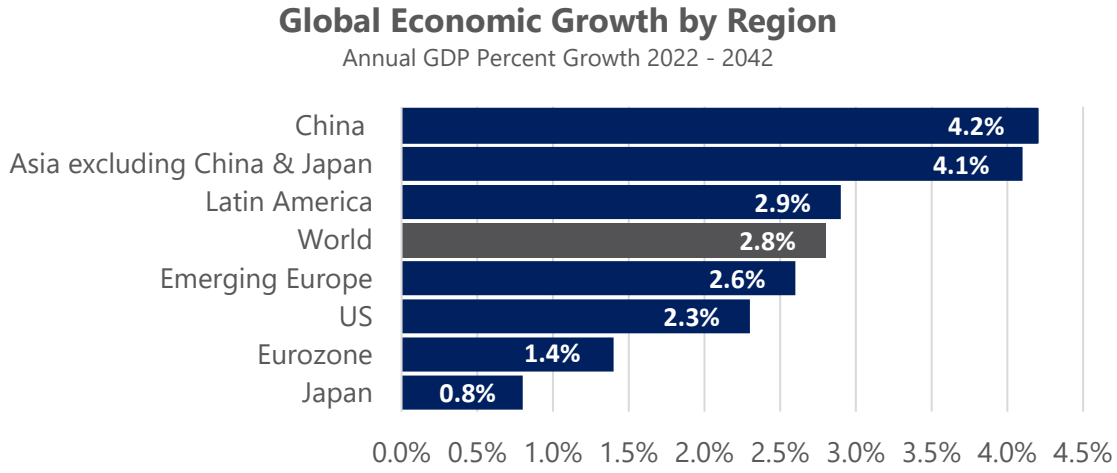
5 The geographical area comprising of the countries that use the euro as the official currency.

innovation and government policies that encourage economic growth. However, the U.S. also faces challenges such as rising debt, political polarization, and income inequality, which could impact its economic growth over the next two decades.

From 2022 to 2042, China is projected to have an annual GDP percent growth rate of 4.2 percent. This is a positive sign for China, as it indicates that the country's economy is likely to continue growing at a steady pace over the next two decades. The growth rate is driven by China's investments in infrastructure, innovation, and education, as well as the country's large population and consumer market. Meanwhile, Asia, excluding China and Japan, is forecast to have an annual GDP percent growth rate of 4.1 percent from 2022 to 2042. This region includes countries such as India, Indonesia, and Vietnam, which are expected to see significant economic growth over the next two decades. The growth rate is driven by a range of factors, including the rise of the middle class, increasing investment in infrastructure and technology, and government policies that encourage economic growth.

Latin America is projected to have an annual GDP percent growth rate of 2.9 percent from 2022 to 2042. This growth rate is lower than that of China and Asia, reflecting the region's slower economic growth compared to other parts of the world. The growth rate is driven by a range of factors, including political instability, high levels of debt, and economic dependence on commodity exports. Emerging Europe is forecasted to have an annual GDP percent growth rate of 2.6 percent from 2022 to 2042. This region includes countries such as Russia, Turkey, and Poland, which are expected to see moderate economic growth over the next two decades. The growth rate is driven by a range of factors, including political and economic instability, low levels of investment, and reliance on natural resources. **Figure 3-2** depicts the forecasted global gross domestic product growth.

Figure 3-2 Forecast – Global GDP Growth



Sources: HIS Markit, December 2021 World Forecast as published by
FAA Aerospace Forecast, FY 2022 - 2042

3.2.2 Other Variables and Trends

The oil and gas industries are the largest component of Alaska's economy. Nearly 85 percent of the state budget is supplied by oil revenues[6]. Alaska's oil and gas economy is primarily focused on the production and export of crude oil. Some portion of Alaskan crude oil is refined in-state at refineries in North Pole, Valdez, and Kenai and distributed in-state as gasoline, jet fuel, and other products. The bulk of Alaskan crude oil is exported to refineries on the west coast of the U.S. and in Asia, where it is refined into gasoline and other products some of which are then shipped back to Alaska.

Although Alaska is a major crude oil producing state, the cost of refinery products such as gasoline and jet fuel are still relatively more expensive compared to the Lower 48 states. Market economics, transportation costs, logistical challenges, and refinery operating costs ultimately contribute to the elevated prices of petroleum products in Alaska. Additionally, Alaska's oil production has been declining in recent years, which has led to a decrease in the amount of crude oil available for domestic refining. This has further increased Alaska's dependence on imported petroleum products and contributed to higher prices.

3.2.2.1 Oil and Jet Fuel Prices

The association between jet fuel prices and aviation demand is complex and can be influenced by a range of economic, political, and environmental factors. Jet fuel prices are a critical factor in the aviation industry as they have a significant impact on airlines' operating costs and

[6] State of Alaska, Department of Administration

profitability. The demand for aviation fuel is driven by the level of air travel and the size of airline fleets. In general, jet fuel prices tend to fluctuate in response to global oil prices, geopolitical tensions, and market supply and demand conditions. At the start of the SARS-CoV-2 Novel Corona Virus Pandemic (COVID-19 Pandemic) in April 2020, when demand was at a record low, fuel prices reached a low price of $1.03 per gallon.

However, the Russia-Ukraine conflict caused prices to rise dramatically, reaching its peak in CY 2022. Oil prices have fallen since then but remain elevated. When fuel prices are high, airlines may reduce their capacity or raise ticket prices to offset the increased costs. Conversely, when fuel prices are low, airlines may expand their operations or offer lower fares to attract more passengers.

Table 3-5 depicts the forecast oil and jet fuel prices during the Forecast Period.

Table 3-5 Forecast – Oil and Jet Fuel Prices

Comparison of Fuel and Oil Price Projections (2022 Dollars)			
Calendar Year	**U.S. Refiners' Acquisition Cost (Dollars per Barrel) (a)**	**Crude Oil Prices (Dollars per Barrel) (b)**	**Jet Fuel Prices (Dollars per Gallon)**
2022	$93.42	$102.00	$3.11
2023	$84.29	$92.00	$2.71
2028	$89.68	$103.00	$2.50
2033	$98.57	$120.00	$2.47
2038	$104.30	$134.00	$2.37
2043	$112.70	$149.00	$2.29
CAGR 2023 - 2043	**1.5%**	**2.4%**	**-0.8%**

(a) Monthly census of all U.S. refiners collecting the net acquisition costs and volumes of crude oil, both domestic and imported, on a corporate regional basis (not for individual refineries). Data reported in FAA Aerospace Forecast.
(b) Brent spot price (rounded)
Sources: FAA, 2023; Energy Information Administration (EIA)

3.2.2.2 Average Air Fares

After labor, fuel is an airline's second-largest expense. Volatile prices of oil and jet fuel eventually end up affecting the consumer, which in this case comes in the form of increased airfares. Airfare prices are volatile and can change by the minute due to travel demand, available capacity, seasonality, airlines' costs and more. After airfares dropped significantly in CY 2020 due to the COVID-19 Pandemic, demand for travel began rebounding in CY 2023 and there is no indication of subsiding. The increase in travel is a welcome trend for the airline industry which struggled to maintain profits; however, the law of supply and demand ultimately affects the customer as more demand drives higher fuel prices. Around the U.S., airfares have risen recently, particularly over the past 18 months. Both the rising costs of aviation fuel and airline debt following the COVID-19 Pandemic shutdown have impacted average ticket prices and have caused them to steadily increase since the start of CY 2022.

Air fare prices are expected to grow at an CAGR of 2.1 percent as depicted in **Table 3-6**.

Table 3-6 Forecast – Air Fares

Projected Domestic Fares (2010 dollars)					
				ANC Outbound Fares (dollars)	
Calendar Year	FAA Adjusted Yield (cents) (a)	FAA Average Trip Length (b)	FAA Fare (dollars) (c)	To Rest of Alaska	To Other U.S.
			Base Case		
2022	13.11	1,048.0	$137.39	$155.59	$306.80
2023	13.46	1,046.6	$140.87	$158.86	$313.24
2028	15.14	1,044.0	$158.06	$176.25	$347.54
2033	16.55	1,058.8	$175.21	$195.55	$385.60
2038	18.01	1,072.8	$193.17	$216.97	$427.83
2043	19.55	1,087.5	$212.61	$240.73	$474.67
CAGR 2023 - 2043	**1.9%**	**0.2%**	**2.1%**	**2.1%**	**2.1%**

(a) FAA forecast of domestic aviation activity; yield (extrapolated)
(b) FAA forecast of domestic aviation activity; average trip length in miles (extrapolated)
(c) FAA yield multiplied by average trip length and divided by 100.
Sources: FAA, 2023

3.2.3 Historical Aviation Activity

This section provides an analysis of recent historical aviation activity and identifies important trends and events that are likely to impact future air service demand at ANC. Activity is presented by Fiscal Year (FY) in this section to align with the State of Alaska's data.

3.2.3.1 Historical Passenger Activity

Since FY 2009, passenger activity at ANC has produced stages of growth as well as a few periods of decline tied to the global economic downturn that occurred from 2007 to 2009 (Great Recession) and COVID-19 Pandemic related events. Currently, ANC serves approximately five million passengers per year and is the largest and busiest passenger airport in the State of Alaska. Passenger volume at ANC is highly seasonal, with high summer volume coinciding with Alaska's summer tourist season. Anchorage is the major aviation gateway to Alaska, which is among the most sought after North American tourist destinations. Tourists are drawn to Alaska's wilderness, mountains, National Parks, hunting and fishing, and remote recreation opportunities.

A total of 5.16 million passengers enplaned, deplaned, or transited ANC in FY 2022. Most passenger volume at the Airport is related to travelers enplaning or deplaning at ANC with a limited number of passengers designated as in-transit, which are those who did not deplane following their arrival at ANC (45,455 in FY 2022).

ANC was previously a significant international passenger transiting hub until the early-1990s. Prior to this time, most passenger airlines would stop at ANC to refuel while flying between the U.S. and Asia. This activity occurred because aircraft of that era did not have the range to fly non-stop from the U.S. east coast to Asia. Some passenger aircraft flying between Europe and Asia also stopped in Anchorage because the then Soviet Union airspace was closed to western airlines. The introduction of longer-range aircraft including the Boeing 747-400 and 777 in the 1980s and 1990s enabled non-stop travel between the United States and Asia. As airlines acquired these aircraft, they ended their refueling stops in Anchorage. The opening of Soviet airspace in the 1990s also enabled more direct routes between Asia and Europe. **Table 3-7** depicts historical passenger activity at ANC back to FY 2009.

Table 3-7 ANC Historical Passenger Activity

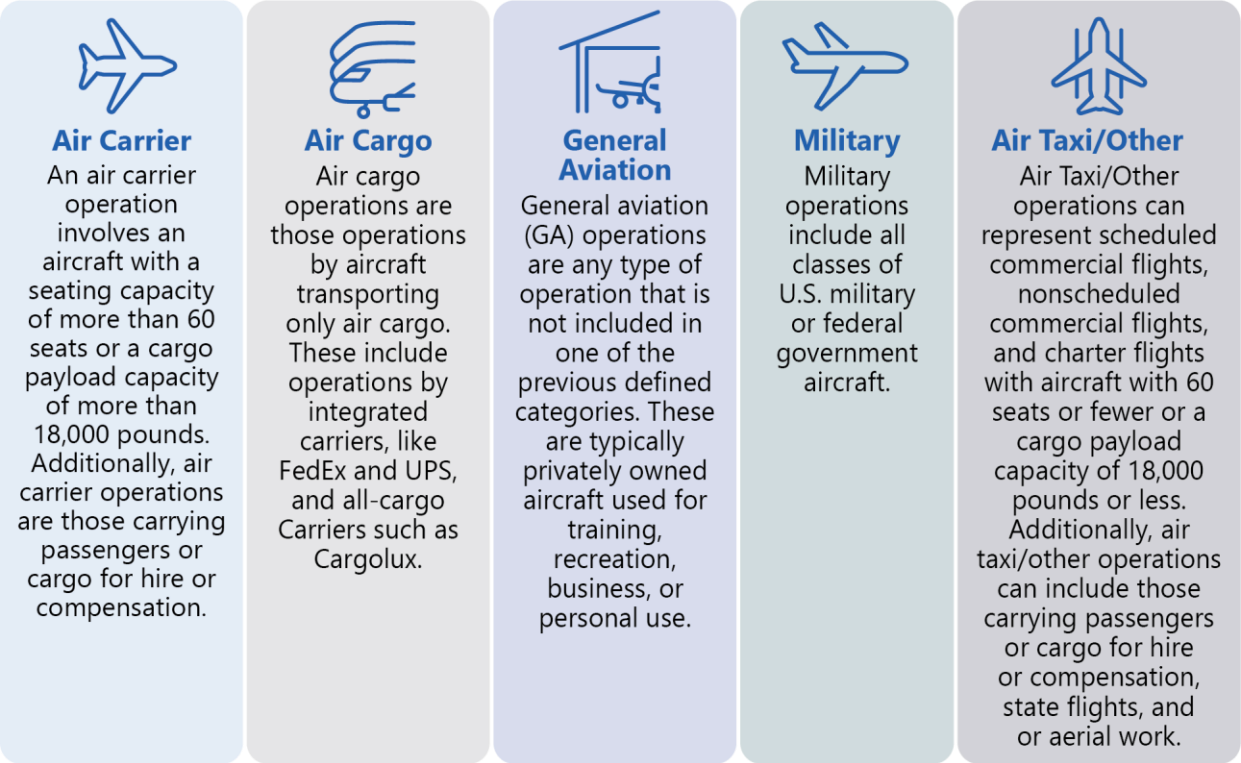
Historical Enplanements and Deplanements				
Fiscal Year	**Enplanements**	**Deplanements**	**In-Transit**	**Total**
2009	2,465,169	2,422,513	180,599	5,068,281
2010	2,346,750	2,346,954	189,231	4,882,935
2011	2,456,175	2,462,554	164,204	5,082,933
2012	2,493,562	2,482,676	90,189	5,066,427
2013	2,469,060	2,445,886	44,398	4,959,344
2014	2,547,025	2,538,699	32,911	5,118,635
2015	2,668,378	2,654,554	41,755	5,364,687
2016	2,774,869	2,764,020	18,651	5,557,540
2017	2,725,897	2,725,282	27,457	5,478,636
2018	2,741,683	2,732,445	29,129	5,503,257
2019	2,824,465	2,820,399	49,160	5,694,024
2020	2,197,794	2,177,066	37,285	4,412,145
2021	1,452,011	1,501,036	43,160	2,996,207
2022	2,564,262	2,554,274	45,455	5,163,991
CAGR 2009-2022	**0.3%**	**0.4%**	**-10.1%**	**0.1%**

Source: AIAS, 2023

3.2.3.2 Historical Operations

Anchorage International Airport opened to commercial air transportation service in December 1951. Since that time, the Airport has served as a critical air transportation link to the State of Alaska and as connecting point between the United States and Asia. The Airport has grown substantially in size over its more than 70-year operating history and accommodates hundreds of thousands of aircraft operations every year.

An aircraft operation is defined as either a takeoff or a landing. Therefore, the typical flight consists of a landing and a takeoff for a total of two operations. The FAA records annual aircraft operations in the following five categories:



As shown in **Table 3-8**, historically, aircraft operations had grown at an CAGR of 0.7 percent from FY 2009 to FY 2022. Total operations within this 13-year period fluctuated between 250,000 and 290,000 operations with air carrier and air cargo operations making up the largest percentage. Although air carrier activity remains the top category of aircraft operations, it has seen a decrease in the CAGR of -1.6 percent since FY 2009. Air cargo activity has led operations activity consistently since FY 2020 and has shown strong growth over the 13 years with an CAGR of 3.4 percent. ANC cargo operations substantially increased in FY 2021 and FY 2022 driven by the increase in demand of healthcare products during the COVID-19 Pandemic with an CAGR of 7.9 percent between FY 2019 and FY 2022.

Table 3-8 ANC Historical Operations Activity

Historical Aircraft Operations								
Fiscal Year	Air Carrier	Air Cargo	Other / Air Taxi(a)	Itinerant		Local		Total ©
				GA (b)	Military	GA (b)	Military	
2009	100,432	72,450	1,673	72,262	4,578	7,942	10	256,001
2010	97,824	80,016	9,329	74,214	4,302	6,351	-	272,036
2011	101,374	83,994	3,780	78,096	2,952	5,879	56	276,131
2012	101,858	75,820	6,373	76,838	2,155	8,488	2	271,534
2013	102,074	72,116	5,137	74,834	2,315	8,368	52	264,896
2014	109,460	70,132	531	80,486	2,213	10,584	36	272,380
2015	102,608	74,534	10,316	81,006	2,177	10,274	29	280,944
2016	103,322	75,036	11,773	77,942	2,406	8,451	60	278,990
2017	98,502	77,626	13,568	75,704	2,373	10,902	18	278,693
2018	83,244	94,542	12,933	72,756	2,502	9,145	32	275,154
2019	89,820	83,796	13,354	71,922	2,949	9,058	76	270,975
2020	74,890	90,506	2,885	68,598	3,016	9,562	32	243,719
2021	62,654	105,422	22,196	76,779	3,579	11,937	20	282,587
2022	81,448	112,202	9,358	65,152	3,687	8,456	1	280,304
CAGR 2009-2022	**-1.6%**	**3.4%**	**14.2%**	**-0.8%**	**-1.7%**	**0.5%**	**-16.2%**	**0.7%**

(a) AIAS landings data multiplied by 2

(b) Includes aircraft operations at Lake Hood Airport (LHD)

(c) Totals may not add due to difference between FAA counts of Air Carrier and Air Taxi operations and ANC counts of commercial (passenger and freight) operations.

Source: AIAS; FAA; US DOT T-100, 2022

3.2.3.3 Historical Air Cargo

As previously mentioned, the Anchorage MSA is less than 9.5 flight hours from 90 percent of the industrialized world. ANC is an important contributor to Alaska's economy and a critical link between communities in Alaska, the contiguous U.S., and international destinations. Cargo activity at ANC has always been among the world's busiest in terms of air cargo throughput. Historically, ANC has ranked among the top six busiest cargo airports and in CY 2022, it surpassed PVG to claim the slot for third busiest airport in the world measured in cargo volume. During the COVID-19 Pandemic, cargo operations grew significantly as ANC's strategic location between North America and Asia was critical in transporting supplies. As noted in **Table 3-9**, total cargo tonnage grew by more than one million cargo tons from FY 2020 to FY 2021.

Table 3-9 ANC Historical Air Cargo Activity

Historical Total Air Cargo Tonnage				
Fiscal Year	**Enplaned Cargo**	**Deplaned Cargo**	**Transit Cargo**	**Total Cargo**
2009	341,726	310,869	2,964,328	3,616,923
2010	421,418	393,990	3,652,821	4,468,229
2011	439,524	408,181	4,060,139	4,907,844
2012	477,983	437,605	3,650,758	4,566,345
2013	452,998	408,845	3,652,361	4,514,204
2014	409,861	356,256	3,809,912	4,576,029
2015	401,327	346,883	4,357,927	5,106,136
2016	365,363	321,819	4,137,679	4,824,861
2017	360,464	341,522	4,390,527	5,092,513
2018	762,858	737,452	3,174,565	4,674,874
2019	726,889	739,517	3,160,149	4,626,555
2020	785,488	778,628	3,120,577	4,684,693
2021	1,049,942	1,021,806	3,668,759	5,740,507
2022	1,084,196	1,079,868	3,583,452	5,747,515
CAGR 2009-2022	**9.3%**	**10.1%**	**1.5%**	**3.6%**

Source: AIAS, 2023

Between CY 2009 and CY 2022, the historical total air cargo tonnage experienced growth in all areas. Enplaned cargo achieved an CAGR of 9.3 percent, while deplaned cargo grew at an CAGR of 10.1 percent. Transit cargo had a relatively lower growth rate, with an CAGR of 1.5 percent. Overall, the total cargo tonnage experienced an CAGR of 3.6 percent at ANC. These figures indicate that while air cargo transportation continued to expand, the rate of growth varied across different transport categories. Nonetheless, the overall trend suggests a steady increase in the demand for air cargo services will continue.

3.2.4 Expert Panel Meeting

A strategic planning meeting for forecasting was held virtually on February 6, 2023. Meeting participants who constituted the expert panel included Airport leadership, Alaska International Airport System (AIAS) leadership, airline representatives, economic experts, and members of the consultant team. The meeting included a discussion of aviation passenger trends, cargo trends, general aviation, and operational trends. The purpose of the meeting was to present preliminary findings of baseline data and trends and gather the Panelists' questions, concurrence, and additional insight on early-level analysis. The discussion was organized into the following segments:

- Project Background
- Cargo Activity
- Commercial Airline Activity (by passengers)
- Commercial Airline Activity (by operations)
- Intended Forecast Approach

Following presentation of the data, a 'diagnostic' of the consultant's impression of the data and trends was presented followed by a breakout session. As this was a virtual meeting, members were assigned into three sub-groups and taken into separate 'virtual breakout rooms' to gather their responses to the information presented. The breakout sessions were maintained as open-ended dialogue from the Expert Panel members. Data that was presented included the following:

- Current domestic and international cargo volumes by carrier and type (enplaned, deplaned, in-transit)
- Top international origin countries
- Changes of cargo carrier market shares since previous forecast
- Cargo volumes over past ten years (enplaned, deplaned, in-transit, total)
- Major industry trends and changes over past ten years
- Passenger enplanements over past ten years

- Current and previous airline market shares
- Total passenger and commercial operations over past ten years
- Split of types of operations since previous forecast
- Intended forecast methodologies for each category

Industry insight, perspectives, and supplemental data were recorded as a result of this meeting prior to completing the forecast analysis. The attendees are listed in **Table 3-10**.

Table 3-10 Organizations Represented in the Expert Panel Presentation

Organizations
Alaska Airlines
Alaska International Airport System (AIAS)
Anchorage Economic Development Corporation (AEDC)
AvAirPros
FedEx
Pegasus Aviation
Ted Stevens Anchorage International Airport (ANC)
UPS

3.3 Passenger Forecasts

This section presents the assumptions, approach and results of the passenger activity forecasts for ANC for the period between FY 2023 through FY 2042 (the "Forecast Period"). All passenger activity forecast numbers for the Airport are shown in FY unless otherwise noted.

3.3.1 The Big Picture

According to the Anchorage Economic Development Corporation (AEDC), the Anchorage MSA economy is projected to experience growth in the short-term after three years of limited economic growth due to the COVID-19 Pandemic. New projects on Alaska's North Slope are expected to increase oil production over the next 10 years, creating new job opportunities in the Anchorage MSA. The visitor industry has a positive outlook with growing Cross-Gulf cruise ship[7] capacity and a new post-COVID-19 Pandemic adventure and eco-tourism sector on the rise.

Some challenges have arisen post-COVID-19 Pandemic such as a lack of available workforce to meet the needs of local employers already constrained in the Anchorage MSA during the current recovery. Inflation continues to be a burden at the national level, and this could result in less disposable income for travelers across the US and the world that could potentially choose

[7] Cruise ships sailing from southeast Alaska across the Gulf of Alaska

Alaska as a travel destination. A possible recession could slow the rate of recovery of the Anchorage MSA's businesses and present new challenges.

As previously mentioned, however, ANC's strategic location continues to be a key factor in the decision of numerous U.S. and international airlines to transit in the major Asia-North America air cargo corridor. In addition, projects funded by new federal sources, such as the Infrastructure Investment and Jobs Act (IIJA), will continue to support demand for professional services and construction companies based in the Anchorage MSA.
These initiatives and investments along with economic challenges are considered in the forecast analysis.

3.3.2 Passenger Forecast Assumptions

The passenger forecasts are based on several key assumptions that were developed from information collected from interviews with airlines and ground handlers, discussions with Airport staff and AEDC, as well as industry knowledge and publications. This section describes the passenger forecast assumptions that were applied in this forecast. More detailed assumptions specific to a particular activity category are described in the sections pertaining to those categories. The following forecast assumptions were used in preparing the passenger forecasts separated into categories.

General

- No new major economic downturn, such as the one that occurred in the Great Recession (CY 2008 – CY 2011). Local, national, and international economies will periodically increase and decrease the pace of growth in accordance with business cycles. However, it is assumed that over the 20-year Forecast Period, the increase and decrease growth periods will offset each other so that the adjusted economic forecasts will be realized.
- The economies which comprise the Anchorage MSA will grow in accordance with the Woods & Poole Economics, Inc. ("W&P"), demographic and economic projections used for these forecasts.
- The Essential Air Service ("EAS") program or a similar program will continue to ensure passenger service to rural Alaskan communities.
- No nighttime curfews will take effect at ANC.
- Environmental regulations will not be so extreme as to significantly constrain air transportation in Alaska.
- The FAA will successfully implement any required changes and improvements for the national airspace system to accommodate the unconstrained forecast of aviation demand.

Inflation

- The U.S. rate of inflation will continue to decline in CY 2024 and CY 2025 as the COVID-19 Pandemic manufacturing and supply-chain imbalances begin to equalize and the aggregate supply and demand begin to balance.
- The Consumer Price Index (CPI)[8] which measures inflation in the Anchorage MSA and has risen due to increased demand for consumer goods and manufacturing slowdowns related to the COVID-19 Pandemic, will continue to follow national trends, and minimally affect the demand for air travel to and from Alaska.
- The U.S. economy will remain robust and despite temporary rising cost of airline tickets, rental cars, fuel, and goods and services, the visitor industry will overcome these challenges and resume as Alaska's fastest growing economic sector.

COVID-19 Pandemic

- North American airlines will continue to lead the industry recovery.
- Expectations of an industry-wide passenger traffic recovery to CY 2019 pre-COVID-19 Pandemic levels are expected in CY 2024.[9]
- The Anchorage MSA's visitor-related businesses, which were disproportionately impacted by the COVID-19 Pandemic, will continue to recover and hotel occupancy and car rental tax revenue will continue to increase.
- Labor force shortages in the Anchorage MSA will continue to recover through FY 2023 and into FY 2024.
- Cruise ship capacity to Alaska will continue to increase and convention bookings and attendee spending will continue to rise to pre-COVID-19 Pandemic levels.

Russia-Ukraine Conflict

- The Russia-Ukraine conflict will not impact the long-term growth of air transport from Alaska to the U.S. and Canada.
- U.S. consumer confidence and economic activity are not significantly impacted by the Russia-Ukraine conflict.

3.3.3 Passenger Forecasts

This section presents the originating passengers, total enplaned passengers and passenger aircraft landings forecast for ANC. This section also includes a break-out of total enplaned, deplaned and in-transit passengers for ANC, a format used by the AIAS to summarize annual aviation activity statistics. This section also provides a description of data sources, the methodology for the originating passenger forecast, the approach used to determine the

8 Published by the U.S. Department of Labor Statistics

9 International Air Transport Association (IATA)

projection of connecting passengers and the split of originating/connecting passenger by market sector. The market sectors for the purposes of this forecast are divided into passengers traveling to/from the Rest of Alaska and to/from other U.S. and international markets. In the conclusion of this section, total enplaned passengers are compared to the FAA TAF for FFY 2022.

The following data sources were used in this analysis:

- Historical and projected information on population, employment, and real income for the Anchorage MSA from W&P.
- US DOT OD1A domestic Origin & Destination (O&D) database for yield (airline revenue per passenger mile) and distance and historical originating traffic on a market-by market basis.
- US DOT T-100 database to obtain outbound passenger data on a market by-market basis.
- Cirium Diio Mi market data on scheduled passenger operations to determine existing scheduled service and historical non-stop service.
- Airline, ground handler and other economic stakeholder interviews.

3.3.3.1 Originating Passengers Forecast

An originating passenger, for the purposes of this forecast, is someone who starts their trip at ANC. Most originating passengers reside or are visitors in the Anchorage MSA. The total number of originating passengers can be viewed as a reflection of that region's attractiveness as a place in which to live, work and conduct business. The predictive model for future air traffic demand in the Anchorage MSA first looks at these passengers as the basis for the forecast because it can quantitatively measure historical economic trends for the region with their propensity to travel.

3.3.3.2 Regression Analysis

In the Anchorage MSA, there are numerous economic factors which support the trends of the Airport's aviation activity. For those reasons, a multivariate regression analysis was chosen for this forecast. Multivariate regressions provide a systematic framework for quantifying the contributions of multiple factors (independent variables) to air traffic growth (the dependent variable), while controlling for the effects of structural changes and extraordinary events (recessions, COVID-19 Pandemic among others) affecting both supply and demand for air service. In addition, recent pre- and post- COVID-19 Pandemic air service and traffic trends at ANC were examined as well as available future airline flight schedules showing the available seats the airlines project to provide the public for sale approximately one year in advance.

Historical originating passengers were used as the dependent variable for this forecast and the selected independent variables (sometimes referred to as "demand drivers" or "predictors") included the following:

- Population
- Employment
- Earnings (2012)
- Total Personal Income (2012)
- Per Capita Personal Income (PCPI) (2012)

The dollar figures for earnings, total personal income and PCPI were adjusted (chained) to 2012 dollars. This method of adjusting real dollar amounts for inflation over time allowed the regression analysis to maintain an even comparison of dollar values over the long historical period. These independent variables were collected from W&P.

One additional independent variable was used for the multivariate regression analysis, which is U.S. average fares, or the average prices paid by all fare paying passengers flying in the U.S. The most common measure of average fares is labelled as passenger yield. Passenger yield is defined as the amount of revenue received per paying passenger flown one mile. This data is collected and distributed by the FAA.

To run the multivariate regression analysis, the dependent and independent variable numbers were converted into logarithmic values to standardize the data. In addition, a dummy variable was added to account for economic downturns and exogenous historical events like the Events of September 11th or the Great Recession. A dummy variable (also known as an indicator variable or just dummy) is one that takes the values 0 or 1 to indicate the absence or presence of some categorical effect that could potentially shift the outcome of the results.

The forecast of the Y or dependent variable, originating passengers, was calculated by applying a formula known as Ordinary Least Square ("OLS") using the intercept and coefficient of the independent variables to calculate the projection of originating passengers. A coefficient is defined as a factor that measures the significance of a specific independent variable in the regression equation. The formula is as follows:

$$Y = a + (b_1X_1) + (b_2X_2)$$

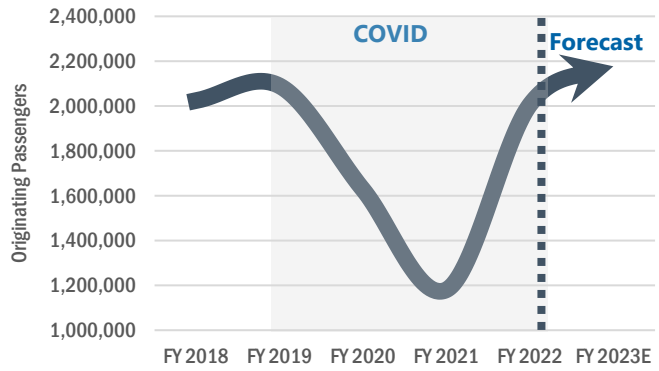
The specific formula is as follows:

Passengers = *Intercept + (Independent Variable A Coefficient * Independent Variable) + (Independent Variable B Coefficient * Independent Variable)*

RS&H considered various approaches to calculating the forecast for originating passengers for ANC however, the preferred approach selected was to run a multi-variate regression utilizing historical passenger data specifically until FY 2019, which was the last year without any aviation traffic effects due to the COVID-19 Pandemic. The growth rates calculated were then applied to originating passengers starting in FY 2024. For FY 2023, RS&H produced an estimate of originating passengers by using three quarters of actual data provided by AIAS, and the last quarter was estimated by using actual seat capacity published by the airlines and applying load factors published by the FAA on a route-by-route basis. In addition, a portion of passengers was deducted to account for connecting passenger activity based on average historical levels.

This methodology was chosen for two reasons. Firstly, ANC experienced a very well defined "V-shaped" recovery as can be observed in **Figure 3-3**. The recovery showed a distinct upturn in FY 2022 and very distinguishable signs of growth adjustments to normal levels in FY 2023 making it statistically plausible to normalize growth at that point. Secondly, a group of regression equations were run through the COVID-19 Pandemic years using dummy variables to account for this exogenous event. These regressions did show signs of statistical significance, however, they exhibited strong/bullish patterns of recovery growth in the first 3 to 5 years of the forecast and consequently were invalidated by unrealistic medium- to long-term growth trends of passenger activity.

Figure 3-3 ANC V-Shape COVID-19 Pandemic Recovery



Source: AIAS; RS&H Analysis 2023

Results

Once the multi-variate regression equations were run utilizing numerous scenarios with several independent and dummy variable combinations, it was concluded that total personal income, population, and passenger yield had the highest correlation and were the best statistical fit for ANC's historical originating passenger data. These variables were found to have a high multiple R and R-squared, or coefficient of determination (see **Table 3-11**). An R-squared is a statistical measure that explains how closely a dependent variable, or ANC's originating passengers, can be explained by a group of independent variables in a regression model.

Table 3-11 Regression Statistics: Originating Passengers

Regression Statistics	
Multiple R	94.9%
R Square	90.1%
	Coefficients
Intercept	-87499588
TOTAL PERSONAL INCOME (2012)	5.25038E-05
POPULATION	-7.677458786
YIELD	-822.7970937

Source: RS&H Analysis, 2023

Based on the regression analysis, originating passengers at ANC are projected to increase from 2,005,748 in FY 2022 to approximately 3,144,383 in FY 2042 at an CAGR of 2.3 percent (See **Table 3-12**). The fastest growing sector is expected to be the originating passenger traffic between ANC and other U.S. and international markets which is projected to increase from 1,486,286 from FY 2022 to approximately 2,389,731 in FY 2042 at an CAGR of 2.4 percent. Originating passengers to the rest of Alaska from ANC are expected to grow at an CAGR of 1.9 percent throughout the Forecast Period. The percentage share of originating passengers to the rest of Alaska had seen a historical decline of 32.2 percent in FY 2009 to 29.4 percent in FY 2020 during the beginning of the COVID-19 Pandemic. This forecast projects that share to continue to decline from 25.9 percent in FY 2022 to approximately 24.0 percent in FY 2042.

Table 3-12 Originating Passengers

	Fiscal Year	To Rest of Alaska	To Other US/Int'l	Total
Historical	2018	597,505	1,427,121	2,024,626
	2019	622,691	1,466,886	2,089,577
	2020	478,509	1,148,259	1,626,768
	2021	326,801	853,954	1,180,755
Baseline	2022	519,462	1,486,286	2,005,748
Forecast	2023	620,498	1,556,687	2,177,185
	2024	627,559	1,595,550	2,223,108
	2025	634,620	1,634,843	2,269,462
	2026	641,681	1,674,579	2,316,260
	2027	648,742	1,714,769	2,363,511
	2032	684,047	1,926,525	2,610,572
	2037	719,352	2,152,168	2,871,520
	2042	754,652	2,389,731	3,144,383
CAGR				
2018 - 2022		-3.4%	1.0%	-0.2%
2022 - 2023		19.5%	4.7%	8.5%
2023 - 2032		1.1%	2.4%	2.0%
2032 - 2042		1.0%	2.2%	1.9%
2022 - 2042		1.9%	2.4%	2.3%

Source: US DOT DB1B 10% Ticket Survey; RS&H Analysis, 2023

3.3.3.3 Total Enplaned Passengers

Following the originating passenger demand projections, estimated domestic connecting passenger activity was "layered" onto the originating passenger forecast to derive total enplaned passengers at ANC. Connecting percentages were calculated historically and analyzed based on varying activity dependent on current and historical air service patterns. Most medium-to-large hub airports in the U.S. tend to have connecting rates that remain constant over their forecast period because of their historical trends. In the case of ANC, historical connecting percentages since FY 2009 and before the COVID-19 Pandemic, had diminished slightly from 29.4 percent to approximately 27.0 percent of total passengers. During the COVID-19 Pandemic, connection rates fell to artificially low rates of between 18.7 percent to 21.8 percent from FY 2021 and FY 2022.

Connecting percentages for this forecast are projected to increase to rates closer to historical average activity from approximately 26.0 percent in FY 2023 to 29.0 percent in 2042. This trend is derived on a connecting passenger recovery in FY 2023 but also on findings resulting from consultations with airlines and airport stakeholder interviews in addition to RS&H research pointing to a varying visitor profile compared to 20 years ago. New leisure industry demographics identify a new trend of young tourists traveling beyond the Anchorage MSA and connecting to more remote destinations in Alaska seeking an adventure/exploration type of tourism which started prior to the COVID-19 Pandemic and has continued to grow.

Adding enplaned connecting passengers with originating passengers equates to total enplaned passengers. As can be observed in **Table 3-13**, total passengers at ANC are projected to grow from 2,564,262 in FY 2022 to approximately 4,056,254 in FY 2042 at an CAGR of 2.2 percent. Connecting passengers are projected to grow from 142,275 in FY 2022 to approximately 206,272 in FY 2042 at an CAGR of 1.9 percent. Connecting passenger activity to the rest of Alaska is projected to increase from 416,239 in FY 2022 to approximately 705,599 in FY 2042 at an CAGR of 2.7 percent.

Table 3-13 Total Enplaned Passengers

		Originating Passengers		Connecting Passengers		
	Fiscal Year	To Rest of Alaska	To Other US/Int'l	To Rest of Alaska	To Other US/Int'l	Total Enplaned Passengers
Historical	2018	597,505	1,427,121	499,541	217,516	2,741,683
	2019	622,691	1,466,886	502,809	232,079	2,824,465
	2020	478,509	1,148,259	357,915	213,111	2,197,794
	2021	326,801	853,954	202,626	68,630	1,452,011
Baseline	2022	519,462	1,486,286	416,239	142,275	2,564,262
Forecast	2023	620,498	1,556,687	367,073	198,995	2,743,253
	2024	627,559	1,595,550	388,846	211,393	2,823,348
	2025	634,620	1,634,843	402,978	209,776	2,882,217
	2026	641,681	1,674,579	425,652	222,901	2,964,812
	2027	648,742	1,714,769	440,364	221,419	3,025,294
	2032	684,047	1,926,525	528,303	228,763	3,367,638
	2037	719,352	2,152,168	614,182	218,559	3,704,260
	2042	754,652	2,389,731	705,599	206,272	4,056,254
CAGR						
	2018 - 2022	-3.4%	1.0%	-4.5%	-10.1%	-1.7%
	2022 - 2032	2.8%	2.6%	2.4%	4.9%	2.8%
	2032 - 2042	1.0%	2.2%	2.9%	-1.0%	1.9%
	2022 - 2042	1.9%	2.4%	2.7%	1.9%	2.3%

Source: US DOT T-100; AIAS; RS&H Analysis, 2023

3.3.3.4 In-Transit Passengers

An in-transit passenger refers to a passenger who arrives at ANC in an aircraft and departs from ANC in the same aircraft, where such aircraft is operating a through flight transiting the Airport. In the 1980s and early 1990s, ANC was a frequent stopover point for flights between North America and Asia. Numerous foreign flag carriers used ANC as a refueling stop between Asia, North America, and Europe. In FY 1990, 1.5 million passengers were counted as in-transit passengers at ANC on inbound or outbound international flights. In-transit passengers from these flights disembarked for a short time at ANC before re-boarding the same aircraft and continuing to their final destination. While this activity has declined since the early 2000s, in-transit passenger activity is still present at the Airport.

In FY 2022, ANC recorded 45,455 total in-transit passengers. These passengers transited ANC from flights originating and terminating from different destinations on the same aircraft. Other types of in-transit passengers include those on charter flights stopping to refuel at the Airport. ANC is considered a primary stop for U.S. government charters between the U.S. and Asia such as those operated by Atlas Air and Omni Air International.

A historical share of in-transit passengers and a trend analysis was used to project this segment. As can be observed in **Table 3-14**, total in-transit passengers at ANC are projected to grow from 45,455 in FY 2022 to approximately 56,348 in FY 2042 at an CAGR of 1.1 percent.

Table 3-14 In-Transit Passengers

	Fiscal Year	Total In-Transit Passengers
Historical	2018	29,129
	2019	49,160
	2020	37,285
	2021	43,160
Baseline	2022	45,455
Forecast	2023	46,182
	2024	46,829
	2025	47,391
	2026	47,959
	2027	48,535
	2032	51,011
	2037	53,613
	2042	56,348
CAGR		
2018 - 2022		11.8%
2022 - 2032		1.2%
2032 - 2042		1.0%
2022 - 2042		1.1%

Source: AIAS; RS&H Analysis 2023

3.3.4 Passenger Aircraft Landings

A passenger aircraft landings forecast was developed and divided into landings from the rest of Alaska and from other U.S./international destinations. The forecast was produced, in part, using historical data provided by AIAS in addition to airline schedules and DOT T-100 data (see **Table 3-15**).

Outlined below are brief descriptions of the approach and methodologies applied to prepare the passenger aircraft landings forecast:

- Total Enplaned Passengers – Total enplaned passengers to destinations in Alaska and other U.S./international markets were used from an independent multi-variate regression forecast exercise as described earlier in this chapter.
- Load Factors – Historical load factors were calculated by dividing outbound Revenue Passenger Miles ("RPM"s) by outbound Available Seat Miles ("ASM"s) for all non-stop markets from ANC using U.S. DOT T-100 data. Historically, average load factors have remained high and constant at ANC except for the COVID-19 Pandemic period between FY 2020 and FY 2022. Prior to the COVID-19 Pandemic, average load factors in ANC were 81.4 percent between FY 2012 and FY 2019, reflecting both a historically stable regional economy, an increasingly competitive air service market and a lack of alternatives for travel outside of Alaska other than air transportation.
- Average Seats Per Departure – The Average Seats Per Departure ("ASPD") metric was calculated historically with data from the U.S. DOT T-100. By dividing the total number of flown seats by the total number of departures, a historical trend of ASPD was calculated and observed to grow from 77.5 seats in FY 2009 to 103.5 seats in FY 2022. Even though the number of seats grew disproportionately during the COVID-19 Pandemic, it does reflect a sizeable increase in passenger aircraft size operating at ANC. Observations from analyzing historical fleet mix data in addition to empirical analysis and airline interviews, show Alaska Airlines increased utilization of the 178-seat Boeing 737-900ER over the Boeing 737-700 and -800 aircraft with a capacity of 124 and 159 seats respectively from FY 2016 to FY 2022. On a regional aircraft basis, the DeHavilland Dash-8-100 operated by Ravn Alaska with a capacity of 29-37 seats also saw a decline in use from a peak of approximately 12,000 departures in FY 2017 to approximately 6,200 departures in FY 2022[10]. Ravn Alaska operations are expected to grow throughout the Forecast Period but a larger aircraft such as the ATR 72 with a capacity of over 70-seats will most likely begin to replace the DeHavilland Dash-8-100s. Horizon Air, a wholly-owned subsidiary of the Alaska Air Group, has also increased intra-Alaska departures with the use of the 76-seat Embraer 175 replacing the 68-seat DeHavilland Dash-8-400.

- Enplanements Per Departure – Enplanements per Departure were calculated by multiplying average load factors by average seats per departure.

10 Ravn Air Group, which included four separate air carriers, filed for bankruptcy in April 2020; the company's assets were sold at auction except for Part 121 operators Corvus Airlines and PenAir which were acquired by FLOAT Air Shuttle.

Table 3-15 Historical Departure and Capacity Metrics at ANC, FY 2009 – FY 2022

Fiscal Year	Departures	No. of Daily Departures	Seats	Load Factor (%)	Avg Seats Per Departure	To Rest of Alaska	To Other US/Int'l
						Enplanements Per Departure	Enplanements Per Departure
FY 2009	43,157	118	3,346,843	77.2%	77.6	24.5	134.3
FY 2010	41,083	113	3,244,419	75.1%	79.0	23.7	131.8
FY 2011	42,339	116	3,298,517	76.4%	77.9	24.7	131.2
FY 2012	41,937	115	3,157,009	81.1%	75.3	26.0	133.4
FY 2013	40,884	112	3,022,481	81.3%	73.9	26.3	131.9
FY 2014	41,278	113	3,152,977	80.1%	76.4	24.6	129.7
FY 2015	41,982	115	3,213,491	80.6%	76.5	28.4	132.2
FY 2016	42,203	115	3,357,726	81.3%	79.6	28.6	136.9
FY 2017	40,520	111	3,361,825	82.3%	83.0	28.8	142.5
FY 2018	37,465	103	3,386,492	82.4%	90.4	36.1	146.0
FY 2019	35,170	96	3,456,871	82.2%	98.3	33.9	144.8
FY 2020	27,440	75	2,864,330	77.3%	104.4	27.6	138.1
FY 2021	22,549	62	2,380,782	61.4%	105.6	23.5	105.0
FY 2022	31,633	87	3,273,727	78.8%	103.5	36.0	110.4

Source: US DOT T-100, 2023

The passenger landing forecast was calculated by dividing total enplaned passengers by the projections of enplanements per departure for both markets to the rest of Alaska and other U.S./international destinations. The mathematical formula expressed below was used to calculate total passenger aircraft landings for ANC.

$$\frac{ENP}{(ALF)*(ASPD)} = \text{Total Landings}$$

KEY

ENP = Total Enplanements

ALF = Projected Average Load Factors

ASPD = Projected Average Seats per Departure

Enplanements per departure were kept mostly flat throughout the Forecast Period with a slight increase to 107 enplanements from FY 2023 to FY 2028 in the other U.S./international market sector due to pilot shortages in the airline industry expected to be addressed throughout that period.

3.3.4.1 Passenger Aircraft Landings Forecast Results

Passenger aircraft landings at ANC are projected to increase from 40,724 in FY 2022 to approximately 61,479 in FY 2042 at an CAGR of 2.1 percent (See **Table 3-16**). The fastest growing sector is expected to be the other U.S./international markets from ANC which are expected to increase from 14,750 landings in FY 2022 to approximately 24,037 landings in FY 2042 at an CAGR of 2.5 precent. The markets from the rest of Alaska are expected to increase from 25,960 landings in FY 2022 to approximately 37,442 landings in FY 2042 at an CAGR of 1.8 percent.

This forecast shows total enplanements grow at a slightly higher rate than passenger aircraft landings, 2.3 percent compared to 2.1 percent. This pattern supports the trend of larger airplanes, less frequencies and higher load factors that has been observed since the U.S. airlines started a systematic realignment of their operations after the Great Recession and reinforced during the COVID-19 Pandemic.

Table 3-16 Passenger Aircraft Landings

		Passenger Aircraft Landings		
	Fiscal Year	From Rest of Alaska	From Other US/Int'l	Total
Historical	2018	30,355	11,267	41,622
	2019	33,175	11,736	44,910
	2020	30,292	9,860	40,151
	2021	22,539	8,789	31,327
Baseline	2022	25,960	14,750	40,724
Forecast	2023	24,689	16,408	41,098
	2024	25,410	16,887	42,297
	2025	25,940	17,239	43,179
	2026	26,683	17,733	44,417
	2027	27,228	18,095	45,323
	2032	31,086	19,956	51,042
	2037	34,193	21,951	56,144
	2042	37,442	24,037	61,479
CAGR				
2018 - 2022		-3.8%	7.0%	-0.5%
2022 - 2023		-4.9%	11.2%	0.9%
2023 - 2032		2.6%	2.2%	2.4%
2032 - 2042		1.9%	1.9%	1.9%
2022 - 2042		1.8%	2.5%	2.1%

Source: US DOT T-100; AIAS; RS&H Analysis 2023

3.4 Cargo Tonnage Forecasts

This section presents the assumptions, approach, and results of the cargo tonnage forecasts for ANC for the Forecast Period. Air cargo tonnage is the total weight of freight and mail (measured in tons) carried by passenger carriers such as Alaska Airlines and all-cargo carriers such as UPS and FedEx. All passenger activity forecast numbers for the Airport are shown in FY unless otherwise noted.

3.4.1 Intrastate Cargo Tonnage

The following is a summary of the methodology used in the intrastate air cargo forecasts:

- Identified and projected the drivers of intrastate activity at ANC.
- Projected future ANC inbound and outbound intrastate cargo using regression analysis.
- Allocated tonnage projections to passenger carriers and all-cargo carriers.

The methodology will be described in greater detail in subsequent sections of this report. The following data sources were used in the analysis:

- The US DOT T-100 database to obtain cargo tonnage and operations data on a market-by-market basis.
- Cirium Diio Mi and individual airline websites for aircraft types and configurations for each airline.
- Airline and ground handler interviews.

A forecast equation using regression analysis was used to validate the statistical relationship between total historical intrastate cargo tonnage for Alaska from ANC with a group of independent variables compiled and projected by W&P. The variable that was most statistically significant was the total employment numbers for the rest of Alaska or the aggregate total employment data for all counties in Alaska except for the Anchorage MSA. **Table 3-17** shows the regression statistics for intrastate cargo tonnage.

The results indicated that at outlying communities, many of which do not have road access, demand responded positively to economic factors like employment. Inbound cargo to ANC from these communities is much less than outbound cargo and probably insufficient to sustain air service on its own and thus primarily dependent on capacity available on the return flights generated by outbound cargo. Alaska's economy is especially dependent on air transportation for the shipment of goods. Since most goods to these communities are already shipped by air, the traditional source of air cargo growth — an increase in market share at the expense of other

modes such as truck and rail — is not possible. In addition, any decline in the oil or gas industries will limit increases in demand.

Table 3-17 Regression Statistics: Intrastate Cargo Tonnage

Regression Statistics	
Multiple R	92.8%
R Square	86.1%
	Coefficients
Intercept	3.754471207
EMPLOYMENT (REST OF ALASKA)	4.480854428

Source: RS&H Analysis, 2023

3.4.1.1 Belly and All- Cargo Tonnage Forecasts

Most of the intrastate air cargo at ANC is transported by air freight specialists such as Lynden Air Cargo, Northern Air Cargo (NAC) and others. Alaska Airlines, which operates a dedicated fleet of Boeing 737-700Fs and is converting two company-owned Boeing 737-800 passenger aircraft into 737-800BCFs (Boeing Converted Freighters), is the only passenger carrier that accounts for more than five percent of the intrastate cargo market. Alaska Airlines also operated the Boeing 737-400 Combi aircraft which carried cargo on both the belly and a portion of the passenger deck. The operation of these aircraft was discontinued in 2018. Since the cargo carried on the passenger deck was counted as belly cargo, intrastate cargo tonnage experienced a reduction of 50.5 percent from FY 2018 to FY 2019 explaining the rapid decline of this cargo sector at that period of time. Additionally, the national trend has been for the belly cargo share of air freight to decline as integrated carriers have gained market share and passenger carriers have increasingly emphasized quick turnaround times and high passenger load factors, which reduce their ability to transport air freight.

The FAA does not publish a specific cargo load factor forecast. However, the FAA projects passenger ASMs to increase much faster than Revenue Ton Miles ("RTMs") on passenger carriers. This can infer that the FAA anticipates passenger carrier cargo load factors will continue to decline relative to passenger load factors.

To forecast the share of inbound and outbound belly versus all-cargo loads, a trend analysis was conducted to verify the assumptions of declining belly cargo based on anecdotal and FAA data

were indeed happening. From FY 2016 until FY 2022, intrastate belly cargo declined by 86.7 percent with a significant portion of that decline occurring during the COVID-19 Pandemic.

Table 3-18 summarizes the intrastate cargo tonnage forecasts for ANC. Combined all-cargo and belly inbound and outbound tonnage is projected to increase from 119,512 tons in FY 2022 to 144,572 tons in FY 2042, an CAGR of 1.0 percent. The belly cargo share is expected to decline slightly at an CAGR of -0.1 percent from FY 2022 to FY 2042 and the all-cargo share is expected to increase at an CAGR of 1.0 percent throughout the Forecast Period.

Table 3-18 Intrastate Cargo Tonnage

		Intra-Alaska Belly			Intra-Alaska All-Cargo			Intra-Alaska Total		
	Fiscal Year	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
Historical	2018	6,466	6,591	13,056	23,210	79,410	102,621	29,676	86,001	115,677
	2019	4,258	4,415	8,673	30,233	85,846	116,079	34,491	90,261	124,752
	2020	3,674	3,932	7,607	20,956	83,735	104,691	24,631	87,667	112,298
	2021	2,642	2,942	5,583	18,785	93,081	111,866	21,427	96,022	117,449
Baseline	2022	1,352	1,486	2,838	21,063	95,611	116,674	22,415	97,097	119,512
Forecast	2023	1,338	1,472	2,810	21,922	97,691	119,613	23,260	99,162	122,423
	2024	1,325	1,457	2,782	22,173	98,719	120,893	23,498	100,176	123,674
	2025	1,312	1,442	2,754	22,439	99,809	122,247	23,750	101,251	125,001
	2026	1,300	1,429	2,729	22,687	100,828	123,515	23,986	102,258	126,244
	2027	1,291	1,419	2,710	22,929	101,834	124,763	24,220	103,253	127,473
	2032	1,275	1,402	2,678	24,078	106,684	130,763	25,354	108,087	133,440
	2037	1,295	1,446	2,741	25,140	111,248	136,388	26,435	112,695	139,129
	2042	1,314	1,498	2,812	26,155	115,606	141,761	27,469	117,104	144,572
	CAGR									
2018 - 2022		-32.4%	-31.1%	-31.7%	-2.4%	4.8%	3.3%	-6.8%	3.1%	0.8%
2022 - 2032		-0.6%	-0.6%	-0.6%	1.3%	1.1%	1.1%	1.2%	1.1%	1.1%
2032 - 2042		0.3%	0.7%	0.5%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
2022 - 2042		-0.1%	0.0%	0.0%	1.1%	1.0%	1.0%	1.0%	0.9%	1.0%

Source: US DOT T-100; AIAS; RS&H Analysis 2023

3.4.2 Asia/North Pacific and Other U.S. All-Cargo Carrier Tonnage

ANC's location roughly half-way between East Asia and North America and in-line with the Great Circle Route makes it an efficient, and strategic stopping point for international air cargo carriers to refuel. Many of the world's largest cargo carriers and integrators have chosen to use ANC as a strategic place to make technical stops. The main reason for the stop in ANC is because cargo carriers have found it is more lucrative to carry heavier cargo loads and refuel at the Airport rather than to carry the maximum fuel capacity of their aircraft and a lighter cargo load (also known as a weight penalty) as would be required in non-stop operations from Asia to North America. Aircraft like the Boeing 747-8F and the 777F have the capabilities of bypassing ANC on flights such as Tokyo Narita ("NRT") to New York ("JFK") or Seoul ("ICN") to Memphis ("MEM") but most carriers at ANC have opted for the refueling alternative to allow them to maximize their cargo load factors, which reduces the cost of fuel per pound of cargo carried.

Boeing and Airbus are currently marketing new all-cargo aircraft with more range and fuel efficiency compared to current aircraft models used worldwide such as the Boeing 747-400F and the MD-11F. Boeing has launched the 777-8 Freighter and Airbus is in the process of launching the A350F, both of which have more range and lower fuel burn to comply with more rigid emissions standards. However, after discussing operational requirements with airlines and ground handlers operating at ANC and reviewing industry journals, the assumption for this forecast is that the cargo carriers at ANC will not materially change the fundamental technical stop business model throughout the Forecast Period. Though individual markets will continue to overfly ANC based on the economic fundamentals of supply and demand of high revenue markets that are time sensitive, carriers will continue to use ANC as a strategic fueling stop even when using newer aircraft.

Newer Boeing and Airbus aircraft are forecast to be incorporated into the ANC fleet mix in the last 10-years of the Forecast Period. ANC's current Asia/North Pacific and U.S. all-cargo fleet mix which is currently comprised of models such as the Boeing 777F, MD-11F and 747-400F, will continue to operate throughout the short- to medium-term. Older models of these variants will be replaced by converted passenger to cargo variants of the Boeing 777 and similar aircraft.

An important characteristic of the Asia-North America market is that it is directionally unbalanced. Asian countries export more to the U.S. (measured in both weight and value) than they import. As a result, eastbound cargo tonnage flows – from Asia to North America – are approximately twice westbound flows. Consequently, aircraft flying eastbound tend to have full (and profitable) loads while they fly light (and unprofitable) loads going westbound. Since most of the tonnage neither originates nor terminates in Alaska, outbound flows are very similar to the inbound flows on both the eastbound and westbound routes. South Korea, Taiwan, and

Hong Kong are the principal points of origin for the non-stop cargo flows going to ANC. However, in many instances, these origins are consolidation points for goods that are manufactured in China or elsewhere in Southeast Asia. New non-stop markets to ANC are expected to move south to new emerging manufacturing centers in places such as Cambodia and Vietnam.

Eastbound cargo flows passing through ANC accounted for over 2.0 million tons in FY 2022. The primary points of origin (in terms of the non-stop air leg) are Seoul Incheon (28.1 percent), Hong Kong (18.3 percent), Taipei (14.0 percent), Osaka (9.2 percent), Tokyo Narita (8.2 percent and Shanghai (7.3 percent). The primary U.S. destinations are Chicago O'Hare (22.6 percent), Louisville (13.9 percent), Los Angeles (9.6 percent), New York Kennedy (8.9 percent) and Memphis (8.5 percent). As noted earlier, westbound flows are slightly less than half of eastbound flows in overall tonnage.

A unique trend emerged through the COVID-19 Pandemic. Historically, eastbound cargo flows to the U.S. via ANC have averaged approximately 65 percent of total tonnage versus 35 percent on the westbound portion to Asia. The percentage split shifted to approximately 59 percent westbound and 31 percent eastbound in FY 2022. During the COVID-19 Pandemic as lockdowns in major urban areas started to occur and international passenger travel was suspended, ANC's all-cargo traffic operations rose by 33.8 percent from FY 2019 to FY 2022. Some of the reasons for this aggressive short-term growth was related to cargo deviations from the bellies of commercial passenger traffic to U.S. lower-48 markets and the sudden rise in movement of Personal Protective Equipment ("PPE") and other COVID-19 Pandemic related goods which began to funnel through ANC as an in-transit point. In addition, maritime shipping problems and accelerated trade to fix global supply chain issues boosted ANC's cargo volumes substantially. As a consequence, and as previously mentioned, ANC became the third busiest airport in the world measured in tons in CY 2022. This compares to its position as the sixth busiest in the recent past.

This forecast assumes that eastbound and westbound cargo tonnage will return to a split of approximately 65/35 percent during the Forecast Period.

3.4.2.1 Forecast Methodology and Results

Regression analysis was used to prepare a forecasting equation for eastbound and westbound air cargo flows. A regression equation was used to find a correlation between all-cargo historical tonnage and independent variables such as local/country specific GDP and fuel prices. The variables that were the most statistically significant were U.S. GDP for westbound traffic and Asia/Pacific GDP for eastbound traffic so the growth rates for these specific independent variables projected by the FAA in their Aerospace Forecast for FFY 2023 were applied to the historical tonnage figures. After performing a sensitivity analysis, a decision was made to lower the forecasted eastbound and westbound tonnage growth rates to better align with airline expectations of the market in the short-term and to better reflect current economic conditions and a growing future competitive landscape.

Table 3-19 shows the regression statistics for Asia/North Pacific and Other U.S. All-Cargo Carrier Tonnage. As shown in **Table 3-20,** the eastbound tonnage forecast projects an average annual increase of 3.3 percent whereas the westbound tonnage forecast projects an average annual increase of 2.0 percent for the Forecast Period. Total Asia/North Pacific and U.S. all-cargo carrier tonnage are expected to increase at an CAGR of 2.8 percent over the Forecast Period.

Table 3-19 Regression Statistics: Asia/North Pacific & Other U.S. All-Cargo Carrier Tonnage

Regression Statistics (EASTBOUND)	
Multiple R	*99.9%*
R Square	*99.8%*
	Coefficients
Intercept	*73430.36645*
GDP (Japan/China/Other Asia)	*39.42344957*

Regression Statistics (WESTBOUND)	
Multiple R	*97.9%*
R Square	*95.9%*
	Coefficients
Intercept	*114.7938593*
GDP (Japan/China/Other Asia)	*1240886.563*

Source: RS&H Analysis, 2023

Table 3-20 Asia/North Pacific & Other U.S. All-Cargo Carrier Tonnage

		Eastbound (To US)			Westbound (To Asia)			Total		
	Fiscal Year	Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
Historical	2018	849,022	900,695	1,749,717	494,494	439,523	934,017	1,343,516	1,340,218	2,683,734
	2019	841,022	872,768	1,713,790	494,503	430,022	924,525	1,335,524	1,302,790	2,638,314
	2020	875,666	916,197	1,791,862	501,481	428,768	930,249	1,377,147	1,344,965	2,722,111
	2021	1,107,132	1,087,738	2,194,870	619,754	611,503	1,231,257	1,726,886	1,699,242	3,426,127
Baseline	2022	1,024,142	1,023,907	2,048,048	734,587	686,481	1,421,068	1,758,728	1,710,388	3,469,116
Forecast	2023	1,065,107	1,064,863	2,129,970	752,217	702,957	1,455,173	1,817,324	1,767,820	3,585,144
	2024	1,107,712	1,107,457	2,215,169	770,270	719,828	1,490,097	1,877,982	1,827,285	3,705,267
	2025	1,152,020	1,151,756	2,303,776	788,756	737,103	1,525,860	1,940,776	1,888,859	3,829,636
	2026	1,198,101	1,197,826	2,395,927	807,686	754,794	1,562,480	2,005,787	1,952,620	3,958,407
	2027	1,246,025	1,245,739	2,491,764	827,071	772,909	1,599,980	2,073,096	2,018,648	4,091,744
	2032	1,482,720	1,482,380	2,965,100	919,431	859,221	1,778,652	2,402,152	2,341,601	4,743,752
	2037	1,722,214	1,721,818	3,444,032	1,007,186	941,229	1,948,415	2,729,400	2,663,047	5,392,447
	2042	1,969,523	1,969,071	3,938,594	1,086,092	1,014,968	2,101,060	3,055,615	2,984,039	6,039,654
	CAGR									
2018 - 2022		4.8%	3.3%	4.0%	10.4%	11.8%	11.1%	7.0%	6.3%	6.6%
2022 - 2032		3.8%	3.8%	3.8%	2.3%	2.3%	2.3%	3.2%	3.2%	3.2%
2032 - 2042		2.9%	2.9%	2.9%	1.7%	1.7%	1.7%	2.4%	2.5%	2.4%
2022 - 2042		3.3%	3.3%	3.3%	2.0%	2.0%	2.0%	2.8%	2.8%	2.8%

Source: FAA Aerospace Forecast FY 23; AIAS; RS&H Analysis, 2023

3.5 All-Cargo Aircraft Landings

An all-cargo aircraft landings forecast was developed as part of the ANC Master Plan Update broken down into landings from the rest of Alaska and from other U.S./international destinations. The forecast was prepared using the following assumptions through the Forecast Period:

General All-Cargo Assumptions

- New aircraft types over the Forecast Period will be based on the fleet acquisition plans of the cargo carriers serving North America and Asia.
- There will be no new aircraft with capabilities beyond those currently in the planning or development stages.
- Since the forecast is unconstrained, the fleet mix projections are not limited by the existing number or length of runways or airfield configuration.
- No supersonic or hypersonic freighter aircraft are projected.

Intrastate All-Cargo Aircraft Operations

- Alaska Airlines will continue to operate the Boeing 737-700F and add Boeing 737-800BCFs to their fleet.
- Everts Air Cargo will discontinue the use of heavy-duty piston aircraft such as the DC-6 and continue to operate with Douglas MD-83s or equivalent size aircraft.
- Northern Air Cargo will continue to operate Boeing 737 or similar sized aircraft.
- Alaska Central Express and FedEx Feeder will continue to operate with Beech 1900 and Cessna Caravans or similar sized aircraft, respectively.

International/Other U.S. All Cargo Aircraft Operations

- Cargo fleets for FedEx, UPS and Asian carriers will remain dependent on the MD-11F, 747-400F, 777F and 747-8F as the primary aircraft for their operations.
- All-cargo international carriers at ANC will introduce new Boeing and Airbus aircraft such as the 777-8F and the A350F with more range and less CO2 emissions in the second half of the Forecast Period.
- The trend of freight converted aircraft from passenger aircraft will continue with many former passenger 777 and 747 aircraft added to the fleet of carriers operating at ANC.
- The operation of Boeing 767-300F and A330-200P2F will continue to be operated by carriers such as MasAir, Maersk and PrimeAir.

RS&H considered various econometric approaches to calculate all-cargo aircraft landings. Ultimately, the growth rate of total RTMs as projected by the FAA was used. The decision to use

this methodology to forecast growth of all-cargo landings was based on interviews with all-cargo carriers at ANC. RS&H quantified observations collected during air carrier interviews and looked at forecasts of air cargo tonnage that provided similar trends which concluded that the intense growth during COVID was a unique, independent event and would be followed by growth rates more indicative of ANC's historical cargo aviation activity. All-cargo landing projections were also divided by landings from the rest of Alaska markets and other U.S./international destinations by applying historical growth rate trends.

Total all-cargo aircraft landings are projected to grow from 56,101 landings in FY 2022 to 81,897 landings in FY 2042 at an annual growth rate of 1.9 percent. **Table 3-21** summarizes the aircraft landings forecast.

Table 3-21 All-Cargo Aircraft Landings

	Fiscal Year	From Rest of Alaska	From Other US/International	Total
Historical	2018	12,138	35,133	47,271
	2019	12,343	29,555	41,898
	2020	12,939	32,314	45,253
	2021	13,558	39,153	52,711
Baseline	2022	13,626	42,475	56,101
Forecast	2023	13,841	43,831	57,672
	2024	14,173	44,883	59,056
	2025	14,485	45,870	60,355
	2026	14,804	46,879	61,683
	2027	15,100	47,817	62,917
	2032	16,606	52,587	69,193
	2037	18,156	57,493	75,649
	2042	19,655	62,242	81,897
CAGR				
2018 - 2022		2.9%	4.9%	4.4%
2022 - 2032		2.0%	2.2%	2.1%
2032 - 2042		1.7%	1.7%	1.7%
2022 - 2042		1.8%	1.9%	1.9%

Source: S DOT T-100; AIAS; RS&H Analysis, 2023

3.6 General Aviation Forecast

General Aviation (GA) is an important component of aviation in Alaska accounting for 12.8 percent of operations at ANC. Nationally, personal and recreational GA has been in decline while corporate and business-related general aviation has been increasing. Like other aviation sectors, GA experienced a steep decline in activity early in the COVID-19 Pandemic; however, demand began to recover for this sector in the second half of CY 2020, much faster than for passenger airlines. Domestic and international business jet operations in April 2020 were nearly 75.0 percent below CY 2019 levels, but by June 2020 had recovered to levels approximately 24.0 percent below those in June 2019, and by December 2020 were only about 12.0 percent lower than the prior year's level of activity.[11] Demand for business aviation has rebounded in part due to increased demand from corporate executives and individuals able to pay for alternatives to commercial scheduled passenger service during the COVID-19 Pandemic.

GA is very cyclical aviation activity and is closely related to fuel price fluctuations and economic trends. ANC and Lake Hood (LHD) have experienced trends similar to national trends in recent years. From FY 2010 until FY 2016 GA traffic was up almost 10.0 percent in ANC followed by a decline of 7.7 percent prior to the COVID-19 Pandemic.

The forecast of GA operations at ANC and LHD is presented in **Table 3-22** and based on a market share analysis of U.S. general aviation activity, measured by general aviation hours flown. The change in the historical ratio of ANC/LHD general aviation operations to U.S. general aviation hours flown was calculated, and this change in the ratio was projected to continue in the future. It was assumed that the percentage split between ANC and LHD general aviation operations will remain constant at FY 2022 levels.

11 FAA data via General Accountability Office ("GAO"), 2022

Table 3-22 General Aviation Aircraft Operations

	Fiscal Year	US Hours Flown (thousands)	ANC	LHD	Total	Ratio
Historical	2018	25,506	26,457	65,000	91,457	0.0036
	2019	25,566	27,812	70,020	97,832	0.0038
	2020	22,492	25,320	62,847	88,167	0.0039
	2021	23,380	30,815	70,112	100,927	0.0043
Baseline	2022	24,211	29,009	58,562	87,571	0.0036
Forecast	2023	24,574	29,431	59,414	88,845	0.0033
	2024	24,937	29,859	60,278	90,137	0.0042
	2025	25,300	30,294	61,155	91,449	0.0045
	2026	25,663	30,734	62,045	92,779	0.0048
	2027	26,024	31,181	62,947	94,129	0.0051
	2032	26,994	32,344	65,294	97,637	0.0073
	2037	28,108	33,678	67,988	101,666	0.0103
	2042	29,563	35,422	71,508	106,929	0.0147
CAGR						
2018 - 2022		-1.3%	2.3%	-2.6%	-1.1%	
2022 - 2032		1.1%	1.1%	1.1%	1.1%	
2032 - 2042		0.9%	0.9%	0.9%	0.9%	
2022 - 2042		1.0%	1.0%	1.0%	1.0%	

Source: FAA Aerospace Forecast FY23; ANC Tower Counts; RS&H Analysis, 2023

3.7 Military Forecast

Table 3-23 present the forecasts of military aircraft operations at ANC. Military operations at ANC declined since CY 2010 as a result of the CY 2011 relocation of the Kulis Air National Guard to Elmendorf Air Force Base. Military operations are related to national and international political and institutional factors rather than local economic conditions and are therefore difficult to forecast using traditional approaches. Consequently, military operations are assumed to remain constant at the FFY 2022[12] level of activity.

Table 3-23 Military Aircraft Operations

	Fiscal Year	Operations
Historical	2018	2,534
	2019	3,025
	2020	3,048
	2021	3,599
Baseline	2022	3,687
Forecast	2023	3,600
	2024	3,600
	2025	3,600
	2026	3,600
	2027	3,600
	2032	3,600
	2037	3,600
	2042	3,600
CAGR		
2018 - 2022		9.8%
2022 - 2032		-0.2%
2032 - 2042		0.0%
2022 - 2042		-0.1%

Source: FAA OPSNET; RS&H Analysis 2023

[12] FFY used because the Military Aircraft Forecast was developed by the FAA

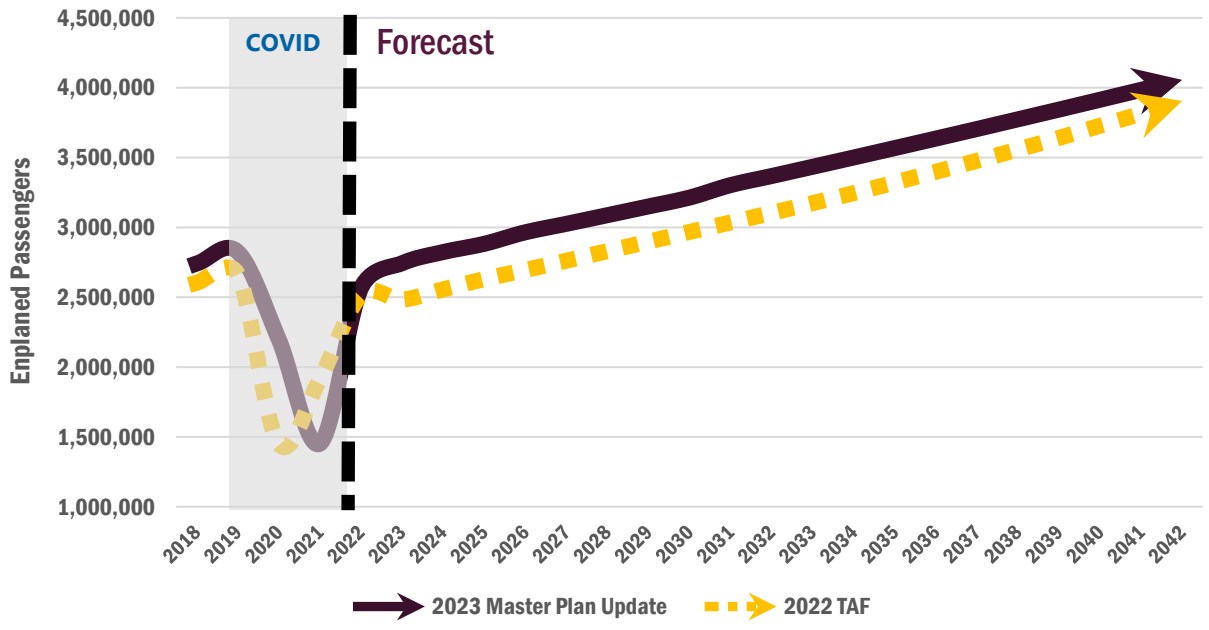
3.8 Comparison to the FAA TAF

The FAA has oversight responsibility to review and approve aviation forecasts developed in conjunction with airport planning studies. The FAA reviews individual airport forecasts with the objective of comparing them to its national TAF and the NPIAS. As previously mentioned in Section 3.1 of this chapter, the FAA must approve sponsor forecasts before they can be used to prepare facility requirements in a master plan or before going forward with an environmental document that requires a forecast. The FAA uses a 10.0 percent threshold for the first 10 years and 15.0 percent threshold for the subsequent 5-year period as a rule-of-thumb for accepting non-FAA forecasts as the basis for planning and environmental studies. If these stated thresholds are exceeded, the FAA Region office in which the airport is located, will forward the forecasts to FAA headquarters for review.

3.8.1 Comparison of Enplaned Passengers to the TAF

After developing the forecast of total enplaned passengers for ANC, the results were compared to the FFY 2022 FAA TAF, the latest available TAF document produced and published by the FAA. As can be seen in **Figure 3-4**, the 2023 Master Plan Update forecast of total enplaned passengers tracks closely with the FFY 2022 TAF, within 10.0 percent for the majority of the Forecast Period except for the period between FY 2023 and FY 2024 where the percentages deviate (exceed the TAF) by 0.5 percent and 0.4 percent respectively.

Figure 3-4 Forecast of Enplaned Passengers Compared to FAA TAF



Source: US DOT T-100; AIAS; FAA TAF; RS&H Analysis, 2023

However, as can be observed in **Table 3-24**, the FFY 2022 TAF has a reduction in enplanements at ANC between FFY 2022 and FFY 2023 of -1.2 percent. As mentioned in Section 3.3.3.2 of this chapter, RS&H developed an estimate of total passenger enplanements for FY 2023 with a result of a 7.0 percent growth rate compared to FY 2022. There is no indication that enplanements will decrease in FFY 2022 and FFY 2023. This is validated by current airline schedules and enplanement data already collected though a portion of FFY 2022 at the time of this writing. Thus RS&H developed an alternative TAF scenario where the FFY 2022 to FFY 2023 period produces a growth of 2.5 percent. All other growth rates for the Forecast Period through FFY 2042 are left unchanged. Under those results, the difference between the TAF and FY 2023 ANC Master Plan Update would range between 0.2 percent and 6.5 percent. The TAF Alternate scenario would result in an average annual compound growth rate of 2.4 percent for the Forecast Period.

Table 3-24 Forecast of Enplaned Passengers Compared to FAA TAF Alternate Scenario

		2023 Master Plan Update	2022 TAF	Diff w/ TAF	2022 TAF (Alternate)	Diff w/ TAF
Baseline	2022	2,564,262	2,513,209		2,513,209	
Forecast	2023	2,743,253	2,483,003	10.5%	2,576,039	6.5%
	2024	2,823,348	2,556,270	10.4%	2,652,051	6.5%
	2025	2,882,217	2,629,693	9.6%	2,728,226	5.6%
	2026	2,964,812	2,695,139	10.0%	2,796,124	6.0%
	2027	3,025,294	2,761,219	9.6%	2,864,680	5.6%
	2032	3,367,638	3,103,629	8.5%	3,219,900	4.6%
	2037	3,704,260	3,476,606	6.5%	3,606,288	2.7%
	2042	4,056,254	3,905,519	3.9%	4,049,861	0.2%
CAGR						
2022 - 2032		2.8%	2.1%		2.5%	
2032 - 2042		1.9%	2.3%		2.3%	
2022 - 2042		2.3%	2.2%		2.4%	

Source: US DOT T-100; AIAS; FAA TAF; RS&H Analysis, 2023

3.8.2 Comparison of Total Aircraft Operations to the TAF

Total aircraft operations at ANC by activity type (passenger, cargo, general aviation, and military) were consolidated for comparison purposes with the TAF. The passenger and cargo landings forecasts were multiplied by two to calculate total operations. From the period between FY 2009 until FY 2022, the historical split between enplaned and deplaned passengers at ANC has been approximately 50.0 percent/50.0 percent.

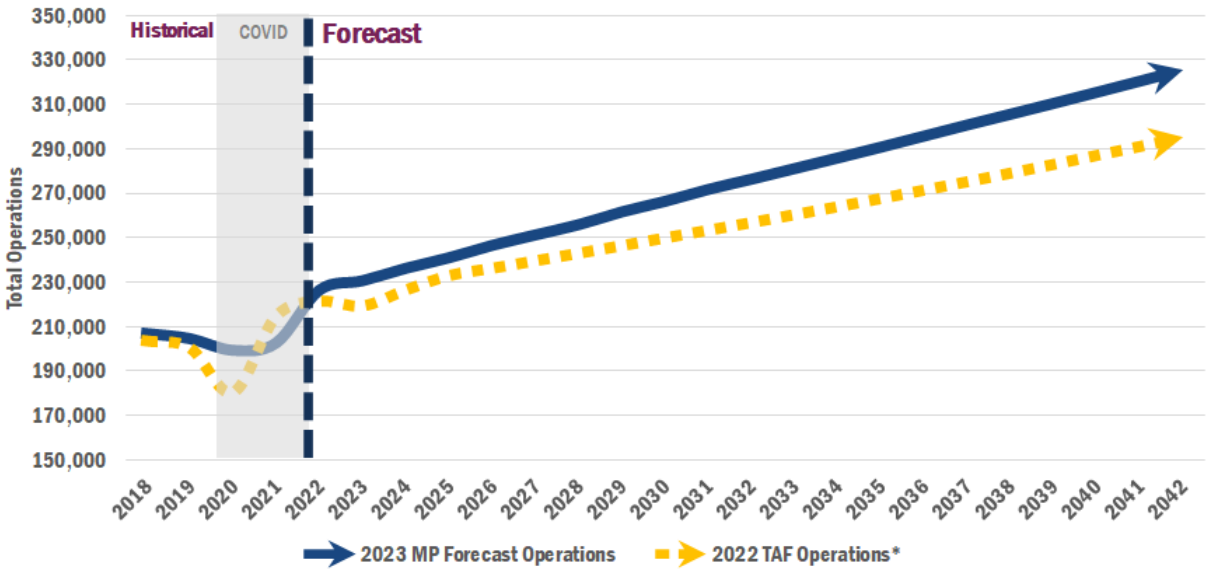
RS&H prepared two aircraft operations forecast comparisons to the TAF for ANC. This approach was taken because the TAF combines the general aviation operations for ANC and LHD.

The first was prepared as a direct comparison forecast between ANC and the TAF and included an adjustment to net out LHD operations from the TAF throughout the Forecast Period. This forecast is labeled as "Adjusted TAF." LHD operations were estimated to make up approximately 25.0 percent of ANC's TAF GA operations based on an RS&H historical analysis using FAA Air Traffic Activity System (ATADS) data and through review of historical counts provided by the ANC Airport Traffic Control Tower (ATCT) staff for CY 2019 through CY 2022.

Figure 3-5 and **Table 3-25** show the ANC total aircraft operations forecast compared to the FFY 2022 Adjusted TAF. ANC's total operations are expected to increase at an CAGR of 1.8 percent over the Forecast Period compared to 1.5 percent for the Adjusted TAF for the same period. This puts ANC within the FAA's preferred 10.0 to 15.0 percent difference with TAF growth rates.

The second comparison does not net out LHD operations from the ANC TAF and keeps operations as published by the FAA. This forecast is labeled as "ANC + LHD." **Figure 3-6** and **Table 3-26** show the ANC 2023 Master Plan Update total aircraft operations forecast compared to the FFY 2022 TAF ANC + LHD. The Airport's total operations are expected to increase at a CAGR of 1.7 percent over the Forecast Period compared to 1.7 percent for the ANC + LHD version of the TAF for the same period. This forecast comparison puts ANC within 3.0 percent of TAF growth rates throughout the Forecast Period.

Figure 3-5 Total Aircraft Operations Compared to FAA Adjusted TAF



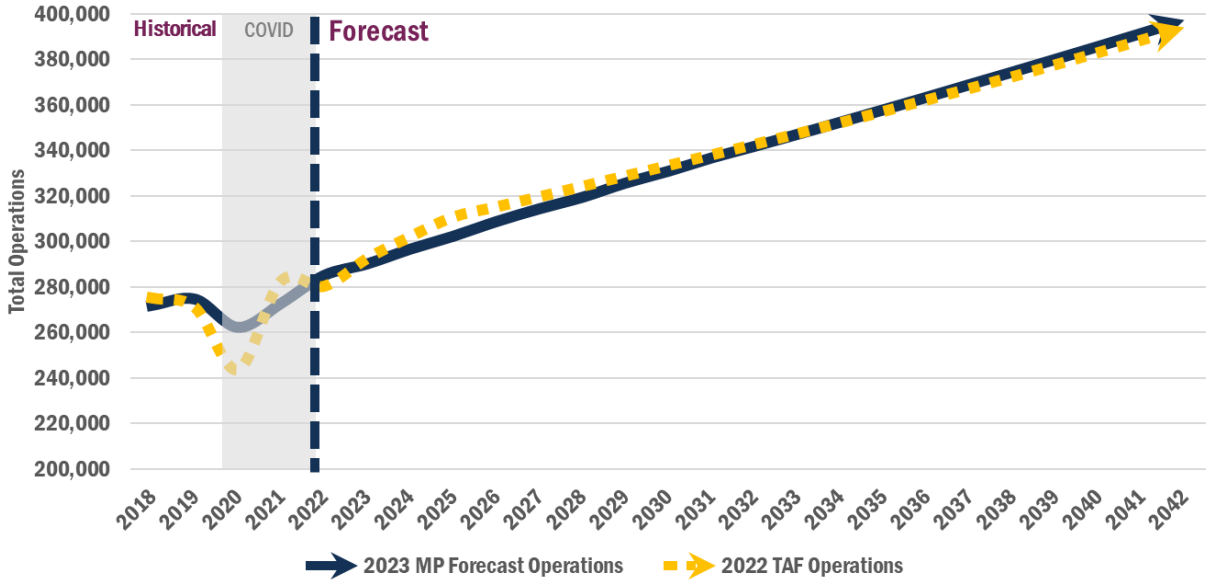
* FAA TAF adjusted to net out LHD operations
Source: US DOT T-100; AIAS; FAA TAF; RS&H Analysis, 2023

Table 3-25 FY 2023 Total Aircraft Operations Compared to FAA Adjusted TAF

	Fiscal Year	Passenger	Cargo	General Aviation	Military	2023 MP Forecast Operations	2022 TAF Operations*	Diff w/ TAF
Historical	2018	83,244	94,542	26,457	2,534	206,777	203,614	
	2019	89,820	83,796	27,812	3,025	204,453	200,522	
	2020	80,302	90,506	25,320	3,048	199,176	180,352	
	2021	62,654	105,422	30,815	3,599	202,490	214,766	
Baseline	2022	81,448	112,202	29,009	3,687	226,346	221,440	
Forecast	2023	82,195	115,344	29,431	3,600	230,570	219,338	5.1%
	2024	84,595	118,112	29,859	3,600	236,166	226,502	4.3%
	2025	86,359	120,710	30,294	3,600	240,963	232,988	3.4%
	2026	88,834	123,366	30,734	3,600	246,534	236,300	4.3%
	2027	90,646	125,833	31,181	3,600	251,260	239,642	4.8%
	2032	102,085	138,386	32,344	3,600	276,414	256,871	7.6%
	2037	112,289	151,297	33,678	3,600	300,864	275,246	9.3%
	2042	122,959	163,794	35,422	3,600	325,775	295,340	10.3%
CAGR								
2018 – 2022		-0.5%	4.4%	2.3%	9.8%	2.3%	2.1%	
2022 – 2032		2.3%	2.1%	1.1%	-0.2%	2.0%	1.5%	
2032 – 2042		1.9%	1.7%	0.9%	0.0%	1.7%	1.4%	
2022 – 2042		2.1%	1.9%	1.0%	-0.1%	1.8%	1.5%	

* FAA TAF adjusted to net out LHD operations
Source: RS&H Analysis, 2023

Figure 3-6 Total Aircraft Operations Compared to FAA TAF (ANC + LHD)



Source: US DOT T-100; AIAS; FAA TAF; RS&H Analysis, 2023

Table 3-26 FY 2023 Total Aircraft Operations

	Fiscal Year	Passenger	Cargo	General Aviation	Military	2023 MP Forecast Operations	2022 TAF Operations	Diff w/ TAF
Historical	2018	83,244	94,542	91,457	2,534	271,777	275,154	
	2019	89,820	83,796	97,832	3,025	274,473	270,975	
	2020	80,302	90,506	88,167	3,048	262,023	243,719	
	2021	62,654	105,422	100,927	3,599	272,602	282,587	
Baseline	2022	81,448	112,202	87,571	3,687	284,908	280,304	
Forecast	2023	82,195	115,344	88,845	3,600	289,984	292,450	-0.8%
	2024	84,595	118,112	90,137	3,600	296,444	302,002	-1.8%
	2025	86,359	120,710	91,449	3,600	302,118	310,651	-2.7%
	2026	88,834	123,366	92,779	3,600	308,578	315,067	-2.1%
	2027	90,646	125,833	94,129	3,600	314,208	319,522	-1.7%
	2032	102,085	138,386	97,637	3,600	341,707	342,495	-0.2%
	2037	112,289	151,297	101,666	3,600	368,852	366,995	0.5%
	2042	122,959	163,794	106,929	3,600	397,282	393,786	0.9%
CAGR								
2018 - 2022		-0.5%	4.4%	-1.1%	9.8%	1.2%	0.5%	
2022 - 2032		2.3%	2.1%	1.1%	-0.2%	1.8%	2.0%	
2032 - 2042		1.9%	1.7%	0.9%	0.0%	1.5%	1.4%	
2022 - 2042		2.1%	1.9%	1.0%	-0.1%	1.7%	1.7%	

Source: RS&H Analysis, 2023

3.9 Forecast Sensitivity Analysis

The assumptions used in developing the forecasts are likely to vary over the Forecast Period and the variations could be material. One way to explore the impact of these variations is to develop a forecast sensitivity analysis in which the baseline forecast is compared and evaluated against the growth patterns of alternative independent forecasts. The baseline forecast provides the basis for determining what additional facilities or policies will be required to manage capacity at ANC through FY 2042. ANC must be able to respond to a range of contingencies that could occur, considering political, economic, and technological changes. The recommended development program must be flexible enough to accommodate these contingencies. In that regard, a "high" and "low" forecast were added to the baseline or "most likely" scenario for the forecast developed for total enplaned passengers, total aircraft operations and total air cargo tonnage as presented earlier in this chapter. In addition, for total enplaned passengers and total aircraft operations, a FFY 2022 TAF line was added for further comparison purposes.

For the high case comparisons, a select group of forecasts as published by FAA in the Aerospace Forecast Fiscal Years 2023 – 2043 book published in May 2023 were selected. For the low case comparisons, RS&H analyzed numerous independent forecasts but decided to designate a low growth rate by identifying and quantifying an extreme possible outcome based on exogenous events such as a new pandemic or a severe global economic shock and assessing for consistency and plausibility. Two points that were considered included:

1. Time frame: the low is an average CAGR based on economic fluctuations throughout the Forecast Period; can a low growth rate be sustained for a 20-year period?
2. Internal consistency: do the economic conditions exist that could create a path to a low case throughout the Forecast Period and how plausible would this be?

Table 3-27 shows the forecast sensitivity analysis for the total enplaned passengers forecast with the most probable CAGR of 2.3 percent over the Forecast Period, compared to a high case with an CAGR of 2.9 percent and a low case with an CAGR of 1.3 percent. The high case growth rates are based on the FAA optimistic forecast of domestic enplanements.

Table 3-28 shows the forecast sensitivity analysis for the total aircraft operations forecast with the most probable CAGR of 1.8 percent over the Forecast Period, compared to a high case with an CAGR of 2.2 percent and a low case with an CAGR of 1.1 percent. The high case growth rates are based on the FAA optimistic forecast of domestic passenger departures.

Table 3-29 shows the forecast sensitivity analysis for the total air cargo tonnage forecast with the most probable CAGR of 2.8 percent over the Forecast Period, compared to a high case with an CAGR of 3.6 percent and a low case with an CAGR of 1.7 percent. The high case growth rates are based on the FAA forecast of international all-cargo carrier RTMs.

Table 3-27 Forecast Sensitivity Analysis – Total Enplaned Passengers

	Fiscal Year	MOST PROBABLE	HIGH	LOW
Historical	2018	2,741,683	2,741,683	2,741,683
	2019	2,824,465	2,824,465	2,824,465
	2020	2,197,794	2,197,794	2,197,794
	2021	1,452,011	1,452,011	1,452,011
Baseline	2022	2,564,262	2,564,262	2,564,262
Forecast	2023	2,743,253	2,633,497	2,595,033
	2024	2,823,348	2,704,601	2,626,174
	2025	2,882,217	2,777,626	2,657,688
	2026	2,964,812	2,852,622	2,689,580
	2027	3,025,294	2,929,642	2,721,855
	2032	3,367,638	3,437,457	2,923,803
	2037	3,704,260	3,965,648	3,103,492
	2042	4,056,254	4,574,999	3,294,224
CAGR				
2018 - 2022		-1.7%	-1.7%	-1.7%
2022 - 2032		2.8%	2.7%	1.2%
2032 - 2042		1.9%	2.9%	1.2%
2022 - 2042		2.3%	2.9%	1.3%

Source: RS&H Analysis, 2023

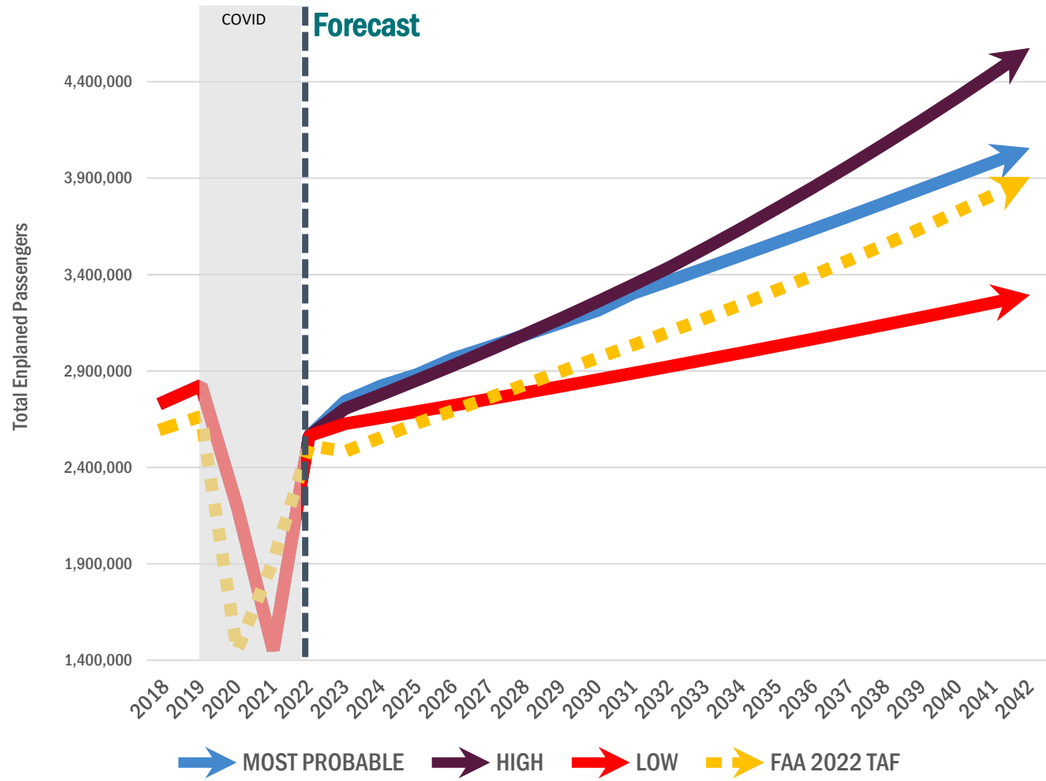


Table 3-28 Forecast Sensitivity Analysis – Total Aircraft Operations

	Fiscal Year	MOST PROBABLE	HIGH	LOW
Historical	2018	206,777	206,777	206,777
	2019	204,453	204,453	204,453
	2020	199,176	199,176	199,176
	2021	202,490	202,490	202,490
Baseline	2022	226,346	226,346	226,346
Forecast	2023	230,570	230,647	229,062
	2024	236,166	235,029	231,811
	2025	240,963	239,494	234,593
	2026	246,534	244,045	237,408
	2027	251,260	248,682	240,257
	2032	276,414	273,221	255,022
	2037	300,864	309,125	269,360
	2042	325,775	349,746	284,505
CAGR				
2018 - 2022		2.3%	2.3%	2.3%
2022 - 2032		2.0%	1.9%	1.2%
2032 - 2042		1.7%	2.5%	1.1%
2022 - 2042		1.8%	2.2%	1.1%

* FAA TAF adjusted to net out LHD operations
Source: RS&H Analysis, 2023

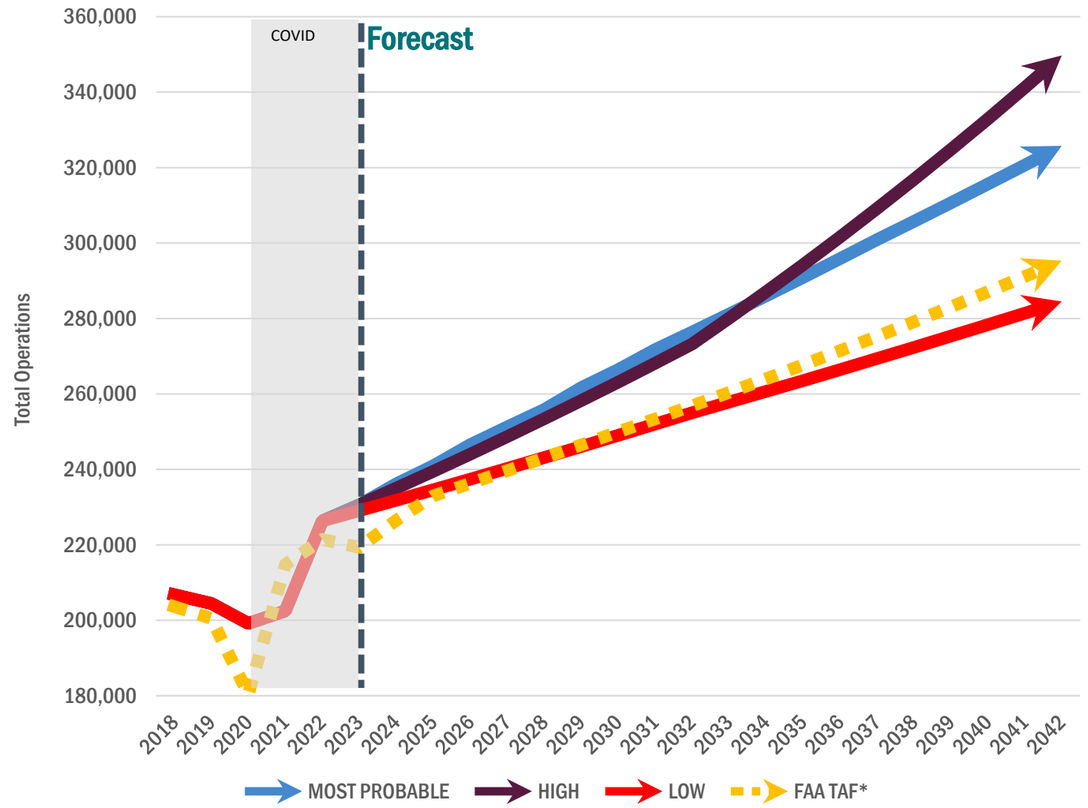


Table 3-29 Forecast Sensitivity Analysis – Total Air Cargo Tonnage

	Fiscal Year	MOST PROBABLE	HIGH	LOW
Historical	2018	2,799,411	2,799,411	2,799,411
	2019	2,763,066	2,763,066	2,763,066
	2020	2,834,409	2,834,409	2,834,409
	2021	3,543,576	3,543,576	3,543,576
Baseline	2022	3,588,628	3,588,628	3,588,628
Forecast	2023	3,707,566	3,728,585	3,660,401
	2024	3,828,941	3,873,999	3,733,609
	2025	3,954,637	4,025,085	3,808,281
	2026	4,084,651	4,182,064	3,884,447
	2027	4,219,217	4,345,164	3,962,135
	2032	4,877,193	5,261,189	4,374,518
	2037	5,531,576	6,218,514	4,712,598
	2042	6,184,227	7,350,034	5,076,806
CAGR				
2018 - 2022		6.4%	6.4%	6.4%
2022 - 2032		3.1%	3.9%	2.0%
2032 - 2042		2.4%	3.4%	1.5%
2022 - 2042		2.8%	3.6%	1.7%

Source: RS&H Analysis, 2023